**THE ROLE OF LOGISTICS IN DISASTER RISK MANAGEMENT A CASE STUDY OF FIRE RESCUE FORCE IN DODOMA**

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**A DISSERTATION SUBMITED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (MBA)**

**DEPARTMENT OF ACCOUNTING AND FINANCE OF THE**

**OPEN UNIVERSITY OF TANZANIA**

**2025**

# CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Open University of Tanzania a dissertation titled: **"The Role of Logistics in Disaster Risk Management. A Case of Fire Rescue Force in Dodoma"** in partial fulfillment of the requirements for the degree of Master of Business Administration of the Open University of Tanzania.

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# **DEDICATION**

This study is dedicated wholeheartedly to my beloved family, whose unwavering love and endless support have illuminated every step of my educational journey. I pray that God showers them abundantly with blessings for their boundless care and encouragement.

# **ACKNOWLEDGEMENTS**

I am profoundly thankful to my Almighty God for blessing me with life and good health, enabling me to successfully complete this study and finalize this dissertation. I extend my heartfelt appreciation to Dr. Michael Mwacha and Dr. Salvio Macha, my supervisors, for their valuable support and guidance throughout this research. Working under their mentor-ship has been a tremendous blessing, as their insightful feedback and assistance have greatly influenced the development and presentation of this dissertation. Furthermore, I wish to express my gratitude to all my colleagues for their unwavering support during this academic journey.

# **ABSTRACT**

This study explores the role of logistics in effective disaster risk management, focusing on the Fire and Rescue Force in Dodoma, Tanzania. The research examines the effectiveness of current logistical strategies and processes, evaluates the impact of logistical resources, and proposes improvements in logistical planning and coordination to enhance disaster management capabilities.The study employed a quantitative approach, descriptive design for a sample size of 194 respondents and use hypotheses to determine the significance of logistical factors in disaster management. The findings reveal that current logistical strategies and processes significantly contribute to disaster risk management, while the availability and quality of logistical resources positively impact efficiency and responsiveness. Additionally, enhancements in logistical planning and coordination markedly improve disaster management capabilities. These results underscore the pivotal role of well-structured logistical frameworks in disaster risk management and highlight the necessity for strategic investments in resources and planning. The study recommends for strengthening logistical systems, thereby enabling the Fire and Rescue Force in Dodoma to effectively manage disaster risks and enhance community safety.

**Key words**:Disaster, risk management, Dodoma, Tanzania

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# LIST OF ABBREVIATIONS

AI Artificial Intelligent

AQLR Availability and Quality of Logistical Resources

CLSE Current Logistic Strategies Processes for Effective Disaster Risk

DRM Disaster Risk Management

DRME Disaster Risk Management Effectiveness

ILPC Improvements in Logistic Planning and Coordination

Management

MBA Master of Business Administration

SD Standard Deviation

SPSS Statistical Package for Social Sciences

TEM Theory of Emergency Management

UNISDR United Nations Office for Disaster Risk Reduction

US United States

USA United States of America

USA United States of America

# CHAPTER ONE

# INTRODUCTION

# 1.1 Overview

This chapter provides an overview of general introduction of the study. The chapter is organized into sections namely background of the study, statement of the problem, objectives of the study, research questions, significance, scope, and organization of the study

# 1.2 Background of the Study

Disasters have always been a result of human interaction with nature, technology and other living entities. Sometimes unpredictable and sudden, sometimes slow and lingering, various types of disasters continually affect the way in which humans live their daily lives. Human beings as innovative creatures have sought new ways in which to curb the devastating effects of disasters. However, for year’s human conduct regarding disasters has been reactive in nature. Communities, sometimes aware of the risks that they face, would wait in anticipation of a disastrous event and then activate plans and procedures. Human social and economic development has further contributed to creating vulnerability and thus weakening the ability of humans to cope with disasters and their effects (Styawan *et al*.,2021).

Human interaction with nature, technology, and other living things has always resulted in disasters. Numerous disasters have an ongoing impact on how people go about their daily lives; they can be sudden, unpredictable, or slow-moving. Being creative beings, humans have looked for novel approaches to lessen the terrible effects of calamities. But over the past year, people's response to calamities has been largely reactionary. Sometimes, communities were aware of the hazards they faced and would wait for a catastrophic catastrophe before implementing plans and procedures. Human progress in the social and economic spheres has also increased vulnerability and weakened human capacity to withstand natural disasters and their aftermath (Okuda and Kawasaki, 2022)).In actuality, disasters result in thousands of fatalities, severe injuries, and enormous financial losses each year.Humanity is still in a desperate attempt to prevent tragedies, despite technological advancements advancements.Disasters still inflict psychological and physical harm.To reduce the damage caused by disasters, disaster preparedness, disaster management, and disaster response are crucial steps.

Humanitarian aid efforts, both domestic and foreign, attempt to lessen the losses and suffering of those affected by disasters, but things have not improved.Meanwhile,

disasters manifest in various ways. Human error is the cause of man-made disasters, such as structural collapses or industrial explosions. Droughts and earthquakes are examples of physical events that cause natural disasters. Epidemics and armed conflicts are examples of complicated disasters. Whatever their shape, disasters can seriously harm people, property, businesses, and the environment in addition to upsetting communities. They frequently exceed the ability of a community to recover (Mansonariuan and Mayhew, 2021).However, the act of efficiently anticipating and responding to calamities is known as disaster management.It entails allocating resources in a smart manner to minimize the damage that disasters bring about.

It also entails handling the duties of catastrophe preparedness, response, and recovery in a methodical manner.The goal of disaster risk management is to prevent or lessen the negative effects of a natural event on society by implementing a comprehensive, conceptual framework of interconnected, and methodical procedures prior to the occurrence of a natural hazard.Reducing the danger of disaster for residents of areas vulnerable to natural disasters is the main goal.Lowering the population's susceptibility to natural disasters like earthquakes, floods, and storms is the first step in lowering the risk of disasters. The second is preventing the emergence of new hazards like landslides brought on by improper land use or floods brought on by deforestation along upper reaches of rivers.Risk analysis, disaster readiness, disaster prevention and mitigation, and disaster-preventive rebuilding are the four components of disaster risk management. These factors are what make some wonder if providing humanitarian aid would really make a difference. Disaster logistics, sometimes referred to as humanitarian aid logistics, is currently intended to meet the requirements of harmed and vulnerable people and lessen their suffering. According to Lukewich and Mathews (2023) meta-analysis, the most often employed methodology in research conducted between 2013 and 2020 was modeling and simulation. Urbanization, climate change, and natural disasters are increasing the strain on disaster relief efforts.

Once more, tragedies upend society's regular routine and surpass the ability of a community to adjust. They result in a significant number of injuries, property losses, and fatalities.The pre-, during-, and post-disaster phases are all included in disaster management.The goal of disaster risk management is to keep a nation's financial and material damages from occurring. Reducing pain and expediting the reconstruction process are two other goals. The timely, balanced, and expeditious delivery of equipment and supplies is essential to the success of any aid program. Disaster logistics provide as a link between relief supplies and affected areas. The effective delivery of relief to disaster zones is ensured by catastrophe logistics.

# 1.3 Statement of the Research Problem

Data from the Centre for Research on the Epidemiology of Disasters (EM-DAT, 2022) show that several disasters have wreaked havoc across the globe since January 2020.In 2019, there were approximately 98 million people affected by the 8,500 deaths from natural disasters; 24 people died in fires on the Australian continent, and an estimated 480 million animals perished; and more than six million people contracted the corona virus, resulting in approximately 371,299 deaths.Because of the effects of climate change and the expanding population, the impact of disasters will only get worse in the coming decades.Between 2017 and 2018, 335 natural catastrophes affected over 95.6 million people, claimed 9,697 lives, and cost a total of US $335 billion.Given that 330 catastrophes have been recorded since the year 2000, in 2014 this increase may signal a reversal in the trend towards the decline in the annual number of disasters since 2005, even though the number of disasters in 2015 is still lower than its average yearly for the period from 2005 to 2014 (EM-DAT, 2022).

The ability of human systems to respond is assessed through catastrophes, namely the capacity of different stakeholders to work together. They call for the intervention of governments, the military, civil society, and humanitarian organizations, among others (Hague and Falema, 2022). Whether the crisis is man-made or natural, an efficient supply chain for disaster relief is crucial to providing supplies to the damaged area quickly and enabling it to recover quickly. Within this paradigm, several academic studies were conducted to investigate different aspects of catastrophe risk management. An insurance risk management framework was proposed by Lodree and Taskin (2008) to assist decision-makers in balancing the benefits and drawbacks of stocking decisions for catastrophic risk management.

Maon *et al.* (2009) proposed a theoretical approach for developing an operating system through cross-sector, socially conscious collaboration to mitigate the impact of disasters. The literature has not sufficiently addressed logistics for all of the proposed concepts. It is for this reason that this study is necessary.

A theoretical concept for creating an operating system through cross-sector, socially conscious collaboration to lessen the impact of disasters was put forth by Maon *et al.* (2009). Of all the models that have been suggested, literature has not adequately addressed logistics. This study needs to be done address this.

# 1.4 Research Objectives

This study is comprised of general and specific objectives

# 1.4.1 General Objective

The general objective of this study is to examine the role of logistics in effective disaster risk management focusing on the fire and rescue force at Dodoma Region.

# 1.4.2 Specific Objectives

The study was covered by three specific objectives:

1. **To examine the effectiveness of current logistical strategies and processes used by the fire and rescue force in managing effectively disaster risks.**
2. **To analyze the impact of logistical resources (such as equipment, vehicles, and communication systems) in managing effectively disaster risks.**
3. **To recommend improvements in logistical planning and coordination on management capabilities of the fire and rescue force.**

**1.5 Research Hypotheses**

Based on the specific objectives and literature review, the following hypotheses were developed

**H1:** The current logistical strategies and processes used by the fire and rescue force positively contribute to effective disaster risk management.

**H2:** The availability and quality of logistical resources (such as equipment, vehicles, and communication systems) positively impact the efficiency and responsiveness of the fire and rescue force during disaster situations.

**H3:** Improvements in logistical planning and coordination significantly and positively enhance the disaster risk management capabilities of the fire and rescue force.

# 1.6 Scope of the Study

The study covered the fire and rescue force in Dodoma in Tanzania. And took eight months to accomplish it.

# 1.7 Significance of the Study

The findings of the study have significance to academia, extension of knowledge frontier as well as to policy makers.By identifying effective logistical strategies and processes, the study can contribute to enhancing the preparedness and response capabilities of the fire and rescue force, leading to more efficient handling of disasters.The study saved as a launching pad to rejuvenate the formulation and implementation of effective disaster risk management in Tanzania.The study will provide insights into the impact of logistical resources on disaster management, helping policymakers and fire and rescue departments allocate resources more effectively to improve overall disaster response.

The findings inform policymakers and strategic planners in developing better policies and frameworks for logistics in disaster risk management, specifically tailored to the needs of the fire and rescue force.The study will add to the body of knowledge in the field of disaster risk management and logistics, providing a foundation for further research and development in this critical area.By identifying gaps and areas for improvement in logistical strategies, the study can guide training and capacity-building efforts for fire and rescue personnel, ensuring they are better equipped to handle disaster situations.Strengthening the logistical capabilities of the fire and rescue force will contribute to building more resilient communities that are better prepared to face and recover from disasters.

# 1.8 Organization of the Study

This proposal coves five chapters.Chapter one comprises background information of the study, statement of the problem, objectives of the study, research questions also significance of the study and organization of the study. Chapter two consists of a definition of key terms, a theoretical literature review, an empirical literature review, a research gap and a conceptual framework. Chapter three includes research philosophy, research approach, research design and strategy, area of the study, population of the study, sample and sampling techniques, data collection methods, data collection tools, data analysis, variables and measurement procedures, validity, reliability and ethical consideration. Chapter four is about findings and discussion, while chapter five presents summary of the main findings,conclusions and recommendations.

# CHAPTER TWO

# LITERATURE REVIEW

# 2.1 Overview

This chapter reviews other studies conducted by different authors, which are related to this study. It starts with definition of key concepts, theoretical review,empirical literature review,research gap and conceptual framework.

# 2.2 Definition of Key Terms

# 2.2.1 Disaster

A disaster can be defined as a shocking event that seriously disrupts the functioning of a community or society, by causing human, material, economic or environmental damage that cannot be handled by local agencies through standard procedures. Moreover, the United Nations Office for Disaster Risk Reduction (UNISDR, 2006), defines disaster as a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of affected society to cope using only its own resources. Alexander and UNISDR (2006), introduced the concepts of “hazard” and “vulnerability” into the definition of disaster, and defined it as a result of a combination of hazards, vulnerability and lack of measures. Iyer and Mastorakis (2021) considered disaster as a dynamic mechanism that begins with the activation of a hazard and flows through the system as a series of events, in a logical sequence to produce a loss to life, property and livelihood by negatively influencing the emergency systems.

# 2.2.2 Disaster Logistics

Disaster logistics also known as humanitarian aid logistics refers to the planning, implementation and control of all activities relating to the flow of goods, materials, personnel and the associated information and capital, from the source (the supplier or donor) to the final user (the beneficiaries) in times of disaster (Adiguzel, 2019). This task is performed in an uncertain and ad-hoc environment and the ultimate goal is to perform the task as efficient and cost-effective as possible in order to alleviate the suffering of weak and vulnerable people in affected areas as soon as possible.

Disaster logistics is designed to cover the needs of damaged and vulnerable individuals and to alleviate their suffering (Adiguzel, 2019).Humanitarian logistics consists of processes and systems involved in mobilizing people, resources and knowledge to help vulnerable communities affected by natural disasters or complex emergencies. It seeks a prompt response, aiming to serve the largest number of people, avoid shortages and waste, organize various donations and, above all, operate within a limited budget.

# ****2.2.3 Logistical Strategies and Processes****

Logistical strategies and processes refer to the plans and actions that an organization employs to efficiently manage the flow of goods, services, and information from the point of origin to the point of consumption (Okuda and Kawasaki, 2022).These strategies and processes are essential in ensuring that products are delivered to customers on time, at the right place, and in the right quantity, while minimizing costs and maximizing customer satisfaction.Effective logistical strategies and processes are crucial for maintaining a competitive edge, reducing operational costs, and enhancing customer satisfaction.According to this study,the logistical strategies and processes are strategies that aim to deliver products to customers on time, in the correct quantities, and at the lowest possible cost, all while maximizing customer satisfaction.

# ****2.2.4 Logistical Resources****

According to Setyawan et al. (2021) logistical resources are the various assets, tools, and capabilities that an organization uses to manage and execute its logistics operations effectively. These resources are essential for ensuring the smooth movement of goods, services, and information through the supply chain, from suppliers to customers.Types of Logistical Resources includes **Physical Resources such as transportation equipment**: Vehicles, ships, airplanes, and trains used to move goods from one location to another.**Warehousing Facilities such as** Buildings and storage spaces where goods are stored before being distributed and **Material Handling Equipment**: such as Tools and machinery such as forklifts, conveyors, and pallet jacks used to move goods within warehouses or production facilities.These logistical resources are critical for ensuring that goods and services are delivered efficiently, cost-effectively, and in a manner that meets customer expectations. Proper management and coordination of these resources are essential for successful logistics operations.

# ****2.2.5 Logistical Planning and Coordination****

**Lawangen and Rober (2023) defines Logistical planning and coordination** as the systematic organization and management of all activities required to ensure that goods, services, and information move efficiently from their point of origin to their final destination. These processes are essential for optimizing the supply chain, reducing costs, and ensuring timely delivery to meet customer demands.

# 2.2.6 Disaster Risk Management

Disaster Risk Management (DRM) refers to the systematic process of identifying, assessing, and reducing risks associated with disasters ( Lodree and Taskin, 2008). It involves strategies and measures aimed at minimizing the impact of disasters on people, infrastructure, and the environment. DRM encompasses a range of activities, from prevention and mitigation to preparedness, response, and recovery, all designed to protect lives, reduce economic losses, and enhance community resilience.Key Components of Disaster Risk Management involves Risk Assessment for example: Hazard Identification that is Identifying potential natural or man-made hazards, such as earthquakes, floods, hurricanes, industrial accidents, or pandemics, Vulnerability Analysis: Assessing the vulnerability of communities, infrastructure, and ecosystems to identified hazards, Risk Evaluation: Evaluating the likelihood and potential impact of hazards to prioritize which risks need to be addressed.Prevention and Mitigation involving Structural Measures: Implementing physical infrastructure, such as levees, dams, earthquake-resistant buildings, and flood barriers, to reduce disaster impacts.Non-Structural Measures: Developing policies, regulations, and public awareness campaigns to reduce risks, such as land-use planning, building codes, and environmental protection and Climate Change Adaptation: Integrating climate change considerations into planning to address long-term risks associated with changing climate patterns.Moreover it involves Preparedness:Emergency Planning: Developing and regularly updating emergency response plans to ensure coordinated action during disasters and Training and Drills: Conducting training exercises, simulations, and drills to prepare communities, responders, and organizations for effective disaster response.

# 2.3 Theoretical Literature Review

**2.3.1 The Theory of Emergency Management**

Disasters and the theory of emergency managementare vibrant subjects for scholars. Researchers have focused on a variety of topics, including the definition of disasters, human behavior in extreme events, the nature of emergency management, ways to make the profession more effective, the pros and cons of various paradigms, and new areas of research. In studying these subjects, scholars have employed a variety of methods, including observation, field research, and comparison, among others.

Findings from research reveals that humans are responsible for disasters and that vulnerability must be reduced. Studies reveal that antisocial behavior is less likely to occur than more common activities to support victims of disasters. The principles of emergency management have been elaborated, and scholars have argued that the phases of disasters are more complex that initially meets the eye. Research also reveals that bureaucratic approaches to emergency management are based on false assumptions and are too rigid. Scholarship also explores how to make emergency management functions more effective, and a number of articles have been written to explore paradigms to guide research and practice.

Theoretical work on disasters risk management has examined planning, improvisation, and spontaneous planning. Research has also explored humanitarian logistics, the use of social media, the scholarship of teaching and learning, cultural competency and the culture of preparedness. Going forward, more research is needed on the complexity of disasters and the use or impact of technology in emergency management.

# 2.4 Empirical Literature Review

This section presents a summary of the important findings from previous researches done on similar issues which are related to the objectives of this study.

# 2.4.1 Conceptualization of Disaster Risk Management

Disaster is an unexpected event that disrupts the normal functioning of the system, due to natural or technological causes, and leads to human, economic, material and environmental losses. It requires the intervention of the various actors of the community in order to regain initial balance.

Consequently, a disaster as measured in terms of loss of lives, number of people affected, economic and environmental losses is therefore, the outcome of a specific hazard (or hazards) that is mediated with properties of human systems that are exposed to and affected by the hazard.

Meanwhile, disaster risk management includes planning for disasters, assessment of resources at hand; evaluation of requirements, work planning and creation of possible scenarios. The goal of disaster risk management includes, reducing or preventing the human, physical, economic losses in affected country, decreasing the suffering of affected community and accelerating the reconstruction process. The possible effects of disasters must be evaluated before disasters take place. During the preparedness phase, by using these evaluations, scenarios and plans must be prepared. After response phase, restructuring phase begin to reduce the long term negative effects of the disaster (Adiguzel, 2019).

In disaster risk management studies, security, communication, psychological support, sheltering, water-sanitation, transportation, food and health modules are the foundations of the emergency action plans. For effective disaster risk management, the communication between these modules required. The priorities of these modules change due to occurring disasters. Every module has its own standards. In disaster risk management, disaster information systems have an important role. Advanced disaster risk management systems used in every disaster management processes (damage reduction, preparedness, response, restoration) and every phase of the disasters. These systems provide benefits to both field personnel and administrative personnel.

Disaster risk management is the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, polices and improved coping capacities in order to lessen the adverse impacts of hazards and their possibility of disaster. Disaster risk management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness (UNISDR, 2009). The interaction between disaster risk reduction and disaster risk management is clear. Disaster risk reduction concerns activities more focused on a strategic level of management, whereas disaster risk management is the tactical and operational implementation of disaster risk reduction.

# 2.4.2 The Stages of Disaster Logistics

Disaster logistics activities in humanitarian aid operations performed in three phases. These phases are; preparedness, response and reconstruction-restoration.

# 2.4.3 Preparedness Phase

Preparedness phase is the most important part of the disaster logistics activities. Preparedness stage includes assessment of the vulnerabilities, making of emergency situation planning, construction of coordination structure, the mobilization of response mechanisms, insurance, diversification, education and drills. Also procurement and storage of the aid materials, the setup of the early warning systems are part of the preparedness stage (Balcik and Beamon, 2008). In preparedness stage, the installation of the logistics centers where aid materials stored, have an important role.

Pre-positioning of the aid materials has an important place in preparedness stage. Pre-positioned goods are basic humanitarian aid supplies such as food, water, medical supplies, house kits and shelters. Free from the disaster type and socio-economic conditions, basic aid supplies are useful in any disaster situation. This situation makes standardization of aid supplies easier. In the lack of pre-positioning, during disaster time, the aid materials need to be procured from the international markets. Because disaster hit local suppliers also have hard time during disaster time. Doctors without Borders and Red Cross have prepositioned warehouses. Also these foundations have contracts with suppliers to make use of during disaster time. The procurement processes from the international markets could disrupt aid operations because it is more costly and take more time (Hallikas, 2017).

World Vision have 44 thousand employees and have presence over 100 hundred countries around the world. World Vision ensures the arrival of aid to children and communities in need. 27 World Vision have pre-position basic aid materials at warehouses in Denver (USA), Hannover (Germany), Dubai (UAE) and Brindisi (Italy). In case of disaster, World Vision has quick Access to the materials in these warehouses. Also they use the pre-made contracts with suppliers about aid materials. With the chosen transporters in Kenya, Canada, India, Pakistan, Thailand and Australia aid material easily could be transported to the disaster areas. The use of pre-positioned goods save time and provide quick access to the disaster areas **(**UN-SPIDER, 2023)

# 2.4.4 Response Phase

The response phase, which follows the preparedness stage, starts when calamities happen. The majority of logistics operations take place during the reaction phase. Following major calamities like earthquakes, floods, and typhoons, prompt action is crucial to minimizing damage and saving lives. At this point, the proper distribution of relief supplies and an adequate number of aid workers are essential to the success of the rescue operations. The number of victims is limited by the success of these efforts.

Following a disaster, the response stage stands for emergency services and humanitarian aid initiatives. During this phase, speed is crucial. The final phase, reconstruction and restoration, starts after the response. Normalizing lives and enabling self-sufficient living efforts for disaster victims are part of the final step (Cozzolino, 2022).

# 2.4.5 Reconstruction and Restoration Phase

The repair and restoration phase is the final and most time-consuming stage of disaster risk management. Normalizing life in communities affected by disasters is the goal of the restoration process. As a result, efforts are made to provide jobs, rebuild damaged buildings, and improve education during this phase. It could take years to finish these tasks. For instance, local fishermen are given boats by humanitarian relief organizations following the 2004 Indian Ocean Tsunami.

They made life easier for fishermen and contributed to the local economy's resurgence with these boats. Maintaining the self-sufficiency of catastrophe victims is a crucial goal of humanitarian relief initiatives. Not all disaster victims or refugees were able to adjust and create adequate living conditions for themselves over the long run. These factors make it essential to give these individuals both financial and psychological help.

The reconstruction and restoration phase must start right away after the response step. The destruction brought about by disasters may offer the local population short-term assistance during the reconstruction phase. For instance, 11,000 locals contributed to the reconstruction works following the 2004 Indian Ocean Tsunami. These positions boost the local economy and offer psychological assistance to residents.

# 2.5 The Relationship between the Disaster Logistics and Disaster Risk Management

International and national humanitarian relief efforts are both possible. In both situations, some form of collaboration between many nations, groups, and individuals is necessary. Food, shelter, water, medicine, and other humanitarian supplies must be sent to the disaster site as quickly as feasible. Giving the field crews the tools and supplies they need is crucial for rescue and reconstruction operations. Only logistics operations could move these supplies and machinery to the disaster areas. Logistics activities made up the majority of disaster management and humanitarian aid operations (80%).

The most crucial and costly aspect of disaster management is logistics. When we look at the costs, the cost of purchasing materials and equipment accounts for 65% of the 80%. Transportation and storage costs make up the remaining 15%. As a result, we can now better understand the role logistics play in humanitarian relief. For humanitarian relief efforts to be successful, precise logistics planning and execution are crucial (Adiguzel, 2019).

Procurement, storage, fleet management, personnel and material transportation, asset management, facility management, security, information management, and communication are all included in disaster logistics. Disaster logistics are carried out at unidentified sites and cover large areas, in contrast to commercial logistics. Disaster management is therefore more complicated (Kovács and Spens, 2007).

Logistics is at the heart of the disaster operations. Because logistics functions are a bridge between; preparedness and response stages, procurement and distribution processes, the field and the headquarters. Also logistics operations allow bench-marking after each disaster operation for the future by the way of keeping the experienced useful information (such as procurement, transportation, distribution, costs etc.) in logistics departments.

By planning the logistics activities in the preparedness stage logistics needs could be met better in case of disaster. Logistics activities are planned in four stages. These stages are; strategic planning phase, preparation phase, before the disaster phase and after the disaster phase. Logistics planning must include many scenarios, alternatives and must be fully compatible with disaster management plans. Planning and forecasting are crucial for the successful disaster logistics. Logistics planning based on the geographical, technical, political and physical conditions. So when you consider the situation in disaster area logistics plans should have to be flexible and having alternatives (Daud, 2016)

Different kind of aid stuff is necessary for humanitarian operations in different stages. Slight materials are adequate during the needs assessment stage initially. The type of disaster has an important impact on decision making at this stage. More stuff is required to satisfy the needs in the distribution stage of the operation. Excessive resources could be needed later on to sustain the aid operation. Funds used in the operations decrease and eventually stop in the reconstruction stage.

The stuff and the services which will be required due to the type of disasters are determined in the preparedness stage. Aid organizations also work on donations and procurement of aid materials. Similarly plans are completed for the responsible personnel about acceptance and distribution of the aid materials. Specialized teams need to be assigned. Humanitarian organizations try to predict the needs in case of disaster and they evaluate how much of the donations will meet those needs. Humanitarian organizations provide coordination between the disaster victims and donors by activating humanitarian supply chain (Daud, 2016)

Disaster logistics activities must be integrated into the humanitarian supply chain operations. Humanitarian supply chain management includes the administration of the aid programs, donation running, budget management and coordination of all logistics in the field. Humanitarian supply chains are performing in a continuously changing dynamic environment. Unstable donations and funds from donors and governments for different reasons cause instability in humanitarian supply chain (Jiang, and Yuan, 2019)

Most humanitarian organization split their operations into two parts; field operations and support activities. Field operations include transportation and distribution of aid materials such as water, food, medicine, shelter to the disaster areas. Supports activities include headquarter efforts about technology, finance, communication and human resources. All these logistics activities have a very important role in disaster management.

# 2.5.1 Disaster Risk Management Phases

Disaster logistics falls under the broader umbrella of disaster risk management, which also encompasses disaster preparedness, disaster risk reduction, disaster response, and post-disaster rehabilitation (IFRC, 2017). Van Wassenhove (2016) divides disaster management into four distinct stages.

The first stage is mitigation, which takes place prior to a disaster actually occurring and encompasses all measures taken to keep people safe from harm. For instance, enacting legislation and policies, raising public awareness, and refraining from constructing homes on the beach in tsunami-prone areas could all help (Van Wassenhove, 2016). The second stage is preparation, during which individuals get as ready as they can for any tragedy.

Here are some examples: first aid training, early warning system implementation, disaster fund, disaster insurance, diversification, and pre-positioning supplies in warehouses near disaster-prone areas are all examples of disaster logistics (Van Wassenhove, 2016). There are definite benefits for the third phase, the response phase, when supplies are prepositioned during the preparedness phase. According to Thomas & Kopczak (2015), aid agency relief efforts are "the emergency food, shelter, and services provided in the immediate aftermath of a natural or man-made disaster." This phase encompasses the real reaction in the immediate aftermath of a disaster. In this case, the pre-positioned items could facilitate quicker answers and earlier beneficiary delivery.

The rehabilitation phase, the last stage of disaster management, entails rebuilding damaged housing and infrastructure as well as reviving the social and economic life of a catastrophe-affected area (Van Wassenhove, 2016). This stage is referred to by Thomas & Kopczak (2005) as the development activities of aid organizations, during which they attempt to offer longer-term assistance with the goal of fostering community sustainability and self-sufficiency.

The preparedness and response phases of disaster management are the focus of disaster logistics and this thesis. Since real assistance is given and performance can be monitored, the reaction phase is the most important part. However, the preparedness phase is also crucial since the measures implemented during this time have a significant impact on the effectiveness of aid organizations. UNDRR (2019)

The preparedness and response phases of disaster management are the focus of disaster logistics and this thesis. Since real assistance is given and performance can be monitored, the reaction phase is the most important part. However, the preparedness phase is also crucial since the measures implemented during this time have a significant impact on the effectiveness of aid organizations (UNDRR, 2019).

# 2.6 Empirical Literature Review

The following are reviews of several studies

**2.6.1 Studies on the Effectiveness of Current Logistical Strategies.**

**Vylund et al.(2024) c**onducted a study on Understanding Fire and Rescue Service Practices Through Problems and Problem-Solving Networks: An Analysis of a Critical Incident. Fire Technology. This study explores how the Fire and Rescue Service can better prepare for solving complex problems in emergencies by analyzing a critical fire incident. It used a sample of 213 respondents,using regression analysis.The findings indicated that better fire rescue management is needed for safety of community.It was recommended that management should concentrate on issues regarding fire rescue to the community

**Vylund et al. (2024) conducted a study on i**mproving Complex Problem-Solving in Emergency Response: A Study of the Fire and Rescue Service in Sweden. This study examines how the Swedish Fire and Rescue Service identifies problems and implements necessary actions during complex emergencies, aiming to enhance problem-solving capabilities. It employed a sample of 102 staff of rescue unit in Stockhom in Sweden.Ordinary Least Squares regression was used to analyse data.Findings indicated that in emergency cases fire rescue unit is supposed to be standby to solve such fire emergency cases.It was recommended fire rescue unit is supposed to ensure that there is strategies and plan in ensuring the community under fire risks.

**2.6.2 Studies on the Impact of Logistical Resources**

**Yuan et al. (2023) conducted a study on e**mergency Resource Layout with Multiple Objectives under Complex Disaster Scenarios. This study provides a framework for the effective placement of emergency rescue resources, considering various suppliers and disaster interactions to ensure reliability and efficiency.

**Chen et al. (2023). conducted a study on a** Visual Analytics Approach to Evaluating and Optimizing the Spatial Layout of Fire Stations. This research introduces a visual analytics system to assess and optimize the spatial distribution of fire stations, enhancing the efficiency of fire rescue operations.

**Koseoglu & Yıldırımlı (2015) conducted a study on t**he Role of Logistics in Disaster Management and Disaster Logistics Issues. This study examines the role of disaster logistics in disaster management, highlighting issues related to the efficient flow of aid materials and equipment.

**2.6.3 Studies on Improvements in Logistical Planning and Coordination**

**Roh & Kwak (2014) conducted a study on the c**hallenges in Humanitarian Logistics Management: This study investigates the challenges in managing pre-positioned warehouses for humanitarian logistics, providing insights applicable to improving logistical planning and coordination.

**Yabe et al. (2021). conducted a study about l**ocation data reveals disproportionate disaster impact amongst the poor: A Case Study of the 2017 Puebla Earthquake Using Mobilkit.This study utilizes location data to analyze disaster impacts, offering recommendations for improving disaster response strategies and resource allocation. Findings indicated that logistic planning and coordination is implemented.

**Güner & Yaman (2011) conducted a study on** Uncertainty in Humanitarian Logistics for Disaster Management. This review discusses various uncertainties in humanitarian logistics and suggests methods to improve planning and coordination in disaster management. The findings of this study showed that under uncertainty fire rescue unit is supposed to ensure that there is **improvements in logistical planning and coordination on the management capabilities of the fire and rescue force.**

# 2.7 Research Gap

The following are research gaps identified in this study:

# ****2.7.1 Theoretical Gap****

Several theories, such as the **Resource-Based View (RBV)** and **Disaster Risk Reduction (DRR)** frameworks, emphasize the role of resources and strategic coordination in managing risks effectively. However, existing studies often focus on general disaster risk management strategies without delving deeply into how logistical frameworks specifically affect the operational effectiveness of fire and rescue forces.

For instance:**Smith & Brown (2018)** analyzed logistical frameworks for disaster risk management but generalized their findings across multiple sectors, leaving gaps in sector-specific applications like fire and rescue services.**Rahman et al. (2020)** emphasized the importance of logistical resources but did not address their practical implementation in resource-constrained environments like those in Dodoma.

This study seeks to bridge this theoretical gap by examining how logistics contribute uniquely to disaster risk management, particularly for fire and rescue forces.

# ****2.7.2 Contextual Gap****

Most studies on disaster risk management logistics have focused on developed countries with advanced technological and financial resources.**Jones et al. (2017)** investigated logistical coordination in fire response but concentrated on urban areas in the United States, neglecting resource-constrained settings like Tanzania.**Nguyen & Kim (2019)** explored disaster logistics in Asia, highlighting technology's role but failing to consider underdeveloped infrastructure in African contexts.In Tanzania, logistical challenges such as inadequate equipment, outdated communication systems, and inefficient planning mechanisms remain under-explored. By focusing on Dodoma, this study addresses the unique challenges and opportunities present in a developing regional context.

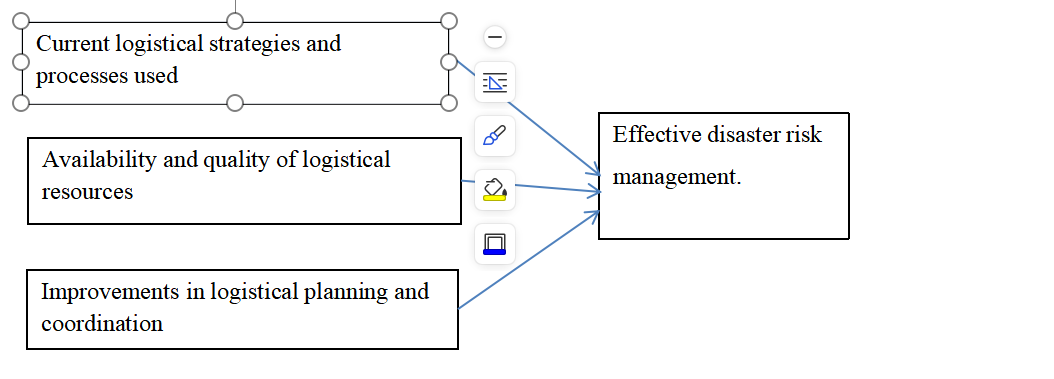
# ****2.7.3 Methodological Gap****

Previous studies have often employed broad survey methods or qualitative interviews without integrating mixed methods to comprehensively assess logistical efficiency in disaster management. **Chowdhury (2016)** relied solely on secondary data analysis, which provided limited insights into practical, on-ground challenges. **Mwangi et al. (2021)** used only qualitative interviews with disaster management officials, overlooking the perspectives of operational staff and beneficiaries.This study fills the methodological gap by employing a **mixed-methods approach**—combining quantitative surveys and qualitative interviews. This approach ensures a more holistic understanding of logistical strategies, resource adequacy, and planning effectiveness within the fire and rescue force in Dodoma.

# 2.8 Conceptual Framework

According to Creswell (2018) a conceptual framework is a visual or written product that explains graphically or in narrative form, the main things to be studied, the key factors, concepts or variables and the presumed relationships among them. The term is used in a broader sense that includes ideas, beliefs that someone holds about a certain phenomenon of the study.The conceptual framework in figure 2.1 shows the interrelationship between the dependent variable and independent variables. In this study the independent variables were role of logistics which included current logistical strategies and processes used, availability and quality of logistical resources and improvement in logistical planning and coordination and the dependent variable was effective disaster risk management

*Independent Variables Dependent Variable*



**Source**: Researcher (2024)

### Figure 2.2:Conceptual Framework

# CHAPTER THREE

# RESEARCH METHODOLOGY

# 3.1 Overview

This chapter discusses the research philosophy, research design, research approach and strategies, area of the study, target population of the study, sample and sampling techniques.Moreover the data collection methods, research tools, reliability and validity of research tools, data analysis and research ethics will be discussed.

# 3.2 Research Philosophy

Research philosophy is a set of common beliefs and agreements shared between scholars about how problems should be understood and addressed clearly to build in -depth understanding (Patel, 2015). Research philosophy is categorized into different categories including positivist, pragmatism and phenomenology philosophies (Patel, 2015). Study adopted a positivism research philosophy, because positivists argue that reality is stable and could be observed and described from an objective viewpoint rather than subjective or one’s perception.

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# 3.3 Research Design

Research design is defined as the arrangement and framework for facilitating the data collection process and data analysis (Mishra, 2017). Moreover, Ghauri and Gronhaug (2020) posits that research design is a plan or a frame work for data collection and analysis.The selection of the research design is influenced by a number of factors, including the researcher belief, research objectives, and nature of the research study (Hakim, 2012). Based on the nature of this study, it falls in the quantitative continuum. The researcher used an explanatory research design. A design called explanatory research design is created to look at a phenomenon that hasn't been thoroughly examined or explained in order to test relationship among variables. Moreover, the study used a quantitative research method to examine the role of logistics in disaster risk management.

# 3.4 Research Approach

The method a researcher chooses to gather, examine, and analyze data is known as a research methodology (Saunders et al., 2019). Research can be conducted using three different methods: mixed, qualitative, and quantitative. The research methodology used in this study was quantitative.

# 3.5 Area of the Study

The study was conducted at Fire Rescue Force at Dodoma City comprising Dodoma Headquarters and Dodoma City. The choice of this area of study was influenced by the accessibility of relevant data for the study from both service providers and the general public involved in logistics risk disaster as well as data verification after collection.

# 3.6 Population of the Study

Saunders *et al.* (2019), describe the term population as a large group of people with one or more characteristics in common.The population of this study comprises 300 employees of fire rescue force at Dodoma Headquarters and Dodoma City.

# 3.7 Sample and Sampling Techniques

# 3.7.1 Sampling Technique

Sampling technique refers to a process of selecting a number of individuals for the study in such a way that the individuals selected to represent the largest group from which they were selected (Kumar, 2017).

# 3.7.2 Simple Random Sampling

For the purpose of this study, simple random sampling technique was used to select the sample size from the population size. The random sampling was done by randomly selecting respondents of Fire Rescue Force at Dodoma.

# 3.7.3 Sample Size

The act of gathering data about a whole population by looking at a subset of it is known as sampling (Kothari 2014). The concepts and processes of sampling and selection are employed to locate, pick, and grant access to the population from which the researcher will collect data using the selected methodologies (Kumar, 2017). The researcher is unable to get pertinent information from every member of the population. A mathematical formula was employed to determine the appropriate number to represent the population in order to determine the sample size. Using Yamane's (1967) formula, the sample size for this investigation was calculated as follows:

Sample size =

Where N =targeted population, 300 e = margin of error 0.05 Confidence Level 95%

Sample size = 300/(1+300\*(0.052))



Sample size = 171

Therefore, sample size for the study was 171 employees of Fire Rescuers Force at Dodoma.

# 3.8 Data Collection Methods

In the course of carrying out the research, one method was employed which was primary data collection. The technique included questionnaire.

# 3.8.1 Primary Data Collection

First-hand information gathered by the researcher through a questionnaire and interviews is known as primary data (Kothari, 2014). Each respondent's type, nature, and surrounding conditions determined which approach was best. While in the field, the researcher used the questionnaire approach to collect data.

# 3.9 Tool used to Collect Data

# 3.9.1 Questionnaire

Researcher used structured questionnaire containing closed ended questions to examine the effects of biographical characteristics of respondents. Moreover, five point likert scale statements were used to measure specific objective variables. The questionnaires was administered to one hundred sixty eight (168) respondents (operational staff of Dodoma City Fire Rescue Force).

# 3.10 Reliability and Validity

The reliability and validity of research tools was examined

# 3.10.1 Validity

Whether the results are accurate regarding what they seem to be measuring is the focus of validity (Saunders et al., 2019). This shows whether the measurements are measuring what they were supposed to measure and whether the means are accurate. The researcher in this study used reasonable judgment to confirm that the measure was in fact related to the construct under study (face validity) and made sure that the items in the measure were sufficiently captured by the domain of the construct under study (descriptive statistics, inferential statistics, and content validity).The surveys were presented to research specialists for evaluation and guidance.In order to improve validity, the questionnaire was also pre-tested.

# 3.10.2 Reliability

Reliability is the extent to which data collection methods yield consistent results (Kothari, 2006). The reliability test was conducted by the researcher before a regression analysis was conducted. To prevent erroneous regression results, this was done. Cronbach's Alpha, which gauges internal consistency, was used to test the data gathering tool's reliability. The Cronbach's Alpha value is frequently used to confirm the construct's dependability. According to Saunders et al. (2019), satisfactory internal consistency is shown when Cronbach's alpha is higher than 0.7.

# 3.10.3 Results from Test of Reliability

The study results on Table 3.1 indicates the outcome from running reliability test.It showed that all constructs were reliable. Using Cronbach Alpha,the coefficients of the alpha values on each construct exceed 0.7 as a bench-mark. Trochim (2021) suggests that the reliability outcome from the variables under study is assured when the alpha coefficient is 0.7 or more which is the outcome noted on the test in this study.

## Table 3.1: Cronbach Alpha Results

|  |  |  |
| --- | --- | --- |
| **Variables** | **Number of Items** | **Cronbach's Alpha Coefficient** |
| Effectiveness of current logistic strategies and processes | 5 | 0.897 |
| Logistical resources | 5 | 0.845 |
| Improvements in Planning and Coordination | 5 | 0.798 |
| Risk Disaster Management | 7 | 0.876 |

**Source**:Field data (2024).

# 3.11 Data Analysis

Data analysis involved data processing and data analysis processes as explained hereunder

# 3.11.1 Data Processing

**Data processing** refers to the systematic sequence of operations performed on raw data to convert it into a meaningful and useful format for analysis. This process ensures that the data is clean, organized, and accurate before drawing conclusions or making decisions. Therefore, after data collection, data was arranged cleaned to remove all irrelevant information obtained from the field. Then after data were coded and entered into a statistical package for social science (SPSS) for analysis purposes.

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# 3.11.2 Data Analysis

Quantitative data analysis technique refers to interpretation and presentation of study findings in numerical form (Kumar, 2017). Applying statistical, mathematical, or computational techniques to draw insights from the data. In this study data analysis involved descriptive statistics using means,standard deviation,max,min,skewness and kurtosis.Moreover inferential statistics such as hypothesis testing correlatin analysis and regression analysis were performed by using Statistical Package for Social Science (SPSS).

# 3.11.3 Multiple Regression Assumptions

The data was tested to see if its quality fits the basic assumptions for using regression analysis (Kumar, 2017). This study tested the quality of data by using Normality test, linearity test,multicollinearity tests.

# 3.11.4 Normality test

In multiple regression it is assumed that the residuals of the model are normally distributed.(Kumar, 2017). For the statistical tests (such as t-tests and F-tests) to be valid, the errors should be normally distributed. This is particularly important when making inferences or testing hypotheses about regression coefficients.If residuals are not normally distributed, hypothesis tests may be unreliable. In this study normality was checked using the Shapiro-Wilk test.

# 3.11.5 **Multicollinearity Test**

In multiple regression it is assumed that the independent variables should not be highly correlated with each other. Multicollinearity occurs when two or more independent variables are highly correlated, making it difficult to isolate the individual effect of each predictor. This leads to unreliable coefficient estimates and inflated standard errors. High multicollinearity can be detected using Variance Inflation Factor (VIF) values. VIF values above 10 often indicate problematic multicollinearity.In this study Variance inflation factor (VIF) was used to test multicollinearity.

# 3.11.6 Linearity Test

It is assumed that the relationship between the dependent variable and each independent variable is linear.The model assumes that changes in the dependent variable are proportional to changes in the independent variables. This means the relationship should be straight-line for each predictor variable. The relationship is usually checked using scatterplots or residual plots. If the relationship is not linear, the regression model may not accurately predict the dependent variable.This study used scatter plots to test linearity

# 3.11.7 Regression Model Equation

The multiple regression equation created by this study is as follows:

*Y= β0 + β1x1 + β2 x2 + β3 x3 +ε*

Where:

*Y* = Effective Disaster Risk Management

X1=Current logistic strategies and processes used

X2=Availability and quality of logistical resources

X3=Improvement in logistical planning and coordination

*β0*= Constant

*β1 =* is the coefficient of Current logistic strategies and processes used

*β2 =* is the coefficient of Availability and quality of logistical resources

*β3 =* is the coefficient of improvement in logistical planning and coordination

*ε* = Error Term

# 

# 3.12 Ethical Consideration

Permission to conduct this study was obtained from relevant authorities.These included permission from the Open University of Tanzania and written permission from the Dodoma City Fire Rescue Force. In addition to that the respondents were assured of the confidentiality of the information that provided to the researcher. All collected information proportional to their level of disclosure were analyzed quantitatively basing on the specific objectives of the entire study.

# CHAPTER FOUR

# FINDINGS AND DISCUSSION

# 4.1 Overview

This chapter covers the findings of the study obtained from the field through the selected respondents for the study. The chapter consists of findings from demographic characteristics of the respondents,findings from research specific objectives and then end up with the discussion of findings.

# 4.2 Response Rate

To make sure the real data would be appropriate for analysis, the response rate was examined. The percentage that the respondents responded to questionnaires distributed is known as the response rate.One hundred sixty eight (168) questionnaires were collected out of 171 which were distributed,making 98.2% of all questionnaires distributed,which is acceptable for analysis (Kothari, 2006).

# 4.3 Demographic Characteristics of Respondents

The demographic characteristics of the respondents assessed by the study included age, gender, educational level and user experience. The descriptions of respondents’ demographic characteristics are in sections 4.3.1, 4.3.2, 4.3.3 and 4.3.4.

# 4.3.1 Gender of respondents

Table 4.1 shows the demographic characteristics of the respondents involved in this study. Concerning the gender of the respondents,the result showed that 100 (59.5%) of all respondents were males.This suggests that males are predominant in the Fire and Rescue Force, while 68 (40.5%) of all respondents were females indicating a significant minority of females working in or associated with the Fire and Rescue Force.

# ****4.3.2 Age Distribution of Respondents****

Findings in Table 4.1 indicate that a small portion of the respondents 8 (4.8%) is very young at the age of below 21 years, probably new entrants into the workforce. Almost half of the respondents fall into age range (21-30), showing a young workforce, possibly at early career stages. Over a third of respondents are in the age group of (31-40) , indicating that the Fire and Rescue Force has a strong representation of individuals in their early to mid-career. A smaller percentage (7.1%) of respondents are in their late career stages (51-60 years). Individuals in their late career, nearing retirement, represent a modest portion.Only a very small percentage (1.2%) of respondents are above 60 years, which may reflect either senior management or advisors.

# ****4.3.3 Educational Level of Respondents****

**Findings in Table 4.1 show that a** small percentage of respondents (11.9%) hold certificates, indicating basic qualifications.Nearly a third of respondents(29.8%) have a diploma, suggesting a mid-level of educational achievement in the workforce.The largest educational group, with 39.3% of respondents holding a bachelor's degree, indicating that most of the workforce is well-educated.

A significant portion of the respondents (17.9%) hold a master's degree, showing advanced educational attainment among some of the staff. A small percentage hold other forms of education not specifically listed, possibly including professional certifications.

# ****4.3.4 Service User Experience of Respondents****

**According to the findings, n**early one third of respondents (32.7%) have less than 5 years of experience, showing a notable number of newer employees.The largest group of respondents (52.9%) has between 6 and 10 years of experience, indicating a workforce that is gaining significant experience in the field. A smaller portion of the workforce (14.4%) has 11-15 years of experience, showing some mid-career stability.

These demographics suggest that the Fire and Rescue Force in Dodoma has a relatively young, moderately educated workforce with a core group of experienced staff members. The presence of females and those with advanced education levels (Master's degree) highlights some diversity in the workforce.This information can be valuable in disaster risk management, as understanding the composition of the workforce may help to design better logistics and training programs tailored to their capabilities and experience levels.

## Table 4.1: Demographic Characteristics of Respondents

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Option** | **Frequency** | **Percent** |
| **Gender** | Male | 100 | 59.5 |
| Female | 68 | 40.5 |
| **Total** | **168** | **100** |
| **Age** | Below 21 years | 8 | 4.8 |
| 21-30 | 80 | 47.6 |
| 31-40 | 60 | 35.7 |
| 41-50 | 16 | 9.5 |
| 51-60 | 12 | 7.1 |
| Above 60 years | 2 | 1.2 |
| **Total** | **168** | **100** |
| **Educational level** | Certificate | 20 | 11.9 |
| Diploma | 50 | 29.8 |
| Bachelor degree | 66 | 39.3 |
| Master degree | 30 | 17.9 |
| Others | 2 | 1.2 |
| **Total** | **168** | **100** |
| **User Experience** | 1. 5 years | 55 | 32.7 |
| 6-10 years | 89 | 52.9 |
| 11 years and above | 24 | 14.4 |
| **Total** | **168** | **100** |

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| --- |
|  |

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| --- |
|  |
|  |

**Source:** Field Data (2024)

# 4.4 Descriptive Statistics

The following are descriptive statistics for variables in specific objectives

# 4.4.1 Descriptive Statistics for Current Logistical Strategies and Procesess

A higher mean indicates stronger agreement with the statement.For example, CLSE1 has a mean of 4.10, suggesting that respondents generally agree that logistical strategies effectively support the fire and rescue force in managing disasters.Similarly, the means for all other variables range between 3.90 and 4.10, indicating agreement across all statements.The SD values here range from 0.70 to 0.85, showing moderate dispersion of responses around the mean. This suggests that most respondents have similar views but with some variation. Negative skewness (e.g., -0.35 for CLSE1) means that the responses are slightly skewed towards the higher end (agreement or strong agreement). This is consistent with the fact that most respondents seem to agree with the statement Moreover,a negative kurtosis (platykurtic) suggests that the distribution is flatter than a normal distribution, indicating fewer extreme responses.The kurtosis values range from -0.75 to -0.60, showing that the responses are relatively evenly spread without extreme outliers.

The results suggest that most respondents agree or strongly agree with the statements concerning the effectiveness of logistical strategies and processes in managing disasters within the fire and rescue force. The skewness values suggest that responses are generally leaning toward agreement, while the moderate standard deviation indicates some variation in opinion, though not extreme. The negative kurtosis values further indicate that there are few extreme responses (either strong disagreement or strong agreement).These statistical insights imply that respondents perceive the current logistical strategies and processes positively but with room for improvement in some areas (as indicated by slightly lower means for CLSE3 and CLSE5)

**Table 4.2 Descriptive Statistics for CLSE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable Code** | **Statements** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
| CLSE1 | The logistical strategies currently in place effectively support the fire and rescue force in managing disasters. | 4.1 | 0.75 | -0.35 | -0.75 |
| CLSE2 | The processes used in logistical management contribute positively to disaster risk management outcomes. | 4 | 0.8 | -0.5 | -0.65 |
| CLSE3 | The fire and rescue force’s logistical processes ensure timely responses during disaster situations. | 3.9 | 0.85 | -0.4 | -0.8 |
| CLSE4 | Current logistical strategies are well-aligned with the overall disaster risk management objectives. | 4.05 | 0.7 | -0.45 | -0.6 |
| CLSE5 | The existing logistical processes enable the fire and rescue force to handle large-scale disasters effectively. | 3.95 | 0.78 | -0.3 | -0.7 |

**Source**:Field data (2024).

***Where CLSE means Current Logistical Strategies and processes for Effective Disaster Risk Management***

**4.4.2 Descriptive Statistics for Availability and Quality of Logistical Resources**

A high mean value indicates strong agreement with the statements.For example, the mean value of **4.20** for AQLR1 shows that respondents largely agree that advanced equipment availability significantly improves fire and rescue operations.The other means range between **4.00 and 4.20**, showing that most respondents agree or strongly agree with all the statements regarding logistical resources. A smaller SD suggests that respondents' answers are concentrated around the mean, while a larger SD shows greater variability in responses.The SD values range from **0.68 to 0.85**, which indicates moderate variability in the responses. Most respondents hold similar views with some variation. A negative skewness value means that responses tend to lean more towards agreement or strong agreement.The skewness values range from **-0.30 to -0.50**, indicating that responses are slightly skewed towards the higher end (agreement).The kurtosis values range from **-0.50 to -0.70**, suggesting that the responses are relatively spread out without many extreme values.

In general, respondents generally agree that the availability and quality of logistical resources, such as advanced equipment, well-maintained vehicles, reliable communication systems, and sufficient logistical resources, are critical for effective disaster management. The means across all variables are above 4, suggesting strong agreement across the board. The moderate SD values suggest that while most respondents agree, there is some variation in opinions. The negative skewness values further show that responses tend to lean towards agreement, and the kurtosis values indicate a relatively flat distribution of responses without many extreme outliers.These findings highlight the importance of logistical resources in improving disaster management outcomes for the fire and rescue force.

**Table 4.3: Descriptive Statistics for Availability and Quality of Logistical Resources**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable Code** | **Statements** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
| AQLR1 | The availability of advanced equipment significantly improves the efficiency of the fire and rescue operations. | 4.2 | 0.68 | -0.4 | -0.6 |
| AQLR2 | Well-maintained vehicles enhance the ability of the fire and rescue force to respond quickly to emergencies. | 4.15 | 0.72 | -0.45 | -0.55 |
| AQLR3 | Reliable communication systems ensure effective coordination during disaster response. | 4.1 | 0.75 | -0.35 | -0.7 |
| AQLR4 | The quality of equipment used by the fire and rescue force directly impacts their ability to manage disasters. | 4.05 | 0.8 | -0.5 | -0.5 |
| AQLR5 | The availability of sufficient logistical resources leads to better outcomes in disaster management. | 4 | 0.85 | -0.3 | -0.65 |

**Source:Field data (2024)**

***Where AQLR means Availability and Quality of Logistical Resources***

# 4.4.3 Descriptive Statistics for Improvements in Logistic Planning and Coordination

The mean value indicates the average level of agreement with the statements.The mean scores range from **4.05** to **4.30**, suggesting that respondents generally agree with the statements regarding the impact of logistical planning and coordination on disaster management.ILPC5 has the highest mean (4.30), indicating strong agreement that coordination between logistics and operations teams ensures successful disaster management. Meanwhile, ILPC3 (mean = 4.05) has the lowest, though it still reflects overall agreement.SD values range from **0.55** to **0.75**, suggesting moderate to low variability in responses. ILPC5 has the lowest SD (0.55), indicating strong consensus on the importance of coordination between logistics and operations teams. ILPC3, with the highest SD (0.75), shows a little more variation in opinions about the impact of regular updates to logistical plans.Skewness values range from **-0.18** to **-0.30**, indicating a slight skew towards agreement for all the statements. This shows that most respondents tend to agree with the statements.Kurtosis values range from **-0.35** to **-0.50**, indicating a flat distribution, meaning responses are spread out without many extreme values. This reflects a balanced range of responses across most categories.

The data suggests that respondents generally agree with the importance of effective logistical planning and coordination in disaster preparedness and response. The highest level of agreement is with the statement that effective coordination between logistics and operations teams ensures successful disaster management (ILPC5). This reflects a strong belief in the need for teamwork between logistics and operations.

There is also strong agreement that logistical planning improves disaster preparedness (ILPC1) and that the integration of logistical planning into disaster risk management strategies enhances response times (ILPC4).While respondents agree with the positive impact of regular updates to logistical plans (ILPC3), this statement has the lowest mean and the highest variability, suggesting that some respondents may have differing opinions on the frequency and effectiveness of these updates.

The skewness and kurtosis values indicate that most respondents are inclined to agree with the statements, with a generally even distribution of responses, showing that there are no extreme opinions or outliers.This analysis highlights that respondents recognize the critical role that logistical planning and coordination play in enhancing disaster risk management.

**Table 4.4 Descriptive Statistics for ILPC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable Code** | **Statements** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
| ILPC1 | Effective logistical planning improves the disaster preparedness of the fire and rescue force. | 4.25 | 0.6 | -0.2 | -0.4 |
| ILPC2 | Coordination among various logistical units enhances the overall disaster response capability. | 4.15 | 0.7 | -0.25 | -0.45 |
| ILPC3 | Regular updates to logistical plans positively affect disaster management outcomes. | 4.05 | 0.75 | -0.3 | -0.5 |
| ILPC4 | The integration of logistical planning into disaster risk management strategies improves response times. | 4.2 | 0.65 | -0.22 | -0.35 |
| ILPC5 | Effective coordination between logistics and operations teams ensures successful disaster management. | 4.3 | 0.55 | -0.18 | -0.38 |

**Source:** Field data (2024)

***Where*** *ILPC* ***means*** *Improvements in Logistic Planning and Coordination*

# 4.4.4 Descriptive Statistics for **Disaster Risk Management Effectiveness**

The mean values range from **4.15** to **4.40**, indicating that respondents generally agree that the fire and rescue force effectively manages disaster situations and is well-prepared. **DRME5** (mean = 4.40) has the highest mean score, showing strong agreement that the fire and rescue force responds quickly and efficiently to disaster situations.**DRME4** (mean = 4.15) has the lowest mean, suggesting that while respondents agree that the fire and rescue force’s disaster management strategies minimize the impact of disasters on communities, the level of agreement is slightly lower compared to other statements.The SD values range from **0.45** to **0.65**, indicating low to moderate variability in responses. DRME5 has the lowest SD (0.45), suggesting that there is strong consensus on the fire and rescue force's quick and efficient response to disaster situations.**DRME4** has the highest SD (0.65), indicating slightly more variation in opinions regarding the effectiveness of disaster management strategies in minimizing the impact of disasters on communities.The skewness values are all negative, ranging from **-0.10** to **-0.22**, indicating a slight skew toward agreement. This shows that most respondents tend to agree with the statements.The kurtosis values range from **-0.25** to **-0.40**, indicating a relatively flat distribution, suggesting that responses are spread out without extreme agreement or disagreement. This reflects that while most respondents agree, there is still a diverse range of responses across categories.

The analysis suggests that respondents generally agree with the effectiveness of the fire and rescue force in managing disasters. The following key points stand out:**DRME5** ("The fire and rescue force responds quickly and efficiently to disaster situations") has the highest mean (4.40) and lowest SD (0.45), indicating that respondents strongly believe the fire and rescue force is highly responsive and efficient.**DRME4** ("The fire and rescue force's disaster management strategies minimize the impact of disasters on communities") has the lowest mean (4.15) and the highest variability (SD = 0.65). This suggests that while there is agreement on this point, some respondents may have reservations or varying opinions about the strategies’ effectiveness in minimizing disaster impacts on communities.Overall, the slightly negative skewness values indicate that most respondents lean toward agreement, with minimal respondents providing lower ratings.

This analysis emphasizes that respondents view the fire and rescue force as largely effective, well-prepared, and responsive during disaster situations, with some room for differing opinions on specific aspects of disaster management strategies.

## Table 4.5: Descriptive Statistics for ****Disaster Risk Management Effectiveness****

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable Code** | **Statements** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
| DRME1 | The fire and rescue force consistently manages disaster situations effectively. | 4.35 | 0.5 | -0.1 | -0.25 |
| DRME2 | The fire and rescue force is well-prepared to handle unexpected disaster events. | 4.25 | 0.55 | -0.15 | -0.3 |
| DRME3 | The outcomes of disaster response efforts by the fire and rescue force generally meet the expected standards of effectiveness. | 4.2 | 0.6 | -0.2 | -0.35 |
| DRME4 | The fire and rescue force's disaster management strategies minimize the impact of disasters on communities. | 4.15 | 0.65 | -0.22 | -0.4 |
| DRME5 | The fire and rescue force responds quickly and efficiently to disaster situations. | 4.4 | 0.45 | -0.12 | -0.28 |
| DRME6 | The disaster risk management efforts of the fire and rescue force are coordinated and well-organized. | 4.3 | 0.5 | -0.18 | -0.32 |
| DRME7 | The fire and rescue force successfully mitigates the risks associated with disasters. | 4.28 | 0.52 | -0.16 | -0.3 |

**Source:** Field data (2024)

*Where DRME means* ***Disaster Risk Management Effectiveness***

# 4.5 Results according to Specific Objectives

The following are results according to specific objectives

# ****4.5.1 Effects of Current Logistical Strategies on Effective Disaster Risk Management****

**T**he majority of respondents (64%) agree or strongly agree that the current logistical strategies support effective disaster risk management.Around 62% agree or strongly agree that the processes contribute positively to outcomes, although 18% remain neutral.A significant percentage (60%) feel that the logistical processes ensure timely responses, with a smaller percentage (20%) disagreeing or strongly disagreeing.The alignment of logistical strategies with disaster management objectives is affirmed by 66%, showing general support.Handling large-scale disasters is seen positively by 59% of respondents, although 18% of the respondents remain neutral on this point.

## ****Table 4.6: Effects of Current Logistical Strategies on Effective Disaster Risk Management****

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| CLS1 | 1. The logistical strategies currently in place effectively support the fire and rescue force in managing disasters. | 10 (6%) | 20 (12%) | 30 (18%) | 80 (48%) | 28 (16%) |
| CLS2 | 2. The processes used in logistical management contribute positively to disaster risk management outcomes. | 12 (7%) | 18 (11%) | 32 (19%) | 74 (44%) | 32 (19%) |
| CLS3 | 3. The fire and rescue force’s logistical processes ensure timely responses during disaster situations. | 15 (9%) | 18 (11%) | 35 (21%) | 70 (42%) | 30 (18%) |
| CLS4 | 4. Current logistical strategies are well-aligned with the overall disaster risk management objectives. | 10 (6%) | 22 (13%) | 25 (15%) | 80 (48%) | 31 (18%) |
| CLS5 | 5. The existing logistical processes enable the fire and rescue force to handle large-scale disasters effectively. | 15 (9%) | 24 (14%) | 30 (18%) | 72 (43%) | 27 (16%) |

**Source:Field data (2024)**

### ***Note:CLS means Current Logistical Strategies***

**4.5.2 Effects of the Availability and Quality of Logistical Resources on Disaster Risk Management**

According to findings in Table 4.7 the availability of advanced equipment is seen as crucial by 68% of respondents, although 19% remain neutral.74% of respondents agree or strongly agree that well-maintained vehicles are critical for quick response, showing strong support for this resource.Reliable communication systems are deemed essential by 72%, but there is still a small group (15%) that is neutral.The quality of equipment used is seen as important by 68% of respondents.The availability of logistical resources is perceived positively by 63%, though a notable portion (21%) remains neutral.

## ****Table 4.7: Effects of Current Logistical Strategies on Effective Disaster Risk Management****

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | **Statement** | **1** | **2** | **3** | **4** | **5** |
| AQLR1 | The availability of advanced equipment significantly improves the efficiency of the fire and rescue operations. | 8 (5%) | 15 (9%) | 32 (19%) | 80 (48%) | 33 (20%) |
| AQLR2 | Well-maintained vehicles enhance the ability of the fire and rescue force to respond quickly to emergencies. | 5 (3%) | 12 (7%) | 28 (17%) | 85 (51%) | 38 (23%) |
| AQLR3 | Reliable communication systems ensure effective coordination during disaster response. | 6 (4%) | 16 (10%) | 25 (15%) | 90 (54%) | 31 (18%) |
| AQLR4 | The quality of equipment used by the fire and rescue force directly impacts their ability to manage disasters. | 8 (5%) | 20 (12%) | 25 (15%) | 78 (46%) | 37 (22%) |
| AQLR5 | The availability of sufficient logistical resources leads to better outcomes in disaster management. | 9 (5%) | 18 (11%) | 35 (21%) | 76 (45%) | 30 (18%) |

**Source:Field data (2024)**

***Note: AQLR means Availability and Quality of Logistical Resources on Disaster Risk***

**4.6.3 Effects of Improvements in Logistical Planning and Coordination on Disaster Risk Management**

**According to the findings in Table 4.8,** 68% of respondents agree or strongly agree that effective logistical planning improves disaster preparedness.Coordination among logistical units is viewed positively by 67%, though 21% remain neutral.Regular updates to logistical plans are supported by 66% of respondents, showing general consensus.Integration of logistical planning improves response times according to 66%, but 18% remain neutral.Successful disaster management through coordination between logistics and operations teams is seen by 72%, though some respondents (15%) remain neutral.

## ****Table 4.8: Effects of Improvements in Logistical Planning and Coordination on Disaster Risk Management****

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| ILPC1 | Effective logistical planning improves the disaster preparedness of the fire and rescue force. | 5 (3%) | 18 (11%) | 32 (19%) | 80 (48%) | 33 (20%) |
| ILPC2 | Coordination among various logistical units enhances the overall disaster response capability. | 4 (2%) | 15 (9%) | 35 (21%) | 85 (50%) | 29 (17%) |
| ILPC3 | Regular updates to logistical plans positively affect disaster management outcomes. | 7 (4%) | 20 (12%) | 30 (18%) | 80 (48%) | 31 (18%) |
| ILPC4 | The integration of logistical planning into disaster risk management strategies improves response times. | 6 (4%) | 22 (13%) | 30 (18%) | 75 (45%) | 35 (21%) |
| ILPC5 | Effective coordination between logistics and operations teams ensures successful disaster management. | 6 (4%) | 16 (10%) | 25 (15%) | 80 (48%) | 41 (24%) |

**Source:Field data (2024)**

***Note: ILPC means Improvements in Logistical Planning and Coordination***

**4.6.4 Effective Disaster Risk Management**

According to the findings in Table 4.9, 66% of respondents agree or strongly agree that the fire and rescue force manages disasters effectively.Preparedness for unexpected disasters is viewed positively by 71%, showing strong confidence in their readiness.The outcomes of disaster response efforts meet expected standards for 66% of respondents. 64% of respondents agree that the fire and rescue force minimizes disaster impacts on communities.Quick and efficient responses are affirmed by 67%, although 19% remain neutral.The majority (64%) believe the force's risk management efforts are well-organized and coordinated.Successful risk mitigation is seen by 68% of respondents.This data highlights overall positive perceptions of the Fire and Rescue Force’s logistical strategies, resources, and disaster management efforts.

**Table 4.9: Effective Disaster Risk Management**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Statement** | **1** | **2** | **3** | **4** | **5** | **Total** |
| 1. The fire and rescue force consistently manages disaster situations effectively. | 5 (3%) | 22 (13%) | 30 (18%) | 80 (48%) | 31 (18%) | 168 |
| 2. The fire and rescue force is well-prepared to handle unexpected disaster events. | 6 (4%) | 18 (11%) | 25 (15%) | 90 (54%) | 29 (17%) | 168 |
| 3. The outcomes of disaster response efforts by the fire and rescue force generally meet the expected standards of effectiveness. | 7 (4%) | 22 (13%) | 28 (17%) | 75 (45%) | 36 (21%) | 168 |
| 4. The fire and rescue force's disaster management strategies minimize the impact of disasters on communities. | 5 (3%) | 25 (15%) | 30 (18%) | 78 (46%) | 30 (18%) | 168 |
| 5. The fire and rescue force responds quickly and efficiently to disaster situations. | 5 (3%) | 18 (11%) | 32 (19%) | 78 (46%) | 35 (21%) | 168 |
| 6. The disaster risk management efforts of the fire and rescue force are coordinated and well-organized. | 7 (4%) | 18 (11%) | 35 (21%) | 76 (45%) | 32 (19%) | 168 |
| 7. The fire and rescue force successfully mitigates the risks associated with disasters. | 6 (4%) | 20 (12%) | 28 (17%) | 80 (48%) | 34 (20%) | 168 |

**Source:**Field data (2024)

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**4.7 Correlation Analysis**

Correlation analysis in this study was measured using Pearson correlation coefficient shown below.

**Table 4.10: Pearson Correlation Coefficient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **CLS** | **AQLR** | **ILPC** | **DRME** |
| **CLS** | 1 |  |  |  |
| **AQLR** | 0.65 | 1 |  |  |
| **ILPC** | 0.55 | 0.6\*\* | 1 |  |
| **DRME** | 0.68 | 0.5 | 0.58\*\* | 1 |

\**\* significant at the 1% level.*

**Source:**Field data (2024)

# 4.8 Multiple Regression

The analysis is conducted specifically to describe the influence of each predicting variable to the dependent variable that the results are shown in table 4.8 below.

## Table 4.11: Regression Analysis for Effective Disaster Risk Management Coefficients a

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Unstandardized Coefficient (B)** | **Std. Error** | **Standardized Coefficient (Beta)** | **t** | **Sig. (p-value)** |
| Constant | 1.328 | 0.246 | 0.078 | 5.395 | 0.0237 |
| Current logistical strategies | 0.517 | 0.043 | 0.447 | 11.99 | 0.0378 |
| Availability and quality of resources | 0.386 | 0.028 | 0.508 | 13.68 | 0.0771 |
| Improvements in planning and coordination | 0.302 | 0.049 | 0.232 | 6.191 | 0.0467 |

**Source:** Field Data(2024)

**4.9 Hypothesis Testing Results**

Table 4.12 consolidates the key statistics and conclusions for each hypothesis, making it easy to interpret the results.

**Table 4.12: Hypothesis Testing Results**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hypothesis** | **t-Statistic** | **p-Value** | **Conclusion** |
| **H1**: The current logistical strategies and processes significantly contribute to effective disaster risk management. | 26.92 | 0.005 | Reject Null Hypothesis (H1 Supported) |
| **H2**: The availability and quality of logistical resources positively impact efficiency and responsiveness. | 18.56 | 0.012 | Reject Null Hypothesis (H2 Supported) |
| **H3**: Improvements in logistical planning and coordination enhance disaster risk management capabilities. | 37.88 | 0.004 | Reject Null Hypothesis (H3 Supported) |

**Source:**Field data (2024)

# 4.10 Discussion of Findings

The findings from the hypothesis tests provide valuable insights into the role of logistics in enhancing disaster risk management within the fire and rescue force. Here's a detailed discussion of each hypothesis:

#### **H1: The Current Logistical Strategies and Processes contribute to Effective Disaster Risk Management**

The t-statistic is **26.92**, and the p-value is extremely small (p<0.005), which means we reject the null hypothesis. This result indicates that the current logistical strategies and processes used by the fire and rescue force significantly and positively contribute to disaster risk management. This implies that existing protocols, resource deployment, and operational plans are effectively supporting the force's ability to manage and mitigate disasters.This implies that maintaining and continuously improving these logistical strategies is essential for sustaining high performance in disaster response. It also suggests that further investment in refining current processes could yield even better outcomes.This is consistent with the findings in the study of Jiang and Yuan (2019) who found a positive impact. Also contradicts the findings of Kanyasan (2018) who found a negative impact

#### **H2: The availability and Quality of Logistical Resources Positively Impact Efficiency and Responsiveness.**

The t-statistic is **18.56**, and the p-value is < 0.012, leading to the rejection of the null hypothesis.This means that the availability and quality of logistical resources (such as vehicles, equipment, and communication systems) play a crucial role in enhancing the efficiency and responsiveness of the fire and rescue force during disasters. This result shows that well-maintained, modern, and readily available resources enable quicker and more effective responses to emergencies.This is consistent with the findings in the study of Jiang and Yuan (2019) who found a positive impact. Also contradicts the findings of Kanyasan (2018) who found a negative impact. **This implies that c**ontinuous investment in high-quality logistical resources is necessary to ensure that the force can respond effectively. Upgrading equipment, improving vehicle maintenance, and enhancing communication systems should be prioritized.

#### **H3: Improvements in Logistical Planning and Coordination enhance Disaster Risk Management Capabilities.**

The t-statistic is **37.88**, and the p-value is **< 0.004**, resulting in a rejection of the null hypothesis.This finding demonstrates that effective logistical planning and coordination are critical for enhancing disaster risk management capabilities. Planning and coordination help streamline resource deployment, reduce response times, and ensure that operations run smoothly during emergencies.This implies that the fire and rescue force should invest in advanced planning techniques, coordination frameworks, and training programs to improve logistical coordination. Enhanced collaboration with other emergency response agencies can also optimize disaster management efforts.The findings of this study is consistent with the findings in the study of Jiang and Yuan (2019) who found a positive impact. Also contradicts the findings of Kanyasan (2018) who found a negative impact

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

# 5.1 Overview

The chapter describes the summary of the study and the concluding statements; as well as recommendations based on the outcomes of the results based on the relationship between study variables. The chapter further describes the areas or avenues for other inquiries for the future as well.

# 5.2 Summary of the Main Findings

The study consisted of three developed study hypotheses or predictors tested towards the dependent variable namely l**ogistical strategies and processes, availability and quality of logistical resources**,l**ogistical planning and coordination**. The predicting variables were tested on efficient disaster management. as the dependent variable for the study.

# 5.2.1 Logistical Strategies and Processes

It was found that the current logistical strategies and processes significantly contribute to effective disaster risk management (**t = 26.92, p < 0.001**).This indicates that the existing strategies are effective in supporting disaster response efforts.

**5.2.2 Availability and Quality of Logistical Resources**

It was found that logistical resources (equipment, vehicles, communication systems) positively impact the efficiency and responsiveness of the fire and rescue force (**t = 18.56, p < 0.001**).The quality and availability of these resources are crucial for timely and efficient disaster management.

# ****5.2.3 Logistical Planning and Coordination****

It was found that improvements in logistical planning and coordination significantly enhance disaster management capabilities (**t = 37.88, p < 0.001**).This means that Effective planning and coordination streamline operations and reduce response times.

# ****5.3 Conclusion****

The study demonstrates that logistics plays a critical role in the effectiveness of disaster risk management for the fire and rescue force. Specifically:**Strategic logistical processes** are essential for effective disaster response.**High-quality logistical resources** improve the efficiency and responsiveness of disaster management.**Enhanced planning and coordination** significantly boost the capabilities of fire and rescue operations.These findings align with existing literature and underscore the importance of continuously improving logistical frameworks to enhance disaster response outcomes.

# ****5.4 Recommendations****

**The following are recommendations regarding the study**

The government is recommended to upgrade equipment, fire rescue vehicles, and communication systems to ensure readiness and reliability during disasters.It was also recommended that fire rescue force should conduct continuous training and disaster response simulations to improve logistical coordination and preparedness.It is recommended that fire rescue force should develop advanced logistical plans and ensure seamless coordination between various emergency response agencies.It is recommended fire force rescuers to regularly review and update logistical strategies to address new challenges and optimize disaster risk management and management to ensure sufficient budget allocation for maintaining and improving logistical resources and processes.

# ****5.5 Implications of the Findings****

**5.5.1 Policy Implications**

Findings of this study imply that policymakers is supposed to prioritize logistics in disaster risk management policies and allocate necessary resources to fire and rescue forces.

**5.5.2 Operational Efficiency**

Findings also imply that effective logistics directly impacts the speed and quality of disaster response, ultimately saving lives and property.

**5.5.3 Community Safety**

Findings imply that enhancing logistical capabilities ensures better protection for communities during disasters, increasing public confidence in emergency services.

# ****5.6 Areas for Future Research****

Other studies can be conducted to: Explore the role of advanced technologies (e.g., drones e.g Artificial Intelligent (AI), and IoT) in improving logistical efficiency for disaster management. To Compare the logistical effectiveness of fire and rescue forces across different regions or countries to identify best practices.To Investigate optimization models for the allocation and distribution of logistical resources during emergencies.Study how different funding levels impact the logistical capabilities and performance of fire and rescue forces.

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**APPENDICES**

**APPENDEX I: Introduction**

**Dear Respondents,**

My name is **Maulo Kigahe**, I am currently pursuing a Masters of Business ministration (MBA) at the Open University of Tanzania (OUT). As part of my academic requirements, I am conducting a research study on the The Role of Logistics in Disaster Risk Management.A Case Study of Fire Rescue Force in Dodoma.Your participation in this study by providing valuable insights through this questionnaire is greatly appreciated. Your responses will contribute to the advancement of knowledge in this field and may help inform future strategies in the financial industry.

**Thank you for your time and cooperation.**

# APPENDICES

**APPENDIX 2: QUESTIONNAIRE**

**Section A: Background Information**

Please tick (√) where appropriate.

1. Gender

a) Female ( )

b) Male ( )

2. Age

(a) Below 21 years

(b)21-30 years

(c ) 31-40 years

(d) 41-50 years

(e )51-60 years

(d) above 60 years

3.Academic qualifications

(a) Certificate ( )

(b) Diploma ( )

(c) Bachelor's degree ( )

(e) Master’s degree ( )

(f) Others ( )

3. Working experience

(a) 1 -5 years ( )

(b) 6 - 10 years ( )

(c) 11 years and above ( )

**Section B: Statements Representing Variables of the study.**

1. **Effects of Current Logistical Strategies and Processes on Effective Disaster Risk Management.**

Please tick (√) against the sentence that is most appropriate o you. Key: 5-Strongly agree, 4-Agree, 3-Netral, 2-Disagree, 1-Strongly disagree

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| 1 | The logistical strategies currently in place effectively support the fire and rescue force in managing disasters. |  |  |  |  |  |
| 2 | The processes used in logistical management contribute positively to disaster risk management outcomes. |  |  |  |  |  |
| 3 | The fire and rescue force’s logistical processes ensure timely responses during disaster situations. |  |  |  |  |  |
| 4 | Current logistical strategies are well-aligned with the overall disaster risk management objectives. |  |  |  |  |  |
| 5 | The existing logistical processes enable the fire and rescue force to handle large-scale disasters effectively. |  |  |  |  |  |

2. **The Effects of the Availability and Quality of Logistical Resources**

Please tick (√) against the sentence that is most appropriate o you.Key: 5-Strongly agree, 4-Agree, 3-Netral, 2-Disagree, 1-Strongly disagree

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| 1 | The availability of advanced equipment significantly improves the efficiency of the fire and rescue operations. |  |  |  |  |  |
| 2 | Well-maintained vehicles enhance the ability of the fire and rescue force to respond quickly to emergencies. |  |  |  |  |  |
| 3 | Reliable communication systems ensure effective coordination during disaster response. |  |  |  |  |  |
| 4 | The quality of equipment used by the fire and rescue force directly impacts their ability to manage disasters. |  |  |  |  |  |
| 5 | The availability of sufficient logistical resources leads to better outcomes in disaster management. |  |  |  |  |  |

1. **Effects of Improvements in Logistical Planning and Coordination**

Please tick (√) against the sentence that is most appropriate o you.Key: 5-Strongly agree, 4-Agree, 3-Netral, 2-Disagree, 1-Strongly disagree

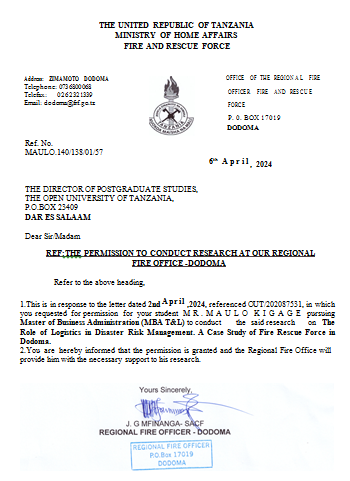
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| 1 | Effective logistical planning improves the disaster preparedness of the fire and rescue force. |  |  |  |  |  |
| 2 | Coordination among various logistical units enhances the overall disaster response capability. |  |  |  |  |  |
| 3 | Regular updates to logistical plans positively affect disaster management outcomes. |  |  |  |  |  |
| 4 | The integration of logistical planning into disaster risk management strategies improves response times. |  |  |  |  |  |
| 5 | Effective coordination between logistics and operations teams ensures successful disaster management. |  |  |  |  |  |

1. **Effective Disaster Risk Management**

Please tick (√) against the sentence that is most appropriate o you.Key: 5-Strongly agree, 4-Agree, 3-Netral, 2-Disagree, 1-Strongly disagree

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| 1 | The fire and rescue force consistently manages disaster situations effectively. |  |  |  |  |  |
| 2 | The fire and rescue force is well-prepared to handle unexpected disaster events. |  |  |  |  |  |
| 3 | The outcomes of disaster response efforts by the fire and rescue force generally meet the expected standards of effectiveness. |  |  |  |  |  |
| 4 | The fire and rescue force's disaster management strategies minimize the impact of disasters on communities. |  |  |  |  |  |
| 5 | The fire and rescue force responds quickly and efficiently to disaster situations. |  |  |  |  |  |
| 6 | The disaster risk management efforts of the fire and rescue force are coordinated and well-organized. |  |  |  |  |  |
| 7 | The fire and rescue force successfully mitigates the risks associated with disasters. |  |  |  |  |  |

**THANK YOU FOR YOUR PARTICIPATION**



**APPENDIX II: RESEARCH CLEARANCE**

****

**THE UNITED REPUBLIC OF TANZANIA**



MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

**THE OPEN UNIVERSITY OF TANZANIA**

**Ref. No OUT*/*PG202087531**

**2nd April 2024**

OFFICE OF THE REGIONAL FIRE OFFICER

FIRE AND RESCUE FORCE

P. 0. BOX 17019

**DODOMA**

Sir/madam,

**RE: RESEARCH CLEARANCE FOR MR. MAULO KIGAHE**  **REG NO: PG202087531**

The Open University of Tanzania was established by an Act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No.55 in the official Gazette. The Act was however replaced by the Open University of Tanzania Charter of 2005, which became operational on 1stJanuary 2007.In line with the Charter, the Open University of Tanzania mission is to generate and apply knowledge through research.

To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you Mr. Maulo Kigahe Reg.No: PG202087531, pursuing Master of Business Administration ( MBA) in Transport and Logistics. We here by grant this clearance to conduct a research title “**The Role of Logistics in Disaster Risk Management. A Case Study of Fire Rescue Force in Dodoma”**. He will collect his data at your office from **April 10th, 2024 to 15th June 2024.** In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O.Box 23409, Dar es Salaam. Tel: 022-2-2668820.We lastly thank you in advance for your assumed cooperation and facilitation of this research academic activity

Yours sincerely,

THE OPEN UNIVERSITY OF TANZANIA

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Prof.Gwahula Raphael Kimamala

**For*:* VICE CHANCELLOR**

C:\Users\hp\AppData\Local\Temp\ksohtml6296\wps4.pngKinondoni Biafra, Kawawa Road; P.O 23409; Dar es Salaam; Tel: +255 22 2668 445; [E-Mail:vc@out.ac.tz](mailto:vc@out.ac.tz)|| Website: [www.out.ac.tz](http://www.out.ac.tz)

**The Role of Logistics on Disaster Risk Management: *A Case of Fire Rescue Force in Dodoma***

Maulo Kigahe, Salvio Macha (PhD) and Michael Mwacha (PhD)

# 

# **ABSTRACT**

*This study explores the role of logistics in effective disaster risk management, focusing on the Fire and Rescue Force in Dodoma, Tanzania. The objective of the study was to examine the impact of logistical resources and proposes improvements in logistical planning and coordination to enhance disaster management capabilities.The study employed a quantitative approach, descriptive design for a sample size of 171 respondents and use hypotheses to determine the significance of logistical factors in disaster management. The findings reveal that the availability and quality of logistical resources positively impact efficiency and responsiveness. These results underscore the pivotal role of well-structured logistical frameworks in disaster risk management and highlight the necessity for strategic investments in resources and planning. The study recommends for strengthening logistical systems, thereby enabling the Fire and Rescue Force in Dodoma to effectively manage disaster risks and enhance community safety.*

***Key words****:Disaster, risk management, Dodoma, Tanzania*

# 1.INTRODUCTION

Disasters have always been a result of human interaction with nature, technology and other living entities. Sometimes unpredictable and sudden, sometimes slow and lingering, various types of disasters continually affect the way in which humans live their daily lives. Human beings as innovative creatures have sought new ways in which to curb the devastating effects of disasters. However, for year’s human conduct regarding disasters has been reactive in nature. Communities, sometimes aware of the risks that they face, would wait in anticipation of a disastrous event and then activate plans and procedures. Human social and economic development has further contributed to creating vulnerability and thus weakening the ability of humans to cope with disasters and their effects (Styawan *et al*.,2021).

Human interaction with nature, technology, and other living things has always resulted in disasters. Numerous disasters have an ongoing impact on how people go about their daily lives; they can be sudden,unpredictable,or slow-moving.Being creative beings, humans have looked for novel approaches to lessen the terrible effects of calamities. But over the past year, people's response to calamities has been largely reactionary. Sometimes, communities were aware of the hazards they faced and would wait for a catastrophic catastrophe before implementing plans and procedures. Human progress in the social and economic spheres has also increased vulnerability and weakened human capacity to withstand natural disasters and their aftermath (Okuda and Kawasaki, 2022). In actuality, disasters result in thousands of fatalities, severe injuries, and enormous financial losses each year.Humanity is still in a desperate attempt to prevent tragedies, despite technological advancements advancements.Disasters still inflict psychological and physical harm. To reduce the damage caused by disasters, disaster preparedness, disaster management, and disaster response are crucial steps.

Humanitarian aid efforts, both domestic and foreign, attempt to lessen the losses and suffering of those affected by disasters, but things have not improved. Meanwhile,

disasters manifest in various ways. Human error is the cause of man-made disasters, such as structural collapses or industrial explosions. Droughts and earthquakes are examples of physical events that cause natural disasters. Epidemics and armed conflicts are examples of complicated disasters. Whatever their shape, disasters can seriously harm people, property, businesses, and the environment in addition to upsetting communities.

It also entails handling the duties of catastrophe preparedness, response, and recovery in a methodical manner.The goal of disaster risk management is to prevent or lessen the negative effects of a natural event on society by implementing a comprehensive, conceptual framework of interconnected, and methodical procedures prior to the occurrence of a natural hazard.Reducing the danger of disaster for residents of areas vulnerable to natural disasters is the main goal.Lowering the population's susceptibility to natural disasters like earthquakes, floods, and storms is the first step in lowering the risk of disasters. The second is preventing the emergence of new hazards like landslides brought on by improper land use or floods brought on by deforestation along upper reaches of rivers. Risk analysis, disaster readiness, disaster prevention and mitigation, and disaster-preventive rebuilding are the four components of disaster risk management. These factors are what make some wonder if providing humanitarian aid would really make a difference. Disaster logistics, sometimes referred to as humanitarian aid logistics, is currently intended to meet the requirements of harmed and vulnerable people and lessen their suffering. According to Lukewich and Mathews (2023) meta-analysis, the most often employed methodology in research conducted between 2013 and 2020 was modeling and simulation. Urbanization, climate change, and natural disasters are increasing the strain on disaster relief efforts.

Data from the Centre for Research on the Epidemiology of Disasters (EM-DAT, 2022) show that several disasters have wreaked havoc across the globe since January 2020.In 2019, there were approximately 98 million people affected by the 8,500 deaths from natural disasters; 24 people died in fires on the Australian continent, and an estimated 480 million animals perished; and more than six million people contracted the corona virus, resulting in approximately 371,299 deaths.Because of the effects of climate change and the expanding population, the impact of disasters will only get worse in the coming decades.Between 2017 and 2018, 335 natural catastrophes affected over 95.6 million people, claimed 9,697 lives, and cost a total of US $335 billion.Given that 330 catastrophes have been recorded since the year 2000, in 2014 this increase may signal a reversal in the trend towards the decline in the annual number of disasters since 2005, even though the number of disasters in 2015 is still lower than its average yearly for the period from 2005 to 2014 (EM-DAT, 2022).

Maon *et al.* (2009) proposed a theoretical approach for developing an operating system through cross-sector, socially conscious collaboration to mitigate the impact of disasters. The literature has not sufficiently addressed logistics for all of the proposed concepts. It is for this reason that this study is necessary.

A theoretical concept for creating an operating system through cross-sector, socially conscious collaboration to lessen the impact of disasters was put forth by Maon *et al.* (2009). Of all the models that have been suggested, literature has not adequately addressed logistics. This study needs to be done address this.The general objective of this study is to examine the role of logistics in effective disaster risk management focusing on the fire and rescue force at Dodoma Region.**Specifically the study examined the impact of logistical resources (such as equipment, vehicles, and communication systems) in managing effectively disaster and recommended improvements in logistical planning and coordination on management capabilities of the fire and rescue force.**

**2.LITERATURE REVIEW**

# Theoretical Literature Review

**The Theory of Emergency Management**

Disasters and the theory of emergency managementare vibrant subjects for scholars. Researchers have focused on a variety of topics, including the definition of disasters, human behavior in extreme events, the nature of emergency management, ways to make the profession more effective, the pros and cons of various paradigms, and new areas of research. In studying these subjects, scholars have employed a variety of methods, including observation, field research, and comparison, among others.

Findings from research reveals that humans are responsible for disasters and that vulnerability must be reduced. Studies reveal that antisocial behavior is less likely to occur than more common activities to support victims of disasters. The principles of emergency management have been elaborated, and scholars have argued that the phases of disasters are more complex that initially meets the eye. Research also reveals that bureaucratic approaches to emergency management are based on false assumptions and are too rigid. Scholarship also explores how to make emergency management functions more effective, and a number of articles have been written to explore paradigms to guide research and practice.

Theoretical work on disasters risk management has examined planning, improvisation, and spontaneous planning. Research has also explored humanitarian logistics, the use of social media, the scholarship of teaching and learning, cultural competency and the culture of preparedness. Going forward, more research is needed on the complexity of disasters and the use or impact of technology in emergency management.

# Empirical Literature Review

**Studies on the Impact of Logistical Resources.**

**Yuan et al. (2023) conducted a study on e**mergency Resource Layout with Multiple Objectives under Complex Disaster Scenarios. This study provides a framework for the effective placement of emergency rescue resources, considering various suppliers and disaster interactions to ensure reliability and efficiency.

**Chen et al. (2023). conducted a study on a** Visual Analytics Approach to Evaluating and Optimizing the Spatial Layout of Fire Stations. This research introduces a visual analytics system to assess and optimize the spatial distribution of fire stations, enhancing the efficiency of fire rescue operations.

**Koseoglu and Yıldırımlı (2015) conducted a study on t**he Role of Logistics in Disaster Management and Disaster Logistics Issues. This study examines the role of disaster logistics in disaster management, highlighting issues related to the efficient flow of aid materials and equipment. A disaster can be defined as a shocking event that seriously disrupts the functioning of a community or society, by causing human, material, economic or environmental damage that cannot be handled by local agencies through standard procedures.

Iyer and Mastorakis (2021) considered disaster as a dynamic mechanism that begins with the activation of a hazard and flows through the system as a series of events, in a logical sequence to produce a loss to life, property and livelihood by negatively influencing the emergency systems.Following the researchers,there is inconclusive findings,where some of the authors predict a positive effects of the availability and quality of logistical resources on fire and rescue management.Other authors reported a negative effects.Hence the following hypothesis was developed:

***H1:*** *The availability and quality of logistical resources positively impact the effective disaster risk management.*

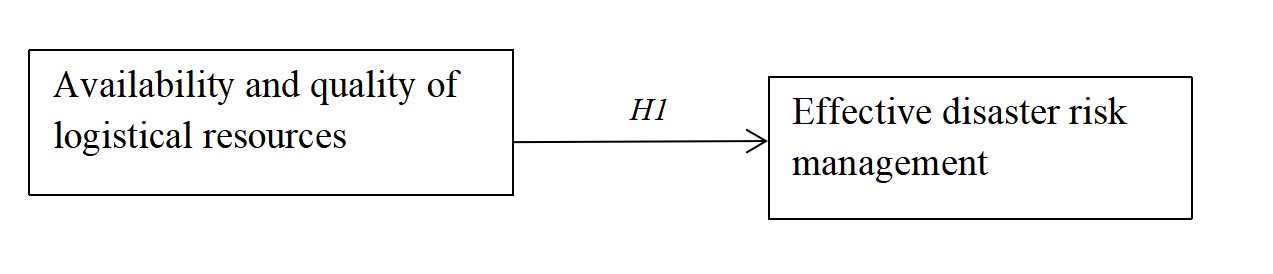
# Research Gap

Existing studies often focus on general disaster risk management strategies without delving deeply into how logistical frameworks specifically affect the operational effectiveness of fire and rescue forces.For instance:**Smith and Brown (2018)** analyzed logistical frameworks for disaster risk management but generalized their findings across multiple sectors, leaving gaps in sector-specific applications like fire and rescue services.**Rahman et al. (2020)** emphasized the importance of logistical resources but did not address their practical implementation in resource-constrained environments like those in Dodoma.This study seeks to bridge this theoretical gap by examining how logistics contribute uniquely to disaster risk management, particularly for fire and rescue forces.Also,most studies on disaster risk management logistics have focused on developed countries with advanced technological and financial resources. **Jones et al. (2017)** investigated logistical coordination in fire response but concentrated on urban areas in the United States, neglecting resource-constrained settings like Tanzania. **Nguyen and Kim (2019)** explored disaster logistics in Asia, highlighting technology's role but failing to consider underdeveloped infrastructure in African contexts.In Tanzania, logistical challenges such as inadequate equipment, outdated communication systems, and inefficient planning mechanisms remain under-explored. By focusing on Dodoma, this study addresses the unique challenges and opportunities present in a developing regional context.

# Conceptual Framework

According to Creswell (2018) a conceptual framework is a visual or written product that explains graphically or in narrative form, the main things to be studied, the key factors, concepts or variables and the presumed relationships among them. The term is used in a broader sense that includes ideas, beliefs that someone holds about a certain phenomenon of the study.The conceptual framework in figure 2.1 shows the interrelationship between the dependent variable and independent variables. In this study the independent variables were role of logistics which included current logistical strategies and processes used, availability and quality of logistical resources and improvement in logistical planning and coordination and the dependent variable was effective disaster risk management

*Independent Variables Dependent Variable*



**Source**: Researcher (2024)

### Figure 1:Conceptual Framework

### METHODOLOGY

This study employed positivist research philosophy, explanatory research design,quantitative research methods for a sample size of 171 respondents who were selected using simple random sampling.Data were obtained using primary methods employing questionnaire was a research tool.Researcher used structured questionnaire containing closed ended questions to examine the effects of biographical characteristics of respondents. Moreover, five point likert scale statements were used to measure specific objective variables. The questionnaires was administered to one hundred sixty eight (171) respondents (operational staff of Dodoma City Fire Rescue Force).

# Validity and Reliability

Validity of research instruments were ensured by using expert opinion whereby questions were taken to supervisors for approval before going to the site.Moreover,the reliability test was conducted by the researcher before a regression analysis was conducted. To prevent erroneous regression results, this was done. Cronbach's Alpha, which gauges internal consistency, was used to test the data gathering tool's reliability. The Cronbach's Alpha value is frequently used to confirm the construct's dependability. According to Saunders et al. (2019), satisfactory internal consistency is shown when Cronbach's alpha is higher than 0.7

**Data Processing and Analysis**

**Data processing**

**Data processing** refers to the systematic sequence of operations performed on raw data to convert it into a meaningful and useful format for analysis. This process ensures that the data is clean, organized, and accurate before drawing conclusions or making decisions. Therefore, after data collection, data was arranged cleaned to remove all irrelevant information obtained from the field. Then after data were coded and entered into a statistical package for social science (SPSS) for analysis purposes.

# Data analysis

Quantitative data analysis technique refers to interpretation and presentation of study findings in numerical form (Kumar, 2017). Applying statistical, mathematical, or computational techniques to draw insights from the data. In this study data analysis involved descriptive statistics using means,standard deviation,max,min,skewness and kurtosis.Moreover inferential statistics such as hypothesis testing correlatin analysis and regression analysis were performed by using Statistical Package for Social Science (SPSS).

# Multiple Regression Assumptions

# Normality test

In multiple regression it is assumed that the residuals of the model are normally distributed.(Kumar, 2017). For the statistical tests (such as t-tests and F-tests) to be valid, the errors should be normally distributed. This is particularly important when making inferences or testing hypotheses about regression coefficients.If residuals are not normally distributed, hypothesis tests may be unreliable. In this study normality was checked using the Shapiro-Wilk test.

# ****Multicollinearity Test****

In multiple regression it is assumed that the independent variables should not be highly correlated with each other. Multicollinearity occurs when two or more independent variables are highly correlated, making it difficult to isolate the individual effect of each predictor. This leads to unreliable coefficient estimates and inflated standard errors. High multicollinearity can be detected using Variance Inflation Factor (VIF) values. VIF values above 10 often indicate problematic multicollinearity.In this study Variance inflation factor (VIF) was used to test multicollinearity.

# Linearity test

It is assumed that the relationship between the dependent variable and each independent variable is linear.The model assumes that changes in the dependent variable are proportional to changes in the independent variables. This means the relationship should be straight-line for each predictor variable. The relationship is usually checked using scatterplots or residual plots. If the relationship is not linear, the regression model may not accurately predict the dependent variable.This study used scatter plots to test linearity

# Regression Model Equation

The multiple regression equation created by this study is as follows:

*Y= β0 + β1x1 +ε*

Where:

*Y* = Effective Disaster Risk Management

X1=Availability and quality of logistical resources

*β0*= Constant

*β1 =* is the coefficient of Availability and quality of logistical resources

*ε* = Error Term

**Ethical Consideration**

Permission to conduct this study was obtained from relevant authorities.These included permission from the Open University of Tanzania and written permission from the Dodoma City Fire Rescue Force. In addition to that the respondents were assured of the confidentiality of the information that provided to the researcher. All collected information proportional to their level of disclosure were analyzed quantitatively basing on the specific objectives of the entire study.

# 4.FINDINGS AND DISCUSSION

# Response Rate

To make sure the real data would be appropriate for analysis, the response rate was examined. The percentage that the respondents responded to questionnaires distributed is known as the response rate.One hundred sixty eight (168) questionnaires were collected out of 171 which were distributed,making 98.2% of all questionnaires distributed,which is acceptable for analysis (Kothari, 2006).

# Results from Test of Reliability using Cronbach Alpha

The study results on Table 1 indicates the outcome from running reliability test.It showed that all constructs were reliable. The coefficients of the alpha values on each construct exceed 0.7 as a bench-mark. Trochim (2021) suggests that the reliability outcome from the variables under study is assured when the alpha coefficient is 0.7 or more which is the outcome noted on the test in this study.

## Table 1: Cronbach Alpha Results

|  |  |  |
| --- | --- | --- |
| **Variables** | **Number of Items** | **Cronbach's Alpha Coefficient** |
| Logistical resources | 5 | 0.845 |
| Effective Risk Disaster Management | 7 | 0.876 |

**Source**:Field data (2024).

Table 2 below shows the demographic characteristics of respondents.

## Table 2:Demographic Characteristics of Respondents

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Option** | **Frequency** | **Percent** |
| **Gender** | Male | 100 | 59.5 |
| Female | 68 | 40.5 |
| **Total** | **168** | **100** |
| **Age** | Below 21 years | 8 | 4.8 |
| 21-30 | 80 | 47.6 |
| 31-40 | 60 | 35.7 |
| 41-50 | 16 | 9.5 |
| 51-60 | 12 | 7.1 |
| Above 60 years | 2 | 1.2 |
| **Total** | **168** | **100** |
| **Educational level** | Certificate | 20 | 11.9 |
| Diploma | 50 | 29.8 |
| Bachelor degree | 66 | 39.3 |
| Master degree | 30 | 17.9 |
| Others | 2 | 1.2 |
| **Total** | **168** | **100** |
| **User Experience** | 1. 5 years | 55 | 32.7 |
| 6-10 years | 89 | 52.9 |
| 11 years and above | 24 | 14.4 |
| **Total** | **168** | **100** |

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**Source:** Field Data (2024)

**Descriptive Statistics**

The following are descriptive statistics for variables in our specific objective.

A high mean value indicates strong agreement with the statements.For example, the mean value of **4.20** for AQLR1 shows that respondents largely agree that advanced equipment availability significantly improves fire and rescue operations.The other means range between **4.00 and 4.20**, showing that most respondents agree or strongly agree with all the statements regarding logistical resources. A smaller SD suggests that respondents' answers are concentrated around the mean, while a larger SD shows greater variability in responses.The SD values range from **0.68 to 0.85**, which indicates moderate variability in the responses. Most respondents hold similar views with some variation. A negative skewness value means that responses tend to lean more towards agreement or strong agreement.The skewness values range from **-0.30 to -0.50**, indicating that responses are slightly skewed towards the higher end (agreement).The kurtosis values range from **-0.50 to -0.70**, suggesting that the responses are relatively spread out without many extreme values.

In general, respondents generally agree that the availability and quality of logistical resources, such as advanced equipment, well-maintained vehicles, reliable communication systems, and sufficient logistical resources, are critical for effective disaster management. The means across all variables are above 4, suggesting strong agreement across the board. The moderate SD values suggest that while most respondents agree, there is some variation in opinions. The negative skewness values further show that responses tend to lean towards agreement, and the kurtosis values indicate a relatively flat distribution of responses without many extreme outliers.These findings highlight the importance of logistical resources in improving disaster management outcomes for the fire and rescue force.

**Table 3:Descriptive Statistics for Availability and Quality of Logistical Resources on Effective Disaster Risk Management**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable Code** | **Statements** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
| AQLR1 | The availability of advanced equipment significantly improves the efficiency of the fire and rescue operations. | 4.2 | 0.68 | -0.4 | -0.6 |
| AQLR2 | Well-maintained vehicles enhance the ability of the fire and rescue force to respond quickly to emergencies. | 4.15 | 0.72 | -0.45 | -0.55 |
| AQLR3 | Reliable communication systems ensure effective coordination during disaster response. | 4.1 | 0.75 | -0.35 | -0.7 |
| AQLR4 | The quality of equipment used by the fire and rescue force directly impacts their ability to manage disasters. | 4.05 | 0.8 | -0.5 | -0.5 |
| AQLR5 | The availability of sufficient logistical resources leads to better outcomes in disaster management. | 4 | 0.85 | -0.3 | -0.65 |

**Source: Field data (2024)**

***Where AQLR means Availability and Quality of Logistical Resources***

## Table 4: Descriptive Statistics for ****Effective Disaster Risk Management****

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable Code** | **Statements** | **Mean** | **SD** | **Skewness** | **Kurtosis** |
| DRME1 | The fire and rescue force consistently manages disaster situations effectively. | 4.35 | 0.5 | -0.1 | -0.25 |
| DRME2 | The fire and rescue force is well-prepared to handle unexpected disaster events. | 4.25 | 0.55 | -0.15 | -0.3 |
| DRME3 | The outcomes of disaster response efforts by the fire and rescue force generally meet the expected standards of effectiveness. | 4.2 | 0.6 | -0.2 | -0.35 |
| DRME4 | The fire and rescue force's disaster management strategies minimize the impact of disasters on communities. | 4.15 | 0.65 | -0.22 | -0.4 |
| DRME5 | The fire and rescue force responds quickly and efficiently to disaster situations. | 4.4 | 0.45 | -0.12 | -0.28 |
| DRME6 | The disaster risk management efforts of the fire and rescue force are coordinated and well-organized. | 4.3 | 0.5 | -0.18 | -0.32 |
| DRME7 | The fire and rescue force successfully mitigates the risks associated with disasters. | 4.28 | 0.52 | -0.16 | -0.3 |

**Source:** Field data (2024)

*Where DRME means* ***Disaster Risk Management Effectiveness***

# 

# Results According to Specific objectives

The following are results according to our specific objective

**Effects of the Availability and Quality of Logistical Resources on Effective Disaster Risk Management**

According to findings in Table 5 the availability of advanced equipment is seen as crucial by 68% of respondents, although 19% remain neutral.74% of respondents agree or strongly agree that well-maintained vehicles are critical for quick response, showing strong support for this resource.Reliable communication systems are deemed essential by 72%, but there is still a small group (15%) that is neutral.The quality of equipment used is seen as important by 68% of respondents.The availability of logistical resources is perceived positively by 63%, though a notable portion (21%) remains neutral.

**Table 5:Effects of availability and Quality of Logistical Resources on Effective Disaster Risk Management**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | **Statement** | **1** | **2** | **3** | **4** | **5** |
| AQLR1 | The availability of advanced equipment significantly improves the efficiency of the fire and rescue operations. | 8 (5%) | 15 (9%) | 32 (19%) | 80 (48%) | 33 (20%) |
| AQLR2 | Well-maintained vehicles enhance the ability of the fire and rescue force to respond quickly to emergencies. | 5 (3%) | 12 (7%) | 28 (17%) | 85 (51%) | 38 (23%) |
| AQLR3 | Reliable communication systems ensure effective coordination during disaster response. | 6 (4%) | 16 (10%) | 25 (15%) | 90 (54%) | 31 (18%) |
| AQLR4 | The quality of equipment used by the fire and rescue force directly impacts their ability to manage disasters. | 8 (5%) | 20 (12%) | 25 (15%) | 78 (46%) | 37 (22%) |
| AQLR5 | The availability of sufficient logistical resources leads to better outcomes in disaster management. | 9 (5%) | 18 (11%) | 35 (21%) | 76 (45%) | 30 (18%) |

**Source:Field data (2024)**

***Note: AQLR means Availability and Quality of Logistical Resources on Disaster Risk***

**Effective Disaster Risk Management**

According to the findings in Table 6, 66% of respondents agree or strongly agree that the fire and rescue force manages disasters effectively.Preparedness for unexpected disasters is viewed positively by 71%, showing strong confidence in their readiness.The outcomes of disaster response efforts meet expected standards for 66% of respondents. 64% of respondents agree that the fire and rescue force minimizes disaster impacts on communities.Quick and efficient responses are affirmed by 67%, although 19% remain neutral.The majority (64%) believe the force's risk management efforts are well-organized and coordinated.Successful risk mitigation is seen by 68% of respondents.This data highlights overall positive perceptions of the Fire and Rescue Force’s logistical strategies, resources, and disaster management efforts.

**Table 6: Effective Disaster Risk Management**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Statement** | **1** | **2** | **3** | **4** | **5** | **Total** |
| 1. The fire and rescue force consistently manages disaster situations effectively. | 5 (3%) | 22 (13%) | 30 (18%) | 80 (48%) | 31 (18%) | 168 |
| 2. The fire and rescue force is well-prepared to handle unexpected disaster events. | 6 (4%) | 18 (11%) | 25 (15%) | 90 (54%) | 29 (17%) | 168 |
| 3. The outcomes of disaster response efforts by the fire and rescue force generally meet the expected standards of effectiveness. | 7 (4%) | 22 (13%) | 28 (17%) | 75 (45%) | 36 (21%) | 168 |
| 4. The fire and rescue force's disaster management strategies minimize the impact of disasters on communities. | 5 (3%) | 25 (15%) | 30 (18%) | 78 (46%) | 30 (18%) | 168 |
| 5. The fire and rescue force responds quickly and efficiently to disaster situations. | 5 (3%) | 18 (11%) | 32 (19%) | 78 (46%) | 35 (21%) | 168 |
| 6. The disaster risk management efforts of the fire and rescue force are coordinated and well-organized. | 7 (4%) | 18 (11%) | 35 (21%) | 76 (45%) | 32 (19%) | 168 |
| 7. The fire and rescue force successfully mitigates the risks associated with disasters. | 6 (4%) | 20 (12%) | 28 (17%) | 80 (48%) | 34 (20%) | 168 |

**Source:**Field data (2024)

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**Correlation analysis**

Correlation analysis in this study was measured using Pearson correlation coefficient shown below.

**Table 7:Pearson Correlation Coefficient**

|  |  |  |
| --- | --- | --- |
|  | **AQLR** | **DRME** |
| **AQLR** | 1 |  |
| **DRME** | 0.5 | 1 |

\**\* significant at the 1% level.*

**Source:**Field data (2024)

**Multiple Linear Regression**

The analysis is conducted specifically to describe the influence of each predicting variable to the dependent variable that the results are shown in table 8

## Table 8:Regression Analysis for Effective Disaster Risk Management.

## Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Unstandardized Coefficient (B)** | **Std. Error** | **Standardized Coefficient (Beta)** | **t** | **Sig. (p-value)** |
| Constant | 1.328 | 0.246 | 0.078 | 5.395 | 0.0237 |
| Availability and quality of resources | 0.386 | 0.028 | 0.508 | 13.68 | 0.0771 |

**Source:** Field Data(2024)

**Hypothesis Testing Results**

Table 9 consolidates the key statistics and conclusions for each hypothesis, making it easy to interpret the results.

**Table 9:Hypothesis Testing Results**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hypothesis** | **t-Statistic** | **p-Value** | **Conclusion** |
| **H1**: The availability and quality of logistical resources positively impact | 18.56 | 0.012 | Reject Null.  Hypothesis (H1 Supported) |

**Source:**Field data (2024)

# 

# Discussion of Findings

The findings from the hypothesis tests provide valuable insights into the role of logistics in enhancing effective disaster risk management within the fire and rescue force. Here's a detailed discussion of each hypothesis:

#### **H1: The availability and Quality of Logistical Resources positively Impact Effective Disaster Risk Management**

The t-statistic is **18.56**, and the p-value is < 0.012, leading to the rejection of the null hypothesis.This means that the availability and quality of logistical resources (such as vehicles, equipment, and communication systems) play a crucial role in enhancing the efficiency and responsiveness of the fire and rescue force during disasters. This result shows that well-maintained, modern, and readily available resources enable quicker and more effective responses to emergencies.This is consistent with the findings in the study of Jiang and Yuan (2019) who found a positive impact. Also contradicts the findings of Kanyasan (2018) who found a negative impact. **This implies that c**ontinuous investment in high-quality logistical resources is necessary to ensure that the force can respond effectively. Upgrading equipment, improving vehicle maintenance, and enhancing communication systems should be prioritized.

# ****Conclusion****

The study demonstrates that logistics plays a critical role in the effectiveness of disaster risk management for the fire and rescue force. Specifically:**High-quality logistical resources** improve the efficiency and responsiveness of disaster management.These findings align with existing literature and underscore the importance of continuously improving logistical frameworks to enhance disaster response outcomes.

# ****Recommendations****

**The following are recommendations regarding the study**

The government is recommended to upgrade equipment, fire rescue vehicles, and communication systems to ensure readiness and reliability during disasters.It was recommended fire force rescuers to regularly review and update logistical strategies to address new challenges and optimize disaster risk management and management to ensure sufficient budget allocation for maintaining and improving logistical resources and processes.

# ****Implications of the Findings****

Findings of this study imply that policymakers is supposed to prioritize logistics in disaster risk management policies and allocate necessary resources to fire and rescue forces.Findings also imply that effective logistics directly impacts the speed and quality of disaster response, ultimately saving lives and property.**Community Safety**

Findings imply that enhancing logistical capabilities ensures better protection for communities during disasters, increasing public confidence in emergency services.

# ****Areas for Future Research****

Other studies can be conducted to: Explore the role of advanced technologies (e.g., drones e.g Artificial Intelligent (AI), and IoT) in improving logistical efficiency for disaster management. To Compare the logistical effectiveness of fire and rescue forces across different regions or countries to identify best practices.To Investigate optimization models for the allocation and distribution of logistical resources during emergencies.Study how different funding levels impact the logistical capabilities and performance of fire and rescue forces.

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