Addis Ababa University

College of Business and Economics, School of Commerce, Department of Logistics and Supply Chain Management

Factors Affecting Logistics Performance during the Humanitarian Crisis: The Case of the Ethiopian Ministry of National Defense, Logistics Main Department

By

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A Thesis Submitted to the School of Graduate Studies of Addis Ababa University School of Commerce in Partial Fulfillment of the Requirements for the Degree of Masters' of Arts in Logistics and Supply Chain Management

Advisor

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Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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STATMENT OF CERTIFICATION

This certifies that Sintayehu Kiros Tesfay's thesis, "Factors Affecting Logistics Performance During Humanitarian Crisis: The Case of the Ethiopian Ministry of National Defense, Logistics Main Department," which was submitted in partial fulfillment of the requirements for a master's degree in logistics and supply chain management (LSCM), complies with university regulations and meets accepted standards for originality and quality.

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External Examiner Signature Date

DECLARATION

I, the undersigned, hereby declare that all sources of information utilized in this study have been properly cited and that this paper is entirely original, with no parts submitted for credit to any other university.

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ABBREVIATIONS AND ACRONYMS

DS……Deployment Speed of Military Logistics Unit

EFSR……..Emergency Food Security Reserve

ENDF……..Ethiopian National Defense Force

FDRE……..Federal Democratic Republic of Ethiopia

HADR…….....Humanitarian Assistance and Disaster Relief

HL…….Humanitarian Logistics

HOM……Humanitarian Operations Management

HSC…… .Humanitarian Supply Chain

KPI……...Key Performance Indicator

LP……....Logistics Performance

LPS……Level of Prepositioned Stockpiles

LSCM……. Logistics Supply Chain Management

LTP……...Level of Training and Preparedness

MoND…….Ministry of National Defense

NCO…….Non Commissioned Officer

NGO……Non-Governmental Organization

OECD……Organization for Economic Co-operation and Development

OS……Organizational Structure

RAU…….Resource Allocation and Utilization

SME…….Small and Midlevel Enterprise

TQM…….Total Quality Management

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ABSTRACT

The study aims to identify the key factors that influence logistics operations in times of crisis and provide insights to improve the overall logistics performance of the military's humanitarian response. The research used mixed research methods, including a comprehensive literature review, interviews with relevant stakeholders, and a survey of military logistics personnel. The key factors investigated include organizational structure, resource allocation and utilization, the level of pre-positioned stockpiles, the deployment speed of military logistics units, and the level of training and preparedness among logistics personnel. Findings indicate that organizational structure, resource allocation, and pre-positioned stockpiles significantly contribute to logistics performance, with mean scores ranging from 2.58 to 3.40. Strong positive correlations (coefficients from 0.718 to 0.898, $p < 0.01$) were observed among these factors, underscoring their interdependence. Training and preparedness were also positively correlated with logistics performance, highlighting the importance of readiness. However, deployment speed, despite positive correlations, did not show a significant impact on performance. Collectively, these factors accounted for 89.1% of the variance in logistics performance, emphasizing the critical role of structured organization and resource management in effective logistics operations during humanitarian crises. Implications: The study provides actionable insights and recommendations for improving logistics performance in the ENDF during humanitarian crises. These include enhancing organizational structures, ensuring efficient resource management, maintaining sufficient pre-positioned stockpiles, improving deployment strategies, and prioritizing ongoing training for logistics personnel. The findings underscore the importance of a holistic approach to logistics management that addresses both structural and operational factors to improve crisis response capabilities.

Key Words: *Humanitarian logistics, Factors, Military logistics, Humanitarian crisis, Ethiopian Ministry of National Defense*

CHAPTER ONE

INTRODUCTION

This section of the study introduced the principal elements, such as logistics performance, and the factors that affected it. The subsections included are the background of the study, statement of the problem, research questions, research objectives, significance of the study, scope of the study, limitations of the study, structure of the paper, and definition of terms for operational use in this specific study.

1.1. Background of the Study

The study's background elucidates the significance of logistics in humanitarian crises, with a focus on military operations. Disasters pose severe threats to human life and societal stability, often overwhelming local capacities (IFRC, 2008, cited in Beyene, 2018). Post-World War II, the global community has strived for human security and rights recognition (Arnarsdóttir, 2012). Effective logistics and supply chain management are crucial in crisis response, encompassing activities from production to consumption (Peyroched'Arnaud de Sarazignac, 2016; Russell & Taylor, 2009). The humanitarian supply chain (HSC) integrates stakeholders aiming to save lives post-disasters (Peyroched'Arnaud de Sarazignac, 2016).

In the context of Ethiopia, the Ethiopian Transport Master Plan Policy and Strategy aims to improve logistics responses during crises by providing efficient logistics, accessibility, coordination, emergency response, infrastructure resilience, and economic recovery (Ethiopian Ministry of Transport and Logistics, 2022).

The military's role as a first responder in humanitarian crises is increasingly recognized, necessitating efficient logistics (Khan et al., 2019; Yuste et al., 2019). Military logistics, essential in both war and peace, require accurate forecasts and reliable execution (Pînzariu & Mînea, 2019). The Ethiopian National Defense Force (ENDF) is pivotal in logistics support during crises (Heaslip, 2016), but there's a need for better efficiency and integration into disaster management (Amdemichael, 2006; Canyon, 2017). Nevertheless, despite the significance of logistics performance, thorough studies particularly concentrating on the factors impacting logistics performance within the Ethiopian National Defense Force (ENDF) are insufficient. Therefore, this study seeks to address the research gap in understanding the

factors influencing logistics performance in the ENDF logistics main department, with a focus on improving response capabilities during humanitarian crises.

1.2. Statement of the problem

Kunz and Reiner (2012) state that after the 2004 Asian tsunami, humanitarian logistics was formally acknowledged as an essential component of the disaster relief effort, leading to the creation of a new field of study. Guha-Sapir, Hoyois, & Below (2014), as cited in Özdamar & Ertem (2015), state that since the 1950s, the number and severity of disasters have increased exponentially, the number of affected individuals has increased proportionately (by about 300 million annually on average since the 1990s), and the yearly damage costs have increased to roughly 0.17 percent of the global GDP.

The effectiveness of logistics during a humanitarian disaster is influenced by several aspects. These elements may manifest in any stage of the disaster assistance process. Thus, according to Kittaneh & Jaaron (2023), "planning for logistics operations" had the greatest impact on the effectiveness of the preparedness phase, while "logistics technical operations" and "logistics, governmental, organizational, and infrastructure issues" had the greatest impact on the response and recovery phases.

In the context of military, many factors affect logistics performance during humanitarian crises. Walton (2011) highlights the subjective nature of speed, emphasizing that close communication and control over decision-making enhance the perception of fast logistics. Sebbah (2013) identifies challenges like resource scarcity, distribution center location, and convoy security, proposing mathematical planning and optimization models to address these issues. Idris (2014) emphasizes the importance of logistics, coordination, and human resource management, emphasizing that the latter is difficult to measure. The establishment of logistical planning elements for humanitarian activities, such as material consumption and assistance for the victim population, is facilitated by Sullivan (1995).

According to Beyene (2018), the following factors have an impact on humanitarian logistics: lack of donor money, socioeconomic, environmental, and infrastructure situational elements.

On the other hand, based on the understanding and the results of the preliminary interview with ten of the logistics experts in ENDF MoND Logistics Main Department, the factors affecting the logistics performance during humanitarian crisis in MoND Logistics Main Department includes: organizational structure, resource allocation and utilization, level of

pre-positioned stockpiles, deployment speed of military logistics units, and level of training and preparedness among military logistics personnel. This meant that the ENDF MoND Logistics Main Department would undoubtedly be impacted by a variety of circumstances, despite the fact that there were minor variations in the elements influencing logistics performance during humanitarian crises.

Though there have been previously conducted studies related to the factors affecting logistics performance in humanitarian crises in the military context, there is a gap in research when it comes to the ENDF MoND Logistics Main Department. The logistics performance of the ENDF while engaging in a humanitarian crisis has been and is being affected by numerous factors. So, the main aim of this study was to examine the extent to which those factors affected logistics performance and to provide reliable recommendations to the Logistics Main Department.

1.3. Research Objectives

1.3.1. General Objective

The general objective of this study is to examine the factors affecting logistics performance during humanitarian crisis, the case of ENDF, Logistics main department.

1.3.2. Specific Objectives

This study aimed to achieve the following specific objectives:

- ⇒ To examine the degree in which the Organizational structure will affect the logistics performance of ENDF Logistics Main Department during their engagement in humanitarian crisis.
- ⇒ To investigate the impact of resource allocation and utilization on the overall success of logistical operations during humanitarian crises?
- ⇒ To examine the degree in which the level of pre-positioned stockpiles contribute to the timeliness and effectiveness of military logistics in the context of a humanitarian crisis.
- ⇒ To investigate how the deployment speed of military logistics units during a humanitarian crisis correlate with the overall success of logistical operations.

⇒ To examine to what extent the level of training and preparedness among military logistics personnel impact logistics performance during humanitarian crises.

1.4. Hypotheses

Based on the background and context of this paper presented above, hypotheses were formulated to test the relationship between the identified factors and logistics performance during a humanitarian crisis. The following hypotheses helped guide the research and provided a framework for data collection and analysis.

H1: Organizational structure positively influences logistics performance during a humanitarian crisis.

H2: Resource allocation and utilization positively impact logistics performance during a humanitarian crisis.

H3: The level of pre-positioned stockpiles positively affects logistics performance during a humanitarian crisis.

H4: Deployment speed of military logistics units positively influences logistics performance during a humanitarian crisis.

H5: The level of training and preparedness among military logistics personnel positively impacts logistics performance during a humanitarian crisis.

1.5. Significance of the Study

The following were only a few of the much significance this study had to the Ministry of National Defense (MoND) institution in general and to the Logistics Main Department in particular.

- It will provide workable and rigorous analysis based findings to the concerned department.
- It will assist the organization through delivering feasible and vital recommendations.
- It will help the organization for its better understanding of the problems and to what extent these factors are affecting the logistics performance of the Army.

1.6. Scope of the Study

It was obvious that conducting this research in a wide range within the organization would have resulted in more concrete, accurate, and feasible findings and recommendations. However, due to the fact that it was impossible and unmanageable to conduct a survey to this extent, this study was delimited to the FDRE, MoND Logistics Main Department.

1.7. Limitations of the Study

Gathering data from multiple logistical units would have made the research more doable. However, time and financial restrictions made it impossible to do more than what was possible for this study. It is recommended that future scholars who are more interested in this topic gather more data in order to allow adequate time to explore the factors affecting the logistical performance of all army units in the Ethiopian National Defense Force. Despite these limitations, this study provided valuable insights into the factors that influenced logistics performance during humanitarian crises in the Ethiopian Ministry of National Defense and contributed to the existing body of knowledge in logistics and supply chain management in the context of humanitarian operations.

1.8. Operational Definition of Terms

Operationalization of key terms is essential for ensuring clarity and consistency in understanding within the study on factors affecting logistics performance during humanitarian crises. In this article, the following terminologies are purposefully used in conjunction with their operational definitions.

Humanitarian crisis: refers to a situation in which a large number of people urgently require assistance owing to a combination of circumstances such as natural disasters, conflicts, diseases, or other emergencies that exceed the local capacity to respond appropriately; as a result, the ENDF is called in to assist and resolve the problem.

Organization: In the context of the Ethiopian Ministry of National Defense's logistical operations during humanitarian crises, an organization can be defined as a structured body with specified aims and functions that operate within a defined framework or system. This systematic arrangement includes military logistical units with an organizational structure, resource allocation mechanisms, pre-positioned inventories, deployment speed, and personnel training and readiness.

Army: refers to a hierarchical military organization within Ethiopia's Ministry of National Defense. The Army is in charge of planning, coordinating, and carrying out logistics activities during humanitarian disasters. It is made up of specialized units that manage resource allocation, maintain pre-positioned inventories, assure fast deployment, and undertake training to improve preparedness among military personnel involved in humanitarian assistance missions.

Unit: in this context it refers to the logistical units within the Ministry of National Defense Logistics Main Department of Ethiopia. These units have the responsibility of overseeing and carrying out logistics operations during humanitarian crises within the Ministry of National Defense.

Organizational Structure: refers to the structure that defines the specific components, hierarchy, roles, and communication channels within the ENDF Logistics Main Department.

Resource Allocation and Utilization: refers to an activity that operationalize how resources are allocated, distributed, and utilized within the logistics Main Department during humanitarian crises, including the criteria used for decision-making.

Pre-positioned Stockpiles: It specifies the types of supplies, amounts, locations, and maintenance protocols for pre-positioned stockpiles to improve the timeliness and efficacy of logistical operations in the ENDF logistics main department.

Deployment Speed of Military Logistics Units: refers to define the metrics and benchmarks used to measure the deployment speed of military logistics units during humanitarian crises and how it correlates with the overall success of logistical operations conducted by ENDF.

Training and Preparedness among Military Logistics Personnel: refers to the degree of training, skills, and preparedness needed for military logistics professionals of ENDF to efficiently perform their tasks during humanitarian situations.

1.9. Organization of the Paper

This paper consisted of five chapters. Chapter one provided an introduction to the study, including the background, problem statement, research questions, objectives, significance, scope, operational definitions of terms, and organization of the study. Chapter two presented a comprehensive literature review on relevant theories and empirical reviews. Chapter three outlined the methodology, covering research design, data source and types, sample size and

sampling procedures, data collection methods, ethical considerations, measures, data analysis method, and instruments used. Chapter four focused on data presentation, analysis, and interpretation. The final chapter summarized the key findings, presented conclusions, and provided recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Introduction to Humanitarian Logistics

A literature review served two purposes. First, it highlighted the current state of research on a topic by identifying the main themes and difficulties, providing a starting point for future research (Kotzab et al., 2005). The other way to look at it was that a literature review was done to introduce the audience to what was known about the issue under study. Conceptual and empirical reviews were done to serve the intended aim. As a result, the literature review section of this study is aimed at informing the readers about what had previously been done and helped identify the research gap in this specific field of study.

2.2. Conceptual Review

2.2.1. Humanitarian logistics and its significance

According to Kunz and Reiner (2012), following the 2004 Asian tsunami, humanitarian logistics was officially recognized as playing a critical part in the disaster relief effort, resulting in the emergence of a new field of research. According to Guha-Sapir, Hoyois, & Below (2014) as cited in Özdamar&Ertem (2015), since the 1950s, the number and magnitude of disasters have grown exponentially, the number of affected people has grown in proportion (about 300 million people per year on average since the 1990s), and the annual damage costs have risen to about 0.17 percent of the global GDP.

In line to this, the definitions related to humanitarian logistics has presented in different literatures. Humanitarian logistics is a distinct area of logistics that handles the response supply chain of essential supplies and services. It faces various challenges, including surges in demand, unreliability of supplies, tight deadlines, and a wide range of operations (Aruna Apte, 2010). In line with Paciarotti et al. (2021), humanitarian logistics entails the rescue and evacuation of affected individuals, utilizing resources and expertise to aid those who are vulnerable or affected after a disaster. Thomas & Kopczak (2005) stated that humanitarian logistics is the part of logistics management, which focuses on “the purpose of alleviating the suffering of vulnerable people.”

As paraphrased from Gonzalez-Feliu et al. (2020), from a research perspective, humanitarian logistics can be defined in addition to the previously mentioned ideas. The primary objective

of the study and practice of humanitarian logistics is to lessen the effects of manmade or natural disasters by implementing robust and reactive logistics systems in response. Anthropogenic crises (economic crisis, wars, terrorism, diseases, explosions, etc.) and natural crises (floods, eruptions, earthquakes, droughts, etc.) are becoming more frequent.

2.2.1.1. Significance of humanitarian logistics

Humanitarian logistics, which focuses on the effective management of flows of goods, information, and services to meet the immediate needs of affected populations in emergency situations, such as those that occur during and after natural or man-made catastrophes, was described by Kunz & Reiner (2012) as a significant component of a successful relief operation.. Tomasini and Van Wassenhove (2009) emphasized that humanitarian logistics has a decisive impact on the effectiveness and efficiency of humanitarian actions and logistics accounts for up to 80% of the costs of relief operations.

In addition to this, researches shows that, humanitarian logistics is a critical component of disaster response, with the efficiency of relief efforts being a key factor in saving lives (McCoy, 2008). The importance of humanitarian logistics has been increasingly recognized in operations management, with a growing body of research and a call for more training for professionals in this area (Merwe, 2010).

It has also gained increasing attention in recent years, particularly in the wake of major disasters such as the 2004 Indian Ocean tsunami and the 2011 earthquake and tsunami in Japan (Majewski, 2010; Daud, 2016). The efficiency and professionalism of humanitarian organizations are key to their success, and they must continually adapt to new challenges, including the impact of climate change (Majewski, 2010; Daud, 2016). Effective relief efforts are essential in disaster response and the application of disaster and emergency response modeling to humanitarian logistics can significantly improve these efforts (McCoy, 2008).

On the other hand, Shafiq & Soratana (2019) claimed that the first step in efficiently responding to a crisis is to develop a strong HL system, while Agostinho (2013) explained that, because assistance, relief efficiency, and speed are all dependent on logistics deployment efficiency, good logistics management can determine the success or failure of disaster operations.

Humanitarian logistics have the potential to improve disaster relief operations and this may be contributed by having the proper set of determinants to assess the performance of

humanitarian logistics, understanding the contribution of logistics cooperation, and the importance of logistics service providers' disaster relief operations in addressing the pandemic (Rutaba, 2022).

In particular, military logistics is a specific case where the ability to provide human and material resources is crucial in terms of minimum time, unpredictable quantity, and variable location of new armed conflicts (The Wharton School, University of Pennsylvania, 2019).

To sum up, if HL is supported and valued, the effectiveness and predictability of humanitarian response will improve. Even small improvements in logistics efficiency will save many lives and reduce logistics costs (Bae et al., 2019).

2.2.3. Historical Context of Humanitarian Crises in Ethiopia

Ethiopians are currently dealing with a number of hazards and vulnerabilities brought on by a severe drought, a high susceptibility to disease outbreaks affecting people, crops, and animals, as well as a confluence of national and international policies, local and global economic pressures. Though alarming deaths, emergency levels of malnutrition, and crippling losses of livelihood assets have been experienced, especially by marginalized communities on the periphery, the combined efforts of the government, donors, UN agencies, NGOs, and Ethiopian communities have helped vulnerable populations avoid the worst of this crisis (Leutze et al., 2003).

According to a study by Dagne (2004), between 14 and 16 million people in Ethiopia and Eritrea are projected to be in need of humanitarian aid. With an estimated 14.3 million people at risk, Ethiopia is by far the most impacted nation. Relief agencies and UN representatives have referred to the situation there as a famine.

According to different studies using the same scenario, Ethiopia was on the verge of a massive disaster in 1999–2000, with an estimated 10 million people in need of food assistance at the height of the crisis. Although the devastating famine of 1984–1985 was not repeated, the sheer number of impacted individuals, the number of fatalities, and the loss of livelihoods made this one of the Horn of Africa's most critical crises in the previous fifteen years (Hammond & Maxwell, 2002).

A variety of problems are currently plaguing Ethiopia, including a severe drought, a rise in the threat of rebels from various parts of the nation, and pressure on its economy from both internal and external sources. According to studies, millions of Ethiopians require humanitarian aid, and the nation is officially recognized as being in the midst of a difficult

intra-conflict. With millions of people in need of food assistance and devastating conflicts in many regions of the country, this is one of the greatest crises the Horn of Africa has seen in recent memory.

Among the logistical difficulties encountered during the 1999–2000 crises were minimal non-food contributions, delayed donor responses, and sluggish food delivery. To prevent port traffic jams and guarantee prompt delivery from the port to distribution locations, coordination was required. For effective distribution, the WFP Food Aid Transport System was essential. On the other hand, during the famine of 1984–1985, there were insufficient institutional mechanisms, inadequate food security reserves, and a lack of early warning and assessment capabilities, all of which contributed to the disastrous outcome (Hammond & Maxwell, 2002).

2.2.4. Logistics in Military and Defense Operations

2.2.4.1. The role of logistics in military operations

Although business (commercial) logistics is expanding faster than military logistics, military logistics remains significantly more sophisticated than many commercial enterprises and is crucial to understanding the logistics system (Pawelczyk, 2018).

Logistics plays a crucial role in military and defense operations, ensuring the efficient flow and storage of supplies and materials (Rodrigue, 2002). Recent advances in military logistics have focused on restructuring processes, prediction and coordination techniques, procurement, inventory control, and maintenance (Zeimpekis, 2014). However, challenges such as scarcity of resources, distribution center location, and security can hinder the effectiveness of humanitarian relief operations, which can benefit from military logistics planning (Sebbah, 2013). Despite the historical and ongoing importance of logistics in warfare, it has not always received the attention it deserves (Prebilič, 2006).

2.2.4.2. Application of military logistics principles during humanitarian crises

The application of military logistics principles in humanitarian crises has been explored in several studies. Rodman (2012) proposed a framework of supply chain management solutions to overcome barriers in humanitarian relief operations, drawing from various disciplines including the military. Tatham (2017) suggested adapting the military concept of a common operating picture to enhance inter-agency coordination in humanitarian logistics. Sebbah (2013) discussed the use of military logistics planning and optimization models to address

challenges in humanitarian relief operations. Bastian (2016) presented a multi-criteria logistics modeling approach to optimize military humanitarian assistance and disaster relief aerial delivery operations.

2.2.5. Unique challenges faced in Humanitarian Logistics

Humanitarian logistics and supply chain management (SCM) have garnered considerable attention and research in recent years (Kovács and Spens, 2011). And these researches show that humanitarian logistics is an incredibly challenging process. Humanitarian logistics face a range of unique challenges, including sourcing relief supplies, transportation issues, and difficulties in identifying initial relief requirements (Baporikar, 2018). These challenges are further complicated by the need to navigate damaged infrastructure, limited communication, and coordination of multiple agents in disaster relief operations (Torre, 2012). The complexity and irregular demand patterns of large-scale emergencies also present significant challenges to inventory control in humanitarian supply chain management (Beamon, 2006). Despite these challenges, the use of operations research models in disaster relief routing has the potential to improve the efficiency and effectiveness of humanitarian logistics (Torre, 2012).

Daud (2016) emphasizes that HL faces significant challenges, particularly in the face of climate instability and the increasing frequency of disasters. Much of the practitioner literature emphasizes the complexities of disaster aid (Overstreet et al., 2011). On the other hand, de sarazignac (2016) clarified the unique challenges of humanitarian supply chain as a complicated concept involving multiple types of players and stakeholders with the singular goal of saving human lives and amortizing the structural and economic repercussions of disasters.

The unique challenges in humanitarian logistics during the 1999-2000 Ethiopian crisis included the war with Eritrea complicating the response to the drought crisis, slow international response due to diplomatic opposition to the conflict, and the need to funnel all assistance through Djibouti instead of closer Eritrean ports. Additionally, there was a delay in food aid and debt repayment, and the separation of humanitarian response from political objectives was difficult. The war consumed government resources, which impacted the humanitarian response, and non-food contributions remained low, with significant needs in agriculture, healthcare, and water supply not adequately resourced (Hammond & Maxwell, 2002).

Current unique challenges had been also seen in Ethiopia since 2020; the conflict in Northern Ethiopia, which began in November 2020, has led to a complex humanitarian crisis, with millions of people in need of aid (Abebe, 2022). The war has severely damaged the region's health system, with a significant decrease in the functionality of hospitals, health centers, and ambulances (Gesesew, 2021). The use of hunger and rape as weapons of war has further exacerbated the crisis, necessitating immediate intervention to deliver food and supplies and rehabilitate the healthcare system (Gesesew, 2021). The conflict has also disrupted livelihoods and led to the displacement of millions of people (Abebe, 2022). These challenges are compounded by the region's history of conflict, drought, and famine, which have contributed to recurring humanitarian crises (Dagne, 2004).

2.2.6. Introducing Factors Influencing Logistics Performance

2.2.6.1. Organizational Structure and its significance

Organizational structure is a fundamental aspect of any organization, influencing its behavior and performance (Clawson and Pitts, 2006). It includes the systematized structure of reporting lines, as illustrated by an organization chart (Clawson and Pitts, 2006). This structure is crucial in defining roles, responsibilities, and communication channels, and can significantly impact a company's operations, culture, and success (Gomathy, 2023). It is also a key element in the change process, as demonstrated in the successful revision of a school's structure (Shah, Organek and Lessner, 1991). Studies pertaining to military organizational structure have emphasized the significance of trust, adaptability, and efficiency. Bjørnstad (2011) and Reinhard (2020) both emphasize the role of trust, with the former linking it to flexibility and the latter to the transition from a mechanistic to an organic structure. Reinhard (2020) also discusses the use of Large Group Interventions and Appreciative Inquiry in the U.S. Navy, suggesting a move towards agility. Andersen and Peterson (2001) provides a historical perspective, noting the stability of military organization structure over time. These studies collectively underscore the need for trust, flexibility, and agility in military organizational structure.

The significance of organizational structure in the military is a key area of study, particularly in the context of the Revolution in Military Affairs (RMA) and the information age (Babb, 2001; Fukuyama and Shulsky, 1999). The shift towards network organization, characterized by flatter structures and decentralized processes, has been explored as a potential solution to the changing tasks and responsibilities of military organizations (Bjørnstad, 2011). However,

the effectiveness of military organizations remains a complex and multifaceted issue, with the sociological approach emphasizing factors such as unit cohesion, leadership, and morale (Millett, Murray and Watman, 2010). These studies collectively highlight the need for ongoing research and adaptation of military organizational structures to meet the evolving challenges of modern warfare

2.2.6.2. Resource Allocation and Utilization

Resource allocation and utilization are crucial in various fields, including cloud computing, organizational management, and decision-making. Dynamic resource allocation is crucial for effective service delivery in organizations, the Round Robin technique has been proposed to improve resource allocation and utilization (Sumathi *et al*., 2020). Decision analysis methods, such as mathematical optimization and benefit-cost ratios, are used to prioritize projects and allocate resources in organizational settings (Kleinmuntz, 2007). Algorithmic approaches are also employed to address resource allocation problems (Ibaraki and Katoh, 1988). These studies collectively highlight the significance of resource allocation and utilization in optimizing performance and achieving organizational goals. The military faces complex resource allocation challenges, particularly in the health system (Bastian *et al*., 2014). These challenges are further complicated by the need to optimize resource usage in combat missions (Metin and Bulkan, 2019). The use of mathematical models, such as the Lanchester attrition model, can help in determining the optimal allocation of resources in military conflicts (Sheeba and Ghose, 2005). Decision analysis tools, including mathematical optimization and benefit-cost ratios, can also aid in prioritizing projects and maximizing the benefits of limited resources (Kleinmuntz, 2007).

Resource allocation in military organizations is crucial for supporting humanitarian missions, as it directly impacts the effectiveness and sustainability of relief operations (Zhu *et al*., 2017). This includes the allocation of medical resources, where a modular organization can enhance the support level for humanitarian assistance missions (Zhu *et al*, 2017). Human resource allocation is also vital, with a need to balance relief operations and capacity building (Sopha and Asih, 2018). The military's role in emergency humanitarian assistance is significant, and a defined mission and organizational structure are essential (Gaydos and Luz, 1994). Furthermore, the selection of specific assets, such as naval vessels, based on their capabilities and contributions to the demanded need can optimize resource allocation in support of humanitarian operations (Apte and Yoho, 2018).

2.2.6.3. Level of Prepositioned Stockpiles and its significance

Prepositioned stockpiles, also known as prepositioning, refer to the strategic placement of essential supplies and equipment in key locations to facilitate rapid response to disasters or conflicts (Russell *et al*., 2015). The level of these stockpiles is a critical consideration, as it determines the readiness and effectiveness of the response. Factors such as distance, risk, and budget uncertainties play a significant role in determining the optimal stocking quantity (Campbell and Jones, 2011; Eftekhar, Jeannette Song and Webster, 2022). Therefore, a standardized definition and consistent reporting of prepositioned stockpiles are essential for decision-making and resource allocation (Russell *et al*., 2015).

The level of prepositioned stockpiles in the military is a critical aspect of readiness for rapid force projection and response to conflicts. The Department of Defense (DOD) has made progress in addressing required reporting elements for these stockpiles, but there is a need for a department-wide policy and coordinated approach (Russell and Siggerud, 2016). The DOD's annual report on prepositioned stocks could be made more useful with a consistent definition and additional information (Russell *et al*., 2015). The Army's Pre-Positioned Stocks (APS) strategy plays a key role in the military's rapid force projection strategy, with a focus on speed and combat power assembly (Bettez, 2000). The Army Sustainment Command (ASC) is responsible for maintaining and issuing combat-ready equipment and materiel, with a focus on reducing the initial amount of strategic lift required and sustaining troops (Theis, 2008).

Prepositioned stockpiles play a crucial role in the success of humanitarian missions, particularly in the military. They enable a rapid response to disasters, reducing the lead time for aid delivery (Menhart, 2015; Akkihal, 2006). These stockpiles are strategically located in pre-positioned warehouses around the world, enhancing the capacity of relief organizations to provide aid quickly (Roh and Kim, 2016). The use of a location routing approach further optimizes the prepositioning of supplies, taking into account the routing of vehicles and potential disruptions in the transportation network (Ukkusuri and Yushimito, 2008).

2.2.6.4. Deployment Speed of Military Logistics Units

The deployment speed of military logistics units is a critical factor in ensuring the efficient and effective support of military operations. Milenkov *et al.* (2020) emphasizes the need for specific training and staffing of logistics personnel in the military, highlighting the

complexity of military logistics systems. Park & Jeong (2023) further underscores the importance of performance indicators in assessing the operational performance of these systems, while Akgün & Tansel (2007) discusses the optimization of transportation requirements in the deployment of military units, which is crucial for enhancing deployment speed. Pînzariu & Mînea (2019) add that the principles of logistic support for military units during peacetime are essential for achieving high-quality support. These studies emphasize the significance of deployment speed in military logistics units and the need for specialized training, performance indicators, and optimization strategies to enhance this speed.

The deployment speed of military logistics units in humanitarian operations is a critical factor in ensuring the rapid distribution of sustainment to affected populations (Vohr, 2011). This speed is often perceived as comparative and is influenced by close communication and decision-making control (Walton, Mays and Haselkorn, 2011). The civil-military interface in humanitarian logistics, particularly in the initial life-sustaining days after a disaster, is crucial for effective and efficient coordination (Heaslip and Barber, 2016). The successful deployment of military medical support in humanitarian operations, as seen in the Rwanda 1994 case, underscores the importance of understanding the disaster-development continuum and the spectrum of military utility (Hawley, 1997).

2.2.6.5. The Level of Training and Preparedness in Military

The level of training and preparedness in the military is a critical factor in determining combat readiness and effectiveness in various scenarios. Hodický, Prochazka & Prochazka (2017) emphasizes the importance of training with autonomous systems, highlighting the differential equation model and system dynamic employed to assess the effectiveness of collective training. Stamatov (2018) further underscores the interdependence between combat readiness and the system of manning, equipping, and training the Armed Forces, with a focus on the use of Combat Readiness Evaluation programs. Knapik *et al.* (2009) discusses the rationale and evaluation of the U.S. Army's Physical Readiness Training, which aims to improve soldiers' physical capability for military operations. Lastly, Georgadze & Harabara (2019) presents a partial methodology for assessing the preparedness level of tank brigades during combat readiness recovery, taking into account the training level of personnel and the coherence in unit management.

The level of training and preparedness in the military is crucial for successful humanitarian operations, particularly in the area of civil-military coordination. Zverec (2023) emphasizes

the importance of CIMIC training for military specialists, which should be integrated into overall armed forces training and continuously updated. This is echoed by Bollettino (2015), who found that familiarity with guidelines on civil-military coordination was lacking among humanitarian actors. Hawley (1997) and Dezee *et al.* (2006) both highlight the need for additional training, particularly in tropical disease management, sanitation, and the practices of civilian humanitarian workers. These researches gave emphasize on the significance of ongoing training and preparedness in the military for effective humanitarian operations.

Based on the literatures above it is possible to conclude that, Organizational structure, characterized by its influence on behavior and performance, is pivotal in shaping an organization's operational framework and success (Clawson and Pitts, 2006; Gomathy, 2023). In the military, the adoption of a flexible and trust-based organizational model is essential for adapting to the complexities of modern warfare and enhancing logistics efficiency during humanitarian operations (Bjørnstad, 2011; Reinhard, 2020). Effective resource allocation is critical for maintaining military readiness and supporting humanitarian missions, ensuring optimized performance through strategic distribution and decision-making tools (Sumathi *et al.*, 2020; Zhu *et al.*, 2017). Prepositioned stockpiles, crucial for rapid disaster response, underscore the importance of a coordinated approach to logistics that enhances readiness and operational effectiveness (Russell *et al.*, 2015; Menhart, 2015). The speed of logistics deployment, influenced by specialized training and civil-military coordination, is vital for timely support in both military and humanitarian contexts, reflecting the need for continuous improvement in training and operational practices (Vohr, 2011; Heaslip and Barber, 2016; Zverec, 2023). Collectively, these elements significantly impact the logistics performance of military forces during humanitarian operations, ensuring they are well-prepared to meet diverse challenges efficiently.

2.2.7. Measuring Logistics Performance in the Military

Researches on logistics performance in the military have highlighted the importance of lean methodologies, such as Value Stream Analysis and DMAIC, in improving order processing lead times (Acero, 2019). These methodologies have been successfully applied in the military context, with their principles also being adopted by civilian organizations (Silva, 2005). The need for high performance in managing logistics processes and providers has been emphasized, with a focus on effectiveness and efficiency (Girardini, 1996).

In addition to the above, authors in the field of military logistics also provided a number of logistics performance measurement mechanisms. The following are some among the parameters in which this research is depend on. Accordingly:

Logistics performance, according to Van Fenema and Kamoen (2021), is determined by: Readiness, cost-efficiency and effectiveness for the reason that Readiness is the metric for military logistics success emphasizing the importance of being prepared for operational requirements rather than focusing solely on profit; whereas military logistics is required to operate cost-efficiently during peacetime but must transition to a posture where effectiveness is paramount during military operations. These measurements highlight the unique nature of military logistics where readiness and effectiveness play crucial roles in evaluating performance, distinct from traditional profit-driven metrics in commercial logistics.

In his paper, Davidson (2002) presents a framework of key performance indicators (KPIs) for assessing logistics performance. These KPIs cover various aspects of humanitarian logistics, including timeliness of delivery, cost-effectiveness, and inventory management, accuracy of information, flexibility, responsiveness, and customer satisfaction. The goal is to ensure efficient and effective relief operations that meet the needs of beneficiaries during crises and by monitoring these indicators, organizations can enhance their logistics processes and optimize resource allocation (Davidson, 2002).

The measurements of logistics performance include the ability to consistently deliver requested products within the requested delivery time frame at an acceptable cost. Efficient logistics performance is crucial for military success as it enhances the fighting power of a military organization by ensuring soldiers have the necessary weapons, food, and ammunition. Additionally, logistics performance is evaluated based on factors such as cost efficiency, responsiveness, on-time availability of supplies, and the ability to navigate complexities in the supply chain (Abdul Rahmen and AB. Hamid, 2019).

On the other hand, the measurements of logistics performance in the context of military supply chain flexibility include (Sokri, 2014),

1. Volume Flexibility Measurement: Volume flexibility is measured as the coefficient of variation of the demand quantity. This metric assesses the ability to change the level of moved products within the supply chain.

2. Delivery Side Measurement: The delivery side is measured using two ratios: the customer satisfaction ratio and the delivery flexibility ratio. These ratios help evaluate the ability of the supply chain to meet short lead times and customer expectations. These performance

measures are designed to provide a comprehensive assessment of the flexibility of a military supply chain, focusing on both volume and delivery aspects.

Among the recommended measurements for evaluating logistics performance in the military, this paper adapted the following parameters to measure the logistics performance of MoND Logistics Main Department during humanitarian crises.

- ⇒ On -Time Delivery
- ⇒ Inventory Accuracy
- ⇒ Fill Rate
- ⇒ Transportation Cost
- ⇒ Asset Utilization
- ⇒ Order Accuracy
- ⇒ Lead Time
- ⇒ Maintenance and Repair Cycle Time

2.2.6.6. Their applicability to the context of the Ethiopian Ministry of National Defense

The applicability of various frameworks and models used to assess logistics performance to the context of the Ethiopian Ministry of National Defense can be explored through a range of studies. Biruk (2020) and Alves (2015) both emphasize the importance of logistics management practices and the need for a model to evaluate internal logistics, respectively. Debela (2013) provides a comprehensive assessment of the current status of logistics practices in Ethiopia, highlighting the challenges and potential solutions. Prastyabudi (2020) offers a conceptual framework for measuring the operational performance of third-party logistics, which could be adapted to the specific needs of the Ethiopian Ministry of National Defense.

2.2.7. Best Practices on Humanitarian Logistics

Gunasekaran et al. (2018) stated that, the management of humanitarian operations is more focused toward the field of operations management due to its uncertain nature. In humanitarian logistics, planning and policy are integrated into several operational phases to enable the implementation of efficient responses.

Coordination is the essential driver for every humanitarian supply chain administration. The main objective of coordination in such networks is to understand and respond to the operational activities efficiently (Ahmed et al., 2019).

Debela (2013) highlights the need for an efficient and effective logistics system in Ethiopia, which is currently lacking due to poor management, inadequate infrastructure, and a lack of sea ports. This is a crucial consideration for the Ethiopian Ministry of National Defense in their humanitarian logistics efforts. Klundert (2013) and deVries (2017) both emphasize the importance of evidence-based optimization in humanitarian logistics, which can be achieved through the use of advanced planning and routing tools, decision support methods, and the best available evidence. These practices can be applied by the Ministry to improve the efficiency and effectiveness of their humanitarian logistics operations.

2.3. Empirical Review

Empirical finding from previously conducted researches are presented hereunder. These are basically related to the impacts of organizational structure, resource allocation and utilization, level of pre-positioned stockpiles, deployment speed of military logistics units, level of training and preparedness among military logistics units on that logistics performance.

2.3.1. The impact of Organizational structure on Logistics Performance

Researches have consistently shown that organizational structure significantly influences logistics performance. Centralized structures have been found to better accommodate logistics system integration, leading to lower logistics costs and more efficient resource utilization (Stank, 1994). This relationship is further supported by the impact of centralized structuring on the number of logistics activities, formalization, and the ability to accommodate certain channel activities (Dröge, 1989). The intermediary effects of integration on the relationship between organizational design and performance have also been confirmed (Stank, 1998). Furthermore, logistics performance has been found to positively impact organizational performance, particularly marketing performance, in a supply chain context (Green, 2008).

It is a complicated and multidimensional topic how organizational structure affects logistical effectiveness during humanitarian crises, especially in military organizations. Hein (2021) identifies formalization, centralization, and standardization as key components of organizational networks that influence logistics activities in humanitarian NGOs. Samii (2010) emphasizes the importance of partnerships and social capital in enhancing the performance of humanitarian organizations, suggesting that these factors can also be beneficial in military logistics. Heaslip (2016) and Sebbah (2013) both highlight the challenges and potential benefits of civil-military coordination in humanitarian logistics, with

Heaslip proposing a model for logistics requirements and Sebbah focusing on military logistics planning.

In addition to the above literatures, plenty of researches has showed how organizational structure significantly impacted logistics performance. To mention some, Salam (2020) and Ah (2020) both emphasize the need for improved coordination and collaboration between stakeholders, including the military, to enhance efficiency and effectiveness in disaster relief operations. Fihun (2016) and Saa'da (2017) stress the importance of information sharing and clear criteria for integrating efforts, particularly in humanitarian supply chains and refugee crises. Wassenhove (2006) and Tomasini (2009) highlight the potential for cross-learning between the private sector and humanitarian logistics, and the role of new players like the private sector in disaster relief. Ergun (2014) and Byman (2000) both discuss the use of technology and the potential for improved military coordination with relief agencies and allies in humanitarian operations. With possible ramifications for military organizations, these studies together highlight the crucial role that coordination, information sharing, and organizational structure play in improving logistics performance during humanitarian disasters.

2.3.2. The Impact of Resource allocation and utilization on Logistics Performance

The impact of resource allocation and utilization on logistics performance is a key area of research, with studies highlighting the need for a performance-based approach (Ross, 2000), the influence of market factors and industrial chain evolution on logistics network resources (Li-xin, 2006), and the importance of coordination and optimization in logistics information systems (Younes, 2015). Autry (2005) emphasizes the role of warehouse management systems in enhancing logistics performance through efficient resource utilization.

On the other hand, the efficient procurement and allocation of resources in humanitarian logistics, particularly in military organizations, is crucial for improving system efficiency and social welfare (Bhattacharya, 2011). However, challenges such as lack of coordination and overlapping initiatives can hinder these efforts (Salam, 2020). To address these issues, mathematical planning and optimization models have been proposed to improve the flow of goods and information in humanitarian relief operations (Sebbah, 2013). Furthermore, a model for civil-military coordination in humanitarian logistics has been suggested, emphasizing the need for military involvement in the initial life-sustaining days after a disaster (Heaslip, 2016).Considering the above information, it is possible to say that, strategic resource allocation and optimal usage is important in increasing logistics performance.

2.3.3. The Impact of Level of pre-positioned stockpiles on Logistics Performance

The impact of pre-positioned stockpiles on logistics performance is a complex issue, influenced by various factors. Brown (1971) and Simchi-Levi (2005) both emphasize the importance of optimal stockade and resupply policies, with the latter specifically addressing the problem of safety stock positioning in supply chains. Gärtner (2009) adds a layer of complexity by highlighting the role of stock out costs in logistics, which can significantly affect service levels. Groote (2011) further complicates the picture by demonstrating the linear relationship between product variety and inventory costs, suggesting that the level of pre-positioned stockpiles should be carefully considered in light of the product mix.

Pre-positioning of stockpiles is a critical factor in humanitarian logistics, particularly in military organizations. Akkihal (2006) and Roh (2013) both emphasize the importance of this practice, with Akkihal focusing on the optimal locations for warehousing and Roh identifying key factors for warehouse location decisions. Yao (2018) further explores the impact of pre-positioned inventory on relief material supply chains, highlighting the significant role of delay cost, shortage penalty cost, and risk of supply shortage. The results of these investigations show us the importance of appropriate pre-positioning tactics for improving logistics performance during humanitarian situations.

2.3.4. The Impact of Deployment speed on Logistics Performance

The deployment speed of military logistics units significantly impacts logistics performance, with faster deployment leading to improved efficiency and cost-effectiveness (Akgün, 2007). Lean methodologies, such as Value Stream Analysis, can be used to optimize logistics processes and reduce lead times (Acero, 2019). Effective transportation utilization, including local inventory and repair, can also reduce costs and improve operational availability in military supply chains (McGee, 2005).

So, the impact of deployment speed on military logistics performance during humanitarian crises is a complicated and diverse problem. Walton (2011) emphasizes the subjective nature of speed, highlighting the importance of communication and decision-making in shaping stakeholders' perceptions. Acero (2019) and Heaslip (2016) both underscore the need for efficient and flexible logistics processes, with Acero specifically advocating for the use of lean methodologies to minimize lead times. Heaslip also suggests that military involvement is most beneficial in the initial life-sustaining days after a disaster. Sebbah (2013) further explores the challenges in humanitarian relief operations, proposing mathematical planning and optimization models to address these issues. These studies emphasize the necessity of

efficient, flexible, and well-coordinated systems, as well as the significance of deployment speed in military logistics performance during humanitarian crises.

2.3.5. The Impact of Level of training and preparedness on Logistics Performance

The level of training and preparedness among military logistics personnel significantly impacts logistics performance (Terziev, 2017). This is particularly important in the context of the evolving nature of work in the Information Age, which requires a focus on adaptive performance (Stokes, 2006). The need for effective management skills, including decision-making, organizational, and communication skills, is also highlighted in the training of logistics officers (Terziev, 2017). These findings underscore the importance of ongoing training and preparedness in enhancing logistics performance in the military.

2.4. Case Studies and Practical Examples

A review of case studies and examples of logistics operations during humanitarian crises reveals several key findings. Costa (2012) identifies the need for efficient logistics procedures in disaster response, emphasizing the importance of rapid supply chain distribution. Klundert (2013) further underscores the role of evidence-based optimization in humanitarian logistics, particularly in the context of decision support methods and network design. Scarpin (2014) provides empirical evidence from a natural disaster, highlighting the critical factors that support logistics processes, including the roles of suppliers, donors, beneficiaries, and distribution centers. Salam (2020) draws lessons from the earthquake in Haiti, emphasizing the need for coordination and collaboration among different stakeholders, as well as the challenge of measuring the performance of humanitarian disaster logistics.

A review of case studies and examples of logistics operations during humanitarian crises reveals several key challenges and lessons that can be applied to the context of the Ethiopian Ministry of National Defense. Salam (2020) emphasizes the need for coordination and collaboration among different stakeholders, including government agencies, the military, and NGOs, to improve the efficiency and effectiveness of disaster relief operations. Costa (2012) underscores the importance of efficiency in logistics, particularly in the distribution of emergency relief. Blecken (2010) highlights the unique challenges of logistics in humanitarian operations, such as the need for rapid response and the complexity of supply chains. Hein (2020) further discusses the challenges of conducting case study research in the context of humanitarian logistics, including the dynamic environment, political context, and general complexity. These studies collectively suggest that the Ethiopian Ministry of National

Defense should prioritize coordination, efficiency, and rapid response in its logistics operations during humanitarian crises.

Thematic Similarities and differences of papers used in this study

The thematic similarities across the papers include the acknowledgment of the unique challenges in humanitarian logistics, such as the need for rapid response and complex supply chains, and the importance of various factors like organizational structure, resource allocation, pre-positioned stockpiles, deployment speed, and training and preparedness in influencing logistics performance. These factors are consistently highlighted as critical to the success or failure of logistics operations during humanitarian crises.

Differences arise in the methodological approaches to studying these factors. For instance, Hein (2020) discusses the challenges of conducting case study research in the dynamic and complex political context of humanitarian logistics, while mine paper (the paper in preparation) chooses for both quantitative and qualitative (mixed) research design to assess the relationships between the independent and dependent variables. Additionally, the papers differ in their empirical findings, with some studies emphasizing the impact of centralized organizational structures on logistics performance, while my research formulates hypotheses to test these relationships within the Ethiopian Ministry of National Defense.

2.5. Conceptual Framework

Based on the literature review presented above, the conceptual framework for this research is outlined hereunder.

⇒ **Independent Variables**

Organizational Structure

Resource Allocation and Utilization

Level of Pre-positioned Stockpiles

Deployment Speed of Military Logistics Units

Level of Training and Preparedness among Military Logistics Personnel

⇒ **Dependent Variable**

Logistics Performance

Based on the literature part and conceptual framework of this research, a conceptual model has developed to show the relationship direction of the variables in a clear way as follows.

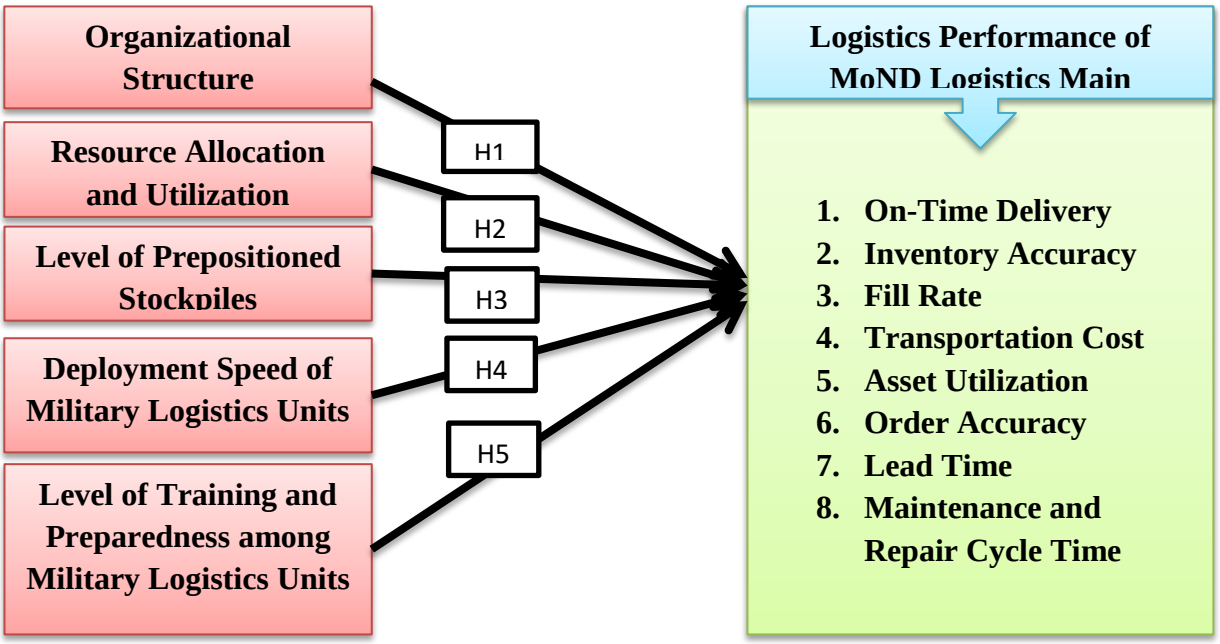

Figure 2.1: Conceptual Model of the Study

Source: Adapted from (Teixeira, Koufteros, and Peng, 2012; Tan and Zeng, 2009)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

A systematic approach to problem solving is what research methodology is all about. It is a scientific examination of how research should be conducted. Research technique refers to the procedures researchers use to describe, explain, and forecast events (Sam, 2012). To achieve the best findings, every research must use an explicit, disciplined, systematic (planned, ordered, and public) method (Mohajan, 2018). As such, this section detailed the research design, data collection methods, data analysis methodologies, and ethical considerations that were used in this study.

3.2. Research approach

Mixed research approach is a method that combines both quantitative and qualitative data in a single study, providing a comprehensive understanding of a research problem (Almeida, 2018; Halcomb, 2015). It can also provide rich insights into various phenomena that cannot be fully understood using only one method (Venkatesh, 2013). The mixed methods approach to research combines strategies for gathering and interpreting data from quantitative and qualitative research methodologies in a single study (Creswell, 2003). Given all of these advantages, the study employed a mixed research approach in the completion of this work.

3.3. Research Design

The study employed a sequential explanatory research design, a method involving a series of steps to gather and analyze data, with each step building on the previous one, for the reason that this research approach entails gathering and analyzing quantitative data first, then qualitative data within the same investigation, and is particularly useful in mixed-methods studies as it allows for a more comprehensive understanding of the research topic (Ivankova, Creswell, and Stick, 2006).

As briefly explained in a research by Hong *et al.* (2017), "sequential explanatory design" entails conducting the quantitative synthesis first, and then informing the subsequent qualitative synthesis. By following this sequential procedure, the design provides a more comprehensive understanding of the research issue or topic under examination. Subedi (2016) further expanded on this concept, discussing the use of sequential mixed-method design in educational research.

Plano Clark (2011), cited in Subedi (2016), added that an explanatory sequential design entails gathering quantitative data first, followed by qualitative data to supplement or further explain the quantitative findings. This technique is justified by the fact that, while quantitative data and results paint a broad image of the study topic, further analysis—more particularly, the collection of qualitative data—is required to fill in, enhance, or clarify the general picture. More clarification is pictorially presented hereunder.

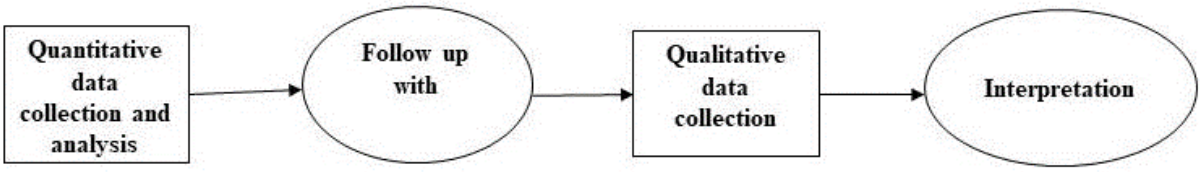

Figure 3- 1: Explanatory Sequential design

Source: adopted from Subedi (2016)

The use of sequential explanatory research design in logistics and supply chain management is feasible, as it allows for a systematic and iterative approach to data collection and analysis (Deck, 2013). This is particularly important in understanding the complexities of supply chain dynamics and the impact of human behavior on decision-making (Tokar, 2010). This approach has been successfully applied in studies on educational supply chain management, providing valuable insights and strategies for stakeholders (Habib, 2011).

Another notable validation of the viability of explanatory sequential design within the field of logistics and supply chain management is provided by Darvish and Coelho (2018) and Manzini et al. (2008). These scholars emphasize the benefits of an integrated approach, underscoring its significance as a fundamental component of explanatory sequential design.

The feasibility of a sequential explanatory design not only in logistics and supply chain management in general but also in humanitarian logistics research in particular, is supported by several studies. Some among the plenty researchers who demonstrated this include: Zhan *et al.* (2021) stated the advantages of a sequential approach in decision-making for disaster relief logistics, particularly in addressing demand-supply incongruence. Hein (2019) provides a systematic characterization of humanitarian NGOs. Vega (2018) proposes a framework for crafting case study research in humanitarian logistics, addressing the lack of rigor in this area. Gatti (2017) applies an action research approach to evaluate the impact of logistics consulting in the humanitarian sector, providing a conceptual framework for impact creation.

Given the numerous advantages discussed, the researcher has chosen to employ a sequential explanatory research design in the course of this study.

3.4. Population and Sampling Design

Under this section of the research, the population of the study, sampling frame, sampling techniques, sampling procedure, sample size, and all the necessary steps in designing the sample were explicitly described to ensure that the study was based on a sound and rigorous approach to sampling.

3.4.1. Population of the study

Since studying the entire population is impractical due to constraints such as time, resources, and feasibility, this research targeted logistics experts within the MoND Logistics Main Department. The study focused on the logistics personnel assigned to the institution's logistics activities. According to the data from the institution's human resource department, the MoND Logistics Main Department comprises 370 logistics experts, encompassing a range of experience, military ranks, and positions. Consequently, the total population size targeted for this study was 370 logistics experts within the MoND Logistics Main Department. A sampling frame comprising 360 individuals was drawn from the targeted population so as create conducive condition for the random sample selection of respondents.

3.4.2. Sample Design

Sample design is a critical component of research methodology, encompassing two primary types: descriptive and analytic (Finkner, 1970). In social science research, the selection of a sample design is influenced by various factors, including the research stage, available resources, and data collection methods (Burger, 2006). Consistent with these considerations, this study employed both probability and non-probability sampling methods. Integrating these methods leverages their respective strengths, thereby enhancing the accuracy of inferences (Wiśniowski et al., 2020).

For probability sampling, random sampling was utilized to select survey questionnaire respondents, ensuring that each unit had an equal probability of inclusion (Berger and Zhang, 2005). Specifically, respondents were chosen through simple random selection, with each value randomly selected using a random number generator to ensure equal chances of selecting any integer between 1 and 360. Additionally, non-probability sampling, particularly the purposive sampling method, was employed to select interview respondents. This method

involves the deliberate selection of individuals based on the researcher's knowledge and judgment (Curtis, 2011), aiming to elicit accurate and genuine responses from highly experienced professionals within various levels of the logistics main department.

3.4.3. Sampling procedure

The targeted population for this study was FDRE MoND Logistics Main Department logistics experts. A representative number of samples were selected from this targeted population. A sample frame was prepared to facilitate the selection of the representative sample. Based on the sampling frame, respondents were high-level logistics officials, middle-level logistics officers, and logistics experts assigned to a variety of logistics roles in the logistics main department, nominated using the simple random sampling technique for the quantitative data respondents and accordingly 189 among the 370 targeted population were selected randomly to fill the survey questionnaire. The purposive sampling technique was also applied for the respondents of the qualitative questions through open-ended interviews.

3.4.4. Sample size

As per the data from the human resource department of the institution, there were 350 logistics experts in FDRE MoND Logistics Main Department within a variety range of experience, military rank, and position which are considered as a target population for this study. Ten among these were interviewed and the remaining 370 (370-10 = 360) was incorporated in the sampling frame that served for the random selection. To select the right representative sample from the targeted population, the researcher relied on Yamane's (1967) formula for determination of sample size. According to Yamane (1967), a simplified formula to calculate sample sizes is:

Taro Yamane Formula, $n = \frac{N}{1+N(e)2}$ Where,

n = sample size

N = population size = 370-10=360

e = error (0.05) reliability level 95%

Alternatively, set e = level of precision to always be 0.05.

According to this formula, a sample size of 189 was obtained.

3.5. Research Instrument

Based on the nature of this research, the type of data the researcher used, and the research objectives, the research instrument that came into practice was structured questionnaires and interview questions. The structured questionnaire was administered to the selected representative samples to collect the necessary information to reach the right findings, and open-ended interview questions were provided to obtain clear and accurate information about the subject under study from the high-level expertise.

3.6. Procedures of Data Collection

The procedure that was followed while collecting the necessary data included the following steps: First, structured questionnaires were designed, sample respondents were selected, and the survey was administered to the selected samples. Questionnaires were administered in person (for those who were actively presented in their office) and via email (designed using Google forms), for the respondents on duty station who are not available in their office physically just to prevent the consequences of physical barrier and to exploit the practical advantage of using Google Forms in data collection and evaluation (Widayanti, 2021 and Fu'adin *et al*., 2023); and qualitative data was collected by conducting interviews with the purposely selected logistics experts. In doing this, two sub-parts of the survey questionnaire for the quantitative data and interview guiding questions were utilized for the qualitative data gathering. A detailed discussion of the subparts is presented hereunder.

Part One: **Background information of respondents**

The back ground information part of this question inquired for personal data which are sex, military rank, educational status, position assigned, and work experience. The collected data via this item were analyzed to determine the frequency of the respondents and the meaning related to it.

Part Two: Questionnaires focusing on the Factors affecting Logistics Performance

Internally consistent and reliable questionnaire ($\alpha = .974$) was developed to assess the factors affecting logistics performance of ENDF logistics main department.

On five hypothesized variables, respondents were asked to rank their degree of agreement or disagreement. There were five elements in each variable. In addition to this, questionnaire related to logistics performance parameters was prepared with total of eight questions. A sum

total of 33 items were utilized to determine whether the hypothesized factors are affecting the presumed effect or not and to examine the correlation of the variables as well as the statistical significance of the predictors' on the outcome variable. Finally, and sequentially too, an interview guiding questions were consumed to get the high-level experts' insight on the factors affecting logistics performance.

3.7. Data Collection Methods and Sources of Data

3.7.1. Sources of Data

This study used both primary and secondary data types. Respondents of the survey questionnaire and interviewees were the mere sources for the primary data whereas reports of the logistics main department, articles of peer reviewed journals, and books are served as secondary data sources of the study.

3.7.2. Data Collection Methods

Structured questionnaires and open-ended interview questions were used to gather primary data from the logistics staff of the MoND Logistics Main Department. The purpose of the questionnaire and the interview checklist was to gather data regarding the military logistics units' deployment speed, pre-positioning stockpile level, organizational structure, resource allocation and utilization, and personnel preparation and training. Prior to the actual data collection, a pre-test of the questionnaire was conducted to guarantee its reliability and clarity. Furthermore, secondary data on logistics performance during humanitarian crises was gathered from existing literature, reports of the institution, and archived documents since secondary data sources have proven to be valuable in logistics research, offering a range of methodologies to address contemporary challenges (Rabinovich, 2011), and these resources helped put the study's findings in context and offered more insights into the variables influencing logistics performance.

3.8. Data Analysis Techniques

The software used for statistical analysis was SPSS (Statistical Package for Social Sciences) version 29, which was employed to examine the collected data. Descriptive statistics such as mean and standard deviation were used to summarize the features of the sample and the variables being studied. Inferential statistics, such as regression analysis and correlation analysis, were utilized to evaluate the statistical significance of the variables and to investigate the relationship between the factors affecting logistics performance and the

logistics performance of the MoND Logistics Main Department.

3.9.Validity and Reliability

3.9.1. Validity

To check the validity of the content, a pilot test was carried out with a small sample to find any problems with the interpretation or wording of the test items. The clarity and applicability of the study tools were examined and subject-matter experts; my adviser in particular, was consulted to confirm their validity. After the pilot test, a face validity check, and comments, some phrasing changes were made, and the questionnaires were verified and approved before being disseminated.

3.9.2. Reliability

The assessment of the study's constructs' internal consistency is conducted through reliability analysis. Constructs exhibiting an Alpha (α) coefficient surpassing the threshold of 0.70 are deemed reliable, as per the criteria established by Hair et al. (2013). The reliability of constructs was ascertained employing Cronbach's Alpha coefficient.

The results revealed that the organizational structure scale with five items (α = .890), the resource allocation and utilization scale with five items (α = .863), and the level of prepositioned stockpiles scale with five items (α = .823) were found reliable. Similarly, deployment speed of logistics of logistics units scale with five items (α = .852), level of training and preparedness among military personnel scale with five items (α = .851), and the logistics performance parameters scale with eight (α = .922) were also find relevant. Lastly, the Cronbach's Alpha coefficient for the entire scales with 33 items used in this study is (α = .974) demonstrates that the scale used in the study is highly reliable and consistent. Reliability results are summarized in table 3.1 below.

Table 3-1: Reliability Statistics

Construct	No. of Item	Cronbach's Alpha	Excluded[a] cases
Organizational Structure	5	.890	0
Resource Allocation and Utilization	5	.863	0
Level of Prepositioned Stockpile	5	.823	0
Deployment Speed of the Unit	5	.852	0
Level of Training and Preparedness	5	.851	0
LP Parameters	8	.922	0
Reliability statistics of all the items	33	.974	0

a. Listwise deletion based on all the variables in the procedure.

3.10. Ethical Considerations

The study procedure was conducted with ethical issues in mind. Prior to their participation in the study, the participants were asked for their informed consent, guaranteeing that their participation was voluntary. Participants' confidentiality and anonymity were preserved by giving responders unique IDs and ensuring that the information gathered was only utilized for academic purposes. Safeguarding participants' privacy and adhering to ethical guidelines were integral aspects of the study procedure. A letter of ethical clearance was also provided, as it can be seen in the appendix part, by the organization in which the study was conducted.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1. Presentation of Findings

4.1.1. Introduction

The data analysis and research findings are presented in this chapter. The researcher then discusses the findings and offers some interpretations of the findings based on the results. To evaluate the results and the conversation regarding the variables influencing the MoND Logistics Main Department's logistics performance the researcher employed various tables, graphs, and figure formats throughout the paper. There are three sections to the chapter. The characteristics of the respondents are covered in the first section; descriptive data analysis and interpretation on the major data are covered in the second part; and inferential statistics such as correlation and regression analysis and interpretation are incorporated in the third part.

4.1.2. Response Rate

The response rate for the questionnaires in this study is notably high at approximately 97.35%, with 184 out of 189 distributed questionnaires being completed. This elevated response rate reflects substantial participant engagement, which enhances the reliability and representativeness of the collected data. The minor proportion of non-responses, attributed to respondents' unavailability due to commitments in remote mission areas, does not significantly undermine the overall validity of the survey. Additionally, the interviews achieved a flawless 100% response rate, with all 10 scheduled interviews being successfully conducted. This complete participation enriches the qualitative data and ensures a comprehensive understanding of the research subject, thereby strengthening the credibility and robustness of the study's conclusions.

4.1.3. Characteristics of Respondents

The characteristics of respondents included: sex, educational background, military rank, and work experience of the respondents. Depending on sample of the study, a total of 184 questionnaires were prepared and disseminated. Orientation was given to respondents to fill and return the questionnaire responsively. Accordingly, the researcher was able to collect 165 of the questionnaires first and again distributed additional number of questionnaires to get the

required amount of responses from the targeted population of this study. Finally, 184 survey questionnaires were collected and consumed for this analysis.

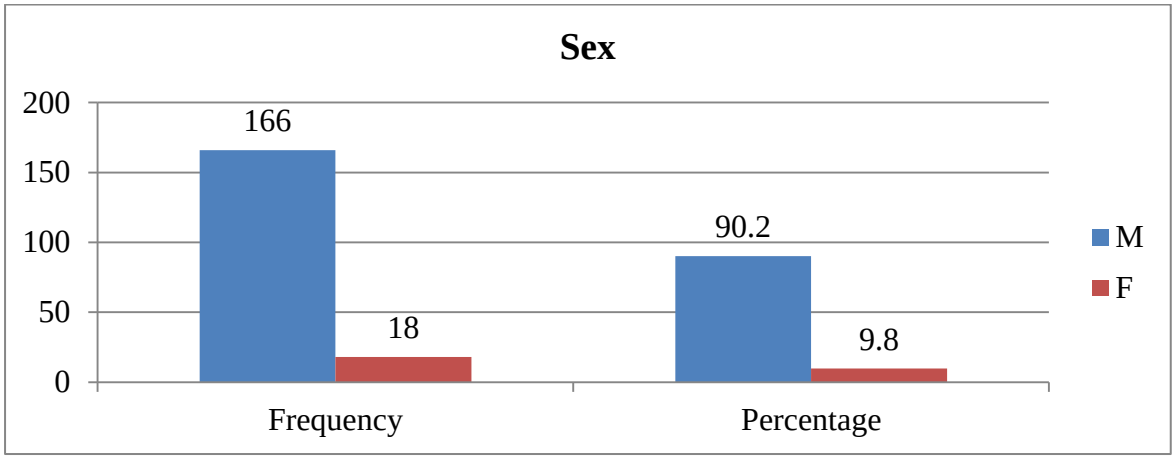

Figure 4.1: Respondents' Gender

The data presented in Figure 4-1 reveals a significant gender imbalance among the respondents. Approximately 90.2% of the individuals are male, while the remaining 9.8% are female. This indicates a significant male majority, with males comprising the vast majority of the population in MoND Logistics Main Department.

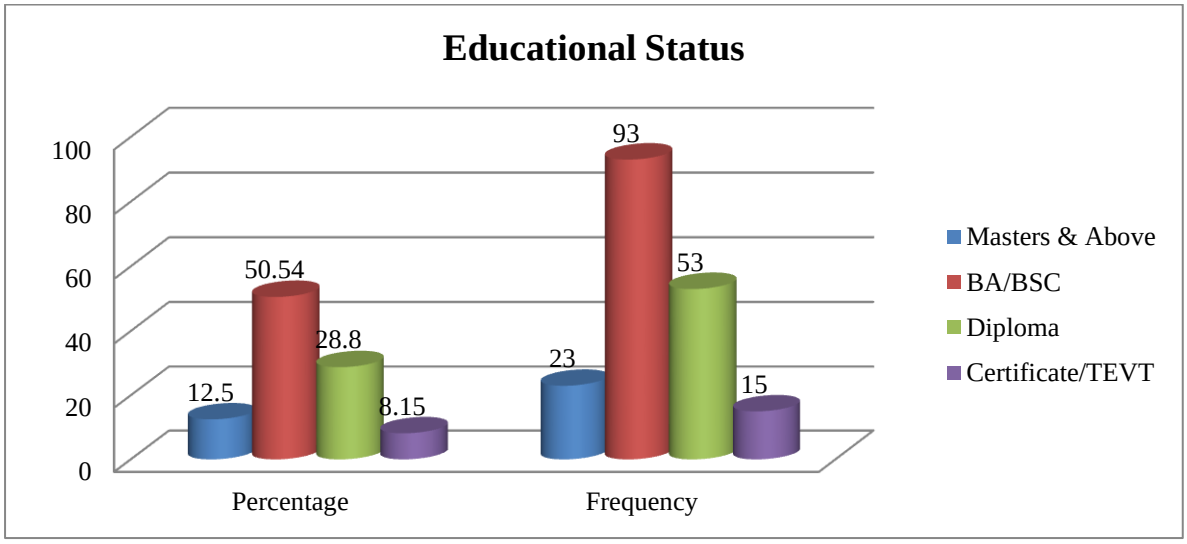

Figure 4.2: Respondents Educational Status

As shown in Figure 4-2 among the total number of respondents 23 (12.5%) of individuals hold a Master's degree or above, while a larger proportion of 93 (50.5%) have a BA/BSC degree. Additionally, 53 (28.8%) possess a Diploma, and 15 (8.15%) have a Certificate/TEVT qualification. This indicates that the data reveals a diverse range of educational statuses within the dataset, with a notable proportion holding BA/BSC degrees,

followed by Diplomas, Master's degrees or above, and Certificate/TEVT qualifications. Accordingly it is possible to say that, the respondents had acquired the required educational status and understanding to work on logistics activities of the MoND during humanitarian crisis.

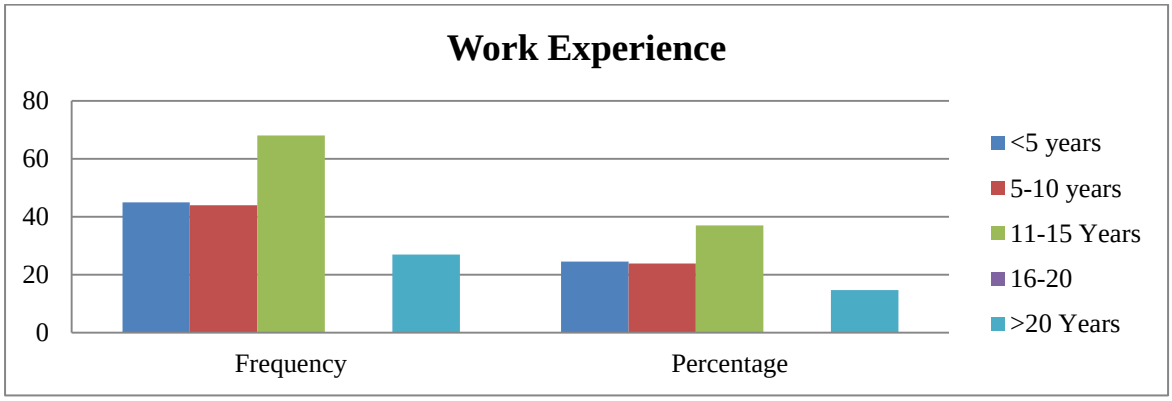

Figure 4.3: Respondents' Work Experience

As depicted in Figure 4-3, 24.5% of individuals have less than 5 years of experience, while a slightly lower proportion of 23.9% have 5-10 years of experience. The bar with the highest representation consists of individuals with 11-15 years of experience, accounting for 37.0% of the population. Lastly, 14.7% of individuals have more than 20 years of experience. This data shows a diverse range of experience levels among the individuals in the MoND logistics main department, with a significant number falling into the 11-15 years' experience category, followed by those with less than 5 years, 5-10 years, and more than 20 years of experience, respectively.

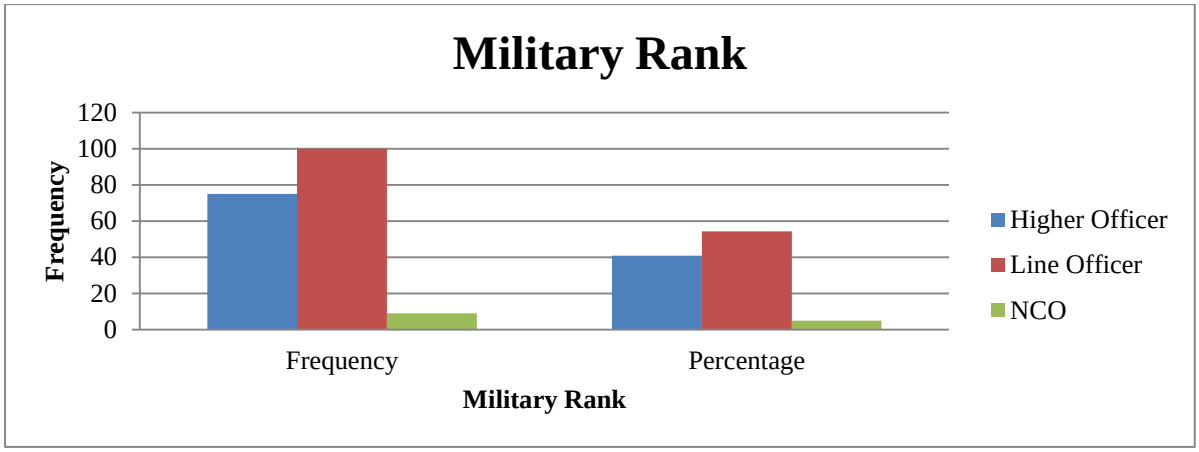

Figure 4.4: Respondents Military Rank

Figure 4-4 shows a diverse representation of military ranks among the respondents. The largest proportion is comprised of Higher Officers, representing 40.8% of the population. Following closely behind are Line Officers, accounting for 54.3% of the population. A smaller group of individuals, specifically 4.9%, hold the rank of Non-Commissioned Officers (NCOs). This indicates the distribution of military ranks in the logistics main department of the ministry with a majority holding the ranks of Line Officer and Higher Officer, while a smaller proportion holds the rank of NCO.

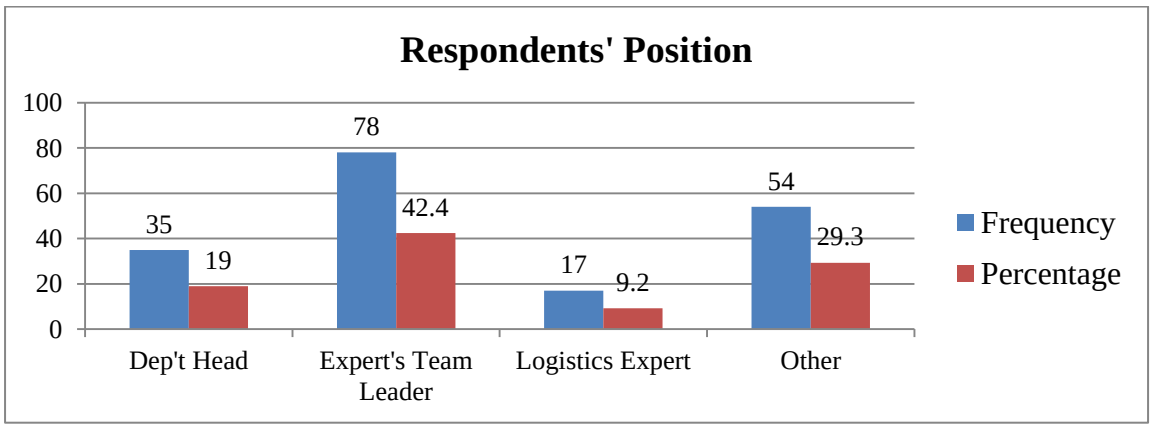

Figure 4.5: Respondents position on the organizational hierarchy

Figure 4-5 presents a variety of positions with the most common position is that of Expert's Team Leader, with 78 individuals, representing 42.4% of the population. Department Heads are the second most prevalent, accounting for 35 individuals or 19.0% of the population. Logistics Experts make up a smaller portion, with 17 individuals constituting 9.2%. The remaining 54 individuals, comprising 29.3% of the population, hold other positions. This shows, among the total respondents a significant number are serving as Expert's Team

Leaders, followed by Department Heads, Logistics Experts, and individuals in other positions.

4.1.4. Descriptive Analysis

4.1.4.1. Impact of Organizational Structure on Logistics Performance

The first objective of the study was to investigate the impact of organizational structure on the logistics performance of the ENDF Logistics Main Department during its involvement in humanitarian crises. Subsequently, participants were requested to indicate their level of agreement or disagreement with statements formulated to assess the Ministry of National Defense's organizational structure. The outcomes are delineated in Table 4.1 presented below. Key: SD = strongly disagree, D=Disagree, NS=Not Sure, A=Agree, SA= strongly agree, F = Frequency, M=Mean.

Table 4-1: Organizational Structure

	N	Mean	Std. Deviation
The organizational structure of the Ministry of National Defense (MoND) Logistics Main Department effectively supports logistics performance during humanitarian crises	184	2.72	1.365
The communication channels within the MoND Logistics Main Department are efficient and contribute to logistics performance during humanitarian crises.	184	2.96	1.103
The decision-making process in the MoND Logistics Main Department is streamlined and facilitates logistics performance during humanitarian crises.	184	2.98	1.223
The organizational structure of the MoND Logistics Main Department is well-designed and supports efficient logistics performance during humanitarian crises	184	2.65	1.359
The organizational structure of the MoND Logistics Main Department aligns with the requirements and demands of managing logistics operations during humanitarian crises.	184	2.73	1.127
Valid N (listwise)	184		

Source: Primary data (2024)

Findings in table 4.1 shows that respondents agreed on the organizational structure of the Ministry of National Defense (MoND) Logistics Main Department effectively supports logistics performance during humanitarian crises (m= 2.72, Std. =1.365), the communication channels within the MoND Logistics Main Department are efficient and contribute to logistics performance during humanitarian crises (m = 2.96, Std. = 1.103), the decision-making process in the MoND Logistics Main Department is streamlined and facilitates logistics performance during humanitarian crises (m = 2.98, Std. = 1.223), the organizational

structure of the MoND Logistics Main Department is well-designed and supports efficient logistics performance during humanitarian crises (m = 2.65, Std. = 1.359), and the organizational structure of the MoND Logistics Main Department aligns with the requirements and demands of managing logistics operations during humanitarian crises (m = 2.73, Std. = 1.127).

The findings from interview respondents indicated that efficient coordination and communication among stakeholders are facilitated, enabling swift decision-making and resource allocation. Secondly, integration into unified command structures improves coordination with other agencies, pooling resources and expertise to enhance response capacity. Flexible and adaptable structures empower frontline personnel to make timely decisions, increasing agility and responsiveness. Clear structures also ensure effective resource allocation and utilization by providing transparency and accountability. Additionally, incorporating robust risk management and contingency planning frameworks mitigates potential challenges and disruptions. Finally, fostering a culture of learning and adaptation through feedback mechanisms and after-action reviews supports continuous improvement in logistics performance.

A graphic illustration of the effect of organizational structure on the logistics performance of the MoND logistics main department is provided below for easier understanding and comprehension.

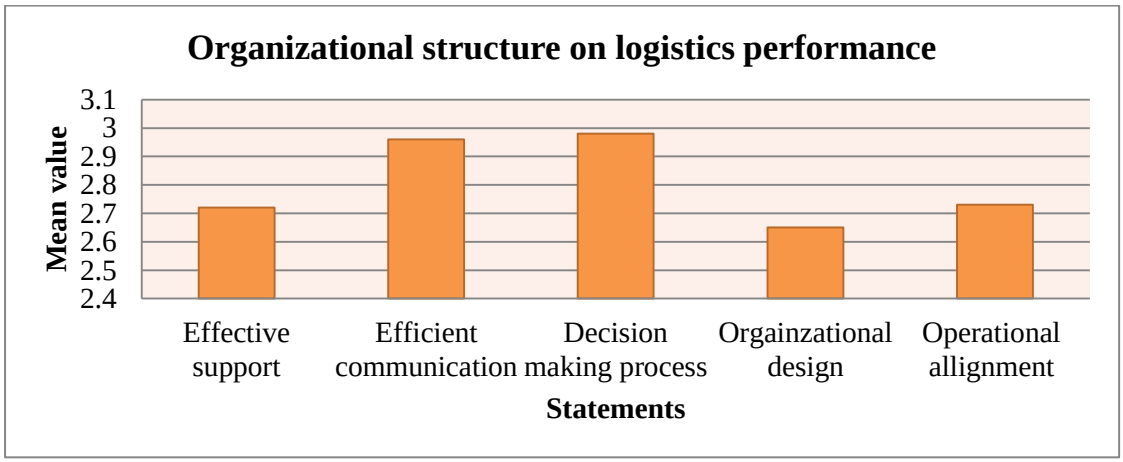

Figure 4.6: The Impact of Organizational Structure on LP

4.1.4.2. Resource Allocation and Utilization

The second objective of the study sought to establish the effect of resource allocation and utilization on the logistics performance of MoND logistics main department during

humanitarian crisis. Respondents were asked to show their degree of agreement/disagreement with the statements prepared to examine the resource allocation and utilization of the MoND. Findings are presented in Table 3 as follows:

Table 4-2: Resource Allocation and Utilization

	N	Mean	Std. Deviation
Adequate resources (financial, human, and technological) are allocated to support logistics operations during humanitarian crises.	184	2.67	1.170
The resources allocated to logistics operations in the MoND Logistics Main Department are efficiently utilized to enhance logistics performance.	184	2.58	1.037
The MoND Logistics Main Department has sufficient access to resources (e.g., transportation, storage facilities) to meet the demands of humanitarian crises.	184	3.05	1.147
The allocation of resources in the MoND Logistics Main Department is aligned with the specific needs and challenges of logistics operations during humanitarian crises.	184	2.73	1.348
The efficient utilization of resources directly contributes to improved logistics performance during humanitarian crises.	184	3.40	1.327
Valid N (listwise)	184		

Source: Primary data (2024)

The findings presented in the above table indicate that the respondents agreed that adequate resources, including financial, human, and technological resources, are allocated to support logistics operations during humanitarian crises (m = 2.67, std. = 1.170), the resources allocated to logistics operations in the MoND Logistics Main Department were perceived to be efficiently utilized to enhance logistics performance (m = 2.58, std. = 1.037), Furthermore, the MoND Logistics Main Department was seen to have sufficient access to resources such as

transportation and storage facilities to meet the demands of humanitarian crises (m = 3.05, std. = 1.147), respondents also agreed that the allocation of resources in the MoND Logistics Main Department is aligned with the specific needs and challenges of logistics operations during humanitarian crises (m = 2.73, std. = 1.348), and finally, the efficient utilization of resources was viewed as directly contributing to improved logistics performance during humanitarian crises (m = 3.40, std. = 1.327).

The findings from the data collected through interview indicates that resource allocation and utilization significantly impact logistics performance during humanitarian crises. Limited availability of resources, such as funding, personnel, and equipment, constrains logistics capacity and affects the effectiveness of response efforts by the MoND logistics main department. The scarcity of resources necessitates complex decision-making processes to prioritize aid delivery, balancing competing demands to maximize impact based on severity and vulnerability. Efficient allocation is critical for the success of logistics operations, maximizing the impact of available resources and ensuring effective relief efforts. However, if resource scarcity and prioritization are not managed effectively, they can undermine the

Below is a visual aid that offers enhanced comprehension and elucidation concerning how resource allocation and utilization impact the logistics performance of the Ministry of National Defense (MoND) logistics main department.

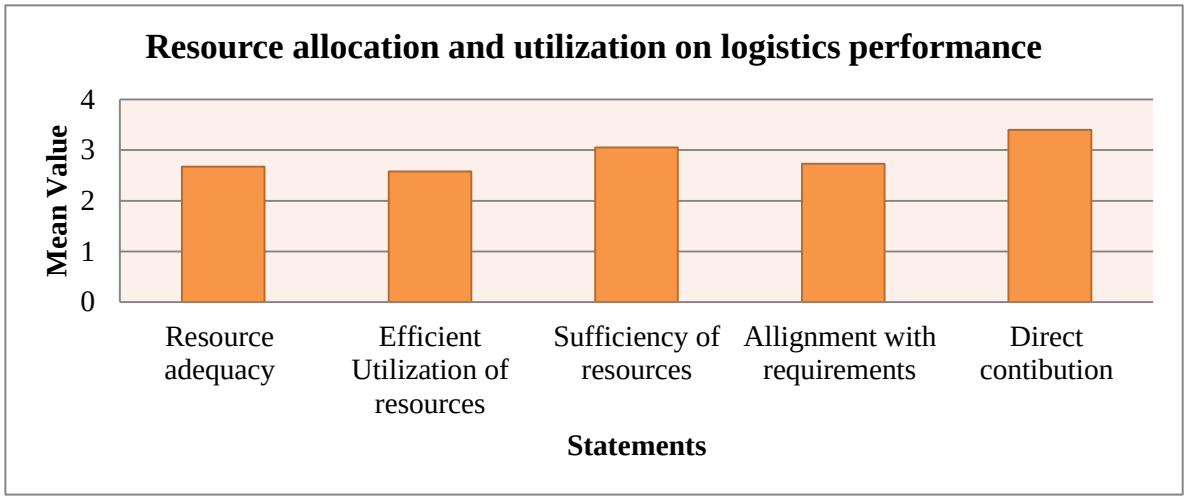

Figure 4.7: Resource allocation and utilization on LP

4.1.4.3. The Level of Prepositioned Stockpiles

Table 4-3: The Level of Prepositioned Stockpiles

	N	Mean	Std. Deviation
The MoND Logistics Main Department maintains sufficient pre-positioned stockpiles of essential supplies and equipment to respond effectively to humanitarian crises.	184	2.93	1.349
The inventory management system in the MoND Logistics Main Department ensures timely replenishment of pre-positioned stockpiles during humanitarian crises.	184	3.08	1.133
The level of pre-positioned stockpiles directly affects the logistics performance of the MoND Logistics Main Department during humanitarian crises.	184	3.25	1.498
The MoND Logistics Main Department regularly assesses and updates the level of pre-positioned stockpiles based on the anticipated needs and risks of humanitarian crises.	184	3.13	.978

The availability of adequate pre-positioned stockpiles positively influences the overall logistics performance of the MoND Logistics Main Department during humanitarian crises.	184	3.56	1.321
Valid N (listwise)	184		

Source: Primary data (2024)

The findings presented in the table 4 indicates that the respondents agreed that the MoND Logistics Main Department maintains sufficient pre-positioned stockpiles of essential supplies and equipment to respond effectively to humanitarian crises (m = 2.93, std. = 1.349), the inventory management system in the MoND Logistics Main Department ensures timely replenishment of pre-positioned stockpiles during humanitarian crises (m = 3.08, std. = 1.133), the level of pre-positioned stockpiles directly affects the logistics performance of the MoND Logistics Main Department during humanitarian crises (m = 3.25, std. = 1.498), the MoND Logistics Main Department regularly assesses and updates the level of pre-positioned stockpiles based on the anticipated needs and risks of humanitarian crises (m = 3.13, std. = 0.978), and the availability of adequate pre-positioned stockpiles positively influences the overall logistics performance of the MoND Logistics Main Department during humanitarian crises (m = 3.56, std. = 1.321).

This finding suggests that respondents perceive the MoND Logistics Main Department's efforts in maintaining and managing pre-positioned stockpiles as generally effective, particularly in terms of the inventory management system and the positive influence of adequate stockpiles on logistics performance during humanitarian crises. The moderate agreement on the sufficiency and impact of pre-positioned stockpiles, coupled with the variability in responses, indicates that while there is recognition of effective practices, there is also a notable perception of areas needing improvement. Specifically, the high variability in opinions on the sufficiency of stockpiles and their impact on performance suggests that experiences and perspectives vary significantly among respondents. The findings underline the importance of continuous assessment and adjustment of stockpile levels to align with anticipated needs and risks, as well as the critical role of inventory management in ensuring timely replenishment and overall logistics performance.

The findings from the interview suggest that prepositioned stockpiles of essential supplies, equipment, and logistics resources are crucial for enhancing the speed and effectiveness of

the MoND logistics main department in delivering humanitarian responses during crises. These stockpiles, strategically located and readily available for rapid deployment, help mitigate initial resource constraints and facilitate the timely delivery of relief items, especially when access and infrastructure are severely compromised. Although not explicitly stated, the importance of anticipating needs and having pre-planned logistics capabilities, including prepositioned stockpiles, is implied as a significant factor contributing to the success of logistics operations during humanitarian crises.

The findings of different researches support the statement that the level of prepositioned stocks has a major impact on logistical performance. Van Wassenhove (2006) emphasizes the importance of prepositioned stocks in improving the speed and efficiency of emergency response operations. Pettit and Beresford (2009) agree, pointing out that properly located inventories improve supply chain responsiveness and reliability. Jahre and Heigh (2008) give additional support by demonstrating how larger levels of prepositioned stockpiles allow businesses to efficiently handle demand surges and sustain service levels during an emergency. Furthermore, Beamon and Balcik (2008) underline the necessity of adequate stocks in lowering lead times and assuring timely delivery of goods, which are critical for maintaining strong logistical performance. Furthermore, Scholten, Sharkey Scott, and Fynes (2014) claim that strategic prepositioning improves overall logistics performance by increasing supply chain resilience and agility. These data collectively strengthen the assumption that the degree of prepositioned stocks is critical in influencing logistical performance, thus providing robust support for this research conclusion.

Presented below is a graphical illustration aimed at facilitating a deeper understanding and clarification of the influence of the level of prepositioned stockpiles on the operational effectiveness of the logistics main department within the Ministry of National Defense (MoND).

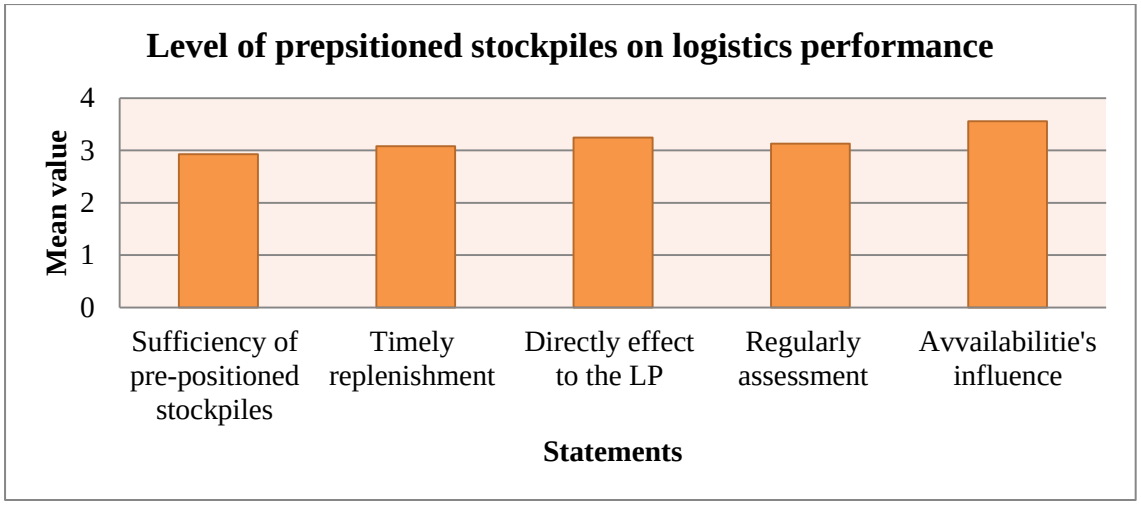

Figure 4.8: Level of Prepositioned Stockpiles

4.1.4.4. Deployment Speed of Military Logistics Units

Table 4-4: Deployment Speed of Military Logistics Units

	N	Mean	Std. Deviation
This logistics unit can mobilize and begin deploying quickly after being activated for a crisis	184	2.99	1.333
The logistics unit can quickly transport personnel, equipment, and supplies to the affected region via air and land.	184	3.04	1.297
The logistics unit has strong distribution networks, warehousing, and support facilities in the deployment area.	184	2.83	1.268
The logistics unit can quickly scale operations by drawing on additional personnel, equipment, and supplies.	184	3.19	1.285
The logistics unit can seamlessly integrate with and support other military and civilian relief organizations involved in the crisis response.	184	3.28	1.257
Valid N (listwise)	184		

Source: Primary data (2024)

The findings in table 4-4 indicate that respondents generally agreed on the effectiveness of the logistics unit of the Ministry of National Defense in crisis response. They believe the unit can mobilize and deploy rapidly after activation (mean = 2.99, standard deviation = 1.333), quickly transport personnel, equipment, and supplies to affected areas by air and land (mean = 3.04, standard deviation = 1.297), and maintain strong distribution networks, warehousing, and support facilities in deployment areas (mean = 2.83, standard deviation = 1.268). Furthermore, respondents agree that the unit can scale up operations efficiently by leveraging additional resources (mean = 3.19, standard deviation = 1.285) and seamlessly integrate with other military and civilian relief organizations (mean = 3.28, standard deviation = 1.257).

As analyzed from the interviewees' response, several key findings on the impact of deployment speed of military logistics units on logistics performance during humanitarian crises are provided. All the respondents agreed that rapid deployment can address infrastructure damage and access challenges, ensuring timely delivery of relief supplies and overcoming transportation bottlenecks. It enhances security by protecting aid workers and supplies from conflict-related threats, providing necessary escort services. Effective integration into humanitarian frameworks improves coordination among stakeholders, facilitating synchronized logistics efforts. Additionally, rapid deployment enhances information management, offering accurate data for better decision-making and resource allocation. Finally, almost all the interviewees' remind that a focus on community engagement and cultural sensitivity during deployment ensures that operations meet the needs and preferences of affected populations, improving the relevance and acceptance of humanitarian assistance.

Presented below is a graphical depiction illustrating the influence of the deployment speed of military logistical units on the logistical effectiveness of the logistics main department within the Ministry of National Defense (MoND). This aims to enhance understanding and clarity regarding this relationship.

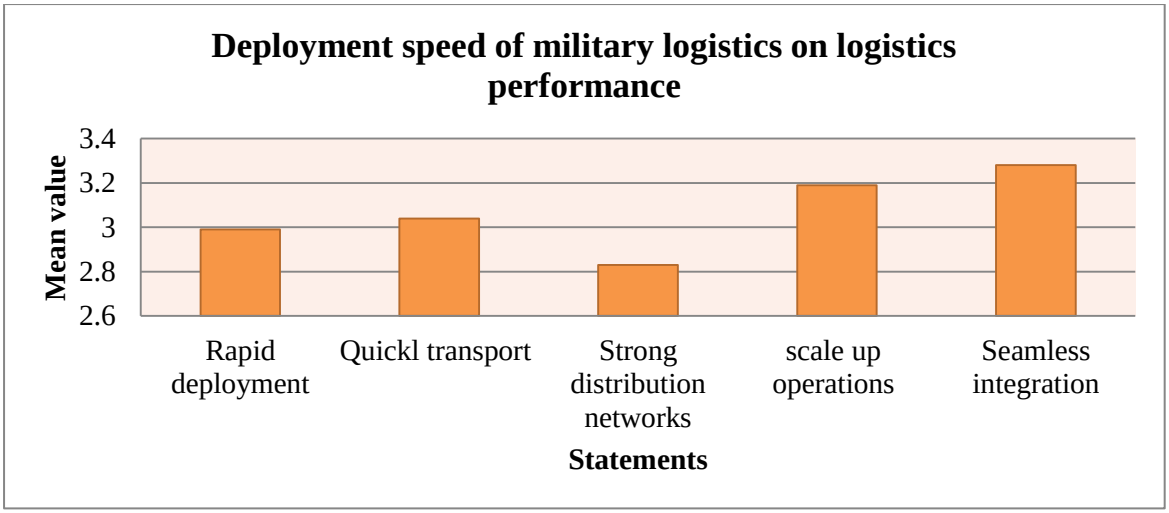

Figure 4.9: Deployment speed of military logistics units

4.1.4.5. The Level of Training and Preparedness among Military Logistics Personnel

Table 4-5: The Level of Training and Preparedness

	N	Mean	Std. Deviation
This logistics unit frequently conducts realistic exercises simulating rapid deployment, disaster relief operations, and humanitarian assistance scenarios.	184	2.87	1.210
Logistics personnel from this unit participate in joint exercises with other military units and civilian aid organizations.	184	2.95	1.057
The logistics unit's personnel understand logistics principles, processes, and best practices for crisis response.	184	3.22	1.135
The unit's personnel are proficient in operating specialized equipment and technologies required for crisis response.	184	2.92	.980
The logistics personnel in this unit are psychologically prepared to operate in high-stress, fast-paced crisis environments.	184	3.17	1.154
Valid N (listwise)	184		

Source: Primary data (2024)

The findings in table 4-5 shows that respondents agree that the logistics unit frequently conducts realistic exercises simulating rapid deployment and disaster relief (mean = 2.88, standard deviation = 1.210), and its personnel participate in joint exercises with other military and civilian aid organizations (mean = 2.95, standard deviation = 1.057). The respondents also believe that the unit's personnel have a strong understanding of logistics principles and best practices for crisis response (mean = 3.22, standard deviation = 1.135), are proficient in operating specialized crisis response equipment and technologies (mean = 2.92, standard deviation = 0.980), and are psychologically prepared to work in high-stress, fast-paced environments (mean = 3.17, standard deviation = 1.154).

The findings from the interview responses demonstrate a significant correlation between the level of training and preparedness of military logistics personnel and the success of logistics operations during humanitarian crises. Enhanced training and preparedness lead to greater operational efficiency, as personnel become adept at planning, executing, and managing logistics activities in challenging environments. Training equips logistics personnel with expertise in procurement, inventory management, and transportation, facilitating informed and timely decision-making, thereby ensuring efficient resource allocation and prompt aid delivery. Regular drills and simulations enhance the adaptability and flexibility of personnel, enabling them to respond effectively to evolving crises by adjusting plans and overcoming logistical challenges in real time. Additionally, well-prepared personnel are proficient in risk identification and mitigation, implementing contingency measures that minimize disruptions during crises. Training programs that emphasize collaboration with various stakeholders foster strong interagency relationships, enhancing overall logistics effectiveness. Furthermore, training in cultural sensitivity and communication promotes respectful engagement with affected communities, fostering trust and cooperation essential for successful logistics operations.

Conversely, insufficient training and preparedness can adversely affect logistics performance. Coordination with other response actors may be compromised, leading to delays and inefficiencies, particularly in interactions with civilian agencies and NGOs. Inadequate training can result in poor decision-making, with personnel struggling to prioritize tasks, allocate resources effectively, and adapt to changing circumstances, ultimately impacting logistics operations. Insufficient preparedness may also cause logistical bottlenecks, delaying aid delivery due to inefficient inventory management and supply chain processes. Additionally, a lack of training in security protocols can increase the risk of accidents or

security incidents, jeopardizing personnel safety and mission success. Challenges in community engagement may arise from inadequate training in cultural sensitivity and communication, leading to difficulties in building trust and cooperation with local populations. Some opinions from the interviewees' regarding instances of inadequate training affecting logistics performance provide valuable lessons, highlighting areas for improvement in training programs and preparedness measures to better equip personnel for future humanitarian crises.

For more interpretation and clarity on the impact of level of training and preparedness on logistics performance of the MoND logistics main department a graphic representation is presented hereunder

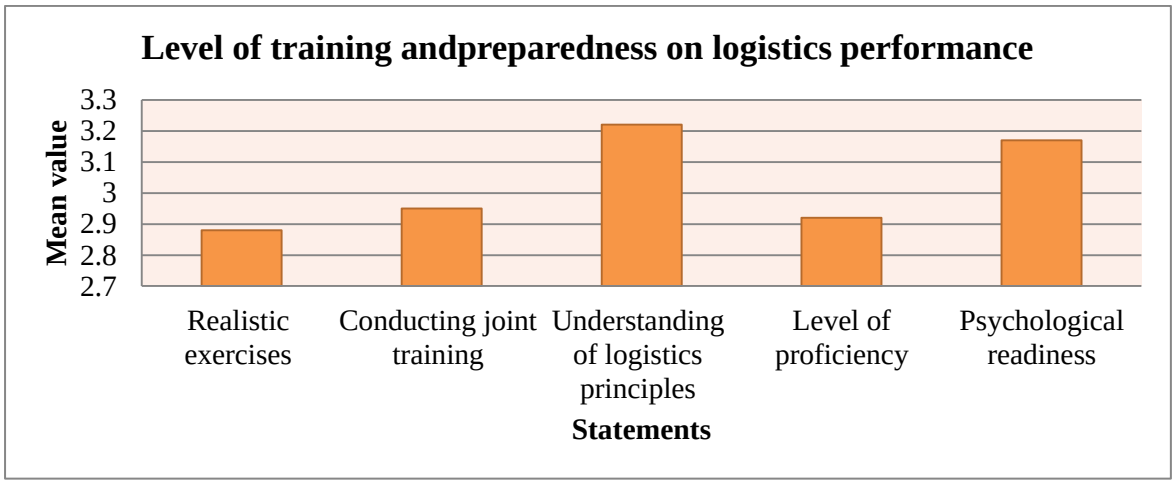

Figure 4.10: Level of training and preparedness

4.1.4.6. Descriptive Statistics of the Logistics performance Parameters

Table 4-6: Descriptive Statistics of the Logistics Performance Parameters

Logistics Performance of the MoND	N	Min	Max	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
On time Delivery	184	1	5	3.09	1.156	.086	.179
Inventory Accuracy	184	1	5	2.97	1.108	-.141	.179
Fill Rate	184	1	5	2.99	1.086	.073	.179
Transportation Cost.	184	1	5	2.99	1.272	-.141	.179

Asset Utilization.	184	1	5	3.33	1.068	-.586	.179
Order Accuracy.	184	1	5	3.09	1.227	-.178	.179
Lead Time.	184	1	5	2.82	1.261	.393	.179
Maintenance and Repair Cycle Time.	184	1	5	3.15	1.236	-.521	.179
Valid N (listwise)	184						

Source: Primary data (2024)

Table 4.6 presents comprehensive descriptive statistics for eight logistics performance parameters of the Ministry of National Defense (MoND), providing valuable insights into the strengths and areas for improvement within the organization's logistics operations. The presentation is hereunder:

On-time Delivery: The MoND achieved an average on-time delivery score of 3.09, indicating moderate adherence to delivery schedules. While there is a slight tendency towards better on-time performance, there is some variability in delivery times (std. deviation = 1.156), suggesting room for improvement in consistency.

Inventory Accuracy: The MoND exhibited an average inventory accuracy of 2.97, indicating scope for enhancement. Monitoring and refining inventory management practices can lead to improved accuracy levels and better alignment between recorded and actual inventory.

Fill Rate: The MoND achieved an average fill rate of 2.99, demonstrating a moderate level of fulfillment. Measures to enhance fulfillment efficiency can optimize logistics operations further and improve the organization's ability to meet demand.

Transportation Cost: The MoND maintained an average transportation cost rating of 2.99, reflecting a moderate level of cost efficiency. Minimizing transportation costs, where possible, can result in cost savings and more efficient resource allocation.

Asset Utilization: The MoND demonstrated commendable average asset utilization with a score of 3.33. However, there is room for improvement as indicated by a negative skewness of -0.586, suggesting some observations with lower asset utilization. Continual monitoring and optimization of asset usage can maximize operational efficiency.

Order Accuracy: The MoND achieved an average order accuracy score of 3.09, representing a moderate level of precision. Fine-tuning order management processes can further enhance order accuracy and reduce errors.

Lead Time: The MoND recorded an average lead time of 2.82, indicating a moderate duration for logistics processes. Streamlining processes and minimizing lead times can optimize overall efficiency and responsiveness.

Maintenance and Repair Cycle Time: The MoND exhibited a moderate average cycle time of 3.15 for maintenance and repairs. Focusing on efficient maintenance practices can help reduce cycle times, resulting in faster turnaround and improved equipment readiness.

4.2. Discussion of Findings

Findings are discussed below to create clear understanding of the results reached through rigorous analysis on the above chapter.

4.2.1. Characteristics of respondents

The finding regarding sex distribution of the MoND Logistics Main department showed that only 9.8% are females. This indicates a significant male majority, with males comprising the vast majority of the population in MoND Logistics Main Department.

4.2.2. Organizational Structure

The results imply that respondents seem to moderately agree that the organizational structure, communication channels, decision-making processes, and alignment with operational requirements of the MoND Logistics Main Department to support logistics performance during humanitarian crises. However, the mean scores are generally in the mid-range (around 2.65 to 2.98), indicating that while there is some level of agreement; there is also a significant room for improvement. The standard deviations, which range from 1.103 to 1.365, suggest that there is considerable variability in the respondents' perceptions, highlighting differing experiences or opinions about the effectiveness and efficiency of the department's logistics performance during crises.

The findings from interview respondents on the other hand, indicate that a well-defined organizational structure significantly enhances logistics performance during humanitarian crises through several mechanisms. The analyzed results from the interviews can possibly summarized that the organizational structure plays a crucial role in shaping logistics

performance during humanitarian crises. The present study's results are consistent with the findings of Stank, Patricia, Daugherty, and Gustin (1994) and Theodore, Stank, and Daugherty Craig (1994) regarding the critical influence of organizational structures on logistics performance.

A range of studies support the idea that organizational structure significantly impacts the logistics performance of army units. Parlier (2004) emphasizes the need for a comprehensive systems approach to improve logistics network efficiency, while Maslii (2021) underscores the importance of a hierarchical, integrated logistics system. Acero (2019) further highlights the potential of Lean Six Sigma methodologies, such as Value Stream Analysis, to optimize logistics processes in the defense sector. These findings collectively suggest that a well-structured and efficient organizational framework is crucial for enhancing the logistics performance of army units.

4.2.3. Resource Allocation and Utilization

Findings on resource allocation and utilization show that the Ministry of National Defense (MoND) Logistics Main Department allocates and utilizes resources effectively to support logistics operations during humanitarian crises in such a way that there is moderate agreement on the adequacy and efficient use of financial, human, and technological resources, indicating some room for improvement and higher agreement on access to essential resources like transportation and storage facilities. In addition to this, the allocation of resources is perceived to align with the specific needs and challenges of humanitarian logistics, although opinions vary significantly and there is strong agreement that efficient resource utilization directly enhances logistics performance during crises. While recognizing the overall adequacy and efficiency of resource management, the findings indicate areas for potential improvement to ensure more consistent and effective logistics performance during humanitarian crises.

The findings from the interview indicates that resource allocation and utilization significantly impact logistics performance during humanitarian crises. Limited availability of resources, such as funding, personnel, and equipment, constrains logistics capacity and affects the effectiveness of response efforts by the MoND logistics main department. The scarcity of resources necessitates complex decision-making processes to prioritize aid delivery, balancing competing demands to maximize impact based on severity and vulnerability.

Efficient allocation is critical for the success of logistics operations, maximizing the impact of available resources and ensuring effective relief efforts. However, if resource scarcity and prioritization are not managed effectively, they can undermine the overall effectiveness of logistics operations of the MoND logistics main department during humanitarian crisis.

Lovallo et al. (2020) investigated the impact of resource allocation flow on firm performance. Although the primary focus is not on logistics, the study emphasizes the importance of effective resource allocation in improving firm performance. This finding is consistent with my finding that "resource allocation and utilization significantly influence logistics performance."

4.2.4. Deployment Speed of Military Logistics units

Findings on deployment speed suggest that respondents generally perceive the Ministry of National Defense (MoND) Logistics Main Department as being highly capable and effective in responding to humanitarian crises. Specifically, they believe the logistics unit can mobilize and deploy rapidly, transport necessary personnel and supplies efficiently via air and land, and maintain strong support infrastructure in deployment areas. Additionally, the unit is seen as capable of scaling operations by drawing on additional resources and integrating seamlessly with other military and civilian relief organizations. This indicates a high level of confidence in the unit's operational readiness and effectiveness in crisis situations.

As analyzed from the interviewees' response, several key findings on the impact of deployment speed of military logistics units on logistics performance during humanitarian crises are provided. All the respondents agreed that rapid deployment can address infrastructure damage and access challenges, ensuring timely delivery of relief supplies and overcoming transportation bottlenecks. It enhances security by protecting aid workers and supplies from conflict-related threats, providing necessary escort services. Effective integration into humanitarian frameworks improves coordination among stakeholders, facilitating synchronized logistics efforts. Additionally, rapid deployment enhances information management, offering accurate data for better decision-making and resource allocation. Finally, almost all the interviewees' remind that a focus on community engagement and cultural sensitivity during deployment ensures that operations meet the needs and preferences of affected populations, improving the relevance and acceptance of humanitarian assistance.

Several studies corroborate my conclusion that deployment speed influences logistics performance. Kress (2002) emphasizes that quick deployment is critical for maintaining operational readiness and effectiveness because it ensures timely assistance and replenishment. McKinzie (2012) discovered that the agility and speed of logistics units have a direct impact on mission performance because they reduce supply chain delays. Similarly, Apte and Yoho (2012) show that rapid deployment is critical for fulfilling urgent operational demands while retaining good logistical performance. Peltz et al. (2005) argue that faster logistical deployment improves operational efficiency and promotes sustained performance in a variety of scenarios. O'Mahony et al. (2010) contend that quick deployment improves the flexibility and responsiveness of military operations, particularly in dynamic and uncertain circumstances. Together, these studies confirm that the deployment speed of military logistics units is an important factor in overall logistical performance, which supports the finding of this research.

4.2.5. Level of Training and Preparedness

Findings on Level of training and preparedness suggest that the logistics unit is well-prepared and skilled in various aspects of crisis response, from training and joint exercises to practical knowledge, technical proficiency, and psychological readiness.

The findings from the interview responses demonstrate a significant correlation between the level of training and preparedness of military logistics personnel and the success of logistics operations during humanitarian crises. Enhanced training and preparedness lead to greater operational efficiency, as personnel become adept at planning, executing, and managing logistics activities in challenging environments. Training equips logistics personnel with expertise in procurement, inventory management, and transportation, facilitating informed and timely decision-making, thereby ensuring efficient resource allocation and prompt aid delivery. Regular drills and simulations enhance the adaptability and flexibility of personnel, enabling them to respond effectively to evolving crises by adjusting plans and overcoming logistical challenges in real time. Additionally, well-prepared personnel are proficient in risk identification and mitigation, implementing contingency measures that minimize disruptions during crises. Training programs that emphasize collaboration with various stakeholders foster strong interagency relationships, enhancing overall logistics effectiveness. Furthermore, training in cultural sensitivity and communication promotes respectful

engagement with affected communities, fostering trust and cooperation essential for successful logistics operations.

Conversely, insufficient training and preparedness can adversely affect logistics performance. Coordination with other response actors may be compromised, leading to delays and inefficiencies, particularly in interactions with civilian agencies and NGOs. Inadequate training can result in poor decision-making, with personnel struggling to prioritize tasks, allocate resources effectively, and adapt to changing circumstances, ultimately impacting logistics operations. Insufficient preparedness may also cause logistical bottlenecks, delaying aid delivery due to inefficient inventory management and supply chain processes. Additionally, a lack of training in security protocols can increase the risk of accidents or security incidents, jeopardizing personnel safety and mission success. Challenges in community engagement may arise from inadequate training in cultural sensitivity and communication, leading to difficulties in building trust and cooperation with local populations. Some opinions from the interviewees' regarding instances of inadequate training affecting logistics performance provide valuable lessons, highlighting areas for improvement in training programs and preparedness measures to better equip personnel for future humanitarian crises.

A number of studies give solid evidence to support the hypothesis that the level of training and preparedness has a direct impact on logistics performance. Liker and Choi (2004) emphasize the critical role of well-trained staff in carrying out logistical activities efficiently. Naim and Tzur (2012) support this idea by emphasizing the favorable relationship between comprehensive training programs and supply chain performance. Similarly, Maltz and Tzur (2005) found that businesses with highly trained workers had fewer operational errors and delays. According to Rao and Kettunen (2009), investing in training programs improves staff competency, which leads to better logistical performance. Furthermore, Dulebenets et al. (2017) underline the importance of ongoing training in dynamic contexts to improve flexibility and resilience. Collectively, these findings confirm that the level of training and preparedness has a considerable impact on logistical performance, which is consistent with this research finding.

4.3. Triangulation of Findings

Combining and cross-examining the data from both the questionnaire and interviews on the variables influencing logistics performance such as, organizational structure, resource allocation and utilization, deployment speed of military logistics units, and level of training and preparedness within the Ministry of National Defense (MoND) Logistics Main Department provides profound insights into its role in enhancing logistics performance during humanitarian crises.

4.3.1. Organizational Structure

The questionnaire responses indicate a moderate level of agreement regarding the effectiveness of the organizational structure, communication channels, decision-making processes, and their alignment with operational requirements. Conversely, the interview data strongly emphasize the benefits of a well-defined organizational structure, highlighting its critical role in enhancing logistics performance. The detailed insights underscore the importance of efficient coordination, communication, and flexibility, all of which are essential in high-pressure crisis scenarios. This perspective aligns with existing literature, such as the findings by Stank et al. (1994) and Theodore et al. (1994), which underscore the necessity of clear organizational structures for effective logistics performance. The interviews particularly highlight mechanisms like swift decision-making, resource allocation, and integration with other agencies as key components of an effective organizational structure in crisis contexts.

Despite the general agreement on the effectiveness of the organizational structure noted in the questionnaire, the mid-range mean scores suggest a need for improvement in several areas. The interviews provide a deeper understanding of these areas, suggesting specific improvements such as enhancing coordination, integrating better with other agencies, and fostering a culture of continuous learning and adaptation. These mechanisms could address the concerns highlighted by the questionnaire respondents and improve overall logistics performance.

The variability in the questionnaire responses underscores the uneven experiences of the perceived benefits of the organizational structure across the board. This disparity might reflect differences in individual roles, clarity of communication, or the effectiveness of implementation at various organizational levels. The interview findings suggest that addressing these perception gaps requires reinforcing transparent communication, providing

clear roles and responsibilities, and ensuring that all personnel are adequately equipped to respond effectively during crises.

These results are in agreement with previous study by Stank et al. (1994) and Theodore et al. (1994), which emphasize the crucial role of organizational structures in logistics performance. The interview data corroborate the need for well-defined structures, efficient communication, and robust decision-making processes for effective logistics operations during crises, reaffirming the critical influence of organizational structures on logistics performance.

4.3.2. Resource allocation and Utilization

The questionnaire findings suggest that there is a moderate level of agreement among respondents about the adequacy and efficient use of resources, including financial, human, and technological assets. While there is consensus that these resources are generally used effectively, the responses also indicate substantial room for improvement. Notably, respondents expressed higher levels of agreement regarding the department's access to critical resources such as transportation and storage facilities, which are essential for maintaining effective logistics operations in crisis situations. Despite the overall positive views of resource management, the variability in opinions points to areas that could benefit from enhancement to achieve more consistent and effective logistics performance during emergencies.

The interview data further emphasize the profound impact of resource allocation and utilization on logistics performance during humanitarian crises. Interviewees consistently noted that limitations in resources, including funding, personnel, and equipment, present significant challenges to the department's logistics capacity and the effectiveness of its response efforts. The scarcity of resources necessitates complex decision-making processes to prioritize aid delivery, requiring careful balancing of competing demands to maximize the impact based on the severity and vulnerability of the crisis. This prioritization is crucial for successful logistics operations as it ensures that the most urgent needs are addressed efficiently. The complexity and necessity of these decisions are underscored by the variability in perceptions among questionnaire respondents, which aligns with the interview findings. These differences highlight that while there is a general consensus on the benefits of efficient resource utilization, there are notable discrepancies in how resource management

effectiveness is experienced within the department, possibly due to differences in roles, responsibilities, or specific crisis-related experiences.

Both the questionnaire and interview findings align with the research conducted by Lovallo et al. (2020), which emphasizes the critical importance of effective resource allocation in enhancing performance. Although Lovallo et al.'s study focuses on firm performance, the principles of efficient resource management apply equally to the logistics operations of the MoND Logistics Main Department. Effective resource allocation maximizes the impact of available resources and ensures the efficacy of relief efforts during humanitarian crises. However, if resource scarcity and prioritization are not managed effectively, they can undermine the overall effectiveness of logistics operations, indicating a need for continuous improvement in resource allocation strategies.

4.3.3. Deployment Speed of Military Logistics Units

The questionnaire results indicate a strong perception among respondents that the department is highly capable and effective in such scenarios. Specifically, respondents believe that the logistics unit is adept at mobilizing and deploying rapidly, efficiently transporting personnel and supplies via air and land, and maintaining robust support infrastructure in deployment areas. Additionally, there is recognition of the unit's ability to scale operations by drawing on additional resources and integrating seamlessly with other military and civilian relief organizations. This reflects a high level of confidence in the unit's operational readiness and effectiveness in crisis situations, suggesting that it is well-equipped to meet the demands of humanitarian emergencies.

Complementing these perceptions, the interview data provides detailed insights into the specific impacts of rapid deployment on logistics performance during humanitarian crises. Interviewees consistently highlighted that swift deployment is crucial for addressing infrastructure damage and overcoming access challenges, ensuring the timely delivery of relief supplies, and mitigating transportation bottlenecks. Moreover, rapid deployment is essential for enhancing security by protecting aid workers and supplies from conflict-related threats and providing necessary escort services. The interview findings also underscore the importance of effective integration into humanitarian frameworks, which improves coordination among stakeholders and facilitates synchronized logistics efforts. Additionally, rapid deployment enhances information management, providing accurate data for better decision-making and resource allocation. The interviews also emphasized that focusing on

community engagement and cultural sensitivity during deployment ensures that operations meet the needs and preferences of affected populations, thereby improving the relevance and acceptance of humanitarian assistance.

The findings from both the questionnaire and interviews align with existing literature on the significance of rapid deployment in military logistics. Kress (2002) emphasizes that quick deployment is vital for maintaining operational readiness and effectiveness, ensuring timely assistance and replenishment. Similarly, McKinzie (2012) underscores that the agility and speed of logistics units have a direct impact on mission performance by reducing supply chain delays. Apte and Yoho (2012) further assert that rapid deployment is crucial for meeting urgent operational demands while maintaining high logistical performance. Peltz et al. (2005) argue that faster logistical deployment enhances operational efficiency and promotes sustained performance across various scenarios. O'Mahony et al. (2010) add that quick deployment improves the flexibility and responsiveness of military operations, particularly in dynamic and uncertain environments. These studies support the conclusion that the deployment speed of military logistics units is a critical factor in overall logistical performance, corroborating the research findings that the rapid deployment capabilities of the MoND Logistics Main Department are essential for its effectiveness.

4.3.4. The Level of Training and Preparedness

The questionnaire findings suggest that the logistics unit is well-prepared and skilled across various aspects of crisis response. Respondents highlight the effectiveness of the unit's training, joint exercises, practical knowledge, technical proficiency, and psychological readiness. These factors collectively contribute to the logistics unit's ability to perform efficiently and effectively during crises. The respondents' confidence in the unit’s preparedness reflects a robust training regime that equips personnel with the necessary skills and knowledge to manage logistics operations under challenging conditions.

The interview data complements these findings by providing in-depth insights into the relationship between the level of training and preparedness of military logistics personnel and the success of logistics operations during humanitarian crises. Interviewees consistently note that enhanced training and preparedness lead to greater operational efficiency, enabling personnel to effectively plan, execute, and manage logistics activities in complex environments. Training programs equip logistics personnel with essential expertise in procurement, inventory management, and transportation, facilitating informed and timely

decision-making that ensures efficient resource allocation and prompt aid delivery. Regular drills and simulations are emphasized as critical for enhancing adaptability and flexibility, allowing personnel to respond effectively to evolving crises by adjusting plans and overcoming logistical challenges in real-time. Moreover, well-prepared personnel are proficient in risk identification and mitigation, which includes implementing contingency measures to minimize disruptions during crises.

Conversely, the interview data also highlight the negative impacts of insufficient training and preparedness on logistics performance. Inadequate training can compromise coordination with other response actors, leading to delays and inefficiencies, particularly in interactions with civilian agencies and NGOs. Poor decision-making stemming from a lack of training can result in personnel struggling to prioritize tasks, allocate resources effectively, and adapt to changing circumstances, ultimately impacting logistics operations. Insufficient preparedness may also cause logistical bottlenecks, delaying aid delivery due to inefficient inventory management and supply chain processes. Additionally, a lack of training in security protocols increases the risk of accidents or security incidents, jeopardizing personnel safety and mission success. Challenges in community engagement due to inadequate training in cultural sensitivity and communication can lead to difficulties in building trust and cooperation with local populations. These insights from the interviewees highlight the areas where improvements in training programs and preparedness measures are necessary to better equip personnel for future humanitarian crises.

The findings from both the questionnaire and interviews are supported by a body of literature emphasizing the critical role of training and preparedness in enhancing logistics performance. Liker and Choi (2004) highlight the importance of well-trained staff in carrying out logistical activities efficiently. Naim and Tzur (2012) support this view by demonstrating the positive correlation between comprehensive training programs and supply chain performance. Maltz and Tzur (2005) found that organizations with highly trained workers experienced fewer operational errors and delays. Rao and Kettunen (2009) emphasize that investing in training programs improves staff competency, leading to better logistical performance. Furthermore, Dulebenets et al. (2017) underscore the importance of ongoing training in dynamic contexts to enhance flexibility and resilience. Collectively, these studies affirm that the level of training and preparedness has a significant impact on logistics performance, which aligns with the findings of this research.

4.4. Analysis of Inferential Statistics

4.4.1. Correlation Analysis

Pearson's correlation value

The first element of Pearson is made up of correlation values. The ranges of values are from -1 to 1. This value basically determines the relationship between two components (Jain and Chetty, 2019). The correlation interpretation of this paper is based on Pearson's correlation and is as per presented in table 4-8 below.

Table 4-7: Pearson's Correlation value interpretation

Correlation Value Ranges	Interpretation
0	No correlation
-0.4 To -0.2/0.2 to 0.4	very weak negative/ positive correlation
-0.6 To -0.4/0.4 to 0.6	moderate negative/positive correlation
-0.8 To -0.6/0.6 to 0.8	strong negative/positive correlation
-1 to -0.8/0.8 to 1	very strong negative/positive correlations
-1/1	perfectly negative/positive correlation

Source: Jain and Chetty (2019)

⇒ **Note:** OS = Organizational Structure, RAU = Resource Allocation and Utilization, LPS = Level of Prepositioned Stockpiles, DS = Deployment Speed of Military Logistics Units, LTP = Level of Training and Preparedness, and LP = Logistics Performance.

Table 4-8: Correlation Analysis between Dependent and Independent Variables

		OS	RAU	LPS	DS	LTP	LP
OS	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	184					
RAU	Pearson Correlation	.844**	1				
	Sig. (2-tailed)	.000					
	N	184	184				

LPS	Pearson Correlation	.811**	.840**	1			
	Sig. (2-tailed)	.000	.000				
	N	184	184	184			
DS	Pearson Correlation	.807**	.759**	.898**	1		
	Sig. (2-tailed)	.000	.000	.000			
	N	184	184	184	184		
LTP	Pearson Correlation	.755**	.802**	.750**	.718**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
	N	184	184	184	184	184	
LP	Pearson Correlation	.859**	.877**	.887**	.840**	.848**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	184	184	184	184	184	184

Source: Primary Data (2024)

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

Table 4-8 displays the results of correlation analysis, provides insights into the relationships between factors affecting logistics performance within the Logistics Main Department of the Ministry of National Defense (MoND). It presents correlation coefficients and their significance levels, revealing the relationships between these factors.

The first factor, Organizational Structure, shows significant positive correlations with all other factors affecting logistics performance which are under investigation in this study, and the dependent variable Logistics Performance of MoND Logistics Main Department. The correlation coefficients range from 0.807 to 0.844, indicating strong positive relationships. The p-values for all correlations are highly significant ($p < 0.01$), suggesting that these associations are unlikely to have occurred by chance. The second factor, Resource Allocation and Utilization, exhibits strong positive correlations with all other factors. The correlation coefficients range from 0.759 to 0.877, indicating significant positive relationships. All correlations have highly significant p-values ($p < 0.01$).

The third factor, The Level of Prepositioned Stockpiles, demonstrates strong positive correlations with all other factors. The correlation coefficients range from 0.750 to 0.898, suggesting significant positive relationships. All correlations have highly significant p-values ($p < 0.01$). The fourth factor, Deployment Speed of Military Logistics Units, displays strong positive correlations with all other factors. The correlation coefficients range from 0.718 to

0.898, indicating significant positive relationships. All correlations have highly significant p-values ($p < 0.01$). The fifth factor, Level of Training and Preparedness, demonstrates strong positive correlations with all other factors. The correlation coefficients range from 0.718 to 0.848, suggesting significant positive relationships. All correlations have highly significant p-values ($p < 0.01$).

Finally, the dependent variable, Logistics Performance of the MoND Logistics Main Department, exhibits strong positive correlations with all other factors. The correlation coefficients range from 0.840 to 0.877, indicating significant positive relationships. All correlations have highly significant p-values ($p < 0.01$). Overall, these findings indicate strong positive associations between the factors affecting logistics performance within the MoND Logistics Main Department. Organizational structure, resource allocation and utilization, prepositioned stockpile level, deployment speed of military logistics units, and level of training preparedness are all significantly correlated with each other and with the overall logistics performance of the department.

4.5. Assumption Testing for Model Fit

4.5.1. Testing the Assumption of Linearity

4.5.1.1. Between Organizational structure and Logistics Performance

The scatter plot provides a visual confirmation of the linearity assumption in the regression model. The distribution of data points suggests a linear relationship between logistics performance (x-axis) and organizational structure (y-axis). The regression line, given by ($y = -0.26 + 0.59x$), aligns well with the data, indicating that a linear model is appropriate for capturing the relationship between these variables. The R^2 value of 0.738 further supports this, showing that 73.8% of the variance in organizational structure is explained by logistics performance. The absence of a systematic pattern in the scatter plot suggests that residuals would be randomly distributed, which is a key indicator that the linearity assumption is satisfied. Overall, the plot supports the use of a linear regression model for analyzing the relationship between logistics performance and organizational structure.

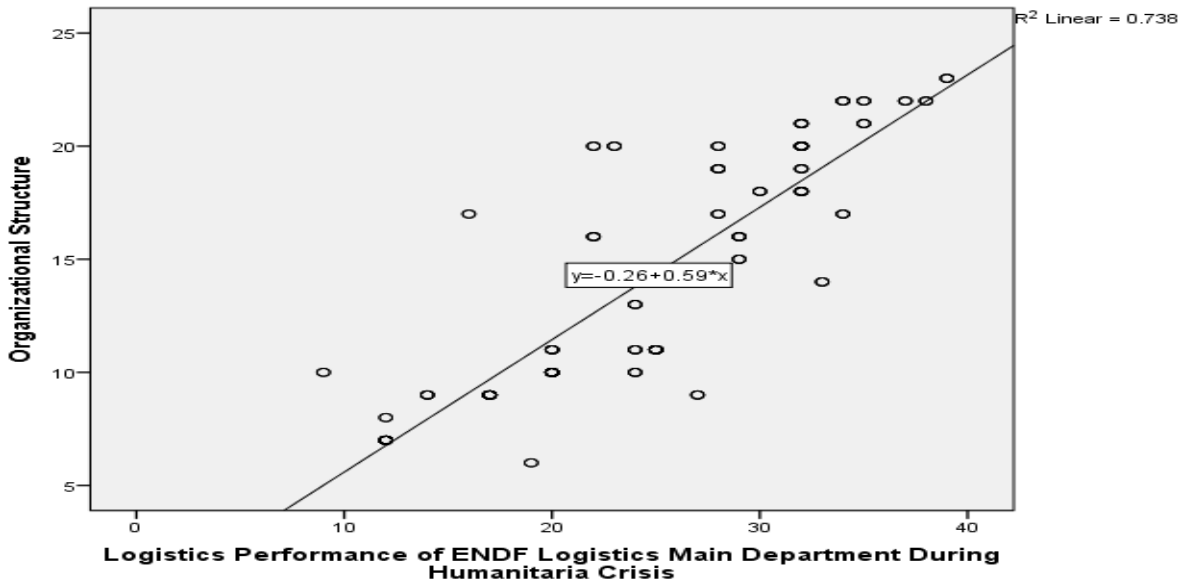

Figure 4.11: Testing Organizational Structure against Linearity Assumption

4.5.1.2. Between Resource allocation and Logistics Performance

The scatter plot illustrates a strong positive linear relationship between the logistics performance of the Ethiopian National Defense Force (ENDF) Logistics Main Department during a humanitarian crisis and resource allocation and utilization. The equation ($y = 0.68 + 0.56x$) indicates that for every unit increase in logistics performance, resource allocation and utilization increase by 0.56 units, with an intercept of 0.68. The high R-squared value of 0.769 signifies that approximately 76.9% of the variance in resource allocation and utilization is explained by logistics performance. The data points cluster around the line of best fit, visually supporting the linearity assumption. Thus, the findings affirm that a linear model is appropriate for describing the relationship between these variables.

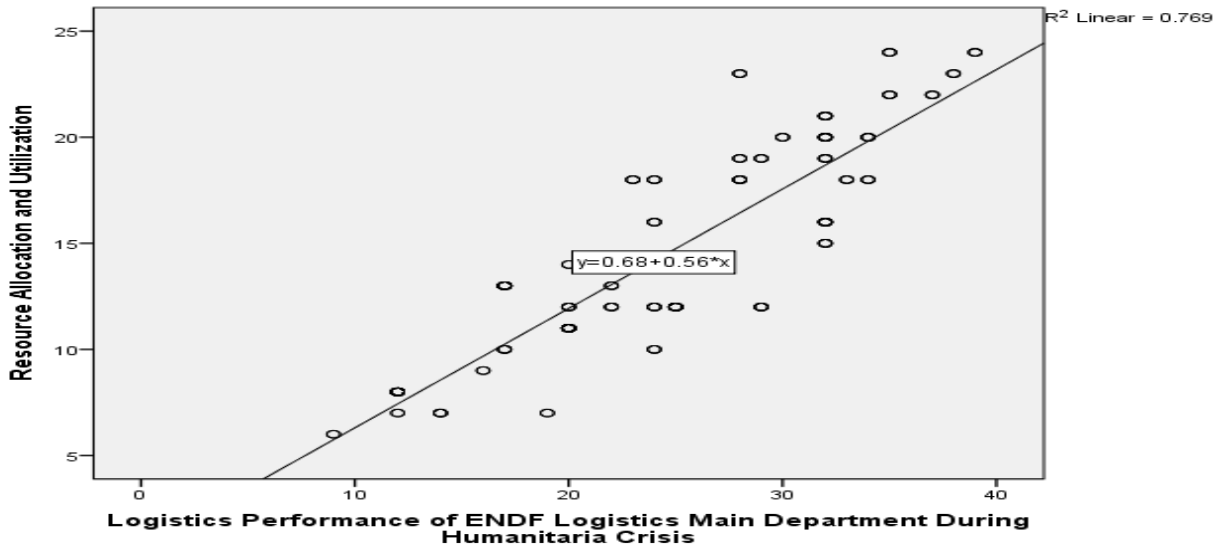

Figure 4.12: Testing Resource Allocation and Utilization for Linearity Assumption

4.5.1.3. Between the Levels of Prepositioned Stockpiles and Logistics Performance

The scatter plot illustrates a strong positive linear relationship between the logistics performance of the Ethiopian National Defense Force (ENDF) Logistics Main Department during a humanitarian crisis and the level of pre-positioned stockpiles. The equation ($y = 2.08 + 0.57x$) indicates that for every unit increase in logistics performance, the level of pre-positioned stockpiles increases by 0.57 units, with an intercept of 2.08. The high R-squared value of 0.788 signifies that approximately 78.8% of the variance in the level of pre-positioned stockpiles is explained by logistics performance. The data points cluster around the line of best fit, visually supporting the linearity assumption. Thus, the findings affirm that a linear model is appropriate for describing the relationship between these variables.

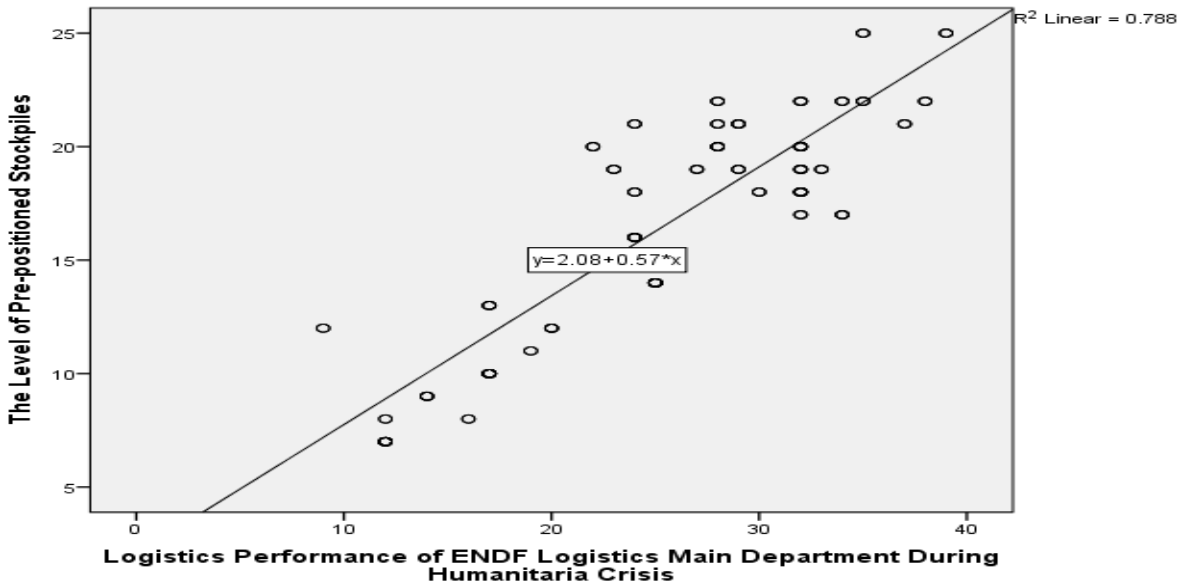

Figure 4.13: Testing Level of Prepositioned Stockpiles against Linearity Assumption

4.5.1.4. Between Deployment Speed of Logistics Units and Logistics Performance

The scatter plot demonstrates a strong positive linear relationship between the logistics performance of the Ethiopian National Defense Force (ENDF) Logistics Main Department during a humanitarian crisis and the deployment speed of military logistics units. The equation ($y = 1.51 + 0.57x$) indicates that for every unit increase in logistics performance, deployment speed increases by 0.57 units, with an intercept of 1.51. The high R-squared value of 0.706 signifies that approximately 70.6% of the variance in deployment speed is explained by logistics performance. The clustering of data points around the line of best fit visually supports the linearity assumption, affirming that a linear model is appropriate for describing the relationship between these variables.

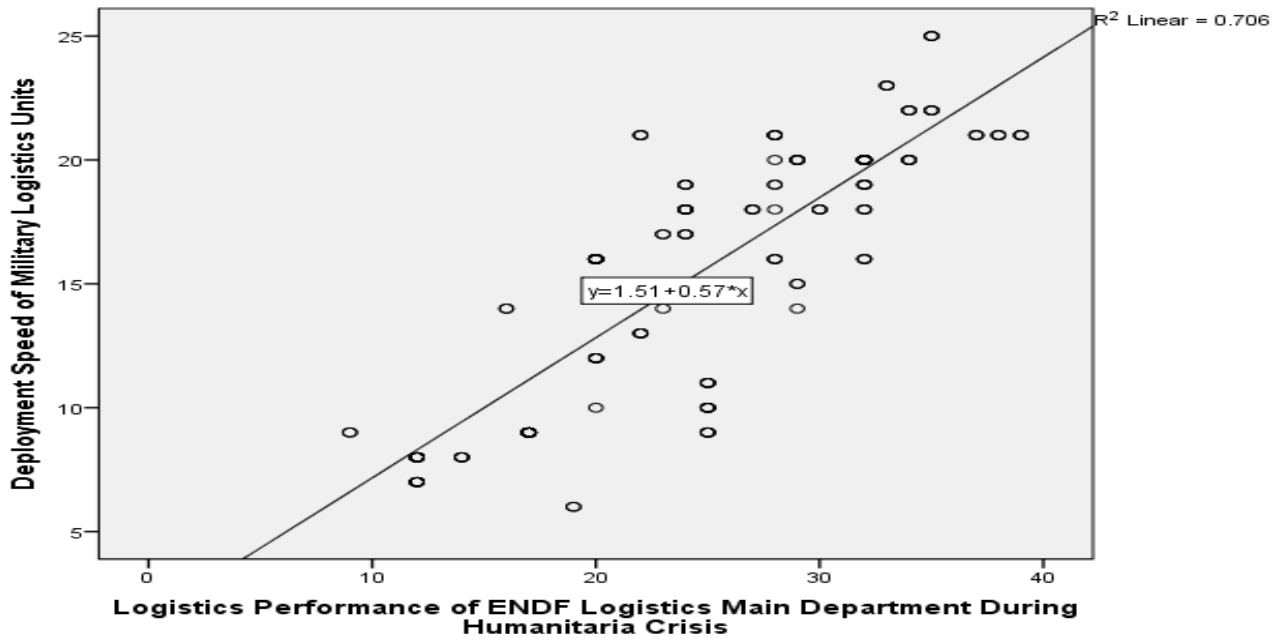

Figure 4.14: Linearity Test for Deployment Speed and Logistics Performance

4.5.1.5. Between Deployment Speed Logistics Units and Logistics Performance

The scatter plot demonstrates a strong positive linear relationship between the logistics performance of the Ethiopian National Defense Force (ENDF) Logistics Main Department during a humanitarian crisis and the deployment speed of military logistics units. The equation ($y = 1.51 + 0.57x$) indicates that for every unit increase in logistics performance, deployment speed increases by 0.57 units, with an intercept of 1.51. The high R-squared value of 0.706 signifies that approximately 70.6% of the variance in deployment speed is explained by logistics performance. The clustering of data points around the line of best fit visually supports the linearity assumption, affirming that a linear model is appropriate for describing the relationship between these variables.

4.5.1.6. Between Level of Training and Preparedness and Logistics performance

The scatter plot illustrates a linear relationship between the logistics performance of the ENDF Logistics Main Department during humanitarian crises (x-axis) and the level of training and preparedness among military logistics personnel (y-axis). The regression line, denoted by the equation ($y = 3.13 + 0.49x$), indicates that for each unit increase in logistics performance, the level of training and preparedness among personnel increases by 0.49 units. The R^2 value of 0.719 suggests that 71.9% of the variability in the level of training and preparedness can be explained by changes in logistics performance, indicating a robust positive linear correlation. This high R^2 value and the well-aligned data points around the regression line signify a strong fit, confirming that an increase in logistics performance correlates with enhanced training and preparedness among military logistics personnel.

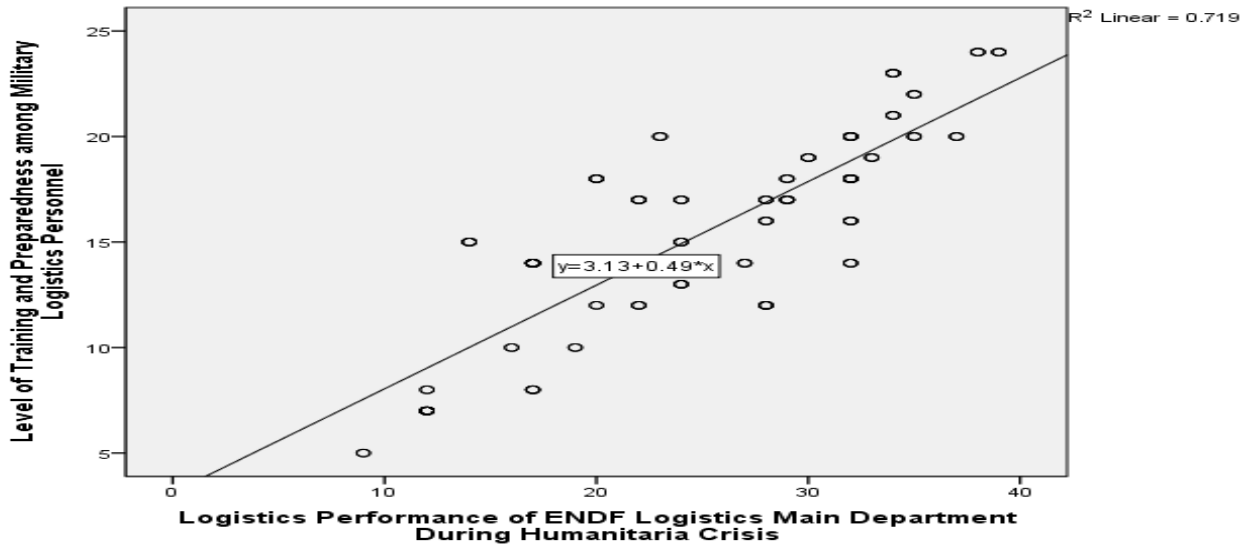

Figure 4.15: Linearity Test for Level of Training and Preparedness with Logistics Performance

4.5.2. Testing the Assumption of Autocorrelation

Table 4-9: Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.944[a]	.891	.888	2.540	1.697

a. Predictors: (Constant), Level of Training and Preparedness among Military Logistics Personnel, Deployment Speed of Military Logistics Units, Resource Allocation and Utilization, Organizational Structure , The Level of Pre-positioned Stockpiles

b. Dependent Variable: Logistics Performance of ENDF Logistics Main Department During Humanitaria Crisis

As it can be seen from the above table, the Durbin-Watson statistic is 1.697. This statistic, which ranges from 0 to 4, is used to detect the presence of autocorrelation in the residuals of the regression model. When the value is 2, it implies no autocorrelation; when the value is close to 0, it indicates positive autocorrelation; and when the value is close to 4, it indicates negative autocorrelation.

The Durbin-Watson value of 1.697 is close to 2, suggesting that there is little to no autocorrelation in the residuals. This implies that the residuals are relatively independent of each other, supporting the assumption that there is no significant autocorrelation issue in the regression model. Consequently, the model's assumptions hold up well, contributing to the overall validity of the regression analysis.

4.5.3. Testing the Assumption of Multicollinearity

Multicollinearity, the high correlation between predictor variables in a multiple regression model, can significantly impact the analysis and conclusions of a study (Schreiber-Gregory, 2017). It is a matter of degree, not just presence, and can lead to imprecise estimations (Paul, 2008). Detection methods include the correlation matrix, variance influence factor (VIF), and eigenvalues of the correlation matrix (Kim, 2019). A VIF greater than 5 to 10 or condition indices greater than 10 to 30 can be used to detect the presence of multicollinearity (Kim, 2019). Advanced regression procedures such as principal components regression, weighted regression, and ridge regression can help mitigate multicollinearity (Shrestha, 2020).

Table 4-10: Testing Multicollinearity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-.111	.710		-.157	.876		
	Organizational Structure	.268	.078	.183	3.443	.001	.218	4.582
	Resource Allocation and Utilization	.287	.091	.184	3.172	.002	.181	5.514

	The Level of Pre-positioned Stockpiles	.473	.106	.303	4.466	.000	.133	7.493
	Deployment Speed of Military Logistics Units	.125	.090	.084	1.397	.164	.168	5.950
	Level of Training and Preparedness among Military Logistics Personnel	.474	.075	.274	6.286	.000	.322	3.106

a. Dependent Variable: Logistics Performance of ENDF Logistics Main Department During Humanitaria Crisis

The findings from the regression analysis presented in the above table indicate the presence of multicollinearity among the predictors, which can complicate the interpretation of individual predictor effects. The Collinearity Statistics, specifically Tolerance and Variance Inflation Factor (VIF), are utilized to evaluate this assumption.

For the predictor ***Organizational Structure***, the coefficient (B) is 0.268 with a standard error of 0.078, yielding a Beta value of 0.183. The t-value is 3.443 with a significance level (Sig.) of 0.001. The Tolerance for this variable is 0.218, and the VIF is 4.582, indicating moderate multicollinearity. The variable ***Resource Allocation and Utilization*** has a coefficient (B) of 0.287 with a standard error of 0.091, and a Beta value of 0.184. The t-value is 3.172, with a significance level of 0.002. Its Tolerance is 0.181, and the VIF is 5.514, which also points to moderate multicollinearity.

The Level of Pre-positioned Stockpiles exhibits a coefficient (B) of 0.473, a standard error of 0.106, and a Beta value of 0.303. The t-value is 4.466 with a significance level of 0.000. This predictor has the lowest Tolerance of 0.133 and the highest VIF of 7.493, indicating significant multicollinearity.

For the ***Deployment Speed of Military Logistics Units,*** the coefficient (B) is 0.125 with a standard error of 0.090, and a Beta value of 0.084. The t-value is 1.397, with a significance level of 0.164. Its Tolerance is 0.168, and the VIF is 5.950, suggesting moderate to high multicollinearity.

Lastly, the ***Level of Training and Preparedness among Military Logistics Personnel*** shows a coefficient (B) of 0.474, a standard error of 0.075, and a Beta value of 0.274. The t-value is

6.286, with a significance level of 0.000. This variable has the highest Tolerance of 0.322 and the lowest VIF of 3.106 among the predictors, indicating lower multicollinearity relative to the other variables.

Overall, the analysis reveals the presence of multicollinearity among the predictors, with The Level of Pre-positioned Stockpiles showing significant multicollinearity, as indicated by a VIF of 7.493 and a Tolerance of 0.133. Other predictors exhibit moderate multicollinearity, with VIF values above 4. The existence of multicollinearity can distort the regression coefficients, making it challenging to accurately determine the individual effect of each predictor.

4.5.4. Testing the Assumption of Homoscedasticity

Regression analysis operates under the premise of homoscedasticity, which states that the variance of the residuals, or mistakes, should be constant at all projected value levels. If this supposition is true, the residuals' distribution ought to be nearly uniform throughout the range of anticipated values. In the event that the heteroscedasticity assumption is broken, the residuals will exhibit a pattern in which the spread varies with the expected values. This might result in estimates that are not accurate and erroneous statistical conclusions (Kutner et al., 2004). The scatter plot of standardized residuals versus standardized predicted values for the logistics performance of the ENDF Logistics Main Department during a humanitarian crisis shows a random distribution around the horizontal axis, indicating constant variance and supporting the assumption of homoscedasticity. The absence of patterns such as fanning or funneling suggests that the variance of the residuals remains consistent across predicted values. This confirms that the regression model's standard errors are reliable and its estimates are unbiased, thereby validating the model's robustness and ensuring that the results are trustworthy for interpretation.

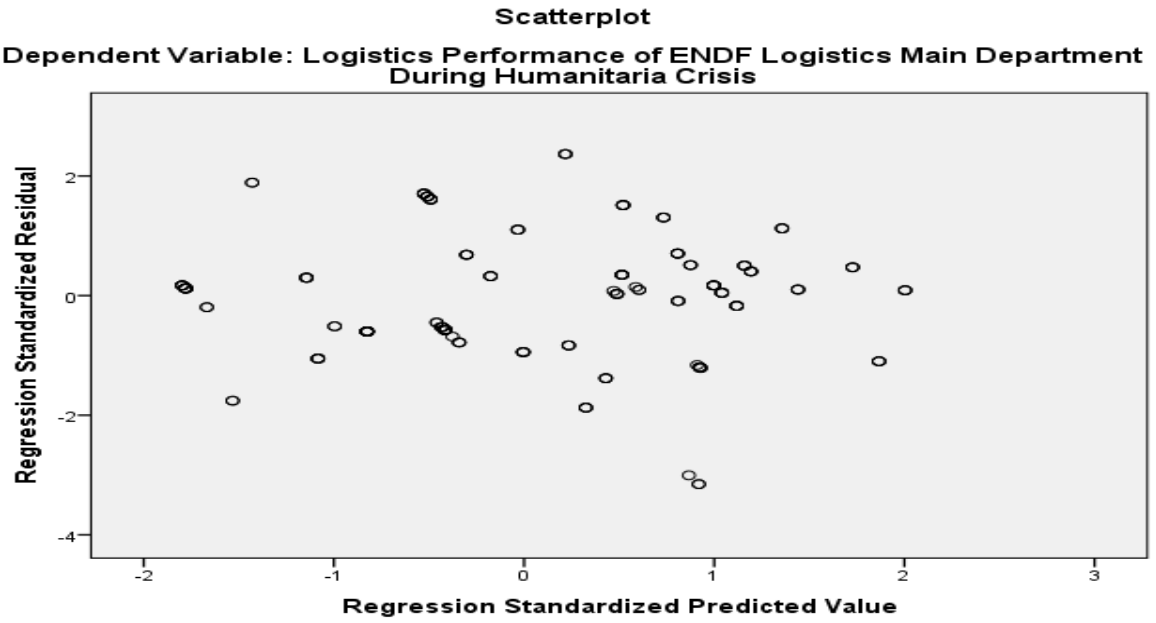

Figure 4.16: Testing for the Hemoscedastisity Assumption

4.5.5. Testing the Assumption of Normality

Table 4-11: Testing for Normality Distribution

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Organizational Structure	184	.215	.179	-1.473	.356
Resource Allocation and Utilization	184	.301	.179	-1.009	.356
The Level of Pre-positioned Stockpiles	184	-.329	.179	-.781	.356
Deployment Speed of Military Logistics Units	184	-.267	.179	-1.263	.356
Level of Training and Preparedness among Military Logistics Personnel	184	-.215	.179	-.236	.356
Valid N (listwise)	184				

Table 4.9 depicted the Skewness value for the Organizational Structure, Resource Allocation and Utilization, Level of Pre-positioned Stockpiles, Deployment Speed of Military Logistics Units, and Level of Training and Preparedness among Military Logistics Personnel and provided a detailed assessment of the data's distributional characteristics. Skewness values for all variables are relatively close to zero, indicating that the distributions are fairly

symmetrical. Although there are minor deviations, such as slight positive skewness for Organizational Structure (0.215) and Resource Allocation (0.301), and slight negative skewness for The Level of Pre-positioned Stockpiles (-0.329), Deployment Speed (-0.267), and Level of Training (-0.215), these values suggest the absence of significant asymmetry. Despite these deviations from perfect normality, particularly in terms of kurtosis, the relatively large sample size (N=184 for all variables) enhances the robustness of parametric tests due to the Central Limit Theorem, which implies that the sampling distribution of the mean will approximate normality.

In addition to this, the provided Q-Q plot (plots are appended; see Appendix V) were employed to see the pattern of distribution of Organizational Structure, Resource Allocation and Utilization, level of prepositioned stockpile, deployment speed of military logistics units, and the level of training and preparedness data to visually assesses the dataset's distribution against a theoretical normal distribution by plotting observed values against expected normal values. The data points align closely with the 45-degree reference line in the central range (observed values from approximately 10 to 20) for almost all variables with a very slight variation, indicating that the dataset reasonably approximates normality. The researcher is further verified by employing non-parametric methods to ensure the accuracy and reliability of the statistical conclusions drawn.

This suggests that it is feasible to proceed with inferential statistics, such as t-tests and ANOVA. Inferential statistics is also presented in the upcoming part of the study to ensure the accuracy and reliability of the statistical conclusions drawn.

4.5.6. Summary of the Assumption Test Results

Following the assumption tests, the model conformed well to almost all criteria, except for an evident issue of multicollinearity. Multicollinearity, characterized by high correlations among predictor variables, can significantly affect the significance of variables in regression analysis. It can diminish the power of statistical tests, produce biased parameter estimates, and introduce non-monotonic relationships within the data (Feng, 2017; Je, 1977). Consequently, this may result in variables displaying opposite signs or becoming insignificant, despite their theoretical or practical importance (Olivia, 2010). The problem intensifies when the model includes an excessive number of variables, leading to strong inter-correlations (Barakat, 2023). To mitigate the effects of multicollinearity, various strategies

have been proposed, one among thus are, eliminating highly correlated variables (Olivia, 2010).

Addressing multicollinearity in regression analysis often necessitates the removal of variables that exhibit high multicollinearity. Landge (2017) suggested a method for compressing dependent elements in a multiset to facilitate the exclusion of such variables. In parallel, Singh (2023) recommended using Hatvalues to identify and eliminate variables with high multicollinearity, thereby improving model accuracy. In alignment with these methodological guidelines and after a comprehensive assessment of the assumptions, the variable of this study which is ***the Level of Pre-positioned Stockpiles*** was excluded from the regression model due to its high Variance Inflation Factor (VIF) and low Tolerance values. The substantial multicollinearity associated with this variable indicated significant redundancy with other predictors, making it the optimal candidate for removal. This decision aims to mitigate the detrimental effects of multicollinearity and enhance the interpretability of the regression results.

4.6. Regression analysis

4.6.1. Hypotheses Testing

The study seeks to investigate the effect organizational structure, resource allocation, deployment speed of military logistics units, and level of training and preparedness of logistics personnel on logistics performance of the MoND logistics main department. The following hypotheses were proposed.

H1: There is a significantly positive impact of organizational structure on logistics performance of the MoND during a humanitarian crisis.

H2: There is a significantly positive impact of resource allocation and utilization on logistics performance of the MoND during humanitarian crisis.

H3: There is a significantly positive impact of deployment speed of military logistics units on logistics performance of the MoND during a humanitarian crisis.

H4: There is a significantly positive impact of the level of training and preparedness among military logistics personnel on logistics performance of MoND during a humanitarian crisis.

Table 4-12: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.937[a]	.879	.876	2.672

a. Predictors: (Constant), Level of Training and Preparedness among Military Logistics Personnel, Deployment Speed of Military Logistics Units, Resource Allocation and Utilization, Organizational Structure

The model summary of predictors and logistics performance was presented in table 4-10. And it shows the multiple correlation coefficient squared (R^2) = .879 depicts that the model explains 87.9% of the variance in Logistics Performance.

Table 4-13: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9245.685	4	2311.421	323.862	.000[b]
	Residual	1277.532	179	7.137		
	Total	10523.217	183			

a. Dependent Variable: Logistics Performance of ENDF Logistics Main Department During Humanitaria Crisis

b. Predictors: (Constant), Level of Training and Preparedness among Military Logistics Personnel, Deployment Speed of Military Logistics Units, Resource Allocation and Utilization, Organizational Structure

The regression model's ANOVA was demonstrated in table 4-11. The independent variables significantly predict logistics performance, F (4,179) = 323.862, P<.001, which indicates that the four variables understudy collectively have a significant impact on Logistics Performance.

Table 4-14: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.593	.728		.814	.416
	Organizational Structure	.265	.082	.181	3.245	.001
	Resource Allocation and Utilization	.457	.087	.293	5.277	.000
	Deployment Speed of Military Logistics Units	.399	.069	.269	5.804	.000
	Level of Training and Preparedness among Military Logistics Personnel	.489	.079	.283	6.175	.000

a. Dependent Variable: Logistics Performance of ENDF Logistics Main Department During Humanitarian Crisis

Additionally, coefficients were further assessed in table 4-12 to ascertain the influence of each of the factors on the criterion variable (Logistics Performance).

H1 evaluates whether organizational structure significantly and positively affects logistics performance. The result revealed that organizational structure has a significant and positive impact on logistics performance (B= .265, t = 3.245, P = .001). Hence, H1 was supported.

H2 evaluates whether resource allocation and utilization has significantly positive impact on logistics performance. The result shows that resource allocation and utilization has a significant and positive impact on logistics performance (B = .457, t = 5.277, P = .000). Consequently, H2 was supported.

H3 evaluates whether deployment speed of military logistics units has significantly positive impact on logistics performance. The result indicates that the deployment speed of military logistics units has a significant and positive impact on logistics performance (B = .399, t = 5.804, P = .000). Consequently, H3 was supported.

On the other hand, H4 evaluated whether level of training and preparedness among military logistics personnel has significantly positive impact on logistics performance. The result revealed that level of training and preparedness among military logistics personnel has a significant and positive impact on logistics performance (B = .489, t = 6.175, P = .000). Consequently, H4 was supported. The results are presented in Table 4-12 hereunder.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1. Introduction

The study findings are summarized in the final section in accordance with the five particular objectives of this research listed in the first chapter of this paper. It also presents implications drawn from the study's findings. Finally, recommendations based on the study's findings are given along with suggestions for further research.

5.2. Summary of Findings from the survey questionnaire

5.2.1. Organizational Structure and Logistics Performance

Respondents moderately concurred that the organizational structure, communication channels, decision-making processes, and alignment with operational requirements within the Ministry of National Defense (MoND) Logistics Main Department contribute to logistics performance during humanitarian crises, with mean scores ranging from 2.65 to 2.98, signifying areas for enhancement. A clearly delineated organizational structure is pivotal in bolstering logistics performance by fostering enhanced coordination, communication, integration, flexibility, resource allocation, and contingency planning.

5.2.2. Resource Allocation and Utilization

Respondents moderately concurred that the MoND Logistics Main Department effectively allocates and utilizes financial, human, and technological resources to bolster logistics operations during humanitarian crises, with mean scores ranging from 2.58 to 3.40. Additionally, respondents acknowledged the department's adequate access to resources such as transportation and storage facilities, highlighting the direct correlation between efficient resource utilization and enhanced logistics performance. The constraints posed by resource scarcity and the necessity for prioritization underscore the pivotal role of effective resource management in optimizing logistics capacity and bolstering the effectiveness of response efforts.

5.2.3. Deployment speed of military logistics units on Logistics Performance

The effectiveness of the Ministry of National Defense's logistics unit in crisis response was demonstrated by the range of mean values across key indicators. The unit displayed prompt mobilization and deployment capabilities upon activation (mean = 2.99), efficient

transportation of personnel, equipment, and supplies to affected areas via air and land routes (mean = 3.04), and maintained robust distribution networks, warehousing, and support facilities in deployment zones (mean = 2.83). Additionally, the unit exhibited adeptness in scaling up operations by utilizing supplementary resources (mean = 3.19) and fostering seamless integration with both military and civilian relief entities (mean = 3.28). Military deployment serves a vital role in addressing infrastructure challenges and access barriers, while bolstering security, coordination, and information management among stakeholders. Effective community engagement and cultural sensitivity by military personnel further augment the relevance and efficacy of relief efforts.

5.2.4. Level of Training and Preparedness on Logistics Performance

The unit exhibited strong preparedness and proficiency across various facets of crisis response, as evidenced by mean values across pertinent metrics. Regular conduct of realistic exercises, including simulations of rapid deployment and disaster relief (mean = 2.88), along with participation in joint exercises with other military entities (mean = 2.95), underscored the unit's commitment to readiness. Respondents expressed confidence in the personnel's grasp of logistics principles and crisis response best practices (mean = 3.22), proficiency in utilizing specialized crisis response equipment and technologies (mean = 2.92), and psychological preparedness to operate in high-stress environments (mean = 3.17). Enhanced training regimens not only contribute to operational efficiency through meticulous planning, execution, and resource management but also foster adaptability and flexibility, crucial for swift responses to dynamic crises. Well-prepared personnel demonstrate proficiency in risk identification and mitigation, thereby minimizing disruptions. Moreover, training emphasizes interagency collaboration and cultural sensitivity, facilitating effective stakeholder engagement.

5.2.5. Relationship between the Independent and Dependent Variables

Organizational Structure: This factor exhibited strong positive correlations with all other factors affecting logistics performance, as well as the dependent variable of Logistics Performance (correlation coefficients ranging from 0.807 to 0.844, all highly significant at $p < 0.01$). This suggests that organizational structure is closely tied to the other key factors and overall logistics performance.

Resource Allocation and Utilization: This factor also demonstrated strong positive correlations with all other factors (correlation coefficients from 0.759 to 0.877, all highly significant at $p < 0.01$). Effective resource allocation and utilization appears to be integral to the various aspects of logistics performance.

Deployment Speed of Military Logistics Units: This factor exhibited strong positive correlations with the other factors (coefficients from 0.718 to 0.898, all $p < 0.01$), indicating that faster deployment of logistics units is associated with enhanced overall logistics performance.

Level of Training and Preparedness: This factor also demonstrated substantial positive correlations with the other factors (coefficients from 0.718 to 0.848, all $p < 0.01$), suggesting that the training and preparedness of logistics personnel is a crucial aspect of logistics performance.

The regression analysis further supported these findings, with the four factors collectively explaining 87.9% of the variance in Logistics Performance and the regression results indicated that organizational structure, resource allocation and utilization, deployment speed of military logistics units, and level of training and preparedness all had statistically significant positive impacts on logistics performance.

5.3. Summary of the key findings from Interview

As per the interview conducted with logistic personnel assigned in various positions of the organization's hierarchy of the MoND logistics main department, the key findings are summarized hereunder.

Effective organizational structures play a critical role in enhancing the logistics performance of the MoND logistics main department during humanitarian crises. These structures promote collaboration, communication, and decision-making, which speed up the distribution of resources. Integration into unified command structures aligns logistics with broader response frameworks and enhances inter-agency coordination. Flexible structures enable rapid adaptation to dynamic situations, empowering frontline personnel who are engaged in the direct rescue mission during crisis. Resilient structures help with contingency planning and risk management. Clear organizational structures enable transparent and accountable resource distribution, ensuring that resources meet identified needs and optimize relief efforts.

- Building on this, transparent resource allocation optimizes relief efforts by addressing identified needs while resource constraints significantly limit logistics capacity and humanitarian response effectiveness. According to the interviewees' response then, prioritizing resource allocation based on the severity of needs and vulnerability of populations is crucial.
- Turning to the role of the military deployment, rapid military deployment helps mitigate infrastructure challenges and access difficulties, while also improving security, coordination, and information management among stakeholders. Effective community engagement and cultural sensitivity by military personnel enhance the relevance and impact of relief efforts.
- Lastly, enhanced training improves operational efficiency through effective planning, execution, and resource management. Regular drills and simulations enhance adaptability and flexibility, enabling swift responses to evolving crises. Well-prepared personnel are adept at risk identification and mitigation, minimizing disruptions. Training emphasizes interagency collaboration and cultural sensitivity, promoting effective stakeholder engagement.

Based on the summary of interview responses, it is valid to conclude that the hypothesized factors that affecting logistics performance such as, organizational structure, resource allocation and utilization, deployment speed of military logistics units, level of training and preparedness among military logistics units personnel are significantly impacting the logistics performance of the ENDF Logistics Main Department.

5.4. Conclusion

This study set out to determine the factors affecting logistics performance. In response to the objectives, the research showed that organizational structure, communication channels, decision-making processes, and alignment with operational requirements of the Ministry of National Defense (MoND) Logistics Main Department moderately support logistics performance during humanitarian crises, indicating room for improvement. Besides, this study intended to determine the relationship between organizational structure and logistics performance. As a result, there has been a significant positive relationship between organizational structure and logistics performance of the institution.

Regarding to the second objective, the MoND Logistics Main Department moderately allocates and efficiently utilizes financial, human, and technological resources to support

logistics operations during humanitarian crises and that efficient resource utilization directly contributes to improved logistics performance. However, interview findings highlighted that resource scarcity and prioritization can constrain logistics capacity and affect the effectiveness of response efforts, emphasizing the importance of effective resource management. In addition to this, it has been determine that resource allocation and utilization directly affects the logistics performance of the department during humanitarian crises.

With respect to the third objective, the logistics unit of the Ministry of National Defense was found to be generally effective in crisis response, with the ability to rapidly mobilize and deploy, quickly transport personnel and supplies, and maintain strong distribution networks and support facilities. On the other hand, the regression analysis portrayed a significant positive effect of deployment speed on logistics performance.

Furthermore, the fourth objective of this study had investigated the impact of the level of training and preparedness on logistics performance. Accordingly, it can be concluded that the critical role that comprehensive training and preparedness play in the effectiveness of military logistics operations during humanitarian crises. The robust training programs and regular exercises highlighted by respondents and interviewees alike demonstrate that well-prepared personnel are key to ensuring efficient resource allocation, timely aid delivery, and effective coordination with various stakeholders. However, the detrimental effects of inadequate training on operational efficiency, decision-making, and coordination emphasize the need for continuous improvement in training regimes. This factor also demonstrated substantial positive correlations with the other factors, suggesting that the training and preparedness of logistics personnel is a crucial aspect of logistics performance.

Regarding the Relationships between Factors, the four factors (organizational structure, resource allocation and utilization, deployment speed of military logistics units, and level of training and preparedness) exhibited strong positive correlations both among themselves and with the logistics performance dependent variable.

The regression analysis conducted to this end had further supported the significant positive impact of organizational structure, resource allocation and utilization, deployment speed of military logistics units, and level of training and preparedness on logistics performance.

To sum up, the findings suggest that the MoND Logistics Main Department has a moderately effective logistics performance, with room for improvement in certain areas. The

organizational structure, resource management, and personnel preparedness, and deployment speed are important factors in enhancing logistics performance of the ENDF Logistics main department during humanitarian crises.

5.5. Recommendations

Based on the findings and conclusions drawn, the following recommendations were made to enhance the positive impacts played by the factors affecting the logistics performance of MoND Logistics main department. By addressing these key recommendations, the MoND Logistics Main Department can enhance its overall logistics performance, improve its ability to effectively respond to humanitarian crises, and better support the broader national disaster management efforts.

- The logistics main department should consider carrying out a thorough review of the organizational structure, communication channels, and decision-making processes to identify areas for improvement.
- The department should look into implementing measures to better align the organizational design with operational requirements and enhance overall logistics performance during humanitarian crises, such as improving coordination, integration, and flexibility within the department.
- The department should look to conduct a comprehensive assessment of its resource allocation and utilization practices to address resource scarcity and prioritize the allocation of financial, human, and technological resources to critical logistics operations.
- The department should continue investing in the training and professional development of logistics personnel to enhance their understanding of logistics principles and proficiency in operating special equipment and technologies.
- The department should look into increasing the frequency and realism of exercises and joint training with other military and civilian organizations to improve overall preparedness and psychological readiness for high-stress, fast-paced humanitarian crises, and leverage the expertise and lessons learned from experienced personnel.
- The department should work on fostering stronger collaboration and information-sharing between the MoND Logistics Main Department and other relevant government agencies, civil society organizations, and international partners involved in humanitarian response efforts.

- It is better for the department to focus on establishing clear communication channels and decision-making protocols to facilitate efficient coordination during crisis situations and explore opportunities for joint training, sharing of resources and the creation of integrated logistics networks.
- The department is better to implement a robust monitoring and evaluation framework to regularly assess its performance and identify areas for improvement.
- The department is recommended to incorporate feedback from field personnel, the needy and other stakeholders to ensure its practices remain responsive to evolving operational needs and inform ongoing refinements and strategic decision-making.

5.6. Suggestion for Further Study

The present investigation effectively elucidates 87.9% of the variability in Logistics Performance, demonstrating the significant impact of the four examined factors. However, the detected multicollinearity in between variables would have been impacting the regression analysis and impede from looking the real contribution of variables, individually and the significance it will have. To rid of this one of the variables has been eliminated since it is recommendable to do so (Oliva, 2010; Landge, 2017; and Singh, 2-23). Therefore, future researchers who are interested in this field of study are recommended to see and further investigate the impact of the level of prepositioned stockpiles on logistics performance of a specific army logistics unit.

Furthermore, researchers are advised to check and verify whether *the level of prepositioned stockpiles* and ***resource allocation and utilization*** are complementary and to try combining these two variables and to check the other way recommended in case of multicollinearity.

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LIST OF APPENDICES

Appendix I: Survey Questionnaire

Addis Ababa University Faculty of Business and Economics School of Commerce

Logistics and Supply Chain Management Program Unit

Questionnaire to be filled by Respondents

Dear respondent,

I would like to express my sincere gratitude for your cooperation and honesty in answering the research questions below. The purpose of this questionnaire is to gather information and data for academic research on the topic of "Factors Affecting Logistics Performance during Humanitarian Crisis: the Case of Ethiopian Ministry of National Defense, Logistics Main Department". This questionnaire is part of my final thesis for a Master's Degree in Logistics and Supply Chain Management.

Your responses are crucial to the success of this study. Therefore, I kindly ask that you provide thorough and objective answers to all questions. I would like to assure you that your responses will be used solely for academic purposes and will remain anonymous.

Thank you in advance for your invaluable cooperation.

Venue: Before answering the questions, please read the following instructions carefully.

- Do not provide your name in this questionnaire.
- Please answer the following questions openly and frankly by marking (√) on the space provided along each question.

Sintayehu Kiros
Graduate Student at AAU, SoC
Email: Sentasintayehu@gmail.com
Phone No: +251904207122

Part One-Background information of respondents

- NB: The military rank **NCO** has purposely put here to define the Non Commissioned Officers working in the Logistics Main Department.

Work experience in the field of Logistics (in year)		**Military Rank**		**Educational Status**		**Position Assigned**	
Less than 5	☐	General officer	☐	Masters & above	☐	Main dep't head	☐
5 -10	☐	Higher officer	☐	BA/B.sc	☐	Department head	☐
11 – 15	☐	Line officer	☐	Diploma	☐	Experts' Team leader	☐
16- 20	☐	NCO	☐	Certificate/TEVT	☐	Logistics Expert	☐
21 & Above	☐	Private	☐	Other	☐	Others	☐

Part Two: Questionnaires focusing on the impacts Influencing Logistics performance of ENDF Logistics Main Department

- **Key: 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree**

No		Factors affecting Logistics Performance	1	2	3	4	5
1	**Organizational structure**						
	1.1	The organizational structure of the Ministry of National Defense (MoND) Logistics Main Department effectively supports logistics performance during humanitarian crises					
	1.2	The communication channels within the MoND Logistics Main Department are efficient and contribute to logistics performance during humanitarian crises.					
	1.3	The decision-making process in the MoND Logistics Main Department is streamlined and facilitates logistics performance during humanitarian crises.					

	1.4	The organizational structure of the MoND Logistics Main Department is well-designed and supports efficient logistics performance during humanitarian crises					
	1.5	The organizational structure of the MoND Logistics Main Department aligns with the requirements and demands of managing logistics operations during humanitarian crises.					
2	**Resource allocation and utilization**						
	2.1	Adequate resources (financial, human, and technological) are allocated to support logistics operations during humanitarian crises.					
	2.2	The resources allocated to logistics operations in the MoND Logistics Main Department are efficiently utilized to enhance logistics performance.					
	2.3	The MoND Logistics Main Department has sufficient access to resources (e.g., transportation, storage facilities) to meet the demands of humanitarian crises.					
	2.4	The allocation of resources in the MoND Logistics Main Department is aligned with the specific needs and challenges of logistics operations during humanitarian crises.					
	2.5	The efficient utilization of resources directly contributes to improved logistics performance during humanitarian crises.					
3	**The level of pre-positioned stockpiles**						
	3.1	The MoND Logistics Main Department maintains sufficient pre-positioned stockpiles of essential supplies and equipment to respond effectively to humanitarian					

		crises.					
	3.2	The inventory management system in the MoND Logistics Main Department ensures timely replenishment of pre-positioned stockpiles during humanitarian crises.					
	3.3	The level of pre-positioned stockpiles directly affects the logistics performance of the MoND Logistics Main Department during humanitarian crises.					
	3.4	The MoND Logistics Main Department regularly assesses and updates the level of pre-positioned stockpiles based on the anticipated needs and risks of humanitarian crises.					
	3.5	The availability of adequate pre-positioned stockpiles positively influences the overall logistics performance of the MoND Logistics Main Department during humanitarian crises.					
4	**Information sharing and technology**						
	4.1	The MoND Logistics Main Department effectively shares critical information with relevant stakeholders during humanitarian crises.					
	4.2	The use of advanced technology (e.g., information systems, communication tools) enhances the efficiency and effectiveness of logistics operations during humanitarian crises.					
	4.3	Timely and accurate information sharing among different units and stakeholders positively impacts logistics performance in the MoND Logistics Main Department during humanitarian crises.					

	4.4	The MoND Logistics Main Department utilizes technology-enabled tracking and monitoring systems to improve visibility and control over logistics operations during humanitarian crises.					
	4.5	The effective utilization of information sharing and technology significantly contributes to the overall logistics performance of the MoND Logistics Main Department during humanitarian crises.					
5	**Collaboration and coordination with external partners**						
	5.1	The MoND Logistics Main Department actively collaborates with external partners (e.g., NGOs, international organizations) to enhance logistics performance during humanitarian crises.					
	5.2	Effective coordination with external partners positively influences the speed and efficiency of logistics operations during humanitarian crises in the MoND Logistics Main Department.					
	5.3	The MoND Logistics Main Department maintains strong relationships and communication channels with external partners to ensure seamless logistics coordination during humanitarian crises.					
	5.4	Collaborative planning and joint decision-making with external partners improve the overall logistics performance of the MoND Logistics Main Department during humanitarian crises.					

	5.5	The successful collaboration and coordination with external partners significantly contribute to the effectiveness and impact of logistics operations during humanitarian crises in the MoND Logistics Main Department.					
6	**Deployment speed of military logistics units**						
	6.1	This logistics unit can mobilize and begin deploying quickly after being activated for a crisis					
	6.2	The logistics unit can quickly transport personnel, equipment, and supplies to the affected region via air and sea.					
	6.3	The logistics unit has strong distribution networks, warehousing, and support facilities in the deployment area.					
	6.4	The logistics unit can quickly scale operations by drawing on additional personnel, equipment, and supplies.					
	6.5	The logistics unit can seamlessly integrate with and support other military and civilian relief organizations involved in the crisis response.					
7	**Level of training and preparedness among military logistics personnel**						
	7.1	This logistics unit frequently conducts realistic exercises simulating rapid deployment, disaster relief operations, and humanitarian assistance scenarios.					
	7.2	Logistics personnel from this unit participate in joint exercises with other military units and civilian aid organizations.					
	7.3	The logistics unit's personnel understand logistics principles, processes, and best practices for crisis response.					
	7.4	The unit's personnel are proficient in operating specialized equipment and technologies required for crisis response.					
	7.5	The logistics personnel in this unit are psychologically prepared to operate in high-stress, fast-paced crisis					

		environments.					

Part Three – Questions focusing on measuring the Logistics performance of the ENDF Logistics Main Department during Humanitarian Crisis

- Please show your degree of Agreement/Disagreement on the logistics performance of MoND Logistics Main Department during humanitarian crises.
- **Key: 1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree**

No	**Logistics Performance of the MoND Logistics Main Department**		**1**	**2**	**3**	**4**	**5**
3.	**Measurement Parameters**						
3.1	**On-Time Delivery**	The MoND Logistics Main Department logistics operations during humanitarian crises consistently achieve on-time delivery of essential supplies					
3.2	**Inventory Accuracy**	The MoND Logistics Main Department logistics performance during humanitarian crises maintains high levels of inventory accuracy.					
3.3	**Fill Rate**	The Logistics department performs consistently by achieving a high fill rate, ensuring that requested items are fully available and delivered during its engagement in humanitarian crises.					
3.4	**Transportation Cost**	While conducting logistics operations during humanitarian crises the MoND Logistics main Department effectively manages transportation costs, optimizing efficiency while minimizing expenses.					
3.5	**Asset Utilization**	The Logistics Main Department efficiently utilizes assets, such as vehicles, equipment, and facilities, to support timely and effective operations during humanitarian crises.					

3.6	**Order Accuracy**	The MoND Logistics Main Department consistently achieves high order accuracy, ensuring that the correct items are delivered as requested during crises.					
3.7	**Lead Time**	The military logistics operations of MoND logistics Main Department during humanitarian crises consistently meet or exceed the expected lead time for delivering supplies and resources.					
3.8	**Maintenance and Repair Cycle Time**	The main department effectively manages maintenance and repair cycle time, ensuring timely maintenance and repair activities for essential equipment and assets during humanitarian crises.					

Thank you for your participation! Your responses will be valuable in this research.

Appendix II: Interview Guiding Questions

Part One: Open-ended questions

1. Can you describe the factors that you believe significantly affect logistics performance during humanitarian crises?
2. In your opinion, what are the key challenges faced in managing logistics operations during humanitarian crises?
3. How do you perceive the impact of organizational structure on logistics performance during humanitarian crises?
4. From your experience, what are the main factors that contribute to the success or failure of logistics operations during humanitarian crises?
5. How do you perceive the relationship between logistics technical operations and the overall logistics performance in the context of humanitarian crises?
6. In your opinion, what role does effective planning play in ensuring efficient logistics operations during humanitarian crises?

Part Two: Probing questions

1. Could you provide specific examples where the organizational structure influenced logistics performance during a humanitarian crisis?
2. Can you elaborate on the resource allocation and utilization challenges you have encountered during humanitarian crises?
3. How have the levels of pre-positioned stockpiles impacted logistics operations in the context of humanitarian crises?
4. Can you provide examples for deployment speed of military logistics unit's issues that have impacted logistics performance during humanitarian crises?
5. Could you explain the relationship between the level of training and preparedness among military logistics personnel and the success of logistics operations during humanitarian crises?

Part Three: Experience-based questions

1. Can you recall a situation where the deployment speed of military logistics units played a crucial role in the success of a humanitarian response? Could you describe that situation and its outcomes?

2. Have you observed any instances where the level of training and preparedness among military logistics personnel affected logistics performance during a humanitarian crisis? Could you share an example?
3. Based on your experience, what are some best practices or strategies that have proven effective in managing logistics during humanitarian crises?
4. Have you observed any specific challenges or lessons learned regarding the coordination and collaboration between military logistics units and non-governmental organizations (NGOs) during humanitarian crises?

Part Four: Closing questions

1. Based on your experience, what recommendations would you provide to improve logistics performance during humanitarian crises in the context of the Ethiopian Ministry of National Defense?
2. Is there anything else you would like to add or any additional insights you would like to share regarding the factors affecting logistics performance during humanitarian crises?
3. Considering the factors you have mentioned, how do you think the Ethiopian Ministry of National Defense can improve its logistics performance during future humanitarian crises?
4. Is there any research gap or specific area within logistics and supply chain management during humanitarian crises that you believe requires further exploration?

Appendix III: Support Letter from AAU, SoC

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ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

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አዲስ አበባ ኢትዮጵያ ADDIS ABABA, ETHIOPIA

Our Ref AAU/SOC/LSCM/ 09 /2023

Date: 12/11/2023

To Whom It May Concern

Subject : Request for cooperation

Dear sir/Madam

Student Sintayehu Kiros, ID No. GSE/1144/12, is an Postgraduate program student at Addis Ababa University, school of commerce, Logistics And Supply Chain Management unit. Currently he is conducting a research project entitled, Factors Affecting Logistics performance during humanitarian Crisis, the Case of Federal Democratic Republic of Ethiopia, MoND, Logistics Main Dept, as a requirement for The Course For The Project In Financial Logistics.

I would like to appreciates your cooperation in providing the data and other relevant information to our student for the research project that he/she is conducting. Thank you in advance for the usual support.

Sincerely,

Busha Tenessea (Dr)
Head, Logistics & Supply Chain Management Unit
School of Commerce
Faculty of Business and economics
Addis Ababa University

Tel : +251115581787

Tel:+251115583615

APPENDIX IV: Ethical Clearance from ENDF Research Development Center

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The F.D.R.E. Ministry of Defence
Center for Research and Development

ስልክ/Tel. +251 115 310 173
ፋክስ/Fax +251 115 310 162
ኢሜይል/e-mail etmond.randd@gmail.com
✉ 1373
አዲስ አበባ/Addis Ababa ኢትዮጵያ/Ethiopia

ቀን 25-12-2023
Date

ቁጥር [illegible]/ዘ02/1045/16
Ref.No.

December 25, 2023

Sintayehu Kiros Tesfay

Addis Ababa, Ethiopia

sentasintayehu@gmail.com

Dear Sintayehu Kiros Tesfay,

Subject: Ethical Clearance for Research Study Titled "Factors Affecting Logistics Performance during a Humanitarian Crisis: The Case of MoND Logistics Main Department"

The Research and Development Center of the FDRE Ministry of National Defense has reviewed your application for ethical clearance for the study titled "Factors Affecting Logistics Performance during a Humanitarian Crisis: The Case of MoND Logistics Main Department."

We are pleased to inform you that the committee has thoroughly examined the ethical aspects of your proposed research and has granted ethical clearance to proceed with your study under the following conditions:

1. Compliance with Ethical Standards: You must adhere to the ethical guidelines and standards set forth by the committee throughout the duration of your study. This includes, but is not limited to, obtaining informed consent from all participants, ensuring confidentiality and anonymity, and minimizing any potential risks to participants.

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2. Periodic Reporting: You are required to submit periodic progress reports to the committee every three months. These reports should include any deviations from the approved protocol, unexpected issues, or incidents, and how they were addressed.
3. Final Report Submission: Upon completion of your study, a final report must be submitted to the committee, summarizing the research findings and any ethical issues encountered during the study.
4. Adverse Events: Any adverse events or significant ethical concerns that arise during the course of the research must be reported to the committee immediately.
5. Amendments: Any changes to the research protocol or methodology must be approved by the committee before implementation.

This ethical clearance is valid from 12/11/2023 to 07/06/2024. Should your study extend beyond this period, a renewal of the ethical clearance must be sought.

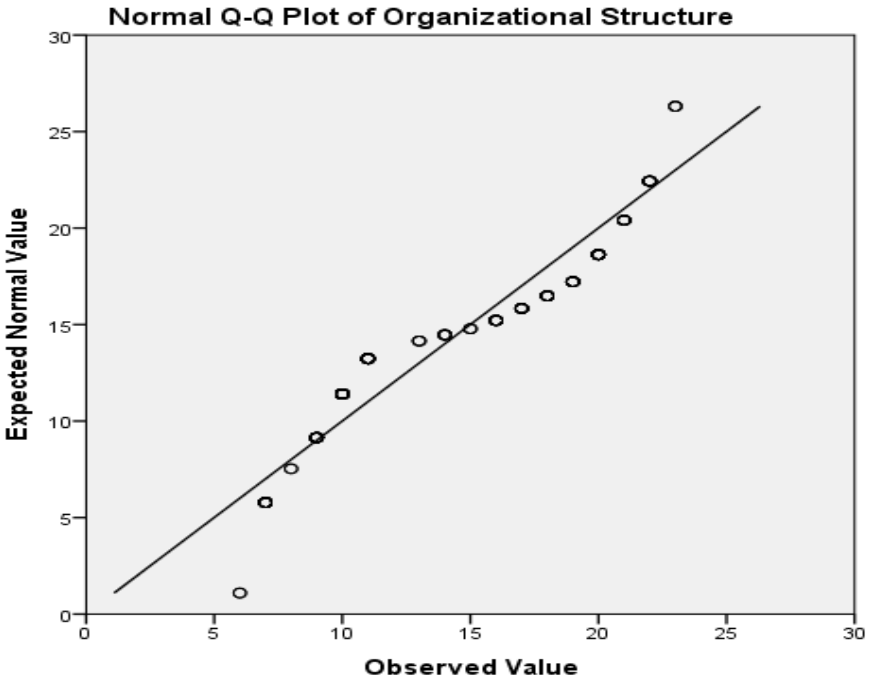
We wish you success in your research endeavors and trust that you will uphold the highest ethical standards.

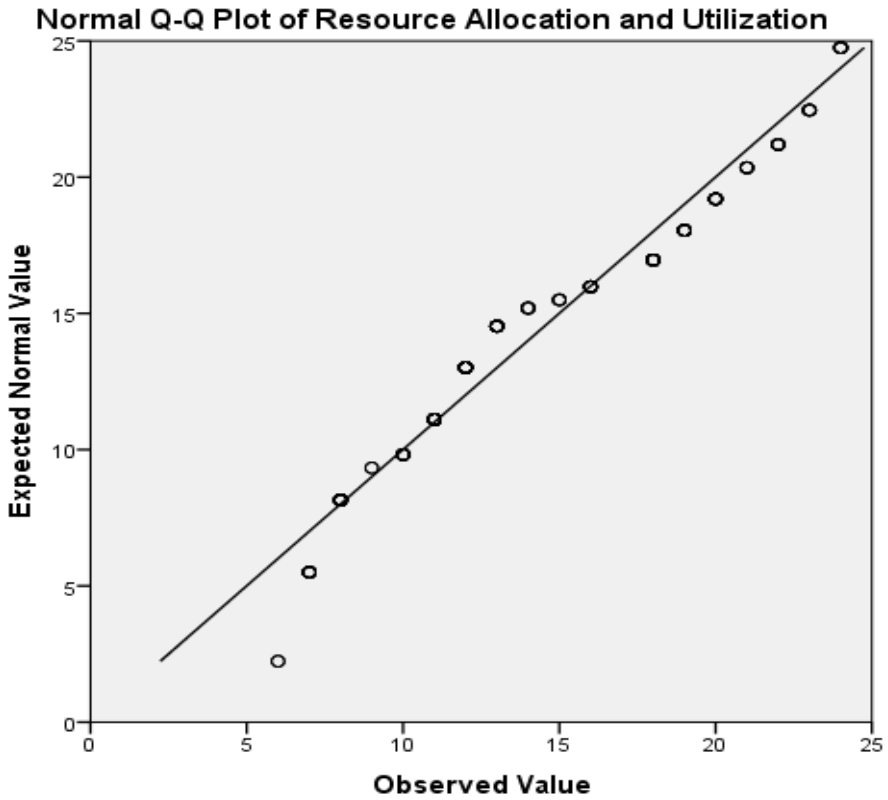
Sincerely,

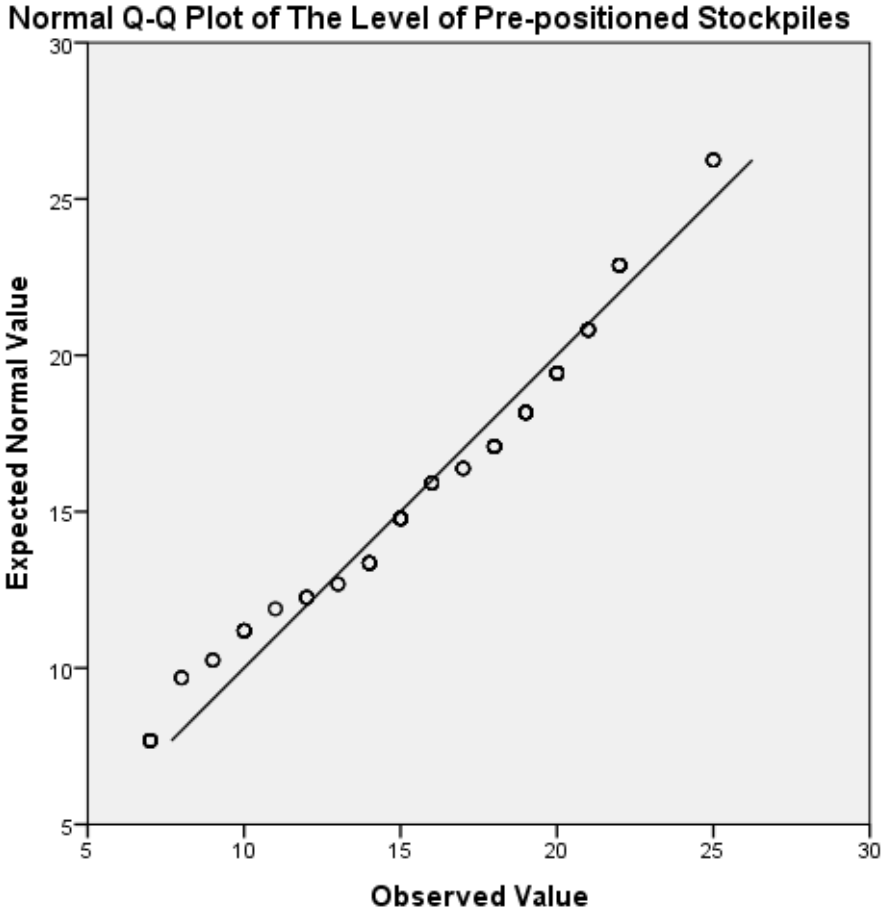
Phone No: +251929480505

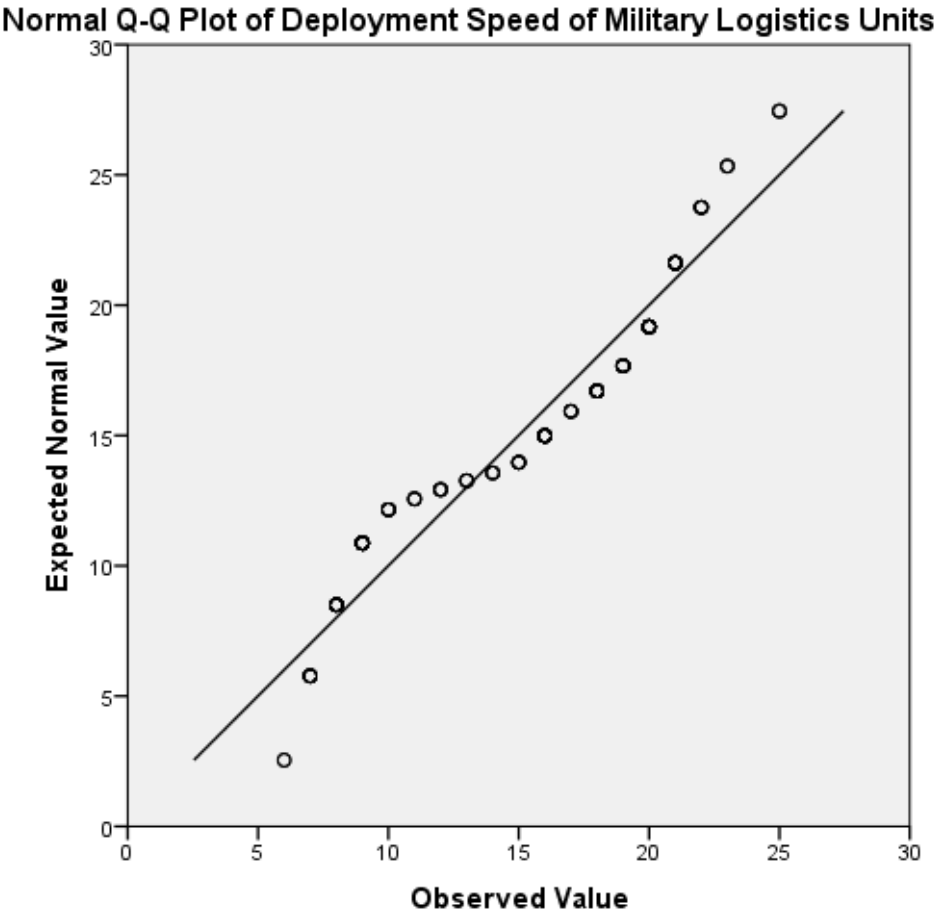
Email: sikotawwondimu@gmail.com

APPENDIX V: A Normal Q-Q Plots






Normal Q-Q Plot of The Level of Pre-positioned Stockpiles
Expected Normal Value
Observed Value
30
25
20
15
10
5
5
10
15
20
25
30


Normal Q-Q Plot of Deployment Speed of Military Logistics Units
Expected Normal Value
Observed Value
0
5
10
15
20
25
30


Normal Q-Q Plot of Level of Training and Preparedness among Military Logistics Personnel
Expected Normal Value
Observed Value
0
5
10
15
20
25

Normal Q-Q Plot of Logistics Performance of ENDF Logistics Main Department During Humanitaria Crisis