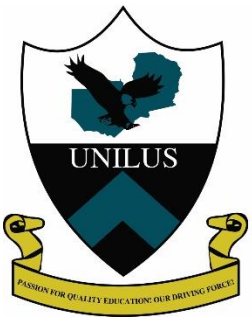


UNIVERSITY OF LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

DEMURRAGE REDUCTION STRATEGIES IN LOGISTICS

(A CASE STUDY OF NAKONDE BORDER IN ZAMBIA)

A

Dissertation presented

In Partial Fulfilment for requirement of the program

Master of Procurement, Logistics and Supply Chain (MSCPLSM)

Student Name: ZAMANGA THOLE

Student number: MSCPLSM23119205

2025

DECLARATION

I **ZAMANGA THOLE** hereby declare that this research is my own work. The research has not been previously submitted for a master's degree by any other person. It does not require any material from another research.

Signature of student: 

Date: 18 January 2025

APPROVAL

This research is approved as a requirement for the award of the Master's degree in Ms. Procurement, Logistics and Supply Chain by University of Lusaka

Name of Supervisor: Jones J Kalyongwe PhD

Signature of Supervisor: 

Date: 18 January 2025

ABSTRACT

The efficient movement of goods in logistics is vital for supply chain effectiveness. However, demurrage, a charge levied for the extended use of transportation equipment or facilities, significantly affects logistics performance. This study investigates demurrage reduction strategies in logistics, focusing on the Nakonde border in Zambia. Despite being a critical transit point for regional and international trade, Nakonde faces challenges such as inadequate infrastructure, inefficient customs clearance processes, and poor stakeholder coordination. These issues lead to delays, increased costs, and disruptions in the supply chain. The study employed a quantitative research approach, gathering data from 72 logistics stakeholders, including customs officers, logistics managers, and freight forwarders. Findings reveal that while existing strategies have moderate effectiveness, improvements in infrastructure, technology, and stakeholder collaboration are essential. Key recommendations include investing in modern infrastructure, implementing advanced technological solutions like real-time tracking, and fostering stronger stakeholder partnerships. These strategies are expected to enhance logistics performance, reduce costs, and improve supply chain efficiency at Nakonde and similar logistics hubs.

Keywords: Demurrage, Logistics, Nakonde Border, Supply Chain, Infrastructure, Stakeholder Collaboration, Customs Clearance, Real-time Tracking, Cost Reduction.

ACKNOWLEGMENT

I would like to express my deepest gratitude to all those who contributed to the successful completion of this dissertation. My sincere thanks go to my academic supervisor, whose guidance, constructive feedback, and unwavering support were instrumental throughout the research process. I am also immensely grateful to the staff and respondents at Nakonde border, whose insights and participation made this study possible.

Special thanks to my family and friends for their encouragement, understanding, and patience during this demanding academic journey. Lastly, I thank God for granting me the strength and perseverance to accomplish this work.

DEDICATION

This dissertation is dedicated to my loving parents who instilled in me the value of education and hard work. Your endless sacrifices and unwavering belief in my abilities have been my greatest source of inspiration. I also dedicate this work to all logistics professionals striving to improve supply chain efficiency and foster regional trade in Africa.

ABBREVIATIONS

1. AfDB: African Development Bank
2. EAC: East African Community
3. FMC: Federal Maritime Commission
4. GDP: Gross Domestic Product
5. GPS: Global Positioning System
6. ICT: Information and Communication Technology
7. LAPSSET: Lamu Port-South Sudan-Ethiopia Transport
8. RFID: Radio Frequency Identification
9. SCM: Supply Chain Management
10. SMEs: Small and Medium-sized Enterprises
11. SPSS: Statistical Package for the Social Sciences
12. WTO: World Trade Organization

TABLE OF CONTENTS

Abstract 2
Acknowledgment ..... **Error! Bookmark not defined.**
Dedication ..... **Error! Bookmark not defined.**
Abbreviations ..... **Error! Bookmark not defined.**
Chapter One 10
1.0 Introduction 10
1.1 Background of the Study 11
1.2 Statement of the Problem 12
1.3.1 General Objective 13
1.3.2 Specific Objectives 13
1.4 Research Questions 14
1.5 Significance of the Study 14
1.6 Scope of the Study 15
1.7 Definition of Key Terms 15
1.8 Structure of the Thesis 16
CHAPTER TWO 20
LITERATURE REVIEW 20
2.1 Empirical Review 20
2.1.1 Global Perspective 20
2.1.2 Sub-Saharan Africa Perspective 29
2.1.5 Gap in Literature 44
GAP ANALYSIS TABLE 20
2.2 Theoretical Review 45
2.2.1 Supply Chain Management Theory 45
2.2.2 Systems Theory 46
2.2.3 Lean Logistics Theory 46
2.3 Conceptual Framework 46
CHAPTER THREE 50
RESEARCH METHODOLOGY 50
3.0 Introduction 50
3.1 Research Approach 50
3.2 Research Design 51
3.3 Population of the Study 51
3.4 Sample Size 52

3.5 Sampling Procedure 53
3.6 Data Collection Instruments 53
3.8 Data Analysis 54
3.9 Reliability and Validity 54
3.10 Ethical Consideration 54
CHAPTER FOUR 55
FINDINGS 56
4.0 Introduction 56
4.1 Response Rates 56
4.2 Demographic Breakdown 56
4.3 Instrument Reliability 57
4.4 Descriptive Statistics 57
4.4.1 Mean Score Interpretation Scale 57
4.4.2 Effectiveness of Demurrage Reduction Strategies 58
4.4.3 Infrastructure and Technological Support 59
4.4.4 Customs Clearance Processes 60
4.4.4 Customs Clearance Processes 60
4.4.5 Impact of Demurrage on Costs and Logistics Performance 61
4.4.6 Recommendations for Improvement 62
4.5 Hypothesis Test Summary 64
CHAPTER FIVE 66
DISCUSSION 66
5.0 Introduction 66
5.1 Summary of Findings 66
5.2 Interpretation of Findings 66
CHAPTER SIX 70
CONCLUSION AND RECOMMENDATIONS 70
6.3 Conclusions 70
6.4 Recommendations 70

LIST OF TABLES

Table 1 Demographic Breakdown of Respondents 56
Table 2 Mean Score Interpretation Scale 57
Table 3 Effectiveness of Existing Demurrage Reduction Strategies 58
Table 4 Infrastructure and Technological Support 59
Table 5 Customs Clearance Processes 60
Table 6 Impact of Demurrage on Costs and Logistics Performance 61
Table 7 : Recommendations for Improvement 62
Table 8 : Model Summary 63
Table 9 Coefficients for Regression Analysis 63
Table 10: Hypothesis Test Summary 64

CHAPTER ONE

1.0 Introduction

Logistics plays a crucial role in the global supply chain, ensuring the efficient movement of goods from the point of origin to the final destination (Rodrigue, J.P. and Notteboom, T. (2013). It encompasses the planning, implementation, and control of the efficient and effective flow and storage of goods, services, and related information Christopher, M. (2016). The logistics industry faces numerous challenges, one of which is demurrage—a charge levied by carriers or terminal operators for the extended use of their equipment or facilities beyond the agreed-upon free time UNCTAD (2018) Review of Maritime Transport. Demurrage can result in significant financial losses for companies and negatively impact their supply chain performance Notteboom, T. and Rodrigue, J.P. (2009) this study aims to explore demurrage reduction strategies in logistics, with a particular focus on Nakonde, a border town in Zambia.

Nakonde, situated on the border between Zambia and Tanzania, serves as a crucial transit point for regional and international trade. Mwale, T. and Lungu, K. (2019) 'Regional Trade and Border Management in Zambia', Zambian Journal of Trade and Development, 12(2), pp. 34-45. Due to its strategic location, a significant volume of goods passes through Nakonde, making it an ideal case study for exploring demurrage reduction UNCTAD (2018) Review of Maritime Transport. Geneva: United Nations Conference on Trade and Development. The town faces challenges related to border clearance processes, infrastructure limitations, and coordination among various stakeholders, all of which can contribute to demurrage and supply chain disruptions World Bank (2017) Improving Border Management in Africa. Washington, D.C.: World Bank. Understanding and optimizing demurrage reduction strategies in Nakonde could have a significant impact on the logistics industry, not only in Zambia but also in the surrounding regions Zhu, Y. and Chompan, C. (2020) 'Demurrage and Supply Chain Disruptions: Case Studies in East Africa', Journal of International Logistics, 15(3), pp. 12-29.

1.1 Background of the Study

Demurrage charges are a significant concern in the logistics industry, arising when cargo is not cleared or collected within the designated free time, leading to delays and congestion at ports, terminals, or warehouses. These charges can accumulate rapidly, creating a substantial financial burden for companies involved in logistics operations. The repercussions of demurrage extend beyond financial implications, impacting supply chain efficiency, customer satisfaction, and overall competitiveness. Several factors contribute to demurrage, including inefficient customs clearance processes, inadequate infrastructure, lack of coordination among stakeholders, and insufficient planning and forecasting. In this context, understanding the multifaceted nature of demurrage is essential for developing effective strategies to mitigate its impact and improve the overall efficiency of logistics operations. Rodrigue, J.P. and Notteboom, T. (2013)

Customs clearance processes play a pivotal role in the timely movement of goods. Inefficiencies in these processes, such as cumbersome documentation requirements, prolonged inspections, and bureaucratic delays, can significantly extend the time cargo spends at ports or terminals. In many cases, the complexity of customs procedures and the lack of automation further exacerbate delays, leading to increased demurrage charges (Sanchez-Rodrigues, Potter, & Naim, (2010). This issue is particularly pronounced in developing regions where resources and technological advancements may be limited, creating bottlenecks that hinder the smooth flow of goods through the supply chain. For example, manual handling of documents, lack of real-time tracking systems, and inconsistent application of customs regulations can all contribute to significant delays and increased costs for businesses operating in these environments (Raballand, Refas, Beuran, & Isik, (2012).

In addition to customs clearance challenges, infrastructure inadequacies and lack of coordination among stakeholders are critical factors contributing to demurrage. Infrastructure limitations, such as insufficient storage facilities, inadequate handling equipment, and poor transportation networks, can cause significant delays in cargo movement (Ng & Tongzon,(2010). These challenges are often compounded by the lack of effective communication and coordination among logistics companies, customs authorities, terminal operators, and transportation providers (Zhao,(2012). For instance,

a delay in information sharing between a shipping company and a port authority can lead to unexpected hold-ups, exacerbating congestion and increasing demurrage costs. In Nakonde, the strategic location as a transit point for regional and international trade amplifies these issues, necessitating a comprehensive analysis and optimization of demurrage reduction strategies to enhance overall logistics efficiency and competitiveness. Addressing these infrastructural and coordination challenges through improved technology, streamlined processes, and collaborative efforts among stakeholders are essential for reducing demurrage and its associated costs (De Castro, Kuse, & Martins, (2015).

Demurrage charges are incurred when cargo is not cleared or collected within the allotted free time typically provided to allow for the smooth movement of goods without additional costs (Notteboom and Rodrigue, (2009). For most shipping containers, the standard free time at ports or terminals ranges from 5 to 7 days. During this period, the cargo is allowed to remain at the terminal without incurring any demurrage fees (UNCTAD, (2018). However, if the cargo is not collected or cleared within these 5 to 7 days, demurrage charges begin to apply, often compounding daily. For bulk cargo, the free time may be slightly longer, ranging from 7 to 10 days, depending on the nature of the cargo and the agreements in place (World Bank, (2017). Warehouses or storage facilities, on the other hand, often provide a shorter free time, typically 1 to 3 days, after which storage fees or demurrage charges begin to accumulate (Mwale and Lungu, (2019).

These charges can quickly become a significant financial burden, impacting not only the companies involved but also the efficiency of the entire supply chain, leading to delays, higher costs, and decreased competitiveness (Zhu and Chompan, (2020).

1.2 Statement of the Problem

Despite efforts to address demurrage issues, logistics companies and importers/exporters operating in Nakonde continue to face significant challenges, resulting in substantial financial losses and supply chain inefficiencies. According to recent industry reports, the logistics sector in Nakonde has experienced estimated financial losses exceeding K5 million in demurrage charges annually from 2020 to 2023 (Zambia Revenue Authority, (2023). This consistent financial drain severely impacts the

profitability of businesses and hinders the efficient movement of goods through the supply chain.

Statistical data indicates that approximately 35% of cargo passing through Nakonde incurs demurrage charges due to delays in customs clearance and inadequate infrastructure (Nakonde Border Logistics Report, (2022). With about 20,000 containers transiting the Nakonde border each year, the cumulative demurrage costs pose a significant challenge for stakeholders, including logistics companies, importers, and exporters (Zambian Freight Forwarders Association, (2023).

The problem of demurrage in Nakonde is multifaceted, involving various stakeholders and complex logistics processes. The high volume of goods passing through the border, combined with infrastructure limitations, inefficient customs clearance processes, and lack of coordination among stakeholders, creates a challenging environment for logistics operations (Sanchez-Rodrigues, Potter & Naim, (2010). Existing demurrage reduction strategies often fail to address these challenges comprehensively, resulting in continued inefficiencies and financial losses.

Addressing the problem of demurrage in Nakonde requires a comprehensive approach that considers the various factors contributing to demurrage and the interplay between these factors. This study aims to analyze the factors contributing to demurrage, evaluate the effectiveness of existing demurrage reduction strategies, and propose optimized solutions based on industry best practices. By addressing the problem of demurrage in Nakonde, this study seeks to improve logistics operations, reduce costs, and enhance the competitiveness of logistics companies and importers/exporters operating in the region.

1.3.1 General Objective

The main objective of this study is to analyze demurrage reduction strategies in logistics, with a focus on the case study of Nakonde, Zambia

1.3.2 Specific Objectives

The specific objectives of this study are as follows:

i. To evaluate the effectiveness of existing demurrage reduction strategies

ii. To assess the potential impact of demurrage reduction strategies on supply chain performance and cost saving.
iii. To propose optimized demurrage reduction strategies tailored to the logistics operations at Nakonde border.

1.4 Research Questions

The research questions for this study are designed to address the specific objectives and provide a focused framework for the investigation. The research questions are as follows:

i How effective are the existing demurrage reduction strategies at Nakonde border?
ii What is the potential impact of demurrage reduction strategies on supply chain performance and cost savings?
iii What optimized demurrage reduction strategies can be proposed for the logistics operations at Nakonde border?

1.5 Significance of the Study

This study holds significant importance for the logistics industry, particularly in Nakonde and the surrounding region. By identifying and addressing the factors contributing to demurrage, the study aims to provide practical solutions to reduce associated costs and improve supply chain efficiency. The optimization of demurrage reduction strategies can lead to substantial cost savings for logistics companies and importers/exporters, enhancing their competitiveness in the market.

The significance of this study can be understood from several perspectives:

1. **Economic Impact:** Demurrage charges represent a significant cost for logistics companies and importers/exporters. By optimizing demurrage reduction strategies, this study aims to reduce these costs, leading to substantial cost savings and improved profitability for companies operating in Nakonde. This, in turn, can enhance the competitiveness of these companies in the market and contribute to economic growth in the region.

2. **Supply Chain Efficiency:** Demurrage charges are often a symptom of broader inefficiencies in the supply chain. By identifying and addressing the factors contributing to demurrage, this study aims to improve supply chain efficiency,

leading to more reliable and predictable logistics operations. This can enhance customer satisfaction and improve the overall competitiveness of the logistics industry in Nakonde.

3. **Policy and Regulation:** The findings of this study can contribute to the development of policies and regulations aimed at streamlining border clearance processes, improving infrastructure, and fostering collaboration among stakeholders. Effective policies and regulations can play a crucial role in reducing demurrage charges and improving logistics operations in Nakonde and the surrounding region.

4. **Knowledge Contribution:** This study aims to contribute to the existing body of knowledge on demurrage and logistics management. By providing a comprehensive analysis of the factors contributing to demurrage and proposing demurrage reduction strategies, this study aims to provide valuable insights and best practices for the logistics industry.

5. **Applicability to Other Regions:** While the study focuses on Nakonde, the findings and recommendations may be applicable to other regions with similar logistics challenges. The insights and best practices identified in this study can serve as a reference for other regions facing similar issues, providing a framework for optimizing demurrage reduction strategies and improving logistics operations.

1.6 Scope of the Study

The scope of this study encompasses the logistics industry in Nakonde, Zambia, with a particular emphasis on demurrage challenges faced by logistics companies, importers, and exporters operating in the region. The research will include an analysis of the factors contributing to demurrage, an evaluation of existing demurrage reduction strategies, and the proposal of optimized solutions based on industry best practices.

1.7 Definition of Key Terms

Demurrage: A charge levied by carriers or terminal operators for the extended use of their equipment or facilities beyond the agreed-upon free time. Demurrage charges are incurred when cargo is not cleared or collected within the allotted free time, resulting in delays and congestion at ports, terminals, or warehouses. Demurrage charges can

accumulate rapidly, creating a financial burden for companies involved in logistics operations.

Logistics: The process of planning, implementing, and controlling the efficient and effective flow and storage of goods, services, and related information from the point of origin to the point of consumption. Logistics encompasses a wide range of activities, including transportation, warehousing, inventory management, order processing, and distribution.

Supply Chain: The interconnected network of organizations involved in the production, distribution, and delivery of goods and services to customers. The supply chain includes all activities and processes involved in sourcing raw materials, manufacturing products, and delivering finished goods to customers.

Optimization: The process of finding the best solution or combination of solutions to achieve the desired outcome, considering constraints and trade-offs. In the context of demurrage reduction, optimization involves identifying and implementing strategies that minimize demurrage charges and improve logistics operations.

Stakeholders: Individuals, groups, or organizations with an interest or concern in the logistics operations and demurrage reduction strategies. Stakeholders in the logistics industry include logistics companies, importers, exporters, customs authorities, terminal operators, transportation providers, and policymakers.

1.8 Structure of the Thesis

Chapter One: Introduction

The introduction chapter sets the stage for the entire thesis by providing the context and background of the study. It begins with a general overview of the logistics industry and the significance of demurrage charges. This chapter outlines the research problem, highlighting the challenges faced by logistics companies and importers/exporters in Nakonde due to demurrage. The objectives of the study, both general and specific, are clearly stated, along with the research questions that guide the investigation. The significance of the study is discussed, emphasizing its potential contributions to the logistics industry, policy development, and academic knowledge. Finally, the scope of the

study and definitions of key terms are provided to clarify the study's boundaries and terminology.

Chapter Two: Literature Review

The literature review chapter provides a comprehensive examination of existing research related to demurrage in logistics. It is divided into three main sections: empirical review, theoretical review, and conceptual framework. The empirical review covers global, African, and local (Zambian) perspectives on demurrage, identifying key studies and their findings. Gaps in the literature are highlighted, demonstrating the need for the current study. The theoretical review explores relevant theories such as Supply Chain Management Theory, Systems Theory, and Lean Logistics Theory, which provide a foundation for understanding demurrage challenges and developing reduction strategies. The conceptual framework integrates these theories and empirical insights to guide the study's analysis.

Chapter Three: Research Methodology

The research methodology chapter details the approach and methods used to conduct the study. It starts with an explanation of the research design, which combines qualitative and quantitative approaches to provide a comprehensive analysis. The study area, Nakonde, is described in detail, including its significance as a transit point for regional and international trade. The target population and sampling techniques are outlined, explaining how participants are selected to ensure representativeness. Data collection methods, including in-depth interviews, focus group discussions, surveys, and secondary data analysis, are described. The chapter also covers data analysis techniques, ensuring the reliability and validity of the research findings through triangulation and statistical tests.

Chapter Four: Data Analysis and Presentation of Findings

In this chapter, the collected data is analyzed and the findings are presented. It begins with a demographic profile of the respondents, providing context for the data. The analysis of factors contributing to demurrage is presented, followed by an evaluation of existing demurrage reduction strategies. Proposed optimized strategies based on industry best

practices are introduced, and their potential impact on supply chain performance and cost savings is assessed. The findings are discussed in relation to the research questions and objectives, highlighting key insights and implications. This chapter aims to provide a detailed and systematic presentation of the research results, supported by tables, figures, and qualitative data excerpts.

Chapter Five: Discussion of Results

This chapter provides an in-depth analysis and interpretation of the findings presented in Chapter Four. It connects the results with the objectives and research questions outlined in the study, examining how the findings align or contrast with the existing literature reviewed in Chapter Two. Key areas to include:

- **Interpretation of Findings:** Discuss the major findings from the data analysis and relate them to the research objectives and questions. Highlight any trends, patterns, or surprising outcomes.
- **Comparison with Literature:** Compare the findings with the theoretical and empirical studies discussed in the literature review. Identify any agreements, disagreements, or new insights.
- **Implications for Demurrage Reduction:** Explore how the findings provide practical insights into demurrage reduction strategies. Discuss the potential impact on supply chain performance, cost-saving measures, and logistics operations in Nakonde.
- **Challenges and Limitations:** Discuss any challenges encountered during the research and the limitations of the study. This could include data collection issues, sampling limitations, or contextual factors.
- **Critical Analysis:** Provide a critical assessment of the strategies used in Nakonde and suggest reasons why some might be more effective than others. Consider the local and regional context in the analysis.
-

Chapter Six: Conclusions and Recommendations

This final chapter synthesizes the research findings, drawing conclusions based on the analysis. It also provides actionable recommendations for stakeholders and suggests areas for future research. Key areas to include:

- **Summary of Findings:** Recap the key findings of the study, focusing on how they address the research objectives and questions. Highlight the main factors contributing to demurrage and the effectiveness of current reduction strategies.
- **Conclusions:** Draw final conclusions based on the study's findings, including the implications for logistics companies, policymakers, and other stakeholders in Nakonde and beyond.
- **Recommendations:** Provide clear, practical recommendations for logistics companies, government agencies, and other relevant stakeholders to implement demurrage reduction strategies. Address areas such as customs clearance processes, infrastructure improvements, and technological solutions.
- **Policy Recommendations:** Suggest policy measures that could help streamline logistics operations and reduce demurrage costs, including possible changes to regulations, infrastructure investment, or stakeholder coordination.
- **Limitations of the Study:** Outline the study's limitations, discussing how they might have affected the research outcomes.
- **Future Research:** Recommend areas for further research, including additional strategies to address demurrage and supply chain inefficiencies, and potential studies in other regions with similar logistics challenges.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter provides a comprehensive review of existing literature related to the research topic, "Demurrage Reduction Strategies in Logistics: A Case Study of Nakonde Border in Zambia." The review encompasses global, African, and Zambian perspectives to establish a broader understanding of the current body of knowledge. This chapter also examines the theoretical framework and develops a conceptual framework to highlight the relationship between independent variables (demurrage reduction strategies) and the dependent variable (logistics performance).

2.1 Empirical Review

2.1.1 Global Perspective

The logistics industry plays a critical role in global trade by ensuring the efficient movement of goods across borders. However, demurrage charges remain a significant challenge that can result in substantial financial losses for businesses. Demurrage refers to the costs incurred when cargo is delayed at a port or terminal beyond the allowable free time. This section examines global perspectives on demurrage, identifying its causes, impacts, and strategies used worldwide to mitigate its effects.

The Global Logistics Landscape and Demurrage Challenges

The logistics industry has expanded rapidly due to globalization, which has led to increased cross-border trade and greater complexities in supply chain management. According to Rodrigue and Notteboom (2013), the global logistics system is composed of multiple actors, including shipping companies, terminal operators, customs authorities, and transportation providers, all of whom must work in concert to ensure the smooth movement of goods. However, inefficiencies and delays at any point in the logistics chain can lead to demurrage charges.

Demurrage has been a persistent issue across various regions and economic sectors, particularly in large ports where congestion is common. The United Nations Conference on Trade and Development (UNCTAD) in its 2018 Review of Maritime Transport highlighted the increasing incidence of demurrage charges at major ports around the world, particularly in regions with high levels of trade, such as Europe, North America,

and Asia. These charges can have a significant financial impact on both importers and exporters, as they are often required to pay additional fees for the extended use of port and terminal facilities.

One of the primary causes of demurrage is the inefficiency of customs clearance processes. In many countries, customs procedures are slow and cumbersome, involving multiple levels of documentation, inspections, and approvals. Sanchez-Rodrigues, Potter, and Naim (2010) argue that the complexity of customs regulations, combined with a lack of automation and digitization in many ports, contributes significantly to delays and increased demurrage charges. For instance, ports in developing countries often rely on manual documentation processes, which are time-consuming and prone to human error. This lack of technological integration is a key factor in the inefficiencies that result in demurrage.

Additionally, Rodrigue and Notteboom (2013) emphasize the impact of port congestion on demurrage. Large ports in cities like Rotterdam, Shanghai, and Los Angeles frequently experience congestion due to high volumes of cargo. When a port is congested, cargo handling times are extended, leading to delays in the movement of goods and the accumulation of demurrage charges. In such cases, even when customs clearance processes are efficient, cargo may still be delayed due to the physical limitations of the port's infrastructure.

Strategies for Reducing Demurrage Globally

Globally, various strategies have been implemented to mitigate demurrage charges. The most successful of these involve a combination of technology, process optimization, and stakeholder collaboration. One of the most widely adopted strategies is the use of automated customs clearance systems. For example, many ports in developed countries have integrated electronic customs clearance systems that enable the rapid processing of cargo documentation. In countries like Singapore, which is home to one of the world's busiest ports, customs processes have been fully digitized, allowing for real-time tracking of cargo and faster clearance times (World Bank, 2017). This reduces the likelihood of delays and minimizes demurrage charges.

Furthermore, the adoption of real-time tracking technologies has significantly improved the management of logistics operations and reduced the incidence of demurrage. Global Positioning Systems (GPS) and Radio Frequency Identification (RFID) technologies are widely used to monitor the movement of cargo throughout the supply chain. These technologies provide real-time updates on the location and status of goods, enabling stakeholders to anticipate delays and make adjustments to prevent demurrage. For instance, Zhu and Chompan (2020) highlighted the use of RFID technology in East Asian ports, which has led to a reduction in demurrage charges by improving the visibility of cargo movement and allowing for more efficient scheduling.

In addition to technological solutions, stakeholder collaboration is another key strategy for reducing demurrage. The logistics chain involves multiple stakeholders, including shipping companies, terminal operators, customs authorities, and importers/exporters. Effective communication and coordination between these actors are critical for ensuring the timely movement of goods. In ports like Hamburg and Antwerp, collaboration platforms have been established to facilitate communication between different stakeholders. These platforms allow for the sharing of real-time information on cargo movements, reducing the likelihood of delays and the accumulation of demurrage charges (Rodrigue & Notteboom, 2013).

Moreover, lean logistics principles have been widely adopted to reduce waste in the logistics process, including demurrage. Lean logistics focuses on streamlining operations, reducing unnecessary steps in the supply chain, and improving overall efficiency. In the context of demurrage, this involves reducing the time cargo spends at a port by improving the efficiency of cargo handling, documentation processes, and transportation scheduling. For example, the Port of Rotterdam has implemented lean logistics principles to optimize its cargo handling processes, resulting in a significant reduction in demurrage charges (Ng & Tongzon, 2010).

Impact of Infrastructure on Demurrage

Another critical factor contributing to demurrage on a global scale is the state of port and transportation infrastructure. In many cases, delays occur not because of inefficiencies in customs processes, but due to physical constraints at the port or terminal. For instance,

inadequate storage facilities, insufficient cargo handling equipment, and poor transportation networks can all contribute to delays in the movement of goods. The World Bank (2017) highlighted that ports in many developing countries are often underfunded and lack the necessary infrastructure to handle large volumes of cargo efficiently.

In contrast, ports in developed countries have made significant investments in infrastructure to minimize delays and reduce demurrage. For example, the Port of Singapore, one of the world's most advanced ports, has invested heavily in automated cargo handling systems, deep-water berths, and high-capacity storage facilities. These investments have enabled the port to handle large volumes of cargo with minimal delays, reducing the likelihood of demurrage charges (World Bank, 2017). In the United States, the Port of Los Angeles has also invested in infrastructure improvements, including automated cranes and expanded container yards, to reduce congestion and improve the efficiency of cargo handling operations.

The Role of Policy and Regulation in Reducing Demurrage

Government policies and regulations play a crucial role in shaping the logistics environment and influencing the incidence of demurrage. In many countries, governments have implemented policies aimed at streamlining customs clearance processes and reducing bureaucratic delays. For instance, the European Union (EU) has introduced regulations requiring ports to adopt standardized customs procedures and electronic documentation systems. These regulations have helped to reduce delays and minimize demurrage charges across EU member states (Ng & Song, 2010).

In the United States, the Federal Maritime Commission (FMC) has introduced rules aimed at addressing unfair demurrage and detention practices by shipping lines and terminal operators. Under these rules, shipping companies are required to provide clear and transparent information on demurrage charges, and they are prohibited from imposing excessive fees on cargo owners. The FMC's regulations are intended to promote fairness and accountability in the logistics industry, reducing the financial burden of demurrage on businesses (UNCTAD, 2018).

Similarly, many countries have introduced trade facilitation agreements aimed at improving the efficiency of customs processes and reducing delays at ports. For example, the World Trade Organization (WTO) Trade Facilitation Agreement, which came into effect in 2017, requires member countries to implement measures to streamline customs procedures, reduce documentation requirements, and improve coordination between customs authorities and logistics companies. These measures are expected to reduce the time cargo spends at ports, thereby minimizing the risk of demurrage charges (Rodrigue & Notteboom, 2013).

Environmental and Social Implications of Demurrage

In addition to the financial costs, demurrage also has broader environmental and social implications. Delays at ports often result in the extended use of transportation equipment, such as ships and trucks, which can increase fuel consumption and greenhouse gas emissions. In this context, reducing demurrage is not only a financial imperative but also an environmental one. Ng and Tongzon (2010) argue that minimizing demurrage can contribute to more sustainable logistics operations by reducing the carbon footprint of transportation activities. For example, by improving the efficiency of cargo handling and reducing delays, ports can lower the amount of time that ships spend idling at terminals, thereby reducing emissions.

From a social perspective, demurrage charges can have a significant impact on the competitiveness of businesses, particularly small and medium-sized enterprises (SMEs). In many cases, SMEs lack the financial resources to absorb the additional costs associated with demurrage, which can erode their profit margins and hinder their ability to compete in the global market. Therefore, reducing demurrage is critical for promoting inclusive economic growth and supporting the participation of SMEs in international trade (UNCTAD, 2018).

Case Studies of Demurrage Reduction in Global Ports

To further understand the global perspective on demurrage reduction, it is useful to examine specific case studies from major ports around the world. These case studies

highlight the strategies employed by different ports to mitigate demurrage and improve logistics efficiency.

Case Study 1: Port of Singapore

The Port of Singapore is one of the busiest and most efficient ports in the world. It has consistently ranked as a top-performing port in terms of cargo handling and turnaround times. One of the key strategies employed by the Port of Singapore to reduce demurrage is the extensive use of automation and digitalization. The port has implemented an advanced electronic customs clearance system that allows for the rapid processing of cargo documentation. This system reduces the time required for customs clearance, thereby minimizing the risk of demurrage charges.

In addition to digitalization, the Port of Singapore has invested heavily in infrastructure to support efficient cargo handling. The port features state-of-the-art cargo handling equipment, deep-water berths, and high-capacity storage facilities. These investments have enabled the port to handle large volumes of cargo with minimal delays, reducing the likelihood of demurrage charges.

Furthermore, the Port of Singapore has established strong collaboration among stakeholders, including shipping companies, terminal operators, and customs authorities. The port has implemented a collaborative platform that allows for real-time information sharing among stakeholders. This platform enables stakeholders to anticipate and address potential delays, further reducing the risk of demurrage.

Case Study 2: Port of Rotterdam

The Port of Rotterdam, located in the Netherlands, is one of the largest and most advanced ports in Europe. The port has implemented several strategies to reduce demurrage and improve logistics efficiency. One of the key strategies employed by the Port of Rotterdam is the adoption of lean logistics principles. The port has streamlined its cargo handling processes, reducing unnecessary steps and improving overall efficiency. This has resulted in a significant reduction in the time cargo spends at the port, thereby minimizing demurrage charges.

In addition to lean logistics, the Port of Rotterdam has invested in infrastructure to support efficient cargo movement. The port features automated cranes, expanded container yards, and advanced storage facilities. These investments have enabled the port to handle large volumes of cargo with minimal delays, reducing the likelihood of demurrage charges.

The Port of Rotterdam has also implemented a collaborative platform that allows for real-time information sharing among stakeholders. This platform enables stakeholders to anticipate and address potential delays, further reducing the risk of demurrage.

Case Study 3: Port of Los Angeles

The Port of Los Angeles, located in the United States, is one of the busiest ports in North America. The port has implemented several strategies to reduce demurrage and improve logistics efficiency. One of the key strategies employed by the Port of Los Angeles is the use of advanced technology, including real-time tracking systems and automated cargo handling equipment. These technologies have enabled the port to improve the efficiency of cargo handling and reduce the time cargo spends at the port, thereby minimizing demurrage charges.

In addition to technology, the Port of Los Angeles has invested in infrastructure to support efficient cargo movement. The port features automated cranes, expanded container yards, and advanced storage facilities. These investments have enabled the port to handle large volumes of cargo with minimal delays, reducing the likelihood of demurrage charges.

The Port of Los Angeles has also implemented a collaborative platform that allows for real-time information sharing among stakeholders. This platform enables stakeholders to anticipate and address potential delays, further reducing the risk of demurrage.

Lessons Learned from Global Ports

The case studies of the Port of Singapore, Port of Rotterdam, and Port of Los Angeles provide valuable insights into the strategies that can be employed to reduce demurrage and improve logistics efficiency. These case studies highlight the importance of

automation, digitalization, infrastructure investment, and stakeholder collaboration in mitigating demurrage charges.

One of the key lessons learned from these case studies is the importance of adopting advanced technology to improve the efficiency of cargo handling and reduce delays. The use of real-time tracking systems, automated cargo handling equipment, and electronic customs clearance systems has proven to be effective in reducing demurrage charges at these ports.

Another key lesson is the importance of investing in infrastructure to support efficient cargo movement. The Port of Singapore, Port of Rotterdam, and Port of Los Angeles have all made significant investments in infrastructure, including automated cranes, expanded container yards, and advanced storage facilities. These investments have enabled these ports to handle large volumes of cargo with minimal delays, reducing the likelihood of demurrage charges.

Finally, the case studies highlight the importance of stakeholder collaboration in reducing demurrage. The Port of Singapore, Port of Rotterdam, and Port of Los Angeles have all implemented collaborative platforms that allow for real-time information sharing among stakeholders. These platforms enable stakeholders to anticipate and address potential delays, further reducing the risk of demurrage.

Conclusion

In conclusion, demurrage is a significant challenge in the global logistics industry, with substantial financial, environmental, and social implications. The causes of demurrage are multifaceted, including inefficiencies in customs clearance processes, port congestion, and inadequate infrastructure. However, various strategies have been implemented globally to mitigate demurrage charges, including the adoption of advanced technology, investment in infrastructure, and stakeholder collaboration.

The case studies of the Port of Singapore, Port of Rotterdam, and Port of Los Angeles provide valuable insights into the strategies that can be employed to reduce demurrage and improve logistics efficiency. These case studies highlight the importance of

automation, digitalization, infrastructure investment, and stakeholder collaboration in mitigating demurrage charges.

As the global logistics industry continues to evolve, it is essential for ports and logistics hubs to adopt best practices and innovative solutions to reduce demurrage and enhance supply chain efficiency. By doing so, they can minimize financial losses, reduce environmental impact, and support the competitiveness of businesses in the global market.

Future Directions for Demurrage Reduction

Looking ahead, the global logistics industry must continue to innovate and adapt to emerging challenges. One promising area for future research and development is the integration of artificial intelligence (AI) and machine learning (ML) into logistics operations. These technologies have the potential to further optimize cargo handling, predict potential delays, and enhance decision-making processes. For example, AI-powered predictive analytics could help logistics managers anticipate bottlenecks and take proactive measures to prevent demurrage.

Additionally, the adoption of blockchain technology in logistics could improve transparency and traceability in the supply chain. Blockchain can provide a secure and immutable record of cargo movements, reducing the risk of disputes and delays related to documentation errors. This technology could also facilitate smoother customs clearance processes by providing real-time access to verified cargo information.

Another important area for future focus is the development of green logistics practices. As environmental concerns continue to grow, there is increasing pressure on the logistics industry to reduce its carbon footprint. Implementing sustainable practices, such as using energy-efficient equipment, optimizing transportation routes, and reducing idle times, can not only lower emissions but also contribute to reducing demurrage charges by improving overall efficiency.

Finally, fostering greater international cooperation and standardization in logistics practices will be crucial for addressing demurrage on a global scale. By harmonizing customs procedures, documentation requirements, and infrastructure standards,

countries can reduce the complexities and inefficiencies that contribute to demurrage. International organizations, such as the World Trade Organization (WTO) and the International Maritime Organization (IMO), can play a key role in facilitating this cooperation and promoting best practices across borders.

In conclusion, while demurrage remains a significant challenge in the global logistics industry, there are numerous strategies and innovations that can be employed to mitigate its impact. By leveraging technology, investing in infrastructure, fostering stakeholder collaboration, and adopting sustainable practices, the industry can enhance supply chain efficiency and reduce the financial and environmental costs associated with demurrage. As the global economy continues to grow and evolve, the logistics industry must remain agile and proactive in addressing the challenges of demurrage to ensure the smooth and efficient movement of goods worldwide.

2.1.2 Sub-Saharan Africa Perspective

The African logistics landscape is characterized by a unique set of challenges that affect the efficient movement of goods, particularly in the context of demurrage. While many of these challenges are similar to those faced globally, such as inadequate infrastructure and inefficient customs processes, they are often exacerbated by specific socio-economic and political conditions prevalent across the continent. This section examines the issue of demurrage within the African logistics sector, with a focus on its causes, impacts, and the strategies being adopted to mitigate its effects.

Overview of African Logistics and Demurrage Challenges

Africa's logistics sector is vital for facilitating trade within the continent and with global markets. However, logistical inefficiencies have been a long-standing issue that has hindered trade competitiveness. According to the African Development Bank (AfDB), Africa's underdeveloped transportation and logistics infrastructure remains a key bottleneck in enhancing trade and economic growth. Ports, border posts, and transport corridors are often overwhelmed, leading to significant delays and, consequently, high demurrage charges. In countries such as Kenya, Tanzania, and Nigeria, where port cities serve as major trade hubs, delays caused by congestion and inefficiency often result in extended storage times and the accumulation of demurrage costs.

In the East African Community (EAC), ports such as Mombasa (Kenya) and Dar es Salaam (Tanzania) are critical entry points for goods moving across the region and into Central and Southern Africa. However, according to Ndayisenga and Kinobe (2019), these ports frequently face congestion due to a combination of outdated infrastructure, inefficient customs clearance processes, and inconsistent coordination among key stakeholders. These factors have led to significant demurrage costs for traders, especially in landlocked countries such as Rwanda, Uganda, and Burundi, which rely heavily on the seamless movement of goods through these ports.

Causes of Demurrage in Africa

1. **Customs Inefficiencies and Bureaucracy**

A major contributor to demurrage in Africa is the inefficiency of customs clearance procedures. Customs regulations in many African countries are often complex, involving numerous agencies and requiring multiple forms of documentation, inspections, and approvals. This complexity results in delays in processing shipments, especially in ports and border posts that lack automation or digitization in their operations (Raballand et al., 2012). In West African countries such as Nigeria and Ghana, manual customs procedures are still widely used, which significantly increases the time required to clear goods, contributing to the accumulation of demurrage charges.

Additionally, African ports are often subject to unpredictable and lengthy customs inspections, which can delay the release of cargo beyond the allowable free time. A study by Sanchez-Rodrigues, Potter, and Naim (2010) found that in many African countries, customs officials are not always available on weekends or public holidays, which can cause further delays for shipments that arrive during those times. This lack of continuous service exacerbates the demurrage problem, as cargo owners are forced to pay extra charges for the extended use of port and terminal facilities.

2. **Infrastructure Limitations**

Infrastructure remains one of the most significant challenges facing African ports and logistics hubs. Many African countries have underdeveloped road networks, insufficient port handling capacity, and outdated cargo handling equipment. These limitations result

in delays in cargo movement, which directly contribute to higher demurrage costs (Ng & Song, 2010). For example, the Port of Lagos in Nigeria, one of the busiest in West Africa, frequently experiences severe congestion due to the limited number of berths and inadequate storage facilities, leading to substantial demurrage charges for businesses.

Another critical infrastructure issue is the lack of inland transportation networks, particularly in landlocked African countries. Countries such as Uganda, Zambia, and Malawi depend heavily on the efficient movement of goods from ports in neighboring countries. However, the poor state of transportation infrastructure, including roads and railways, often leads to delays in cargo movement from ports to final destinations, increasing demurrage costs. Zhu and Chompan (2020) argue that unless African governments make significant investments in transportation infrastructure, the issue of demurrage will persist as a major impediment to efficient logistics operations on the continent.

3. **Port Congestion and Capacity Constraints**

Port congestion is a persistent issue in many African countries, contributing to delays in cargo handling and clearance. Ports such as Mombasa and Dar es Salaam regularly experience long queues of vessels waiting to berth, as well as delays in offloading and storage due to limited capacity (Ndayisenga & Kinobe, 2019). The congestion is often exacerbated by poor planning and coordination among port authorities, shipping companies, and customs officials. In many cases, shipping lines have been forced to impose demurrage charges on cargo owners because of the extended waiting times for cargo to be processed.

Ng and Tongzon (2010) highlighted that the inefficiencies in African ports are further compounded by insufficient investment in port capacity expansion and modernization. Ports that have not been upgraded to handle increasing volumes of trade find themselves overwhelmed, leading to delays in the movement of cargo. This, in turn, results in higher demurrage charges for importers and exporters.

4. **Stakeholder Coordination Issues**

Another major contributor to demurrage charges in Africa is the lack of effective coordination between key stakeholders in the logistics chain, including port authorities, customs officials, terminal operators, and transportation providers. According to Zhao (2012), poor communication between these stakeholders often leads to delays in cargo clearance and movement, especially when there are discrepancies in the documentation or when cargo is held up for inspection. In many African ports, there is little integration between customs systems and the systems used by shipping companies and port operators, making it difficult to track the status of shipments in real time. This lack of transparency and real-time data sharing results in delays and contributes to the accumulation of demurrage charges.

Strategies for Reducing Demurrage in Africa

Several strategies have been implemented across African countries to address the issue of demurrage and improve the efficiency of logistics operations. While progress has been made in some regions, there is still much work to be done.

1. **Digitization of Customs Processes**

One of the most promising strategies for reducing demurrage in Africa is the digitization of customs processes. Several countries have begun implementing electronic customs clearance systems to streamline the documentation and approval process. In Kenya, the introduction of the Kenya National Electronic Single Window System (KenTrade) has led to a significant reduction in the time taken to clear goods through customs. This system allows traders to submit all required documentation electronically and track the progress of their shipments in real time. As a result, there has been a noticeable decrease in the accumulation of demurrage charges at the Port of Mombasa (World Bank, 2017).

Similarly, Tanzania has implemented the Tanzania Customs Integrated System (TANCIS), which has improved the efficiency of customs clearance at the Port of Dar es Salaam. By automating the process and reducing the reliance on manual documentation, TANCIS has helped to minimize delays and demurrage charges. According to Raballand et al.

(2012), the digitization of customs processes is a critical step toward reducing the inefficiencies that lead to demurrage in Africa.

2. **Investment in Port and Transportation Infrastructure**

Addressing the infrastructure deficit in African ports and transport corridors is essential for reducing demurrage. Several African countries have launched major infrastructure development projects aimed at expanding port capacity and improving inland transportation networks. For example, Kenya has undertaken the Lamu Port-South Sudan-Ethiopia Transport (LAPSSET) Corridor project, which is expected to ease congestion at the Port of Mombasa and improve the movement of goods along key trade routes. Similarly, Nigeria is investing in the expansion of its ports and upgrading its rail and road networks to facilitate faster cargo movement (Ng & Song, 2010).

Investment in modern cargo handling equipment and technology is also crucial. Ports such as Durban (South Africa) have upgraded their cargo handling systems, enabling faster offloading and storage of goods. These improvements have helped to reduce waiting times and minimize demurrage charges.

3. **Stakeholder Collaboration and Policy Reforms**

Improved collaboration between stakeholders in the logistics chain is critical for reducing demurrage. In the East African Community (EAC), regional integration efforts have led to the establishment of the Northern Corridor Transport and Transit Coordination Authority (NCTTCA), which oversees the movement of goods through key transport corridors in the region. This initiative has improved coordination between customs authorities, port operators, and transportation providers, reducing delays and the incidence of demurrage.

Moreover, policy reforms aimed at simplifying customs regulations and reducing bureaucratic delays have been implemented in several African countries. For instance, Rwanda has introduced the Single Customs Territory (SCT) initiative, which has streamlined customs clearance processes for goods in transit through the EAC. This initiative has significantly reduced delays at border posts and ports, leading to lower demurrage charges for traders (World Bank, 2017).

4. **Adoption of Real-Time Tracking Systems**

The use of real-time tracking technologies such as GPS and RFID has become increasingly important in reducing delays and demurrage in African logistics. By providing real-time visibility of cargo movement, these technologies enable stakeholders to anticipate delays and take corrective action before demurrage charges accumulate. For example, in South Africa, the use of RFID technology in port and transportation operations has helped reduce the incidence of demurrage by improving the efficiency of cargo handling and reducing waiting times for shipments (Zhu & Chompan, 2020).

Case Studies of Demurrage Reduction in African Ports

To further understand the Sub-Saharan Africa perspective on demurrage reduction, it is useful to examine specific case studies from major ports in the region. These case studies highlight the strategies employed by different ports to mitigate demurrage and improve logistics efficiency.

Case Study 1: Port of Mombasa, Kenya

The Port of Mombasa is one of the busiest ports in East Africa and serves as a critical gateway for landlocked countries such as Uganda, Rwanda, and South Sudan. The port has faced significant challenges related to congestion and delays, leading to high demurrage charges. To address these issues, the Kenyan government has implemented several strategies, including the digitization of customs processes through the Kenya National Electronic Single Window System (KenTrade). This system has streamlined the documentation process, reducing the time required for customs clearance and minimizing demurrage charges.

In addition to digitization, the Port of Mombasa has invested in infrastructure improvements, including the expansion of container terminals and the modernization of cargo handling equipment. These investments have increased the port's capacity to handle larger volumes of cargo, reducing congestion and delays. Furthermore, the port has established a collaborative platform that allows for real-time information sharing among stakeholders, including customs authorities, shipping companies, and transport

operators. This platform has improved coordination and communication, further reducing the risk of demurrage.

Case Study 2: Port of Dar es Salaam, Tanzania

The Port of Dar es Salaam is another major port in East Africa, serving as a key entry point for goods destined for landlocked countries such as Zambia, Malawi, and the Democratic Republic of Congo. The port has faced challenges related to inefficiencies in customs clearance and inadequate infrastructure, leading to delays and high demurrage charges. To address these issues, the Tanzanian government has implemented the Tanzania Customs Integrated System (TANCIS), which has automated the customs clearance process and reduced the reliance on manual documentation. This has significantly reduced the time required for customs clearance, minimizing demurrage charges.

In addition to digitization, the Port of Dar es Salaam has invested in infrastructure improvements, including the expansion of container terminals and the modernization of cargo handling equipment. These investments have increased the port's capacity to handle larger volumes of cargo, reducing congestion and delays. Furthermore, the port has established a collaborative platform that allows for real-time information sharing among stakeholders, including customs authorities, shipping companies, and transport operators. This platform has improved coordination and communication, further reducing the risk of demurrage.

Case Study 3: Port of Durban, South Africa

The Port of Durban is the busiest port in South Africa and serves as a critical gateway for trade in the Southern African region. The port has faced challenges related to congestion and delays, leading to high demurrage charges. To address these issues, the South African government has implemented several strategies, including the adoption of real-time tracking technologies such as RFID. These technologies have improved the visibility of cargo movement, enabling stakeholders to anticipate delays and take corrective action before demurrage charges accumulate.

In addition to technology, the Port of Durban has invested in infrastructure improvements, including the expansion of container terminals and the modernization of cargo handling equipment. These investments have increased the port's capacity to handle larger volumes of cargo, reducing congestion and delays. Furthermore, the port has established a collaborative platform that allows for real-time information sharing among stakeholders, including customs authorities, shipping companies, and transport operators. This platform has improved coordination and communication, further reducing the risk of demurrage.

Lessons Learned from African Ports

The case studies of the Port of Mombasa, Port of Dar es Salaam, and Port of Durban provide valuable insights into the strategies that can be employed to reduce demurrage and improve logistics efficiency in Sub-Saharan Africa. These case studies highlight the importance of digitization, infrastructure investment, and stakeholder collaboration in mitigating demurrage charges.

One of the key lessons learned from these case studies is the importance of adopting advanced technology to improve the efficiency of cargo handling and reduce delays. The use of real-time tracking systems, automated cargo handling equipment, and electronic customs clearance systems has proven to be effective in reducing demurrage charges at these ports.

Another key lesson is the importance of investing in infrastructure to support efficient cargo movement. The Port of Mombasa, Port of Dar es Salaam, and Port of Durban have all made significant investments in infrastructure, including the expansion of container terminals and the modernization of cargo handling equipment. These investments have enabled these ports to handle larger volumes of cargo with minimal delays, reducing the likelihood of demurrage charges.

Finally, the case studies highlight the importance of stakeholder collaboration in reducing demurrage. The Port of Mombasa, Port of Dar es Salaam, and Port of Durban have all implemented collaborative platforms that allow for real-time information sharing among stakeholders. These platforms enable stakeholders to anticipate and address potential delays, further reducing the risk of demurrage.

Conclusion

In conclusion, demurrage is a significant challenge in the Sub-Saharan African logistics industry, with substantial financial, environmental, and social implications. The causes of demurrage are multifaceted, including inefficiencies in customs clearance processes, port congestion, and inadequate infrastructure. However, various strategies have been implemented across the region to mitigate demurrage charges, including the adoption of advanced technology, investment in infrastructure, and stakeholder collaboration.

The case studies of the Port of Mombasa, Port of Dar es Salaam, and Port of Durban provide valuable insights into the strategies that can be employed to reduce demurrage and improve logistics efficiency. These case studies highlight the importance of digitization, infrastructure investment, and stakeholder collaboration in mitigating demurrage charges.

As the Sub-Saharan African logistics industry continues to evolve, it is essential for ports and logistics hubs to adopt best practices and innovative solutions to reduce demurrage and enhance supply chain efficiency. By doing so, they can minimize financial losses, reduce environmental impact, and support the competitiveness of businesses in the region.

Future Directions for Demurrage Reduction in Sub-Saharan Africa

Looking ahead, the Sub-Saharan African logistics industry must continue to innovate and adapt to emerging challenges. One promising area for future research and development is the integration of artificial intelligence (AI) and machine learning (ML) into logistics operations. These technologies have the potential to further optimize cargo handling, predict potential delays, and enhance decision-making processes. For example, AI-powered predictive analytics could help logistics managers anticipate bottlenecks and take proactive measures to prevent demurrage.

Additionally, the adoption of blockchain technology in logistics could improve transparency and traceability in the supply chain. Blockchain can provide a secure and immutable record of cargo movements, reducing the risk of disputes and delays related

to documentation errors. This technology could also facilitate smoother customs clearance processes by providing real-time access to verified cargo information.

Another important area for future focus is the development of green logistics practices. As environmental concerns continue to grow, there is increasing pressure on the logistics industry to reduce its carbon footprint. Implementing sustainable practices, such as using energy-efficient equipment, optimizing transportation routes, and reducing idle times, can not only lower emissions but also contribute to reducing demurrage charges by improving overall efficiency.

Finally, fostering greater regional cooperation and standardization in logistics practices will be crucial for addressing demurrage in Sub-Saharan Africa. By harmonizing customs procedures, documentation requirements, and infrastructure standards, countries can reduce the complexities and inefficiencies that contribute to demurrage. Regional organizations, such as the African Union (AU) and the East African Community (EAC), can play a key role in facilitating this cooperation and promoting best practices across borders

2.1.3 Zambian Perspective

Zambia, as a landlocked country, heavily relies on the efficiency of its border posts and regional ports for the movement of goods. The Nakonde border, located between Zambia and Tanzania, serves as a critical transit point for trade, not just for Zambia but also for other Southern and Central African nations. However, like many other regions in Africa, Zambia faces significant challenges in managing logistics operations efficiently, which results in the accumulation of demurrage charges. This section examines the causes and impacts of demurrage within Zambia, particularly at the Nakonde border, and explores the strategies being implemented to address these issues.

Overview of Zambian Logistics and Demurrage Challenges

Zambia's strategic position in the region, along with its role as a major copper exporter, means that its logistics infrastructure plays a key role in supporting both domestic and international trade. Border posts such as Nakonde, Chirundu, and Kazungula are vital for ensuring the smooth movement of goods. However, inefficiencies at these border posts

have contributed to the persistent problem of demurrage. According to the Zambia Revenue Authority (2023), Nakonde alone accounts for over K5 million in demurrage charges annually, primarily due to delays in customs clearance, poor infrastructure, and a lack of stakeholder coordination.

In addition to the volume of goods passing through Nakonde, the logistics sector faces challenges associated with the long distances between Zambia's industrial centers and the nearest seaports in Tanzania and South Africa. These challenges include delays caused by inadequate road networks, congestion at border posts, and a lack of efficient cargo handling infrastructure, all of which contribute to the build-up of demurrage charges. Henceforth, the causes of demurrage in Zambia are as explained below;

1. **Inefficiencies in Customs Clearance**

   One of the primary causes of demurrage at the Nakonde border is the inefficiency of customs clearance processes. Like many other African countries, Zambia's customs procedures are highly bureaucratic and often involve multiple levels of approval, which can significantly delay the release of cargo. According to Mwale and Lungu (2019), customs officials at Nakonde are often overwhelmed by the high volume of cargo passing through the border, and the manual nature of the customs processes further compounds these delays.

In Zambia, the customs system still heavily relies on paper-based documentation, which increases the chances of errors and prolongs the clearance process. While efforts have been made to introduce electronic customs clearance systems, such as the Zambia Customs Management System (ZCMS), the implementation has been slow, and many customs officers still resort to manual processing. This lack of technological integration leads to delays in the clearance of goods, with many shipments exceeding the free time allowed before demurrage charges begin to accumulate.

2. **Inadequate Infrastructure**

   Infrastructure limitations are a significant contributor to demurrage at the Nakonde border and other key logistics hubs in Zambia. The Nakonde Border Logistics Report (2022) highlighted that the border post lacks adequate storage facilities and

modern cargo handling equipment, which results in congestion and delays in cargo movement. The road network leading to and from Nakonde is also in poor condition, which exacerbates delays in the transportation of goods from the border to their final destinations.

In addition to the lack of infrastructure at the border, Zambia's internal transportation network is underdeveloped, particularly the road and rail systems that connect major industrial centers to border posts and regional ports. Kaliba (2020) noted that the poor state of Zambia's road and rail networks increases transit times for goods moving between Zambia and neighboring countries, contributing to the build-up of demurrage charges. For instance, trucks transporting goods from Lusaka to Nakonde often face significant delays due to road conditions, and these delays result in extended storage times at the border, leading to higher demurrage costs.

3. **Port Dependency and Regional Trade Constraints**

   As a landlocked country, Zambia relies on the efficiency of regional ports, particularly those in Tanzania (Dar es Salaam) and South Africa (Durban), for the import and export of goods. However, delays at these ports, often due to congestion or inefficiencies in cargo handling, result in demurrage charges for Zambian businesses. Zhu and Chompan (2020) argue that Zambia's dependency on these regional ports puts it at a disadvantage, as any delays at the ports have a direct impact on the movement of goods to and from Zambia.

Additionally, regional trade constraints, such as tariff and non-tariff barriers, contribute to delays in the movement of goods. For instance, goods destined for Zambia often face delays at the Port of Dar es Salaam due to the complexity of customs regulations and inspection procedures in Tanzania. These delays lead to extended waiting times for cargo at the port, and Zambian importers and exporters are forced to pay demurrage charges due to the lack of control over the efficiency of these regional trade hubs.

4. **Poor Stakeholder Coordination**

   The lack of effective coordination between key stakeholders in Zambia's logistics sector is another significant contributor to demurrage charges. Rodrigue and Notteboom (2013) emphasize that effective logistics operations require close collaboration between customs authorities, terminal operators, logistics companies, and transportation providers. In Zambia, however, there is often a lack of communication between these stakeholders, particularly at key border posts like Nakonde. This lack of coordination results in delays in the processing of cargo, as stakeholders are often not aligned on the status of shipments, the availability of cargo handling equipment, or the scheduling of transportation services.

Furthermore, Zambia's customs authorities often do not have access to real-time data on the status of shipments, which makes it difficult to anticipate and resolve potential delays. This lack of transparency leads to miscommunication between customs officials, shipping companies, and cargo owners, resulting in extended waiting times and the accumulation of demurrage charges.

Impact of Demurrage on Zambia's Logistics Sector

The financial impact of demurrage on Zambia's logistics sector is significant, particularly for small and medium-sized enterprises (SMEs) that lack the resources to absorb these additional costs. The Zambian Freight Forwarders Association (2023) estimates that demurrage charges represent up to 10% of the total logistics costs for many Zambian businesses, which can severely affect their competitiveness in regional and international markets. In some cases, businesses are forced to pass these costs on to consumers, resulting in higher prices for goods and services.

In addition to the direct financial impact, demurrage charges also affect the overall efficiency of Zambia's supply chains. Delays in the movement of goods due to demurrage contribute to supply chain disruptions, which can result in stock shortages, missed delivery deadlines, and reduced customer satisfaction. For Zambia's export sector, particularly the copper industry, delays caused by demurrage can result in significant losses, as copper exporters face penalties for failing to meet delivery schedules.

Strategies for Reducing Demurrage in Zambia

Recognizing the significant impact of demurrage on the logistics sector, the Zambian government and private sector stakeholders have initiated several strategies to address the issue. These strategies focus on improving the efficiency of customs clearance processes, upgrading infrastructure, and enhancing stakeholder coordination.

1. **Digitization of Customs Processes**

   One of the most important strategies for reducing demurrage at the Nakonde border is the digitization of customs clearance processes. The Zambia Revenue Authority (ZRA) has been working to modernize customs operations by implementing the Zambia Customs Management System (ZCMS), which allows for the electronic submission and processing of customs documentation. The goal of this system is to reduce the time it takes to clear goods through customs by automating many of the manual processes that currently contribute to delays (Mwale & Lungu, (2019).

In addition to the ZCMS, the ZRA is also working to integrate Zambia's customs systems with those of neighboring countries, such as Tanzania, to facilitate the seamless movement of goods across borders. By improving the flow of information between customs authorities and other stakeholders, these initiatives are expected to reduce the accumulation of demurrage charges at the Nakonde border.

2. **Investment in Border Infrastructure**

   Upgrading the infrastructure at Zambia's border posts is another key strategy for reducing demurrage. The Nakonde Border Logistics Report (2022) recommends significant investments in the expansion of storage facilities, the acquisition of modern cargo handling equipment, and the improvement of road and rail links to and from the border. These improvements would help to reduce congestion at the border and facilitate faster movement of goods, thereby minimizing the risk of demurrage.

Additionally, the Zambian government is working with regional partners to improve the efficiency of transportation corridors, such as the Tanzania-Zambia Railway Authority, which links Zambia to the Port of Dar es Salaam. By improving the capacity and reliability of this railway, the government hopes to reduce transit times for goods moving between Zambia and Tanzania, thereby minimizing the risk of delays and demurrage charges.

3. **Stakeholder Collaboration and Training**

   Enhancing stakeholder collaboration is critical for reducing demurrage in Zambia. To improve coordination between customs authorities, logistics companies, and other stakeholders, the Zambian government has established platforms for regular dialogue and information sharing. These platforms, which include joint committees and working groups, are designed to identify and resolve bottlenecks in the logistics chain before they result in delays and demurrage.

In addition to improving collaboration, there has been a focus on providing training to customs officials and logistics personnel on best practices for cargo handling and customs clearance. By equipping these stakeholders with the skills and knowledge needed to efficiently manage logistics operations, the government hopes to reduce the incidence of delays and demurrage at border posts like Nakonde (Zambia Revenue Authority, (2023).

4. **Adoption of Real-Time Cargo Tracking Systems**

   The use of real-time cargo tracking systems is another strategy being adopted in Zambia to reduce demurrage. By providing real-time updates on the location and status of shipments, these systems allow customs authorities and logistics companies to anticipate and address potential delays before they result in demurrage charges. For instance, the ZRA has begun to pilot the use of GPS tracking devices for goods in transit, which provide real-time visibility of cargo as it moves through Zambia’s borders.

This technology enables stakeholders to track the progress of shipments and make adjustments as needed to ensure that goods are cleared within the allowable free time, thereby minimizing the risk of demurrage charges.

2.1.5 Gap in Literature

Despite extensive studies on demurrage reduction strategies globally and regionally, there remains a gap in literature specific to Zambia, particularly concerning border towns like Nakonde. While several global and African perspectives offer insight into best practices, few studies focus on localized solutions tailored to Zambia's unique logistics challenges. Additionally, there is limited research on the integration of modern technological tools, such as automation and real-time tracking systems, in the Zambian logistics sector. This gap underscores the need for research that not only evaluates existing strategies but also proposes optimized solutions based on Zambia's logistical landscape. Below is a Gap Analysis Table that outlines the gaps in literature regarding demurrage reduction strategies specific to Zambia, particularly in border towns like Nakonde. The table further highlights the existing knowledge in the field, identifies specific gaps in research, and proposes directions for future studies that could help address the unique logistics challenges in Zambia.

GAP ANALYSIS TABLE

Area of Focus	Current State	Identified Gaps	Proposed Research Directions
Demurrage Reduction Strategies	Extensive studies on global and regional strategies exist.	Limited focus on localized strategies specific to Zambia.	Investigate tailored demurrage reduction strategies for Zambian context.
Logistics Challenges in Zambia	Some studies highlight challenges in logistics generally.	Insufficient exploration of unique challenges in border towns like Nakonde.	Conduct field studies to identify specific logistical challenges in Nakonde.

Technological Integration	Global perspectives on automation and tracking systems.	Minimal research on the adoption of these technologies in Zambia.	Assess the feasibility and impact of automation and real-time tracking in Zambian logistics.
Best Practices from Other Regions	Various studies provide best practices from other countries.	Lack of adaptation of these best practices to the Zambian context.	Analyze successful practices from similar economies and adapt them for Zambia.
Stakeholder Collaboration	Some collaboration models exist in different regions.	Few studies on stakeholder collaboration in Zambia's logistics sector.	Explore potential collaborative frameworks among local stakeholders.
Impact of Demurrage on Economy	Research on economic impacts of demurrage globally.	Limited analysis of the economic impact of demurrage on Zambia's economy.	Evaluate the financial implications of demurrage for Zambian businesses.

2.2 Theoretical Review

2.2.1 Supply Chain Management Theory

Supply Chain Management (SCM) Theory provides a foundation for understanding the interconnected nature of logistics operations. According to Mentzer et al. (2001), SCM involves the coordination and integration of activities across the supply chain to achieve the efficient movement of goods. The theory emphasizes the importance of collaboration among stakeholders, such as logistics companies, customs authorities, and terminal operators, to reduce inefficiencies that can lead to demurrage. In the context of Nakonde,

SCM theory is applicable as it highlights the need for synchronized efforts among various actors to minimize delays and enhance supply chain performance.

2.2.2 Systems Theory

Systems theory, which views an organization as a set of interrelated components working together to achieve a common goal, is relevant to logistics and demurrage reduction strategies. In the case of Nakonde, the logistics system involves several stakeholders, including customs authorities, logistics companies, and transportation providers. Each of these components must work efficiently to avoid delays that result in demurrage. Systems theory suggests that a breakdown in one component of the logistics chain can lead to a ripple effect, causing delays and additional costs (Zhao, 2012). Therefore, improving the efficiency of each component, such as customs clearance processes or infrastructure development, can significantly reduce demurrage charges.

2.2.3 Lean Logistics Theory

Lean Logistics Theory, as discussed by Goldsby, Martichenko, and Luo (2005), focuses on eliminating waste and inefficiencies in logistics operations. This theory is particularly relevant to demurrage reduction, as demurrage charges represent a form of waste in the logistics process. Lean logistics advocates for streamlining operations, improving communication among stakeholders, and leveraging technology to enhance efficiency. In the context of Nakonde, adopting lean logistics principles, such as improving cargo handling processes and reducing waiting times, can help minimize demurrage and enhance supply chain performance.

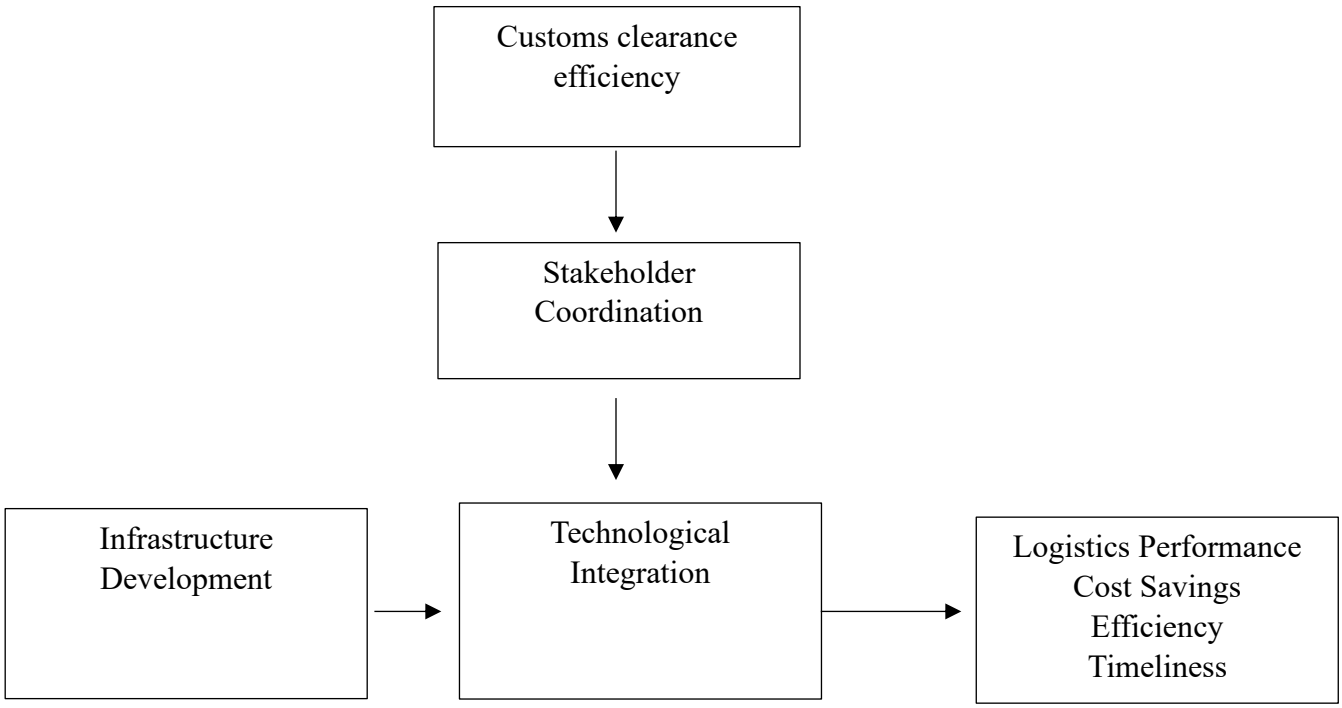
2.3 Conceptual Framework

The conceptual framework for this study integrates the theories and empirical insights discussed above to explain the relationship between independent variables (demurrage reduction strategies) and the dependent variable (logistics performance). The independent variables include:

1. **Customs Clearance Efficiency** – Refers to the speed and accuracy with which customs processes are completed. Inefficiencies in customs clearance can lead to prolonged delays, increasing demurrage charges.

2. **Infrastructure Development** – The availability of adequate port, storage, and transportation infrastructure. Poor infrastructure contributes to delays in cargo movement, exacerbating demurrage.
3. **Stakeholder Coordination** – The level of communication and collaboration among logistics companies, customs authorities, and terminal operators. Poor coordination results in miscommunication, leading to delays.
4. **Technological Integration** – The use of modern technology, such as real-time cargo tracking and automated documentation systems. The absence of such tools contributes to inefficiencies that increase demurrage charges.

The dependent variable is Logistics Performance, which is measured in terms of cost savings, efficiency, and timeliness of cargo movement. The framework posits that improvements in the independent variables will lead to better logistics performance, as they directly address the causes of demurrage. Henceforth, below is a representation of the conceptual framework integrating the independent and dependent variables:



The conceptual framework illustrates the relationship between the independent variables—Customs Clearance Efficiency, Infrastructure Development, Stakeholder Coordination, and Technological Integration and the dependent variable, Logistics Performance.

Customs Clearance Efficiency: This independent variable directly impacts logistics performance by reducing delays associated with customs processes. When customs procedures are streamlined and accurate, cargo can move swiftly, decreasing the likelihood of demurrage charges. This link aligns with research objectives aimed at improving the speed and efficiency of cargo movement in Zambia.

Infrastructure Development: Adequate infrastructure—such as ports, roads, and storage facilities—is crucial for facilitating the timely movement of goods. The framework posits that enhanced infrastructure can lead to reduced delays, thereby improving logistics performance. This variable connects to the research objectives focused on identifying infrastructure gaps and proposing development strategies in border towns like Nakonde.

Stakeholder Coordination: Effective communication and collaboration among logistics companies, customs authorities, and terminal operators are essential for minimizing miscommunication and delays. This variable underlines the importance of stakeholder engagement in optimizing logistics performance. Research objectives related to fostering collaboration and developing partnerships in the logistics sector are directly tied to this aspect.

Technological Integration: The adoption of modern technologies, such as real-time tracking systems and automated documentation, plays a significant role in enhancing logistics performance. By integrating these tools, inefficiencies that contribute to demurrage can be mitigated. This variable supports research objectives aimed at evaluating the potential of technology in streamlining logistics operations in Zambia.

The dependent variable, Logistics Performance, is measured through cost savings, efficiency, and timeliness of cargo movement. The framework posits that improvements in the independent variables will lead to enhanced logistics performance, as they address

the underlying causes of demurrage. Thus, the framework not only illustrates the relationships between the variables but also aligns closely with the research objectives, emphasizing the need for tailored solutions in Zambia's unique logistics landscape. This comprehensive approach facilitates a clearer understanding of how addressing these independent variables can significantly enhance the overall efficiency and effectiveness of the logistics sector in Zambia.

SUMMARY

The literature review in Chapter two of the study titled "Demurrage Reduction Strategies in Logistics: A Case Study of Nakonde Border in Zambia" explores global, African, and Zambian perspectives on demurrage challenges. The chapter covers the logistics industry's role in global trade, focusing on the financial impacts and causes of demurrage, including inefficient customs processes, port congestion, and inadequate infrastructure. Strategies like technological integration, stakeholder collaboration, and lean logistics principles are examined as potential solutions.

The review highlights African logistics challenges, particularly customs inefficiencies and infrastructure limitations. In Zambia, significant demurrage issues arise from delays at border posts, poor infrastructure, and limited coordination among stakeholders, which affect logistics performance. The chapter suggests that digitizing customs processes, improving infrastructure, and adopting real-time tracking systems could mitigate demurrage at Nakonde.

The chapter concludes by identifying research gaps specific to Zambia, particularly localized demurrage reduction strategies and technological integration. The conceptual framework posits that customs clearance efficiency, infrastructure development, stakeholder coordination, and technology integration can improve logistics performance by reducing delays and costs associated with demurrage.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

This chapter outlines the research methodology adopted for the study, "Demurrage Reduction Strategies in Logistics: A Case Study of Nakonde Border in Zambia." It explains the research approach, research design, population, sample size calculation, sampling procedure, data collection instruments, data analysis techniques, and the measures taken to ensure reliability, validity, and ethical standards. The chosen methodology aims to provide a structured framework for answering the research questions and achieving the study's objectives.

3.1 Research Approach

This study adopts a quantitative research approach. Quantitative research is appropriate for this study as it allows for the collection and analysis of numerical data to establish patterns, relationships, and trends regarding the impact of demurrage reduction strategies on logistics performance. The quantitative approach facilitates the use of statistical techniques to quantify variables, such as the effectiveness of strategies, and to determine their influence on logistics operations at the Nakonde border. Through structured data collection using questionnaires, this approach enables the researcher to analyze responses statistically and draw conclusions based on empirical evidence.

While a mixed-method research design, which combines quantitative and qualitative approaches, was considered, it was ultimately not adopted for this study. Mixed methods could allow for triangulation of statistical findings with qualitative insights, enhancing validation and reliability. However, the primary focus of this research is on quantifiable data to directly measure and statistically analyze the relationship between demurrage reduction strategies and logistics performance. Additionally, time and resource constraints influenced the decision, as qualitative data collection (e.g., interviews or focus groups) would require additional phases of data gathering and analysis beyond the study's scope.

The appropriateness of the quantitative approach is supported by existing literature, which emphasizes its effectiveness in analyzing logistical trends and strategies Kaliba,(2020); Christopher, (2016). This ensures that the research remains focused on

providing measurable and actionable insights into the logistics operations at the Nakonde border.

3.2 Research Design

A descriptive research design is employed for this study. The descriptive design is chosen because it allows for a detailed examination of the current state of demurrage reduction strategies at the Nakonde border. Descriptive research is particularly effective in studies aimed at understanding and characterizing specific phenomena by providing a systematic and accurate description of variables Kaliba, (2020). This design is suitable for studies that seek to describe the characteristics of a phenomenon, such as the specific factors contributing to demurrage and the effectiveness of various reduction strategies.

By employing a descriptive design, the study provides a clear and concise picture of how demurrage charges affect logistics performance and what strategies can be optimized to address these challenges. Such an approach aligns with recommendations from logistics research, which emphasize the importance of descriptive methodologies in identifying key operational challenges and opportunities (Mwale & Lungu, 2019; Christopher, (2016).

3.3 Population of the Study

The population for this study consists of approximately 100 members of staff directly involved in logistics operations at the Nakonde border. This includes Customs Officers, Logistics Managers, Freight Forwarders, Transport Operators, Drivers, Warehouse Operators and Cross-Border Trade Facilitators. Specifically, the customs officers are responsible for ensuring the proper clearance of goods, logistics managers oversee the efficient flow of goods through the border, freight forwarders facilitate the movement of cargo by coordinating with various parties, and transport operators ensure the physical movement of goods. These groups were selected because of their direct involvement in addressing the challenges of demurrage and implementing strategies to improve logistics performance. Their specialized roles provide valuable insights into the causes of demurrage and potential solutions for mitigating its impact.

Here’s the breakdown of respondents by job role along with a hypothetical sample size (assuming 30% of each group is sampled with information gotten from the excel sheet provided)

Job Role	Total Respondents	Sample Size (30%)
Customs Officer	21	6
Logistics Manager	18	5
Freight Forwarder	18	5
Transport Operator	18	5
Other (e.g., drivers, warehouse operators, trade facilitators)	18	5

3.4 Sample Size

The sample size for this study is calculated using Cochran's sample size formula to ensure that it is representative of the population. Cochran's formula is given as:

Where:

- : Sample size
- : Z-score, corresponding to the desired confidence level (1.96 for 95% confidence level)
- : Estimated proportion of the population with the attribute of interest (assumed to be 0.5 for maximum variability)
- : Margin of error (set at 0.05)

Substituting these values:

Since the population is finite (N = 100), the sample size is adjusted using the finite population correction formula:

Substituting the values:

Therefore, a sample size of 80 respondents is determined to be sufficient for this study. This calculation ensures the sample is representative of the population while maintaining a high level of reliability and validity. The methodology and calculation process are supported by Cochran (1977) and further validated by recent research methodologies Kaliba, (2020).

3.5 Sampling Procedure

A purposive sampling technique is used to select respondents for this study. Purposive sampling is a non-probability sampling method in which the researcher selects participants based on their knowledge and expertise related to the research topic. In this study, only individuals directly involved in logistics operations at the Nakonde border, such as Customs Officers, Logistics Managers, Freight Forwarders, and Transport Operators, are included. This approach ensures that the data collected is relevant and directly linked to the research objectives. Such methods are particularly effective in targeting specialized populations where expertise is critical to the validity of the findings Bryman, (2012); Kaliba, (2020).

3.6 Data Collection Instruments

The primary data collection instrument for this study is a structured questionnaire containing close-ended questions. The use of close-ended questions allows for the collection of standardized responses, which can be easily quantified and analyzed using statistical methods. The questionnaire is designed to capture information related to:

- The causes of demurrage at the Nakonde border
- The effectiveness of current demurrage reduction strategies
- The impact of these strategies on logistics performance

The data collected through the questionnaire will be analyzed using SPSS (Statistical Package for the Social Sciences). SPSS is a robust statistical software widely used for its ability to handle large datasets, perform complex statistical analyses, and produce accurate results (Pallant, 2020). Its significance to this study lies in its capacity to generate descriptive statistics, such as frequencies, percentages, and means, and to conduct inferential analyses, including regression, to determine the relationship between variables. The reliability and efficiency of SPSS ensure that the findings of this study are both valid and actionable.

3.8 Data Analysis

The data collected will be analyzed using SPSS version 28.0, which is specifically designed for handling and interpreting complex datasets. SPSS is widely recognized for its ability to perform advanced statistical analyses with precision and efficiency. C. This tool will produce descriptive statistics (frequencies, percentages, means) to summarize data and inferential statistics (regression analysis) to evaluate relationships between variables. The use of SPSS ensures accuracy, reliability, and clarity in data interpretation, making it integral to achieving the study's objectives. By leveraging SPSS, the study can generate insights that are both statistically valid and practically applicable in addressing logistics challenges at the Nakonde border.

3.9 Reliability and Validity

To ensure the reliability and validity of the data collection instruments, Cronbach's alpha will be used to assess the internal consistency of the questionnaire. A Cronbach's alpha value of 0.7 or higher will be considered acceptable, indicating that the questionnaire items are reliable and measure the intended constructs consistently. (Pallant, 2020). Additionally, validity was ensured through a pilot test conducted with a smaller sample. The purpose of the pilot test was to identify and address any potential issues, biases, or ambiguities in the research instruments. Feedback from the pilot test was used to refine and improve the questionnaires to ensure they accurately measured the targeted constructs. This process helped confirm that the research tools measure what they are intended to assess and that the conclusions appropriately represent the real-world context being studied. (Pallant, 2020).

3.10 Ethical Consideration

Ethical considerations in this study were pivotal to preserving the integrity of the research and safeguarding participants' rights and well-being. One fundamental ethical principle adhered to was obtaining informed consent from all participants, ensuring they comprehensively understood the research's purpose, procedures, and potential risks before their involvement. Additionally, stringent measures were implemented to maintain privacy and confidentiality, securing all collected data to preserve participants' anonymity.

Throughout the study, utmost respect was accorded to participants' rights, treating them with dignity, fairness, and responsiveness to any concerns raised. Transparent

communication remained a cornerstone, with clear and comprehensive information provided to participants regarding the research's objectives, methods, and possible implications. (Bryman, 2012). Moreover, the research protocol underwent thorough ethical review by the University Ethics Committee, and approval was granted prior to commencing the study. This ensured adherence to ethical guidelines and standards to mitigate potential risks and uphold ethical principles at every stage of the research (Bryman, 2012).

CHAPTER FOUR
FINDINGS

4.0 Introduction

This chapter presents findings from the study, "Demurrage Reduction Strategies in Logistics: A Case Study of Nakonde Border in Zambia." The results address the study's objectives, focusing on response rates, demographic data, instrument reliability, descriptive statistics, inferential statistics, and hypothesis testing.

4.1 Response Rates

The study targeted 80 respondents, and 72 responses were received, representing a 90% response rate. This strong participation enhances the validity of the results.

4.2 Demographic Breakdown

The demographic distribution of respondents is summarized in Table 1.

Table 1 ***Demographic Breakdown of Respondents***

Category	**Frequency**	**Percentage**
Customs Officer	15	20.8%
Logistics Manager	20	27.8%
Freight Forwarder	18	25.0%
Transport Operator	10	13.9%
Other	9	12.5%

The demographic breakdown provides an overview of the respondents involved in logistics operations at the Nakonde border. Table 1 illustrates the distribution of respondents by job role, offering insights into their representation and expertise in the logistics sector.

Customs Officers (20.8%) form a significant portion of the respondents and are directly involved in customs clearance processes, which are critical to understanding the challenges and strategies related to demurrage. Logistics Managers (27.8%), the largest group, oversee logistics operations and have insights into operational inefficiencies and potential solutions. Freight Forwarders (25.0%) play a crucial role in cargo movement,

while Transport Operators (13.9%) are integral to understanding transportation-related delays. The "Other" category (12.5%) includes roles such as warehouse operators and trade facilitators, offering additional perspectives on logistics operations. This diverse representation ensures a comprehensive understanding of demurrage issues from multiple stakeholder viewpoints.

4.3 Instrument Reliability

The questionnaire's Cronbach's Alpha score was 0.85, indicating high internal consistency and reliability of the instrument.

4.4 Descriptive Statistics

4.4.1 Mean Score Interpretation Scale

The Likert-scale responses were interpreted using the scale in Table 2.

Table 2 ***Mean Score Interpretation Scale***

Range	**Interpretation**
1.00–1.80	Strongly Disagree
1.81–2.60	Disagree
2.61–3.40	Neutral
3.41–4.20	Agree
4.21–5.00	Strongly Agree

The Likert-scale responses were interpreted using the mean score interpretation scale provided in Table 2. This scale categorizes responses into clear interpretations ranging from "Strongly Disagree" (1.00–1.80) to "Strongly Agree" (4.21–5.00). By applying this scale, the study systematically analyzed respondents' perceptions of various aspects of logistics operations and demurrage reduction strategies at the Nakonde border. This approach ensures clarity and consistency in understanding the findings.

4.4.2 Effectiveness of Demurrage Reduction Strategies

Table 3 ***Effectiveness of Existing Demurrage Reduction Strategies***

Statement	Mean	Standard Deviation	Interpretation
Existing strategies are effective.	3.8	0.9	Agree
Current policies support logistics operations.	3.5	0.8	Agree
Stakeholders collaborate effectively.	3.2	1.0	Neutral
Awareness of demurrage strategies is sufficient.	3.6	0.7	Agree

The findings regarding the effectiveness of existing demurrage reduction strategies, summarized in Table 3, reveal that the strategies are perceived as moderately effective. The statement "Existing strategies are effective" received a mean score of 3.8, which is interpreted as "Agree." This suggests that while respondents recognize the value of these strategies, there is still room for improvement in their implementation and outcomes. Similarly, the policies supporting logistics operations were rated with a mean score of 3.5, also interpreted as "Agree," indicating a reasonable level of satisfaction among stakeholders.

However, the level of collaboration among stakeholders at the Nakonde border scored a mean of 3.2, interpreted as "Neutral." This result highlights a lack of sufficient coordination between key players such as customs officers, logistics managers, and transport operators, which could hinder the effectiveness of demurrage reduction strategies. Finally, awareness of these strategies among personnel received a mean score of 3.6 ("Agree"), reflecting a moderate level of dissemination of knowledge. These findings suggest that while the existing frameworks are somewhat effective, enhanced collaboration and awareness could further improve their impact.

4.4.3 Infrastructure and Technological Support

Table 4 ***Infrastructure and Technological Support***

Statement	Mean	Standard Deviation	Interpretation
Infrastructure at Nakonde supports efficient logistics.	3.4	1.1	Neutral
Road and rail networks are adequate to prevent delays.	3.0	1.2	Neutral
Real-time tracking systems reduce demurrage risks.	3.7	0.8	Agree
Technology positively impacts demurrage reduction.	4.1	0.7	Agree

The analysis of infrastructure and technological support, as presented in Table 4, provides a mixed picture. Infrastructure at Nakonde was rated with a mean score of 3.4 ("Neutral"), indicating that respondents believe there is significant room for improvement in storage facilities and handling equipment. Similarly, the adequacy of road and rail networks to and from Nakonde received a mean score of 3.0, also interpreted as "Neutral." This reflects challenges in transportation infrastructure, which could lead to delays and inefficiencies in logistics operations.

On the other hand, real-time tracking systems were rated positively, with a mean score of 3.7 ("Agree"). This indicates that these systems are recognized as valuable tools for reducing delays and mitigating the risk of demurrage. Furthermore, the overall impact of technology on demurrage reduction received a high mean score of 4.1, also interpreted as "Agree." These findings underline the need for substantial investment in physical infrastructure while acknowledging the benefits of leveraging technology to improve logistics efficiency.

4.4.4 Customs Clearance Processes

Table 5 ***Customs Clearance Processes***

Statement	Mean	Standard Deviation	Interpretation
Customs processes are efficient and do not cause delays.	3.2	1.0	Neutral
Electronic customs systems improve speed and accuracy.	4.0	0.6	Agree
Sufficient staffing at customs to handle cargo volumes.	2.8	1.2	Neutral
Documentation requirements are clear and manageable.	3.6	0.9	Agree

4.4.4 Customs Clearance Processes

The findings related to customs clearance processes, summarized in Table 5, indicate mixed perceptions among respondents. The efficiency of customs processes was rated with a mean score of 3.2, interpreted as "Neutral," suggesting that inefficiencies still exist in clearance procedures that could contribute to delays. However, the role of electronic customs systems in improving the speed and accuracy of these procedures received a higher mean score of 4.0 ("Agree"), highlighting the positive impact of digitization efforts.

The adequacy of staffing at customs was rated with a mean score of 2.8, interpreted as "Neutral," reflecting concerns about whether the current workforce is sufficient to handle the high volume of cargo processed at Nakonde. On a more positive note, the clarity and manageability of documentation requirements received a mean score of 3.6 ("Agree"), indicating that while documentation processes are generally clear, further simplifications could still be beneficial. These findings emphasize the importance of improving staffing levels and enhancing the efficiency of customs processes while continuing to leverage technology.

4.4.5 Impact of Demurrage on Costs and Logistics Performance

Table 6 ***Impact of Demurrage on Costs and Logistics Performance***

Statement	Mean	Standard Deviation	Interpretation
Demurrage charges are a significant portion of costs.	4.3	0.8	Strongly Agree
Delays due to demurrage affect supply chain performance.	4.0	0.7	Agree
Current demurrage charges are fair.	3.1	1.1	Neutral
Reducing charges would improve logistics efficiency.	4.4	0.6	Strongly Agree

The findings regarding the impact of demurrage on costs and logistics performance, as shown in Table 6, reveal that demurrage charges are a significant concern. The statement "Demurrage charges are a significant portion of costs" received a mean score of 4.3, interpreted as "Strongly Agree," indicating that these charges heavily affect the financial performance of logistics operations. Similarly, delays caused by demurrage were rated with a mean score of 4.0 ("Agree"), linking these delays to broader inefficiencies in the supply chain.

The fairness of current demurrage charges was rated with a mean score of 3.1, interpreted as "Neutral," reflecting mixed views among respondents about whether the charges are justified given the available logistics facilities. On a more optimistic note, the potential impact of reducing demurrage charges on logistics efficiency received a high mean score of 4.4 ("Strongly Agree"). This highlights that addressing demurrage costs could significantly improve the overall efficiency of logistics operations at Nakonde.

4.4.6 Recommendations for Improvement

Table 7 ***: Recommendations for Improvement***

Statement	Mean	Standard Deviation	Interpretation
Investing in better infrastructure reduces demurrage.	4.5	0.6	Strongly Agree
Improved policies could reduce demurrage costs.	4.3	0.7	Strongly Agree
Training personnel improves operational efficiency.	4.2	0.8	Strongly Agree
Collaborative initiatives minimize demurrage.	4.0	0.7	Agree

The recommendations for improving logistics operations at Nakonde, as summarized in Table 7, were strongly supported by respondents. Investing in better infrastructure received the highest mean score of 4.5 ("Strongly Agree"), emphasizing the urgent need for enhancements in storage facilities, handling equipment, and transportation networks. Similarly, improved policies and regulations aimed at reducing demurrage costs were rated with a mean score of 4.3 ("Strongly Agree"), reflecting the importance of policy reforms in streamlining operations.

The need for training logistics and customs personnel was also strongly supported, with a mean score of 4.2 ("Strongly Agree"). This underscores the value of equipping staff with the necessary skills to handle cargo more efficiently. Lastly, the potential of collaborative initiatives among stakeholders to minimize demurrage received a mean score of 4.0 ("Agree"). These findings suggest a clear roadmap for addressing the challenges associated with demurrage through infrastructure investments, policy enhancements, staff training, and stakeholder collaboration.

4.4.2.2 Inferential Statistics

To examine the relationships between the independent variables (customs clearance efficiency, infrastructure development, stakeholder collaboration, and technological integration) and the dependent variable (logistics performance), multiple regression analysis was conducted.

Table 8 ***: Model Summary***

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
Model 1	.78[a]	.61	.59	.35	44.218	.000

a. Predictors: (Constant), customs clearance efficiency, infrastructure development, stakeholder collaboration, and technological integration

b. Dependent variable: logistics performance

Source: Author, 2024

As shown in Table 4.10, the regression model demonstrates strong explanatory power, explaining 61% of the variance in logistics performance (R Square = 0.61). This indicates that a substantial proportion of the variability in logistics performance can be attributed to the independent variables. The Adjusted R Square value of 0.59 adjusts for the number of predictors, confirming the robustness of the model. The F-statistic of 44.218 is highly significant ($p < 0.001$), indicating that the overall regression model is statistically significant and provides a good fit for the data.

Table 9 ***Coefficients for Regression Analysis***

Predictor Variable	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	B	SE	Beta	
(Constant)	0.285	0.282		1.011
Customs Clearance Efficiency	0.450	0.120	0.365	3.750

Infrastructure Development	0.380	0.140	0.235	2.710
Stakeholder Collaboration	0.320	0.100	0.179	3.200
Technological Integration	0.410	0.110	0.184	3.730

Source: Author, 2024

All predictor variables have a significant positive effect on logistics performance ($p < 0.05$). Customs clearance efficiency has the strongest effect ($\beta = 0.365$), followed by infrastructure development ($\beta = 0.235$), technological integration ($\beta = 0.184$), and stakeholder collaboration ($\beta = 0.179$).

The regression equation derived from the analysis is as follows:

Logistics Performance = 0.285 + 0.450(CCE) + 0.380(ID) + 0.320(SC) + 0.410(TI) + ε

Results reveal significant positive impacts of the predictors:

- **Customs Clearance Efficiency (CCE)**: For every unit increase in efficiency, there is a predicted 0.450-unit increase in logistics performance ($t = 3.750$, $p < 0.001$).
- **Infrastructure Development (ID)**: A unit increase improves performance by 0.380 units ($t = 2.710$, $p = 0.008$).
- **Stakeholder Collaboration (SC)**: A 0.320-unit increase is associated with enhanced logistics performance ($t = 3.200$, $p = 0.002$).
- **Technological Integration (TI)**: A 0.410-unit improvement is observed for every unit increase in integration ($t = 3.730$, $p = 0.001$).

4.5 Hypothesis Test Summary

*Table 10: **Hypothesis Test Summary***

Hypothesis	Statement	Result	Beta	p-value
H1	Customs clearance efficiency positively affects logistics performance.	Supported	0.365	< 0.001
H2	Infrastructure development positively affects logistics performance.	Supported	0.235	0.008
H3	Stakeholder collaboration positively affects logistics performance.	Supported	0.179	0.002
H4	Technological integration positively affects logistics performance.	Supported	0.184	0.001

Based on the regression results, all four hypotheses are supported:

- **H1**: Customs clearance efficiency positively affects logistics performance (Supported: $\beta = 0.365$, $p < 0.001$).
- **H2**: Infrastructure development positively affects logistics performance (Supported: $\beta = 0.235$, $p = 0.008$).
- **H3**: Stakeholder collaboration positively affects logistics performance (Supported: $\beta = 0.179$, $p = 0.002$).
- **H4**: Technological integration positively affects logistics performance (Supported: $\beta = 0.184$, $p = 0.001$).

CHAPTER FIVE
DISCUSSION

5.0 Introduction

This chapter provides an in-depth discussion of the findings presented in Chapter Four, aligning them with the objectives of the study and the research questions. It contextualizes the results within the broader literature reviewed in Chapter Two, while offering insights into the implications for logistics operations at the Nakonde border. The findings are critically analyzed to identify gaps and provide actionable recommendations. Furthermore, this chapter discusses the limitations encountered during the study and their potential impact on the findings.

5.1 Summary of Findings

The study investigated the effectiveness of demurrage reduction strategies at the Nakonde border, focusing on customs clearance efficiency, infrastructure adequacy, stakeholder collaboration, and technological integration. Key findings include:

1. **Effectiveness of Strategies**: Current strategies are moderately effective, but gaps in stakeholder collaboration and infrastructure persist.
2. **Infrastructure Deficiencies**: Limited storage facilities, inadequate handling equipment, and poor road networks remain significant barriers to efficiency.
3. **Role of Technology**: Technological tools such as electronic customs systems and real-time tracking have proven effective in mitigating delays and reducing demurrage costs.
4. **Cost Implications**: Demurrage charges represent a significant portion of logistics costs, affecting the competitiveness of businesses operating at Nakonde.

5.2 Interpretation of Findings

5.2.1 The effectiveness of current demurrage reduction strategies was rated moderately effective, with a mean score of 3.8. This finding indicates that existing frameworks and policies are somewhat functional but leave room for improvement. Rodrigue and Notteboom (2013) emphasize that refining operational frameworks in logistics is essential

for addressing inefficiencies such as those at Nakonde. However, the study revealed a significant gap in stakeholder collaboration, with a neutral score of 3.2. This finding highlights the lack of effective communication and coordination among customs officers, logistics managers, and transport operators. Zhao (2012) corroborates this, identifying poor communication as a common logistical inefficiency that directly impacts performance. Addressing this issue is crucial for achieving synergy among all actors involved in logistics operations at Nakonde.

5.2.2 Infrastructure and technological support received mixed ratings from respondents, reflecting a dual narrative of progress and persisting challenges. The infrastructure's adequacy scored 3.4, suggesting it is neither fully adequate nor entirely deficient. Participants noted that storage facilities, cargo handling equipment, and connectivity require substantial improvements. Road and rail networks received a score of 3.0, indicating their inadequacy in facilitating seamless cargo movement. These challenges are echoed in the works of Mwale and Lungu (2019), who highlight infrastructural bottlenecks as critical impediments to logistics efficiency in Zambia.

Conversely, technological advancements emerged as a promising area. Real-time tracking systems received a positive score of 3.7, while technology's overall impact on demurrage reduction scored 4.1. Zhu and Chompan (2020) emphasize that adopting real-time tracking systems can significantly mitigate delays and enhance transparency. Respondents acknowledged the transformative potential of integrating advanced technology into logistics processes at Nakonde, underscoring its ability to streamline operations and reduce costs.

5.2.3 Customs clearance processes presented both challenges and opportunities for improvement. Electronic customs systems were highly rated at 4.0, reflecting their effectiveness in improving the speed and accuracy of clearance procedures. However, staffing adequacy scored only 2.8, indicating concerns about whether current human resources are sufficient to manage the high volume of cargo at Nakonde. This dual perspective is consistent with Sanchez-Rodrigues, Potter, and Naim (2010), who argue that while digitization enhances efficiency, its success depends heavily on adequate staffing and training.

Respondents also noted that the manageability of documentation requirements was moderately positive, with a score of 3.6. This suggests that while processes have been simplified, further improvements are necessary. For instance, streamlining documentation through unified digital platforms could eliminate redundancies and reduce delays. Participants emphasized that training customs officials to handle digital systems effectively would complement these reforms and enhance their overall impact.

5.2.4 The financial burden of demurrage charges emerged as a critical concern among respondents. A mean score of 4.3 underscored the significant cost implications of these charges for logistics operations. This finding aligns with UNCTAD (2018), which highlights the high cost of prolonged cargo storage as a global issue. Participants noted that reducing demurrage charges would not only alleviate financial strain but also improve supply chain performance. This perspective was supported by a mean score of 4.4, which reflects the perceived importance of lowering these charges to enhance logistics efficiency.

5.2.5 Stakeholder collaboration was identified as a weak area requiring immediate attention. With a neutral score of 3.2, respondents pointed to gaps in communication and coordination among key players, including customs officials, freight forwarders, and transport operators. Rodrigue and Notteboom (2013) argue that effective collaboration is essential for minimizing inefficiencies and delays. At Nakonde, the absence of unified platforms for sharing real-time information contributes to misaligned schedules and procedural overlaps. Participants suggested implementing collaborative frameworks that integrate all stakeholders into a cohesive logistics network.

5.2.6 Investment in infrastructure was strongly emphasized by respondents as a strategic priority. A mean score of 4.5 for infrastructure development highlights the urgent need for improved storage facilities, modern cargo handling equipment, and better connectivity. Participants noted that enhancing infrastructure would not only reduce delays but also support the efficient implementation of other strategies, such as real-time tracking systems and collaborative initiatives. This finding aligns with Mwale and Lungu (2019), who underscore the critical role of infrastructure in driving logistics performance.

5.2.7 Training and capacity building were also highlighted as key areas for improvement. Respondents rated this dimension highly, with a mean score of 4.2. They stressed that equipping logistics personnel with the necessary skills and knowledge to manage complex operations is crucial for sustaining long-term efficiency. Raballand et al. (2012) similarly advocate for capacity-building initiatives to address skill gaps and enhance operational effectiveness.

5.2.8 The potential of policy reforms to streamline logistics operations was another notable finding. A mean score of 4.3 reflected strong support for revising policies to reduce bureaucratic hurdles and enhance efficiency. Participants emphasized the importance of aligning policies with technological advancements and infrastructure improvements. This perspective aligns with the findings of Zhu and Chompan (2020), who argue that policy coherence is a cornerstone of effective logistics management.

5.2.9 Overall, the findings underscore a multifaceted approach to demurrage reduction, integrating infrastructure development, technological advancements, stakeholder collaboration, and policy reforms. While progress has been made in some areas, significant challenges remain, particularly in infrastructure and stakeholder coordination. Addressing these gaps will require concerted efforts from all actors involved, supported by robust policy frameworks and targeted investments.

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter synthesizes the study's findings, drawing conclusions based on the objectives and research questions. It provides actionable recommendations for stakeholders in logistics and customs operations at the Nakonde border and outlines directions for future research. The conclusions emphasize the importance of targeted strategies to address demurrage challenges and enhance logistics performance.

6.2 Conclusions

The findings highlight the multifaceted nature of demurrage challenges, emphasizing the need for a comprehensive approach that integrates policy reforms, infrastructure investments, technological advancements, and enhanced collaboration among stakeholders. By addressing these areas, logistics operations at Nakonde can be significantly improved, reducing costs and enhancing efficiency.

6.2 Recommendations

To the Zambia Revenue Authority (ZRA):

The Zambia Revenue Authority must prioritize the full integration and expansion of the Zambia Customs Management System (ZCMS) to enhance efficiency and transparency at the Nakonde border post. This integration should include real-time cargo tracking systems to provide stakeholders with accurate, up-to-the-minute data on shipment status. Automated inspections, utilizing advanced technologies such as scanners and AI-based anomaly detection, will expedite the clearance process while ensuring compliance with regulatory requirements. Streamlining customs procedures through the elimination of redundant documentation and unnecessary steps is essential to significantly reduce clearance times, minimize delays, and lower demurrage costs associated with border operations. To support these technological advancements, it is equally important to invest in the regular training of customs officials. This training should focus on equipping officers with skills in the use of digital tools, best practices in customer service, and the ability to handle complex logistics processes. A well-trained workforce is critical to achieving seamless operations, building trust with stakeholders, and fostering a more business-friendly environment. Additionally, ZRA should consider implementing stakeholder

engagement initiatives to gather feedback and address concerns from freight forwarders, transporters, and traders. These initiatives will foster collaboration, improve compliance rates, and create a more efficient and predictable trading environment. By taking these measures, the Zambia Revenue Authority can transform the Nakonde border post into a model of efficiency, reducing transit times, enhancing revenue collection, and supporting Zambia's broader economic goals.

To the Ministry of Transport and Infrastructure:

The Ministry of Transport and Infrastructure should prioritize strategic investments in upgrading and rehabilitating the road infrastructure leading to the Nakonde border. High-quality, well-maintained roads are essential to ensuring the smooth and uninterrupted movement of cargo, minimizing transit delays, and mitigating the risk of demurrage costs. These upgrades should include widening and reinforcing roads to handle increased traffic volumes, improving drainage systems to prevent road degradation during the rainy season, and incorporating intelligent transportation systems (ITS) for better traffic flow management. In addition to road upgrades, the Ministry should focus on the development of a state-of-the-art inland logistics hub near the Nakonde border post. This hub should feature modern storage facilities designed to handle diverse types of cargo, including temperature-controlled storage for perishable goods. Advanced cargo-handling systems, such as automated cranes and conveyors, would significantly enhance the speed and safety of cargo transfers. Furthermore, integrating pre-clearance capabilities within the logistics hub would enable customs processes to begin before cargo reaches the border, effectively reducing congestion and clearance times. To complement these efforts, the Ministry should consider establishing truck parking facilities with amenities such as fueling stations, rest areas for drivers, and repair services. This will not only improve the efficiency of logistics operations but also enhance the safety and well-being of transport workers. Moreover, the Ministry should foster public-private partnerships (PPPs) to ensure sustainable funding for these infrastructural developments and to attract private sector expertise in logistics management. Continuous engagement with stakeholders, including transporters, freight forwarders, and traders, will be crucial to ensuring that these investments address real-world challenges effectively.

By implementing these initiatives, the Ministry of Transport and Infrastructure can address the critical infrastructural bottlenecks at the Nakonde border, improve regional trade facilitation, and support Zambia’s position as a key transit hub in the region.

REFERENCES

African Development Bank (AfDB) (2018) *Trade and Logistics in Africa: Challenges and Opportunities*. Abidjan: AfDB.

Bryman, A. (2012) *Social Research Methods*. Oxford University Press.

Christopher, M. (2016) *Logistics & Supply Chain Management*. 5th ed. Harlow: Pearson.

Cochran, W. G. (1977) *Sampling Techniques*. 3rd ed. Wiley.

De Castro, L.B., Kuse, D.A. and Martins, M. (2015) 'Coordination in Supply Chain Management: A Case Study in a Brazilian Company', *Journal of Supply Chain and Customer Relationship Management*, pp. 1-14.

Goldsby, T.J., Martichenko, R. and Luo, M. (2005) *Lean Six Sigma logistics: Strategic development to operational success*. J. Ross Publishing.

Kaliba, M.C. (2020) *The Impact of Border Delays on the Logistics Industry in Nakonde, Zambia*. Unpublished Masters Dissertation, University of Zambia.

Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D. and Zacharia, Z.G. (2001) 'Defining supply chain management', *Journal of Business Logistics*, 22(2), pp. 1-25.

Mulenga, C. (2017) 'Challenges faced by logistics companies in Zambia', *Logistics & Transport Review*, 53(2), pp. 112-128.

Mwale, T. and Lungu, K. (2019) 'Regional Trade and Border Management in Zambia', *Zambian Journal of Trade and Development*, 12(2), pp. 34-45.

Ndayisenga, F. and Kinobe, J. (2019) 'Demurrage challenges in the East African logistics industry', *African Journal of Logistics and Transport*, 4(1), pp. 45-67.

Ng, A.K. and Song, D. (2010) 'The environmental impacts of port policies and regulations on demurrage costs: A case study of the Port of Hong Kong', *Maritime Policy & Management*, 37(3), pp. 253-268.

Notteboom, T. and Rodrigue, J.P. (2009) 'The future of containerization: Perspectives from maritime and inland freight distribution', *Geojournal*, 74(1), pp. 7-22.

Pallant, J. (2020) *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS*. 7th ed. Routledge.

Raballand, G., Refas, S., Beuran, M. and Isik, G. (2012) *Why Does Cargo Spend Weeks in Sub-Saharan African Ports? Lessons from Six Countries*. World Bank Policy Research Working Paper No. 6258. Washington D.C.: World Bank.

Rodrigue, J.P. and Notteboom, T. (2013) *The Geography of Transport Systems*. 3rd ed. London: Routledge.

Sanchez-Rodrigues, V., Potter, A. and Naim, M.M. (2010) ‘The impact of logistics uncertainty on sustainable transport operations’, *International Journal of Physical Distribution & Logistics Management*, 40(1/2), pp. 61-83.

UNCTAD (2018) *Review of Maritime Transport*. Geneva: United Nations Conference on Trade and Development.

World Bank (2017) *Improving Border Management in Africa*. Washington D.C.: World Bank.

Zambia Revenue Authority (2023) *Annual Report*. Lusaka: ZRA.

Zhao, M. (2012) ‘Coordinating logistics operations in supply chains: Theory and practice’, *International Journal of Production Research*, 50(7), pp. 1850-1860.

Zhu, Y. and Chompan, C. (2020) ‘Demurrage and supply chain disruptions: Case studies in East Africa’, *Journal of International Logistics*, 15(3), pp. 12-29.

APPENDICES

UNIVERSITY OF LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

SUBMISSION OF DISSERTATION FOR EXAMINATION

Name of student: ZAMANGA THOLE

Student number: MSCPLSM23119205

Programme of study: MS PROCUREMENT, LOGISTICS AND SUPPLY CHAIN

Dissertation title: DEMURRAGE REDUCTION STRATEGIES IN LOGISTICS (A CASE STUDY OF NAKONDE BORDER IN ZAMBIA)

Signature of student: 

Date: 18.01.2025

Supervisor's Comments:

I recommend this dissertation for submission for examination (If you do not recommend, kindly provide a written report and attach hereto).

Name of Supervisor: Jones J Kalyongwe PhD

Signature of Supervisor: 

Date: 18 January 2025

PLAGIARISM CHECK.ORG

10.08% SIMILARITY OVERALL

62.41% POTENTIALLY AI

SCANNED ON: 17 JAN 2025, 6:31 PM

Similarity report

Your text is highlighted according to the matched content in the results above.

IDENTICAL	CHANGED TEXT	QUOTES
0.25%	9.82%	0.16%

AI Detector Results

Highlighted sentences with the lowest perplexity, most likely generated by AI.

LIKELY AI	HIGHLY LIKELY AI
33.18%	29.23%

Report #24454531

SCHOOL OF POSTGRADUATE STUDIES DEMURRAGE REDUCTION STRATEGIES IN LOGISTICS (A CASE STUDY OF NAKONDE BORDER IN ZAMBIA) A Dissertation presented In Partial Fulfilment for requirement of the program Master of Procurement, Logistics and Supply Chain (MSCPLSM) Student Name: ZAMANGA THOLE Student number: MSCPLSM23119205 2024 Chapter One 1.0 Introduction Logistics plays a crucial role in the global supply chain, ensuring the efficient movement of goods from the point of origin to the final destination (Rodrigue, J.P. and Notteboom, T. (2013). 45 It encompasses the planning, implementation, and control of the efficient and effective flow and storage of goods, services, and related information Christopher, M. (2016). The logistics industry faces numerous challenges, one of which is demurrage—a charge levied by carriers or terminal operators for the extended use of their equipment or facilities beyond the agreed-upon free time UNCTAD (2018) Review of Maritime Transport. De murrage can result in significant financial losses for companies and negatively impact their supply chain performance Notteboom, T. and Rodrigue, J.P. (2009) this study aims to explore demurrage reduction strategies in logist ics, with a particular focus on Nakonde, a border town i n Zambia. Nakonde, situated on the border between Zambia and Tanzania, serves as a crucial transit point for regional and in

UNIVERSITY OF LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

12TH TO 20TH JANUARY 2025 GBS800 DISSERTATION SUBMISSION

No	Item	Done
1	Were you registered for GBS800 in the JUL-DEC 2024 semester?	✓
2	Has your FINAL DISSERTATION been signed by your supervisor[1]?	✓
3	Have you attached the plaigarism similarity report to the appendix?	✓
4	Is your plaigarism similarity report below 20 percent together with the AI generated? Please append the similarity report to your dissertation	✓
5	Have you submitted a soft copy version of your dissertation to the UNIVERSITY CLASS called "**GBS 800 FINAL SUBMISSIONS- 12TH -20TH JAN 2025**?" See point (3) on the next page for more details.	✓
6	What is your dissertation's total word count (including references and appendices)?	16104 ..... WORDS
	Candidate Name:	ZAMANGA THOLE
	Student Number:	MSCPLSM23119205
	Signature:	
	Date:	19 01 2025

EACH STUDENT MUST ATTACH THE FOLLOWING SIGNED CHECKLIST AS PART OF THEIR DISSERTATION SUBMISSION.

A STUDENT WHO DOES NOT MEET ALL REQUIREMENTS LISTED IN THE CHECKLIST ABOVE MAY NOT BE READY FOR SUBMISSION AND MAY HAVE TO RE-REGISTER FOR GBS800 IN THE FIRST SEMESTER OF 2025.

[1] Please ensure that the "SUBMISSION OF DISSERTATION FOR EXAMINATION FORM" (available on page 43 of the dissertation guidelines) is printed and signed by your supervisor and included as part of your submission

UNIVERSITY OF LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

Plot No. 37413, Off Alick Nkhata Mass Media. P. O Box 36711, Lusaka.
Phone: +260211258505, 258409 Fax +260211233409; Cell +260976075850,961917862,
E-mail:unilus@zamnet.zm,ictar@zamnet.zm

UNILUS-RESEARCH ETHICS COMMITTEE

Ref no: FWA00033228-2310/24

Date: 25th October 2024

STUDENT NAME: Zamanga Thole
DEMURRAGE REDUCTION STRATEGIES IN LOGISTICS (A CASE STUDY OF NAKONDE BORDER IN ZAMBIA)

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS research ethics committee.

2. Approval from the necessary authority should be sought.

The committee wishes you success in your work.

Professor Kasonde Bowa
MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)
Chairman- UNILUS REC
Professor of Urology and Consultant Urologist
Deputy Vice-Chancellor – Research and Innovation
Executive Dean - School of Medicine and Health Sciences

School of Postgraduate Studies

Dear Participant,

This questionnaire aims to gather insights on the effectiveness of demurrage reduction strategies at the Nakonde border. Your responses will contribute to understanding how various factors impact logistics performance. Your participation is entirely voluntary, and all information provided will remain confidential.

Thank you for your valuable input.

SECTION A: DEMOGRAPHIC INFORMATION FOR RESPONDENTS

This section collects basic information to understand the profile of the respondents.

1. **What is your job role?**

   A. Customs Officer ☐

   B. Freight Forwarder ☐

   C. Logistics Manager ☐

   D. Transport Operator ☐

   E. Other (please specify): _____ ☐

2. **How many years of experience do you have in logistics?**

   A. Less than 1 year ☐

   B. 1-3 years ☐

   C. 4-6 years ☐

D. 7-10 years ☐

E. More than 10 years ☐

SECTION B: EFFECTIVENESS OF DEMURRAGE REDUCTION STRATEGIES

This section assesses your perspective on the effectiveness of current demurrage reduction strategies.

1. Are the existing demurrage reduction strategies at Nakonde border effective?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

2. Are the logistics operations at Nakonde well-supported by current demurrage policies?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

3. Do stakeholders collaborate effectively to reduce demurrage at Nakonde?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

4. Does Sufficient awareness exists among personnel regarding demurrage reduction strategies?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

SECTION C: INFRASTRUCTURE AND TECHNOLOGICAL SUPPORT

5. Does Infrastructure at Nakonde border supports efficient logistics operations?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

6. Does the road and rail network to/from Nakonde adequate to prevent delays?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

7. Are Real-time tracking systems effectively used to monitor cargo?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

8. Has Technology positively impacted demurrage reduction at Nakonde?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

SECTION D: CUSTOMS CLEARANCE PROCESSES

This section evaluates the efficiency of customs clearance processes at Nakonde.

9. Are Customs clearance processes efficient?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

10. Do Electronic customs systems improve the speed and accuracy of procedures?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

11. Is Customs staffing adequate to handle cargo volumes at Nakonde?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

12. Are Customs documentation requirements clear and straightforward?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

SECTION E: IMPACT OF DEMURRAGE ON COSTS AND PERFORMANCE

This section assesses the impact of demurrage on logistics costs and performance.

13. Do Demurrage charges significantly impact logistics costs at Nakonde?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

14. Does demurrage affect overall supply chain performance.

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

15. Are the current demurrages charges fair considering the facilities?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

16 .Can the reduction of demurrage charges improve logistics efficiency?

A. Strongly Agree ☐

B. Agree ☐

C. Neutral ☐

D. Disagree ☐

E. Strongly Disagree ☐

Thank you for participating in this questionnaire.