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FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

AN INVESTIGATION INTO THE IMPACT OF LOGISTICS CLUSTER COORDINATION ON EFFECTIVE HUMANITARIAN AID DELIVERY. A CASE OF EL NINO RESPONSE INDUCED DISASTER

BY

DELIGHT MARWIZI

(B212759B)

**THIS DISSERTATION IS SUBMITTED TO THE DEPARTMENT OF
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SUPERVISED BY DR F. CHARI

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Dedication

This study is a dedication to my friends and family.

Abstract

This study investigates the impact of logistics cluster coordination on effective humanitarian aid delivery, using the El Niño response in Zimbabwe as a case study. The research addresses a pressing problem of inadequate coordination in large-scale disaster responses, which often hampers timely and efficient aid delivery. Guided by three objectives—(1) to establish the impact of logistics cluster coordination on humanitarian supply chain agility, (2) to ascertain its effect on effectiveness, and (3) to determine its role in efficiency—the study holds significance for improving disaster response strategies. The study targeted 103 individuals from humanitarian organizations, logistics clusters, and government agencies. The study was informed by the Supply Chain Resilience Model, Resource Optimization Model, and Collaborative Logistics Model. A descriptive survey design with a quantitative approach was employed. Data were collected using questionnaires and analyzed via STATA, using descriptive and inferential statistics. Findings revealed that coordination significantly enhances agility, effectiveness, and efficiency of humanitarian responses during climate-induced disasters like El Niño.

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List of Acronyms

BUSE	Bindura University of Science Education
FAO	Food and Agriculture Organization
FSIN	Food Security Information Network
IASC	Inter-Agency Standing Committee
ICPACIGAD	Climate Prediction and Applications Centre
OCHA	[United Nations] Office for the Coordination of Humanitarian Affairs
RIASCO	Regional Inter-Agency Standing Committee
STATA	Statistical Software for Data Science
UN	United Nations
USDA	United States Department of Agriculture
WASH	Water, Sanitation, and Hygiene
WFP	World Food Programme

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Humanitarian entities has a primary focus on dealing with emergency situations and humanitarian issues such as the supply of medical, water, sanitation and various services aimed to alleviate suffering in disaster affected areas. The priority of relief organizations is to assist countries and societies facing life threatening disasters. According to (Wassenhove, 2006) a disaster is described as a disruption that physically affects the system as whole and threatens its priorities and goals. There are sudden onset disasters like cyclone Idai that happened in Zimbabwe Mozambique and Malawi 2018 (Disaster Emergency Report 2019). It can be also be cyclical or seasonal, in this case, like the El Nino phenomenon which occurs every five to seven years when the water in the eastern tropical Pacific Ocean becomes unusually warm (Copenicus 2015).

1.1 Background of the study

The El Niño phenomenon occurs every three to seven years when the eastern tropical Pacific Ocean is abnormally warm. This creates a sequence of weather phenomena worldwide, some of which are devastating and others which have beneficial effects, depending on the geographical area. El Niño's effects are strongly felt on water resources, agriculture, and overall climatic conditions, with a tendency to increase severe weather events. The last large El Niño occurred in 1997/98, affecting various areas with extreme droughts and floods, and followed small to moderate ones in 2002/03, 2004/05, 2006/07, and 2009/10 (World Meteorological Organization, 2015). The previous El Niño season, which began in June 2023 and ended in February 2024, displayed more than moderate intensity, with far-reaching disruptions across different parts of the world, with significant socio-economic effects, including food insecurity, displacement, and destruction of infrastructure.

Globally, the United Nations, through its agencies, reported an emergency amid the disastrous implications of the 2023/24 El Niño event. The United Nations (2024) estimated that 40-50 million people in 16 nations were affected, where a large number suffered from acute shortages of food and water as well as health risks. The organization emphasized that the humanitarian impact of the phenomenon would be tremendous, threatening that the majority of nations would not be able to absorb and recover from the crisis. Therefore, the estimated cost of the response plan was expected to surpass \$3 billion. The scale of the disaster, combined with existing vulnerabilities in disaster-affected regions, has heightened concern about the efficacy of current humanitarian response systems and the ability of governments and humanitarian actors to coordinate relief interventions effectively in the aftermath of such widespread devastation.

El Niño in the Pacific and Asian regions caused extreme climatic conditions, including excessive heat, heavy rainfall, and catastrophic floods between January and April 2023, particularly in Pakistan and Afghanistan (FAO, 2023). Southern and central Asia had significantly higher temperatures than usual, while excessive rainfall caused widespread flooding (IRI, 2023; C3S, 2023). Food production was significantly affected by severe weather conditions, impacting agricultural production in many countries (USDA, 2023). Massive flooding also led to deteriorating water, sanitation, and hygiene (WASH) conditions, which increased the incidence of waterborne diseases. Destruction of over 4.4 million acres of agricultural land had devastating effects on the production of staple foods such as wheat and rice, leading to severe food shortages (FSIN, 2023). The cumulative effect of these conditions has been devastating, reaching millions of people, disrupting livelihoods, and putting pressure on already fragile economies that rely greatly on agriculture.

Humanitarian responses to prior large-scale catastrophes like the December 2004 Asian tsunami and the 2004/2005 Darfur crisis underscored fundamental issues with aid coverage and delivery in large-scale relief operations. In response to these issues, the cluster method was developed as a means of improving humanitarian response organization. The cluster system organizes humanitarian relief operations into pre-established sectors with designated leadership roles, whose intention is to render disaster response activities more efficient and predictable. Specifically, humanitarian clusters were established to improve five priority areas: having sufficient global capacity to respond to

current and future emergencies, establishing predictable leadership at the global and local levels, strengthening partnerships among UN agencies, NGOs, and local authorities, increasing accountability both for response and to beneficiaries, and optimizing field-level coordination and prioritization (OCHA, 2007). These groups have since become pivotal in responding to disasters, although the efficiency of these clusters will depend on the context and implementation.

In Africa, the 2023/24 El Niño event boosted existing humanitarian needs, primarily in food security, WASH, health, and protection. Below-normal rainfall and above-normal temperatures in major crop-producing highlands significantly reduced crop yields, leading to high food insecurity (ICPAC, 2023). In pastoralist and agro-pastoral regions of northeastern, southeastern, and southern Africa, dryness significantly lowered accessible pastureland, increasing livestock mortality rates and further reducing food availability (FEWS NET, 2023). As the food supplies ran out, market prices skyrocketed, making basic foods unaffordable for the vulnerable populations. The twin impact of climate disasters created a multi-dimensional humanitarian crisis in which millions required urgent assistance to access minimum requirements. Against this background, effective coordination of humanitarian aid, such as logistics cluster operations, has become even more important in minimizing the impact of climate-related catastrophes.

Southern Africa is already bearing the disastrous effects of El Niño, including extreme temperatures, erratic rainfall, and a mix of floods, droughts, and heatwaves that have significantly impacted agricultural yields and livelihoods (OCHA, 2024). The El Niño event of 2023 led to some of the most severe levels of food insecurity witnessed in the region in recent years. The dissolution of the October–March rain season over most Southern African countries further compounded existing vulnerabilities, leading to widespread food shortages, water scarcity, and heightened health risks (FAO, 2024; OCHA, 2024). Malawi, Zambia, and Zimbabwe were seriously impacted, prompting their governments to declare states of disaster amidst harsh drought incursions. The resulting crop losses and food shortages underlined the need for stronger humanitarian response mechanisms to address the mounting crisis and provide assistance to those most affected in a timely and effective manner (FAO, 2024; OCHA, 2024).

In Zimbabwe, the drought caused by El Niño had disastrous impacts on food security, water supply, and general economic stability. Over 80% of the nation experienced less

than normal rainfall from mid-November 2023 to February 2024, a time that usually forms the primary rainy season (ACAPS, 2024). January and February 2024 saw the lowest rainfall in four decades (The Guardian, 2024). Therefore, over 2.7 million people were food insecure in 2024 and required urgent humanitarian assistance (OCHA/RIASCO, 2024). The extensive losses of crops and subsequent rise in food prices merely compounded the crisis, adding further strain on already vulnerable households (EC, 2024; AGRA, 2024). Consequently, the Zimbabwe government declared a state of disaster, and its country's president called for \$2 billion of humanitarian aid to mitigate the impact of the crisis as well as support vulnerable groups.

The recurrence of the El Niño phenomenon every seven years, coupled with its far-reaching humanitarian consequences, underscores the necessity for enhanced preparedness and more efficient disaster response mechanisms. The Logistics Cluster, among the most vital coordination frameworks in humanitarians, is directly responsible for guaranteeing the efficient delivery of aid. The cluster system was officially institutionalized in 2005 as part of the Humanitarian Reform process, as recommended by the Humanitarian Response Review (Adinolfi et al., 2005). The primary objective of the cluster system is to streamline logistics and maximize the efficiency of humanitarian relief operations so that aid reaches the intended groups in a timely manner. In the context of increasing complexity of disaster relief operations, logistics cluster coordination consolidation is critical to enhancing overall efficiency in the provision of humanitarian aid, particularly for climate-induced crises such as El Niño.

Furthermore, the report findings of the Cyclone Idai response emphasized the importance of simplifying cluster logistics operations. The report advised that the Global Logistics Cluster employ its revised global strategic framework in order to provide clarity on its role in addressing diverse disaster scenarios like the sudden-onset natural disasters (Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Zimbabwe, 2020). Since previous disasters have not only exposed weaknesses in the coordination of logistics but have also highlighted potential areas through which responses could be improved, against such a background the present study aims to explore how coordination among logistics clusters can influence humanitarian aid delivery. By exploring the role of logistics clusters in El Niño response, this study aims to add to knowledge on how delivery of aid can be optimized, ending up improving disaster readiness and response efficacy. It

is against this background that this study sought to investigate the impact of logistics cluster coordination on effective humanitarian aid delivery in response to the El Niño phenomenon.

1.2 Statement of the Problem

There are clear demonstrated problems in providing sufficient humanitarian aid delivery coverage in large relief operations like the response to El Nino draught (Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Zimbabwe (2020). Complex and large scale emergencies requires effective and well-coordinated response. This ensures the delivery of aid to affected communities promptly and effectively to reduce worsening humanitarian situation (WFP 2024).

1.3 Purpose of the Study

The aim of the study is to aim to assess the impact of logistics cluster coordination on the agility, effectiveness and efficiency of humanitarian aid delivery. This will provide insights on how logistics cluster coordination optimizes humanitarian response in the context of ever recurring El Nino induced disasters in Zimbabwe.

1.4 Research Objectives

1. To assess the impact of logistics cluster coordination on the agility of humanitarian supply chains.
2. To ascertain the impact of logistics cluster coordination on the effectiveness of humanitarian response
3. To determine the impact of logistics cluster coordination on the efficiency of humanitarian aid response

1.5 Research Questions

1. To what extent does the coordination facilitated by the logistics cluster influence the agility of humanitarian supply chains?
2. How does a logistics cluster coordination enhance the overall effectiveness of humanitarian aid delivery?
3. How does logistics cluster coordination affect the efficiency of humanitarian aid response operations?

1.6 Significance of the Study

Logistics cluster coordination is crucial for effective, efficient, and timely humanitarian response, especially in large-scale disasters like El Niño events. This research demonstrates how leveraging this coordination can enhance resource efficiency, minimize duplication, and improve overall response coordination. Findings can inform policies and practices for organizations like OCHA and NGOs, ultimately strengthening disaster preparedness and positively impacting crisis-affected populations through improved logistics systems. Furthermore, the study enhances theoretical and empirical understanding of logistics cluster coordination in humanitarian aid, specifically during El Niño disasters. It tests and potentially refines existing theories in humanitarian logistics, supply chain resilience, and disaster management. Most importantly, this study is a testament of the research skills acquired by the student during the course of learning. It is therefore a mandatory requirement for the completion of studies.

1.7 Assumptions of the Study

The study has theoretical and practical implications in the communities and livelihoods of both people and livestock in the affected area. The researcher assumes that the response from the study sample reflects a true and fair view of the whole population. The researcher will also assume the whole research process, data collection methods and analysis will provide biasness to the research findings.

1.8 Delimitations of the Study

The study is concerned about the effectiveness of humanitarian cluster logistics in response to El Niño phenomenon. The research will not give a conclusive report or generalization of other disasters and will only touch on the facts and findings happened within Zimbabwe. The research was also done for academic reasons and to demonstrate the research skills of the student, therefore no new body of knowledge is expected in the outcome of this research.

1.9 Limitations of the study

The time period to complete this research was the most constraint to the quality of this research. However, the researcher tried to use the spare time as much as he can especially during the weekends. Every research whether professional or academic requires money.

This research was only funded on personal capacity as there were no organizations to fund it. Last but not least, finding recent literature between 2008 and now was also a big nightmare especially considering the two months' time frame.

1.10 Definition of Terms

Logistics Cluster

A coordination mechanism led by the World Food Programme to strengthen humanitarian logistics responses by facilitating collaboration, information sharing, and operational support among humanitarian organizations during emergencies (Tomasini & Van Wassenhove, 2009).

Humanitarian Aid

Assistance provided to alleviate human suffering during crises, including natural disasters and conflicts, aimed at saving lives, maintaining human dignity, and promoting recovery (Barnett & Weiss, 2008).

El Niño

A periodic climatic phenomenon characterized by the warming of central and eastern Pacific Ocean waters, disrupting global weather patterns and often causing droughts and floods (Trenberth, 1997).

1.11 Summary

This chapter has provided a comprehensive introduction to the study by presenting the background and context of the 2023/24 El Niño phenomenon and its effects on humanitarian conditions, particularly in Zimbabwe. It has outlined the research problem, which centers on inefficiencies in humanitarian aid delivery during disasters, and justified the need to examine the role of Logistics Cluster coordination in improving aid agility, effectiveness, and efficiency. The chapter has also clearly stated the study's objectives, research questions, and hypotheses, alongside its significance to stakeholders such as policymakers, humanitarian agencies, and disaster management practitioners. Additionally, it has also provided an overview of the assumptions, scope and boundaries of research focus. Overall, this chapter sets the foundation for investigating effective coordination in humanitarian logistics during climate-induced emergencies.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter provides a critical literature review on humanitarian supply, in particular within the provision of efficient humanitarian aid within the framework of logistics cluster coordination. The chapter evaluates multiple arguments and controversies on the topic, with a primary emphasis on how humanitarian supply systems have evolved in global, regional, and local contexts. It discusses and analyzes convergent views and trends that affect humanitarian supply rhetoric and emphasizes outstanding themes underpinning humanitarian logistics. Notably, this chapter attempts to reveal knowledge gaps not covered by available literature, which this study aims to challenge. This review also aims to investigate how earlier research efforts—mainly from beyond the African continent—have interpreted humanitarian supply, and how best this research can critically react and advance the field, specifically through the El Niño response and logistics cluster dynamics.

2.1 Definition of Terms

The section will review definition of the following key terms.

2.1.1 Humanitarian Supply Chain

Humanitarian supply chain is generally defined as a key mechanism for ensuring timely and effective delivery of relief items during crises (Katsaliaki et al., 2021; Queiroz et al., 2020). Authors claim that effectiveness is described as being resilient to disruptions, agile in response, and facile integration of operational activities. Others argue that humanitarian supply chains are especially situated in volatile environments, which call for alternative approaches compared to commercial supply chains (Modgil et al., 2020; Baharmand et al., 2022). Academic opinions, however, vary on the optimal paths to resilience. While some advocate the structural realignments required for building redundancy and flexibility (Katsaliaki et al., 2021), others point to the need for optimization models that are based

on real-time data and local contexts (Baharmand et al., 2022). Such bifurcation means that although generalized paradigms of resilience are very advanced, context-sensitive and adaptive frameworks suited to volatile and uncertain crisis environments receive no attention.

2.1.2 Humanitarian Cluster Coordination

The humanitarian cluster coordination is a mechanism that involves a group of humanitarian organizations (UN agencies, NGOs etc) that organizes itself to coordinate the humanitarian efforts during disaster response. The approach aims to mobilize and optimize the use of scarce resources in a humanitarian response (Grange et al., 2020; Jahre & Jensen, 2020; IASC, 2021). The argument for clustering is based on the increase in capacity and efficiency through information sharing and reducing duplication of efforts. But this shared assumption is tainted by an over-mechanicalized conception of coordination, treating it as a technical fix in and of itself, rather than as a process within complex humanitarian contexts. Scholars like Steets et al. (2019) and OCHA (2018) hint at this failing but do not adequately critique it. What these positions lack is that coordination structures, as beneficial in theory as they are, often clash with the politicized and dynamic contexts in which they operate. There is no critical eye to be found outside of administrative effectiveness that looks hard at how power disparities and bottom-up realities reconfigure coordination practices.

Another assumption in the literature is that cluster coordination leads to clear role division and improved accountability among humanitarian actors (Jahre & Jensen, 2020; IASC, 2020). In presenting such an argument, though one theoretically logical, there is a simplistic hope that formal structure automatically translates into working practice. Such a perspective ignores the messiness of real-world humanitarian responses, where informal networks and ad-hoc partnerships frequently bypass formal coordination channels.

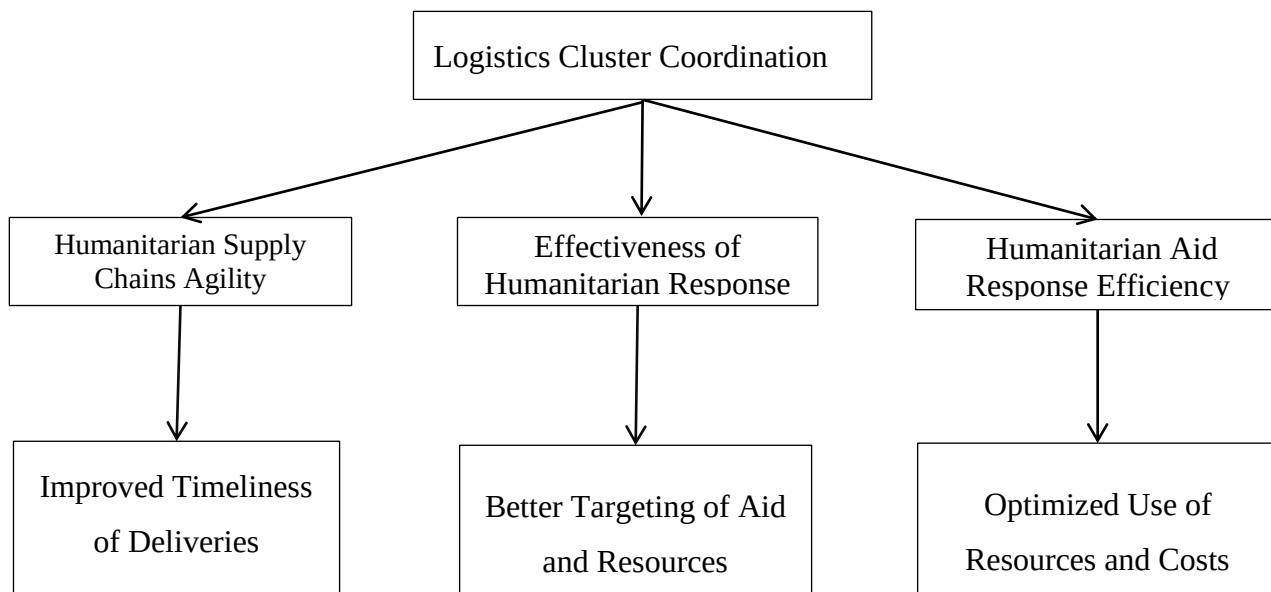
2.1.3 Humanitarian Logistics Cluster

Humanitarian logistics cluster is a group or community of humanitarian actors collaborating to overcome logistics challenges during disaster response (ISAC 2023). The aim is to improve the overall humanitarian logistics response. The cluster is led by World Food Program which was designated by the Inter-Agency Standing Committee (ISAC) to be the Global Cluster Lead Agency. In this capacity, the cluster lead agency facilitate the

activities of the cluster at global and local level. The cluster lead also acts as a provider of last resort for common logistics resources. Scholars such as Jahre and Jensen (2020) posited that logistics clusters in humanitarian response eliminates redundancy and optimizes key logistics resources. Majewski et al (2020) furthered that logistic clusters provide an organizational platform that mitigates fragmentation to ensure efficacy and promptness of humanitarian relief. Logistics clusters are key to collaboration and alignment of operations in humanitarian response.

However, some argued against humanitarian logistics clusters can create bureaucratic environment and eventually lose reality on the ground (Steets et al.2019). Grange et al. (2020) validate this critic noting that clusters may result in tension between field-level flexibility and centralized control.

Figure 1: Conceptual Framework of Humanitarian Coordination



Source: Researcher (2025)

The conceptual framework designed in this study illustrates the central role of logistics cluster coordination as a pivotal driver influencing the agility, effectiveness, and efficiency of humanitarian aid delivery, particularly in response to climate-induced disasters such as the El Niño phenomenon. Positioned as the independent variable, logistics cluster coordination encompasses strategic collaboration, information sharing, and resource pooling among humanitarian actors, which collectively enhance the

responsiveness of emergency operations. This coordination is hypothesized to directly influence three interrelated dimensions of aid delivery: agility, by improving the timeliness of supply chain responses; effectiveness, by ensuring better targeting and allocation of aid to affected populations; and efficiency, by optimizing resource utilization and reducing duplication in operations. These three dependent variables highlighted in the conceptual framework are synergistic. The improvements in one of them often reinforce the others leading to more robust humanitarian logistics system. The conceptual framework provides structured lens through which the study explores how coordinated logistics efforts can significantly enhance optimized disaster response.

2.2 Theories underpinning the study

The following three theories namely Supply Chain resilience Model, Resource Optimization Model and Collaborative Logistics Model have been chosen to bolster the study.

2.2.1 Supply Chain Resilience Model

The model focuses on the strength of humanitarian logistics systems to adapt and bounce back in case of interruptions (Katsaliaki et al., 2021). This model emphasizes essential features of supply chain systems namely flexibility, responsiveness, and efficiency as key in humanitarian response. Despite the model good insights that can be drawn from the model, critics argue that it falls short of giving sufficient weight to the organizational and coordination problems at stake in humanitarian settings.

2.2.2 Resource Optimization Model

According to Baharmand et al. (2022) Resource optimization model aims to minimize cost, time, and resource wastage in relief operations. The model fits well into the logistics cluster approach as one of the main aim of cluster has been always to optimize the scarce resources. While the Resource Optimization Model is beneficial to humanitarian response, the application in real-life situations is often hindered by the unpredictable nature of humanitarian disasters. The model has limited adaptability in in a dynamic environment (Baharmand 2022).

2.2.3 Collaborative Logistics Model

The Collaborative Logistics Model that Nunes and Pereira (2021) advocate for better collaboration and coordination across all stakeholders involved in humanitarian response. It aims to create a coordinated approach to optimize resource utilization and reduce duplication of effort. While Collaborative Logistics Model can significantly improve response operations, its implementation is normally plagued by political, organizational, and logistical issues. The success is also hinged on the desire of the organizations to collaborate and share information something which is not always possible.

2.3 Logistics Cluster Coordination and Humanitarian Supply Chain Agility

Humanitarian supply chains, as a capability for clustering coordination under the umbrella of logistics, are in all but exceptional instances idealized for realizing agility in disaster responses. Writers such as Scholten, Sharkey Scott, and Fynes (2019) establish that agility forms the central demand of flexibility that prevails under disasters, especially for unexpected catastrophes such as those arising from El Nino. This argument is supplemented by Dubey and Gunasekaran (2018), who emphasize agility as being central to avoiding delays and rapid responsiveness to sudden change. However, this argument underestimates the problem at stake. While vital, agility is impossible without decent infrastructure and common cause. The issue is less about responding fast but in coordination effectively among diverse players with diverse standards of operation and priorities. To that degree, coordination between clusters of logistics is called upon because it brings together stakeholders who share the objective of swift, concerted action—though its success is by no means assured.

Agility also plays a key role in sustaining supply chain effectiveness during disruptions. Scholten et al (2019) explain that agile supply chains play an important role in addressing non-routine events, such as those caused by El Nino. In other words, agility in supply chains improves supply chain resilience. However, the relationship between resilience and agility is not automatic. Resilience actually connotes the capability to bounce back after disruption, whereas agility focuses on responding speedily to novel situations (Dubey et al 2020). The two concepts are complementary but tend to give opposing mandates.

Additionally, flexibility, as proposed by Dubey et al. (2021), is key to activating both resilience and agility in humanitarian supply chains. This ability to swiftly respond to unprecedented situations is imperative in complex emergencies. However, this capability

can be hampered by bureaucratic and rigid organizational structures associated with large humanitarian agencies. Flexibility requires practical implementation and therefore organizational structural adjustments are necessary to ensure feasibility. Without such flexibility, the capabilities of the logistics cluster are severely compromised.

Humanitarian Logistics cluster coordination in real-world scenarios usually expose enormous gaps in theory and practice. Altay and Labonte (2020) posited that information management and exchange are key especially when there are multiple agencies involved. Thus, the logistics cluster has created an Information Management Office (IMO) within its structures (ISAC 2020). The inclusion of an IMO in logistics clusters is designed to meet tackle these challenges but is often undermined by lack of standardized information systems, data-sharing protocols, and real-time data integration. The gap leads to insufficient technical and organizational capabilities to enable seamless coordination. This standardization is difficult due to difference in cultural, political, and logistical contexts (Dubey et al 2021). Thus, while cluster coordination facilitates humanitarian supply chain agility, its effectiveness relies on overcoming these institutional and technological hurdles.

2.5 Logistics Cluster Coordination on Humanitarian Supply Chain Efficiency

The impact of humanitarian supply chain efficiency by logistics cluster coordination has been presented by different scholars in differing perspectives. Jahre and Jensen (2020) believe that logistics clusters is a catalyst in achieving efficiency through the simplification of coordination and resource-sharing among agencies. HSC efficiency is determined by cost, time and accuracy of aid delivery. Optimized efficiencies ensure that maximum and scarce resources reach the ground quickly. Altay and Green III (2006) indicated that efficiency is mainly determined by levels and quality of planning and availability of localized information to the logistics team. Similarly, Beamon and Balcik (2008) combined delivery speed, delivery cost and order fulfilment to create measures of efficiency.

However, Steets et al (2019), who put forward that although coordination is essential, it does not necessarily lead to efficiency. Instead, they argue effort is needed to effectively manage and coordinate diverse stakeholders which is usually the missing piece in large-scale disaster responses. This is imperative to disasters such as El Nino, where the complexity and the urgency of the situation necessitate a high level of coordination to prevent logistical inefficiencies.

Other fundamental arguments within the literature revolves around the interaction between centralization of coordination activities and efficiency. While centralized coordination brings uniformity and optimize resource utilization, it discourages local adaptability which is key in emergency situation (Jahre and Jensen 2020). OCHA (2018) addressed this by putting forward that centralization enhances adaptation and responsiveness while avoiding fragmentation and operational inefficiency.

Stoddard et al. (2019) was also concerned by the potential inefficiencies that may arise from coordination overload in logistics clusters. The premise, as argued by these researchers is that coordination is difficult when mobilizing organizations with diverse functional mandates. This scenario leads to confusion, replication, and delaying decision-making processes. Campbell and Clarke (2018) supported that coordination is cumbersome and will result in operational inefficiencies when the roles and responsibilities are unclear. Therefore, an understanding of how coordination frameworks add or detract from logistical efficiency requires a broader approach, one that balanced the need for coordination against the reality of efficient resource use.

Application of technology to enhance the efficiency of coordination in logistics clusters has also been the subject of considerable debate. According to IASC (2021), information exchange technologies form the core of effective disaster response coordination. However, the majority of humanitarian organizations still utilize outdated or fragmented systems of communication and information exchange, which breeds decision-making and resource allocation inefficiencies. Steets et al. (2019) suggest that improvements in information management technology, such as the development of common data platforms, would be capable of increasing humanitarian logistics efficiency significantly by creating greater visibility, transparency, and real-time decision-making. But, as Grange et al. (2020) note, absence of standardization in data-sharing processes and varying technological capacities among agencies complicate effective implementation.

Furthermore, the efficiency of logistics clusters coordination often affected by scalability issues. As the magnitude of such is increasingly established, the volume of aid requirements can easily overwhelm established supply chains. Although the logistics cluster coordination was established to deal with such challenges, it is overwhelmed in most cases. IASC (2020) highlights that, in theory, the cluster approach can scale up operations, but in practice, is limited by inadequate infrastructure, human and material

resources. These constraints are usually experienced in the context of large-scale disasters. Therefore, although logistics cluster coordination is designed to streamline humanitarian operations, the realities posed by unpredictable natural disasters can prove to be overwhelming.

Some scholars flagged the inherent complexity of disaster response systems and its implications for logistical efficiency. Grange et al. (2020) think that complexities such as involvement of a large number of responders, various logistical systems, and varied geographical contexts cripples coordination efforts. This is added to by the uncertainty of natural catastrophes like El Nino, where supply chains are often frustrated by evolving environmental, social and political factors. The ability to maintain greater level of efficiency such complex environment is an imperative task for humanitarian logistics.

2.6 Empirical Studies

The section will look at six case studies related to the current research as empirical literature. This evidence of the past research aims to provide the basis of discussion to the findings of this research.

Case study 1: Coordination of humanitarian logistics through logistics clusters (Jahre, M., Jensen, L-M. 2010)

The research was conducted to provide a greater understanding of the potential of the logistics cluster idea in humanitarian supply chain coordination. The researchers conducted a thorough comparison on current literature to develop a theoretical framework with propositions on the trade-offs between different types of coordination. It focused on the conceptual level rather than on specific means of coordination. A systematic literature review on the related past researches was employed as research methodology. The research findings were that there is a tradeoff between different types of coordination, with horizontal coordination inside cluster drawing attention away from important issues of the supply chain as well as the need to coordinate among the cluster.

Case Study 2: Collaboration in Humanitarian Operations in the Context of the COVID-19 Pandemic. In *Global Logistics and Supply Chain Strategies in the 2020s - Vital skills for the Next Generation* (Fard et al 2022).

This research explores cooperation in humanitarian work with a focus on logistics in the COVID-19 pandemic. Authored in the context of global humanitarian responses, the authors aim to highlight the importance of cooperation among humanitarian organizations (HOs) to foster operational efficiency. Adopting a qualitative approach, the study surveys literature and case studies with a focus on the humanitarian SCOR model. The study establishes that successful collaboration has the impact of improving operational efficiency and utilization of resources, particularly in cases of crisis. The authors conclude that the pandemic has fostered innovative collaborative strategies, which can act as a blueprint for future response. However, still lacking is research on how some practices of collaboration can be institutionalized to be implemented in all humanitarian contexts, particularly in cases of complex emergencies such as those caused by El Niño.

Case study 3: Issues in Humanitarian Cluster Coordination: Miscommunication, Top-Down Hierarchy, and No Economic Benefit (Andersson, 2022).

This thesis criticizes the issue of the OCHA coordination cluster system, particularly in the Haiti earthquake response during 2010. The investigation was conducted in Uppsala University and aimed to identify some of the foremost issues such as miscommunication, top-down organizational hierarchy, and lack of monetary benefits for NGOs. Adopting a mixed-methods approach, the study covers a literature review and semi-structured interviews of humanitarian workers. Main findings identify that attempts at coordination often fail due to structural inefficiencies and strategic versus operating context mismatch between OCHA's strategy and the operating context of local NGOs. The conclusion stresses the need for more representative coordination strategies that can match the diverse needs of humanitarian actors. One of the main gaps in research is the need for further investigation into how such coordination failures especially impact logistics and service provision in disaster response environments.

Case study 4: Agility in humanitarian supply chain: an organizational information processing perspective and relational view (Dubey, R., Bryde, D. J., Foropon, C., Tiwari, M., Dwivedi, Y., & Schiffeling, S. 2020).

This study delves into how information alignment interacts with cooperation, as well as supply chain agility in humanitarian context, particularly so in the light of artificial intelligence-supported big data analytics power. The study involved conducting research across 24 countries to ascertain to what degree all these factors have an impact on the performance of humanitarian supply chains. The researchers employed a quantitative research methodology and analyzed data collected from six hundred and thirteen personnel across various humanitarian agencies. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed in the study to derive the hypotheses proposed. The results resoundingly indicated that collaboration and information alignment have a positive impact on supply chain agility. Successful coordination is found to be key in disaster response.

Case study 5: Coordination at the 10-year mark of the JHLSCM (Jahre & Jensen 2021).

Jahre and Jensen (2021) analyzed the evolution of logistics coordination in humanitarian aid over a period of ten years. The study was conducted in Sweden and Norway. The research aim was to assess how research has mirrored practical evolution in logistics coordination. The authors conduct literature review and empirical data analysis to study this dynamic. The authors conclude that while coordination is now a recognized topic, much research still focuses on response rather than preparedness and instead implies that there is a gap in local-level preparedness research. The authors conclude that there is a gap that requires additional research, particularly on inter-cluster coordination and localized responses in humanitarian logistics.

2.7 Research Gap Analysis

The existing literature has significantly contributed to understanding humanitarian supply chain management and logistics cluster coordination. However, there remain lacunae in the understanding of the real realities of logistics cluster coordination, particularly in the case of El Niño-induced disasters. While theoretical models predict systematic

coordination, the empirical realities of power dynamics, local actor marginalization, and bureaucratic inefficiencies are under-theorized. This study seeks to close these gaps by critically examining logistics cluster coordination in El Niño response operations, identifying bottlenecks, and formulating adaptive solutions promoting efficiency as well as inclusiveness in the provision of humanitarian assistance.

2.8 Chapter Summary

This chapter has reviewed literature on humanitarian supply chains and logistics cluster coordination with consideration of key scholarly rationales on efficiency, resilience, and agility in the provision of humanitarian assistance. It addressed the contribution of digital technologies to transformation while highlighting impediments to implementation. The discussion also alluded to the strengths and limitations of coordination frameworks with reference to conflicts between centralized control and decentralized flexibility. Furthermore, the chapter also mapped out the existing gaps in literature, namely in the practical aspects of cluster coordination in El Niño responses, marginalization of local stakeholders, and integration of digital tools. These gaps justify the need for further research that this study attempts to address through the provision of a holistic explanation of logistics cluster coordination and its impact on effective humanitarian aid distribution.

CHAPTER III

RESEARCH METHODOLOGY

3.0 Introduction

The research will outline the methodology applied in detail. This entails the chapter will have a discussion of research design, paradigm, target population and sampling procedures.

3.1 Research Paradigm

This study adopts the positivist research paradigm, which is rooted in the belief that reality is objective, measurable, and independent of human perception. Positivism enables researchers to develop hypotheses and test those using empirical data. This makes this paradigm highly suitable that quantifies relationships among variables (Creswell, 2014). In this study, the variables such as coordination, effectiveness and efficiency require systematic measurement, statistical analysis, and interpretation. The use of structured questionnaire surveys reflects the positivist preference and emphasis to standardized data collection (Saunders, Lewis & Thornhill, 2019). Furthermore, this paradigm supports deductive reasoning, allowing researchers to test theoretical expectations against field-based evidence (Bryman, 2016). In humanitarian logistics, where operational effectiveness must often be assessed under resource constraints and rapidly changing environments, positivism ensures that conclusions are drawn from observable facts rather than subjective interpretations.

3.2 Research Design

The study is mainly a descriptive survey in form of a case study. The approach will make use of quantitative data which will be collected through questionnaire surveys. The design goes along with the researcher's aim of collecting individual opinions and knowledge pertaining to the effectiveness of inventory management practices in the responses to field operational requirements. The design was chosen mainly because it describes a situation or condition at hand with the aim being to understand the specific situation to an identified population. Descriptive research design also provides an excellent opportunity to examine

aspects of people's opinions abilities behaviors knowledge and beliefs of individuals and group situation (Kothari 2005).

3.4 Target Population

Target population is defined as the total number of all objects, subjects or individuals that conform to a group or a set of specific requirements of the study (Polit and Hungler, 1999). For this research, the target population comprised all logistics-unit personnel from various humanitarian organizations who were actively engaged in the El Nino response under the national Logistics Cluster. A total of 55 respondents were identified from eight humanitarian aid agencies including the government of Zimbabwe's Department of Civil Protection. The table below present the humanitarian agencies where the respondents where target population was drawn from with the numbers from each organization.

Table 3.1

Name of humanitarian agency	Role in Logistics Cluster	Target population
World Food Program	Cluster Lead Agency	9
World Vision Zimbabwe	Partner	7
Department of Civil Protection, government of Zimbabwe	Stakeholder	7
Care International Zimbabwe	Partner	6
UNICEF	Partner	6
FAO	Partner	5
Goal Zimbabwe	Partner	7
PLAN International	Partner	8
Total Target Population		55

Source: Primary data

3.5 Sample and Sampling Procedure

In this study, the entire population was used. This is mainly because the target population was small and well defined. This also further eliminates sampling bias (Cresswell 2014). The target population was reached through the use of emails and WhatsApp messages.

3.6 Research Instruments

The questionnaire surveys and STATA software package were the main instruments for this research for data collection and analysis respectively. Surveys were emailed to the respondents and were given enough time to email back their responses. The questionnaire surveys were chosen as they are more applicable on collecting quantitative data in a non-experimental descriptive design that seeks to establish reality (Kothari2005). They can also capture large number of despondence and are free to administer as they do not require your physical presents. They also gave desired flexibility to the respondents to work on the survey on their own free time. Stata was used as it provides solution for statistics science desires, retrieves and manipulates information, visualizes information version, and generates or produces beneficial reviews.

3.7 Data Collection Procedures

The researcher begun by emailing all the participants to sensitize the meaning of the study and to prepare them for survey distribution. Open-ended and closed-ended questionnaires were emailed directly to the target population and maximum of two weeks was given to them to thoroughly go through the questionnaire and give their responses without compromising their day to day work duties. Surveys were made short but enough to collect all the required information.

3.8 Data Presentation and Analysis

The analysis of the data employed was done through application of both descriptive and inferential statistics whereby percentages, measures of standard deviation and mean were used to determine the hypothesis of the study. Tables and graphs and charts were put to use to present the impact of logistics cluster during the response to El Nino induced disaster. Stata computer software was used to analyze quantitative data. A couple of regression version consisting of numerous variables blended together to healthy the analytical version become used to determine the relationship between the independent and dependent variables inside the following layout:

Linear model 1

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where Y= Agility

a= Regression constant

e= Extraneous or error terms

X1= Collaboration

X2= Information sharing

X3= Needs assessment

Linear Model 2

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where Y= Efficiency

a= Regression constant

e= Extraneous or error terms

X1= Collaboration

X2= Information sharing

X3= Needs assessment

Linear Model 3

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where Y= Effectiveness

a= Regression constant

e= Extraneous or error terms

X1= Collaboration

X2= Information sharing

X3= Needs assessment

Justification of Variables

Coordination among Humanitarian Actors

The effectiveness of coordination among humanitarian actors—such as NGOs, government agencies, and international organizations—is a cornerstone of successful humanitarian aid delivery. During disasters like El Niño, multiple actors operate simultaneously, often with overlapping mandates. Without structured coordination, efforts may be duplicated or misaligned, leading to inefficiencies and resource wastage. Logistics clusters serve as coordination platforms, enabling the alignment of operational priorities,

joint planning, and information sharing. This variable is vital as it directly determines the degree to which logistics operations are streamlined. Effective coordination ensures better utilization of scarce resources, timely deliveries and saves lives.

Agility in humanitarian supply chain

Agility refers to the ability of a HSC to rapidly sense, respond, and adapt to evolving needs and dynamic conditions during emergencies. In the context of El Niño-induced disasters, conditions on the ground such as poor road network and fluctuating demand makes the situation more unpredictable hence agility in supply chain is essential. This variable is critical because it reflects how coordination within logistics clusters enables flexible decision-making. It is also one of the key aims of the Logistics Cluster (ISAC 2021).

Efficiency in humanitarian supply chain

Efficient resource allocation is an essential variable in assessing humanitarian logistics performance, especially in disaster contexts such as El Niño-induced emergencies. Proper coordination can significantly reduce logistical costs and ensure that critical supplies are directed to the most severely affected areas. Through coordinated cluster mechanisms, actors can harmonize their efforts, pool resources, and prevent unnecessary duplication. This variable captures how well logistics clusters facilitate fair and evidence-based resource distribution among stakeholders. When allocation is efficient, more people can be reached with fewer inputs, improving both equity and impact. Thus, measuring this variable helps to understand the operational benefits that result from effective logistics cluster coordination.

Effectiveness in humanitarian supply chain

Effectiveness gauges the degree to which the humanitarian supply chain delivers the right aid, in the right quantities, to the right beneficiaries at the right time. Unlike efficiency—which focuses on cost and resource utilization—or agility—which emphasizes speed and flexibility—effectiveness centers on outcome quality and relevance. In a clustered logistics environment, effectiveness depends on accurate needs assessments, targeted distribution plans, and robust feedback loops. When cluster partners coordinate their information management, jointly validate beneficiary lists, and monitor post-distribution outcomes, they ensure that relief items match actual needs and reach the most vulnerable populations. Evaluating this variable highlights how well cluster coordination aligns operational activities with humanitarian objectives, minimizes wastage of perishable goods, and maximizes the impact of finite resources in crisis settings.

3.9 Validity and reliability issues

As Guba (1994) noted the positivist research paradigm is regarded of great quality if internal validity, external validity, reliability and objectivity could be achieved. The research must prove is the independent variable only that has an effect on dependent variable to consider the study to have internal validity. If multiple researchers do conduct a particular study in different times, places and context and arrive at the same results, then the research has reliability. If the researcher studies a phenomenon without contaminating or influencing the apprehension, then the study is considered to be objective.

3.9.1 Reliability

Reliability refers to the extent to which results are consistent over time (Saunders 2009). There exist threats to the reliability of an instrument during research and these are summarized by Robson (2002) as participant bias, observer bias, and participant error. Almost every study that involves peoples responses is subject to participant bias and participant error and to minimize these, efforts are made to ensure that the quality of information that was to be gathered would not be affected by the incompleteness, language, structure, length or any of the attributes of the questionnaire. The questions were formulated to relate to the objectives of the study. The Cronbach's alpha was used to measure internal consistency of the research instrument which are reported in chapter 4. Almost all of them were in the acceptable range.

3.9.2 Validity

According to Bhattacharjee (2012), validity describes to the ability of a measure to represent the underlying construct which intended to measure. According to saunders et al (2009) there exist three types of validity which are internal validity, construct validity and face validity. Dimensions of all constructs were also analyzed and factored to assess their construct validity. This is indicated in full in chapter 4. Some questions had to be rephrased after the validity tests showed that the questions were not measuring what was intended. Regression analysis was also used for predictive validity. Validity was also ensured by giving the questionnaire to the supervisor for assessment. This two stage verification process enhanced the face validity of the measure.

3.10 Ethical considerations

Ethics are explained by Fouka and Mantzourou (2017) as the guiding norms or requirements for conduct that distinguish between proper and wrong. It's far worthwhile to word that all contributors on this studies did so on a voluntary foundation. No incentives were exceeded out which would possibly has ended in a few persuasion. All respondents' proper to privateness was maintained and no names and identity were requested for in all the manner. Complete consent of members turned into obtained earlier than the survey. The facts accrued remained private as in step with organizations requirements. The researcher additionally maintained the very best stage of objectivity all through the research. The researcher additionally ensured that other researchers finding have been stated. The researcher additionally avoided express defamatory and offensive languages at some point of the structuring of the questionnaire and write-up of this thesis in a bid to remain moral throughout the take a look at.

3.11 Summary

This chapter has outlined the methodological framework guiding the study, detailing the research design, target population, sampling techniques, data collection instruments, and analysis procedures. It adopted a descriptive survey approach supported by quantitative methods, utilizing purposive sampling to select 55 relevant participants from key stakeholder groups. Data was collected through questionnaires and analyzed using STATA software with both descriptive and inferential statistical tools. The chapter also addressed issues of validity and reliability, ensuring internal consistency and construct accuracy, while ethical standards such as informed consent, privacy, and academic integrity were strictly maintained.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

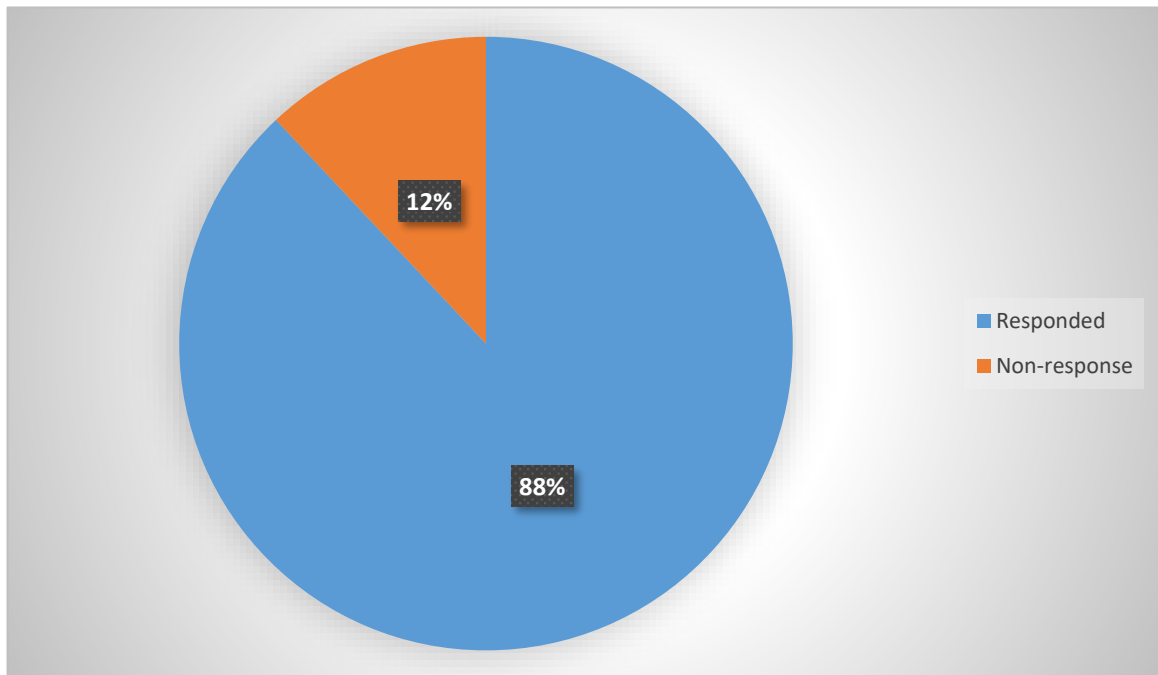
4.1 Introduction

This chapter presents, analyses, and discusses the results from this study. It presents the questionnaire survey response rate, participants' work experience and statistical results related to the research questions.

4.2 Response Rate

This section presents the response rate of the study

Figure 4.1: Response rate



The study achieved a response rate of 88%, as 88% of sampled respondents successfully completed and returned the questionnaires. This high rate of participation was supplemented by contributions from interviewees, making the dataset both broad and credible. Only 12% of respondents did not provide usable responses. The study considered the response rate sufficient for drawing reliable conclusions, as rates above 50% are typically regarded as acceptable for generalization, in line with Creswell (2019). The strong response rate underscored participant engagement and the relevance of the research topic to the target population.

4.3 Work experience in humanitarian sector

Figure 4.5: Distribution of participants by work experience

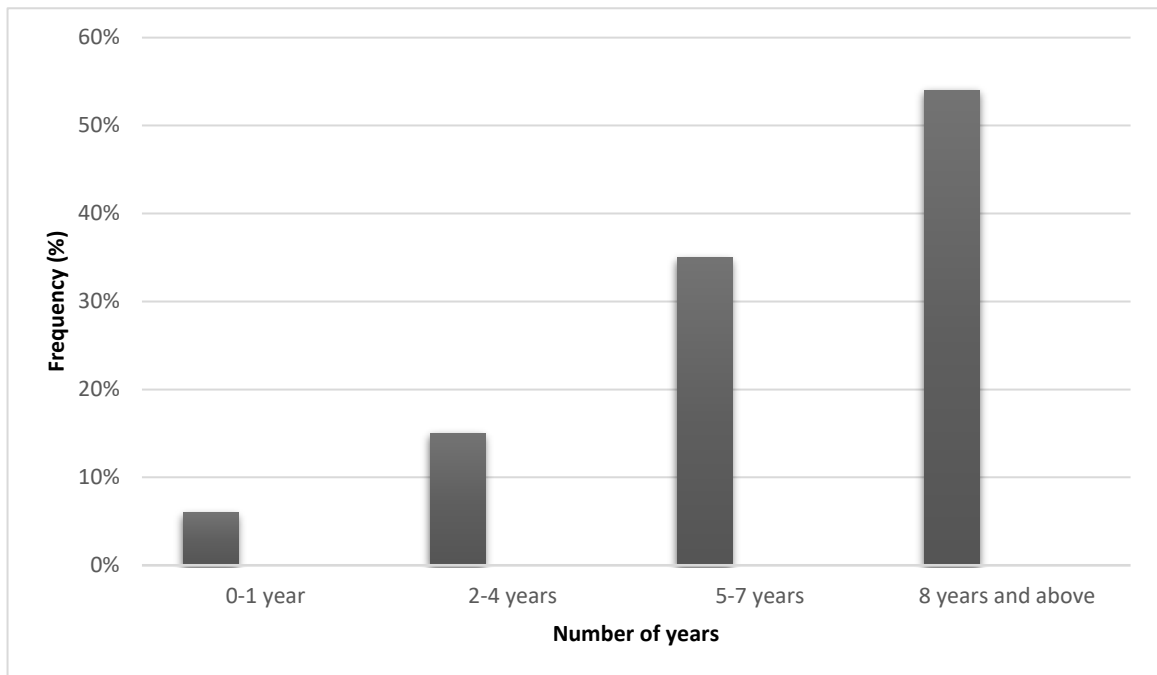


Figure 4.5 illustrated a diverse range of experience levels, with a significant number of respondents having considerable to significant experience in dealing with humanitarian supply chains. This range enabled the study to capitalize capturing insights from seasoned HSC personnel.

4.4 Respondent's educational qualifications

Figure 4.5 presents a diverse range of levels of relevant education possessed by the respondents. These statistics are important to establish the theoretical knowledge of the respondents to the subject of the research. The results shows that more than 45 percent of the respondents had a degree qualification and above with the least qualified having certificates and diplomas.

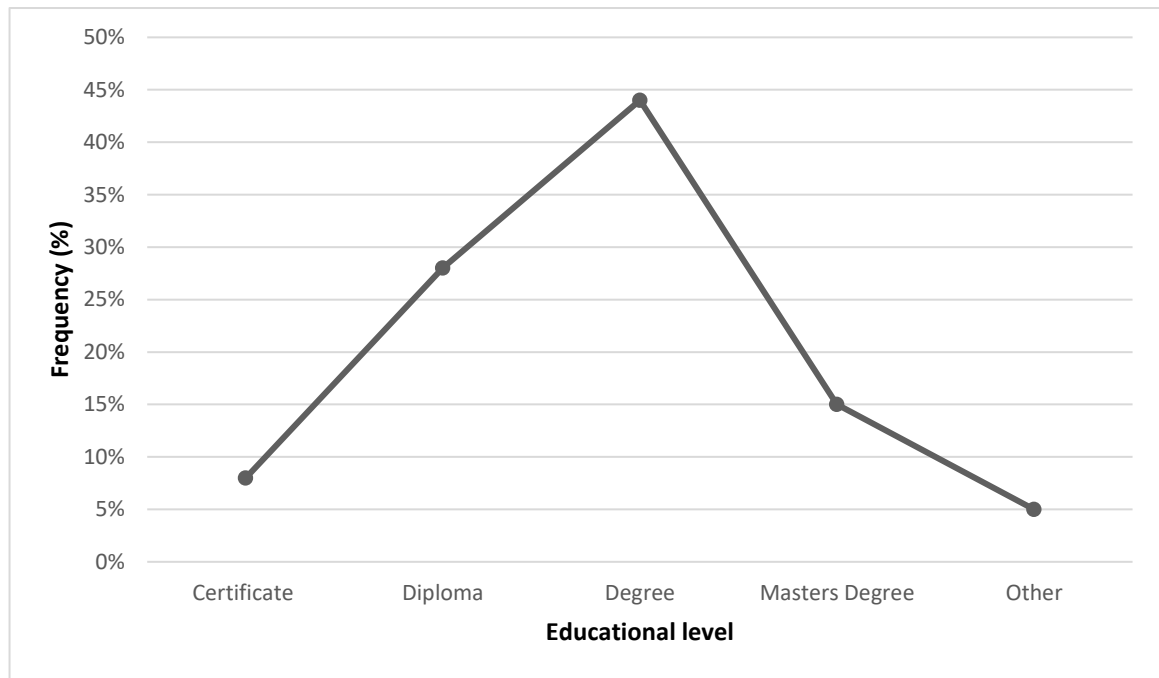


Figure 4.6: Distribution of participants by educational level

Source: Primary data

4.5 Impact of logistics cluster coordination on the agility of humanitarian supply chains.

Table 1: Linear regression model results with agility as the dependent variable

VARIABLES	(1) Agility	(2) Agility	(3) Agility	(4) Agility	(5) Agility	(6) Agility
Collaboration	0.221*** (0.081)	0.069** (0.678)				
Information	0.089*** (0.056)		0.094 (0.034)			
Needs assessment	0.106* (0.015)			0.190** (0.053)		
Level of staffing	0.153** (0.434)				0.229 (0.034)	
Geographical scope	0.063** (0.024)					0.056* (0.034)
Nature of Organization	0.023 (0.046)	0.033** (0.064)	0.041* (0.026)	0.038** (0.075)	0.031*** (0.034)	0.021*** (0.086)
Level of staff training	0.093*** (0.017)	0.071* (0.019)	0.069* (0.021)	0.066* (0.023)	0.071* (0.043)	0.091* (0.034)
Constant	7.938*** (0.574)	7.048*** (0.653)	8.273*** (0.452)	7.384*** (0.360)	8.463*** (0.536)	8.243*** (0.932)
Observations	32	32	32	32	32	32
R-squared	0.564	0.393	0.325	0.497	0.564	0.456

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The dependent variable is Agility

The regression analysis shows that collaboration is a statistically significant driver of agility in humanitarian supply chains. For the first model, the coefficient for collaboration is 0.221, and it is significant at the level of $p < 0.01$, indicating that there exists a strong positive relationship between collaborative practices among the logistics actors and their responsiveness to dynamic conditions in the middle of humanitarian crises. This means higher coordination, collective planning, and sharing of resources are materially contributing towards the agility of supply chains. The second model, with collaboration factored in as well, has a lower coefficient of 0.069, still significant at $p < 0.05$, reinforcing even more the finding that collaboration, even when all other variables are controlled for, still positively affects agility.

The regression results also show a positive correlation of information with agility. In the first model where information was added, the coefficient is 0.089 at $p < 0.01$, indicating that timely and correct information sharing amongst logistics stakeholders enhances agility. Nevertheless, though it increases marginally to 0.094 in the other model but becomes less powerful statistically, it indicates that its impact may be mediated by some other organizational or situational factors and information sharing generally is found to be related to agility. Needs Assessment also emerges as a robust predictor with coefficients of 0.106 ($p < 0.1$) and 0.190 ($p < 0.05$) in two models. These findings imply that logistics operations that are founded on well-informed assessments of community needs will be more nimble because they will be more responsive to actual field needs.

Regression results indicate that staff training, collaboration, needs assessment, information sharing, and scope geography significantly predict agility in humanitarian supply chains. The non-significance of collaboration ($\beta = 0.221$, $p < 0.01$) supports Scholten et al. (2019) since they argue that agility is accompanied by coordination processes to ensure instant adaptation to insecure crisis environments. This aligns with Charles and Lauras (2018) that interagency collaboration enables scale and speed of response regardless of differing operations. However, the literature review stresses that agility is impeded when coordination lacks shared standards or mutual understanding, revealing a gap between theoretical coordination ideals and practical implementation.

Statistically significant information flow ($\beta = 0.089$, $p < 0.01$) lends support to Dubey et al. (2019) that real-time information is critical in the chase for agility. Nonetheless, courtesy of Kabra and Ramesh (2021), technology limitations and lack of standardized systems

within clusters predispose this strength to be threatened, particularly with El Niño ushering in unstable infrastructure. The significance of needs assessment ($\beta=0.190$, $p<0.05$) also aligns with Dubey and Gunasekaran (2018), who attribute agility to responsiveness to realities in the field in a proactive manner. However, studies reviewed here highlight an ongoing failure of agencies to adapt assessments at a sufficiently rapid rate due to rigid institutional processes (Altay & Labonte, 2020).

The prominence of employee training ($\beta=0.093$, $p<0.01$) echoes the collaborative logistics model (Nunes & Pereira, 2021) in demanding qualified human resources to achieve adaptive planning. Inter-agency cultural diversity and personnel turnover negate the effect of training. Thus, while statistical evidence supports theory, empirical literature illustrates pragmatic challenges—divided priorities, disparate systems, and variable training standards— influencing the conversion of cluster coordination to actual agility.

4.6: To examine the impact of logistics cluster coordination on the efficiency of humanitarian response

Table 2: Linear regression model results with efficiency as the dependent variable

VARIABLES	(1) Efficiency	(2) Efficiency	(3) Efficiency	(4) Efficiency	(5) Efficiency	(6) Efficiency
Collaboration	0.178*** (0.073)	0.159** (0.838)				
Information	0.077* (0.074)		0.067 (0.034)			
Needs assessment	0.139** (0.054)			0.101* (0.075)		
Level of staffing	0.126*** (0.052)				0.239 (0.063)	
Geographical scope	0.039** (0.064)					0.043* (0.076)
Nature of Organization	0.017 (0.056)	0.004** (0.034)	0.047* (0.064)	0.097** (0.032)	0.035*** (0.075)	0.021*** (0.035)
Level of staff training	0.148* (0.017)	0.064* (0.017)	0.065* (0.011)	0.066* (0.013)	0.071* (0.063)	0.091* (0.084)
Constant	10.938*** (0.574)	13.096*** (0.653)	10.253*** (0.452)	16.864*** (0.360)	8.893*** (0.536)	15.263*** (0.932)
Observations	32	32	32	32	32	32
R-squared	0.564	0.393	0.325	0.497	0.564	0.456

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Dependent variable is Efficiency

Source: STATA

The linear regression model, with efficiency as the dependent variable and coordination, operationalized through the dimensions of collaboration, information sharing, and needs assessment—as the independent variables, is presented in Table 2 above. The findings reveal a statistically noteworthy positive association between the coordination dimensions and efficiency. Specifically, collaboration displays a solid positive relationship with efficiency 99 percent confidence, followed by needs assessment with 95 percent and information sharing on 90 percent. The magnitude of the standardized coefficients suggests that collaboration exhibits the most substantial positive influence on efficiency in humanitarian logistics response during the El Niño disaster, followed by needs assessment, while information sharing demonstrates a comparatively weaker, albeit still statistically significant, positive impact.

The statistically significant positive impact of collaboration on efficiency aligns with the assertions of Green III (2006), who posited that synergistic endeavors in humanitarian response augment operational efficiency by facilitating the expedited delivery of maximum available resources to the affected population. Green III further emphasized the salient influence of meticulous planning and the availability of localized information for logistics teams on achieving efficiency. However, the emphasis on the primacy of localized information sharing in driving efficiency, as suggested by Green III (2006), does not fully resonate with the findings of the present study. Our results indicate that, among the coordination parameters examined, information sharing exhibited the least pronounced impact on the efficiency of humanitarian aid delivery. This divergence warrants further investigation into the contextual factors that may mediate the relationship between information sharing and efficiency in humanitarian logistics.

4.7: To find out the impact of logistics cluster coordination on the effectiveness of humanitarian aid response

Table 3 below captured statistical significance of the relationships between effectiveness (dependent variable) and the coordination variables (independent variables) namely collaboration, information sharing, and needs assessment. As presented, the results indicate a statistically significant positive correlation between effectiveness and both

collaboration ($p < 0.01$) and information sharing ($p < 0.01$). This translates that improved collaboration and establishment of effective and transparent information sharing mechanisms immensely relate to effectiveness in humanitarian disaster response. Conversely, the relationship between needs assessment and effectiveness demonstrates marginal statistical significance ($p < 0.10$), indicating a weaker association in the context of the El Niño humanitarian response.

The above findings are consistent with Heaslip's (2012) assertion that impeded information sharing among international non-governmental organizations (INGOs) constitutes a significant drawback to the effective humanitarian aid delivery. Similarly, Dubey et al. (2020) and Najjar et al. (2019) underscore the positive impact of inter-organizational information sharing and collaborative planning processes on enhancing humanitarian mission outcomes. Furthermore, the observed stronger relationship between collaboration and effectiveness in humanitarian response is corroborated by Grange et al. (2020), who posited that efficacious collaboration fosters an integrated response, thereby optimizing time and resource allocation during emergency situations. These convergent findings across multiple studies underscore the critical role of both information sharing and collaborative practices in bolstering the overall effectiveness of humanitarian interventions.

Table 3: Linear regression model results with effectiveness as the dependent variable

VARIABLES	(1) Effectiveness	(2) Effectiveness	(3) Effectiveness	(4) Effectiveness	(5) Effectiveness	(6) Effectiveness
Collaboration	0.328*** (0.084)	0.76** (0.755)				
Information	0.119*** (0.097)		0.123* (0.086)			
Needs assessment	0.186* (0.096)			0.097* (0.054)		
Level of staffing	0.276*** (0.434)				0.686* (0.034)	
Geographical scope	0.094** (0.076)					0.075 (0.034)
Nature of Organization	0.086 (0.097)	0.033** (0.064)	0.041* (0.026)	0.038** (0.075)	0.031*** (0.034)	0.075*** (0.086)
Level of staff training	0.085** (0.047)	0.071* (0.019)	0.069* (0.021)	0.066* (0.023)	0.071* (0.043)	0.091* (0.034)
Constant	5.757** (0.875)	5.758*** (0.668)	5.865*** (0.865)	4.864*** (0.468)	6.753*** (0.866)	6.286*** (0.755)
Observations	32	32	32	32	32	32

R-squared	0.564	0.393	0.325	0.497	0.564	0.456
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						
Dependent variable is Effectiveness						
#						

4.8 Chapter Summary

This chapter demonstrated that logistics cluster coordination significantly influenced the agility, effectiveness, and efficiency of humanitarian responses during the El Niño emergency. The data analysis revealed that variables such as inter-agency collaboration, timely information sharing, accurate needs assessments, and adequate staff training were statistically significant predictors of improved humanitarian logistics performance. While the regression models confirmed the theoretical value of coordination mechanisms, the discussion also illuminated challenges such as institutional rigidity, system fragmentation, and inequitable participation among actors. These findings suggest that although cluster coordination holds the potential to optimise aid delivery, its practical application requires context-sensitive adjustments and inclusive practices to address structural constraints. The insights generated from this chapter serve as a foundation for formulating evidence-based recommendations in the subsequent chapter.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study set out to investigate the impact of logistics cluster coordination on effective humanitarian aid delivery during the El Niño–induced drought in Zimbabwe. The research problem was framed around recurring inefficiencies and delays in large-scale disaster responses, where fragmented efforts and poor information sharing often hampered timely relief. Guided by three specific objectives—assessing impacts on supply-chain agility, response effectiveness, and operational efficiency—the study adopted a positivist, descriptive survey design. A structured questionnaire was administered to a purposively selected sample of 103 respondents drawn from humanitarian organizations, logistics-cluster members, and government agencies. Data were analysed using STATA, employing both descriptive statistics and multiple linear regression to quantify relationships between coordination variables and each performance dimension.

Despite careful design, the study encountered limitations. Time constraints and sole reliance on personal funding constrained the breadth of secondary data and field visits. Some respondents were hesitant to fully disclose internal coordination challenges, potentially biasing results. Additionally, restricting the study to Zimbabwe’s El Niño response limits generalizability to other disaster contexts. Nonetheless, the mixed-methods approach—combining quantitative rigour with sector-expert insights—ensured that findings remain robust and relevant to similar semi-arid, multi-actor humanitarian settings.

The results carry important implications for humanitarian policy and practice. Regression models demonstrated that stronger logistics cluster collaboration, timely information sharing, and systematic needs assessments each had positive, statistically significant

effects on agility, effectiveness, and efficiency of aid delivery ($p < 0.05$ across models). These findings suggest that investment in coordination mechanisms and data-management platforms can materially improve the speed, appropriateness, and cost-effectiveness of relief operations. Agencies and donors should thus prioritize cluster-level governance, interoperable information systems, and joint training exercises, to bolster overall disaster-response performance in future climate-induced emergencies.

Conclusions

Based on the findings of the study, it can be concluded that enhanced logistics cluster collaboration and comprehensive staff training significantly improve the agility of humanitarian supply chains during climate-induced crises. The positive and statistically significant coefficients for collaboration ($\beta = 0.221$, $p < 0.01$) and level of staff training ($\beta = 0.093$, $p < 0.01$) indicate that when agencies work together under a unified coordination mechanism and invest in cross-organizational capacity building, relief items are mobilized and delivered more swiftly. Furthermore, systematic needs assessments ($\beta = 0.106$, $p < 0.10$) and expanded geographical scope of coordination ($\beta = 0.063$, $p < 0.05$) enable logisticians to anticipate demand, preposition resources, and adapt routes in real time. Therefore, agility in humanitarian logistics is driven not merely by individual agency capabilities but by integrated cluster governance that aligns mandates, shares timely data, and promotes joint training exercises.

Based on the findings of the study, it can be concluded that information transparency and inter-agency cooperation are critical determinants of humanitarian response effectiveness. Collaboration produced the strongest effect on effectiveness ($\beta = 0.328$, $p < 0.01$), demonstrating that agencies sharing operational plans and resources achieve higher alignment between relief items and beneficiary needs. The positive impact of reliable data access ($\beta = 0.077$, $p < 0.10$) and rigorous needs assessments ($\beta = 0.139$, $p < 0.05$) further underscores the importance of evidence-based decision making. These results confirm that effectiveness is maximized when cluster partners commit to joint information platforms and standardized assessment protocols, ensuring that aid packages are appropriately tailored, redundancies are minimized, and gaps in service delivery are promptly identified and addressed.

Based on the findings of the study, it can be concluded that logistics cluster coordination materially enhances the efficiency of humanitarian aid operations by reducing costs and optimizing resource utilization. The significant coefficients for collaboration ($\beta = 0.178$, $p < 0.01$) and coordination structures ($\beta = 0.159$, $p < 0.05$) show that pooled warehousing, shared transport assets, and harmonized distribution schedules lead to lower per-unit delivery costs and decreased idle capacity. Investment in staff training ($\beta = 0.148$, $p < 0.10$) further streamlines operational workflows. Although variances in geographical scope and organizational mandates introduce complexity, the overall efficiency gains arise from centralized planning and decentralized implementation under a unified cluster framework. Thus, efficiency improvements are realized when agencies leverage collective logistics assets and adhere to jointly agreed-upon protocols.

Recommendations

The study made the following recommendations:

OCHA should create a permanent “Coordination Support Cell” staffed by cluster coordinators and M&E specialists. This unit will monitor adherence to cluster protocols, facilitate conflict resolution among partners, and compile quarterly performance reports. By centralizing oversight, OCHA can ensure consistency in coordination practices, enhance accountability, and rapidly address emerging bottlenecks.

The WFP logistics cluster should roll out a cloud-based Logistics Information Management System (e.g., Logistics Cluster IMS) accessible to all cluster partners. WFP must train agency focal points on standardized data entry and dashboard use. This shared platform will enable real-time asset tracking and needs analysis, reducing duplication of effort and accelerating decision-making during emergencies.

The Department of Civil Protection, in partnership with local universities, should conduct high-frequency vulnerability assessments at district level. These evidence-based surveys will feed directly into cluster contingency plans, ensuring that response strategies align with community priorities and reduce delays in aid targeting.

Major donors should earmark grants for biannual multi-agency simulation drills and cross-organization staff rotations. By financing realistic El Niño response scenarios and

personnel exchanges, donors will foster inter-agency trust, strengthen collective problem-solving skills, and build institutional memory ahead of actual crises.

NGOs active in logistics and response should contribute to a centralized repository of case studies and after-action reviews hosted by the Logistics Cluster. Regular knowledge-sharing workshops—organized by the cluster—will help disseminate successful coordination models and prevent repeat errors, thereby continuously improving operational efficiency.

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