ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MBA PROGRAM

The Role of Rail Transport to the Multimodal Operator Performance of Ethiopian Shipping and Logistics Enterprise.

By: Meaza Tenkir

Advisor: Habtam Abebaw Worku (PhD)

May, 2021

Addis Ababa, Ethiopia

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A Thesis Submitted to School of Graduate Studies of St. Marry University in Partial Fulfillment of the Requirements for the Degree of Master of Art in Business Administration.

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Approved by Board of Examiners

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Dean, Graduate Studies	Signature
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External Examiner	Signature
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Internal Examiner	Signature

DECLARATION

I, hereby declare that this thesis entitled “The Role of Rail Transport to the Multimodal Operator Performance of Ethiopian Shipping and Logistics Enterprise”, my own work and that, to the best of my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any other degree by the university or any other university, except where due acknowledgment has been made in the context. I have produced it independently except for the guidance and suggestion of my Research Advisor. This study has offered for the partial fulfillment of the Degree of Master of Business Administration [General MBA] by:

Meaza Tenkir _____
Name Signature
SMU, Addis Ababa, Ethiopia May, 2021

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Finally yet importantly, I would also like to thank my work colleagues in the workplace and friends for their moral support, and encouragement.

List of Acronyms and Abbreviations

ACIS	Advance Cargo Information System
ANOVA	Analysis of Variance
CSRQ	Customer Service Quality
EDI	Electronic Data Interchange
ERC	Ethiopian Railway Corporation
ESLSE	Ethiopian Shipping and Logistics Services Enterprise's
ICC	International Chamber of Commerce
ICT	Information and Communication Technology
LPI	Logistics Performance Index
LSV	Logistics Service Value
MDP	Mojo Dry Port
MT	Multimodal Transport
MTO	Multimodal Transport Operator
NVO-MTO	Non-Vessel Operating Multimodal Transport Operator
SPSS	Statistical Package for The Social Science
TEU	Twenty Equivalent Units
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nation for Development Plan
US	United State
USD	United State Dollar
VO-MTO	Vessel Operating Multimodal Transport Operators
WEF	World Economic Forum

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Abstract

The main aim of this study was assessing the role of rail transport performance for multimodal operator performance of Ethiopian Shipping and Logistics Service Enterprise. A descriptive and explanatory *research design is adopted using quantitative study methods. The research approach which used for this study was Quantitative in Nature. From 325 total population, 197 respondents were selected, to undertake the study. Descriptive analysis, correlation analysis and linear regression was used to analyze the gathered data. The result of the study indicates that there is a positive significant relationship between role of rail transport performance and multimodal operator performance. Financial metrics is at ($r=0.397^{**}$ $p<0.01$). The correlation between variable was direct which means as financial metrics is good overall performance of multimodal is increases. Linear regression analysis revealed that amount for r = 0.911 which explains a strong positive relationship between predictors and Overall Performance of Multimodal. It means that the relationship between delivery performance (cycle metrics), financial metrics, quality metrics in ESLSE is very strong, and by increasing the quality of one the other one will increase as well. The R^2 result are safe to say that overall performance of multimodal is about 86.2 % dependent over delivery performance (cycle metrics), financial metrics, quality metrics. Therefore, the conclusion of this study is that rail transport performance meets the expectations of the operator and most rail transport in emerging economies was developed to move container from Djibouti port to Modjo dry port reduce freight transport cost, reduce transit time, decrease dwell time, which means that improves quality metrics, and increase productivity of the operator. Finally, the researcher has recommended that ESLSE should give due emphasis to those driving factors to appropriately address performance issues.*

Key words: Delivery performance (cycle metrics), financial metrics, quality metrics, and Overall Performance of Multimodal.

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Globalization and technological advances have changed the approach to manufacturing, trade and transport, both in industrialized countries and in developing countries, in recent decades. This pattern has contributed to a continuous transfer in production to countries that give a competitive advantage (Ferrantino and Arvis et.al., 2013). In the global manufacturing and selling of products, logistics has thus become an important value-added operation. Economic policy in many countries, especially in the developing world, is currently promoting export-led economic development, with manufactured products growing in terms of value added. Without an effective transport system, economic transformation and, indeed, the development of any nation is hardly feasible (Andrew, 2011). The technology needed by transport operators will continue to be affected by this focus. In the overall demand-supply chain of goods and services in a country, freight transportation is a critical element. The ability to move goods rapidly, efficiently, economically and reliably is considered important to business success and to the growth and ability of nations to compete in the globalized economy (Douglas, et al, 1998).

As one of the developing countries, Ethiopia needs to be integrated with the global economy and this can be done only through efficient and effective foreign trade flows of goods to and from the country. To this end, an effective multimodal transport system for freight transport needs to be adopted or established by the country. To this end, the country needs to adopt or develop an efficient multimodal transport system for freight transport. With the aim of improving the flow of goods between Djibouti port and dry ports in Ethiopia, implemented what referred multimodal transport system since January 2011 by new proclamation number 548/2007 in Ethiopia targets for seamless, low cost, and maximum customer convenient transporting of imported goods form Djibouti to dry port in Ethiopia and reverse flow in case of exported goods (T. K. Amentae, G. Gebresenbet, 2015). On the other hand freight transportation is critically tied to the economic growth and well-being of a region that freight transportation planning has become a major focus of transportation planning around the world (Ram, 2011). The road freight transport system, the main stream of inland freight transport, is highly congested and is having several infrastructural

limitations which make it inextensible to accommodate the drastic increasing freight transport demands and volumes (Muh Patrick, 2007).

In terms of land-use and energy usage, rail is often widely known as safer and more efficient. Recent investments in road and rail along the Djibouti corridor have the potential to dramatically reduce transport costs and time and are a key element in fostering greater investor interest in opportunities to grow export production capacity in Ethiopia. The success of this corridor will be of vital importance, with estimates that imports and exports will more than double under the growth transformation plan by 2020.This has been recognized by the government, which pays close attention to the performance of logistics and has established a national logistics strategy (World Bank, 2017). Multimodal transport operator (MTO) responsibility for loss of goods or harm to goods and delay in delivery. That is to say that the MTO is responsible if the incident that caused the loss, harm or delay in delivery happened when the goods were at its cost, unless the MTO shows that it or its agents or any other person whose services it allows use of the contract's results, it took all steps that might reasonably be needed to prevent the event and its consequences. From that point on, the MTO completes a range of sub-contracts on behalf of the MTO, not the shipper or the consignee, with individual carriers, road rail, shipping lines, port authorities, terminal operators, stevedores, etc... Only the MTO is entitled to take delivery of the products from each sub-carrier in question and to move them on to the next sub-carrier. The MTO is responsible for the entire transport chain, serving as a principal (UNCTAD, 2017).

Ethiopian Shipping and Logistics Services Enterprise’s (ESLSE) multimodal transport goal is to increase the movement of goods between the port of Djibouti and Ethiopia's dry ports. Logistics issues contribute to high shipping costs and extended travel times. Role of Rail Transport assessment is even more relevant, because of logistics, the developmental government agency and the only vessel-owned Multimodal Transport operator is an input to the economic sector such as industry, trade, and so on. The difference find will what the multimodal operation system's contribution to ESLSE efficiency will. In this research thesis, the researcher tried to identify the main role of Rail Transport to Multimodal operator performance of ESLSE's success to indicate the optimal use of the gain and open way for further research carried out.

1.2. Statement of the problem

Since the independence of Eritrea in 1993, Ethiopia has been a land locked country in East Africa, a key factor shaping the external environment in which Ethiopia exports and imports. With over 95

percent of Ethiopia importing and exporting via this route, the Ethiopia Djibouti Corridor linking Ethiopia to the port is now the dominant gateway for the country. The practice of freight transport in Ethiopia is characterized by a range of problems, including an underdeveloped and fractured management system, insufficient and inappropriate vehicle fleets and bad transport and logistics infrastructure, etc., very high accidents rated among the worst in the world and urban congestion at inlets/outlets, lack of coordination of good transport and logistics infrastructure, etc. (Fikadu Debela, 2012; Tadesse, 2006). Vehicle and freight congestion at the transfer station are among the problems faced during freight transportation using multimodal transport system due to lack of proper coordination and unbalance between the delivery and transport vehicles. But the Ethiopian Government pays an immense amount of money to the Government of Djibouti for long-term storage in Djibouti during the transport of this freight, owing to the lack of freight transport vehicles and their inappropriate management. The total amount of cargo discharged at Djibouti port from 2016 to 2019 is based on data obtained from ESLSE.

The global ranking of the International Logistics Performance Index (LPI) was established to help countries recognize the challenges and opportunities they face in their trade logistics performance and what they can do to enhance their performance. Ethiopia is ranked 126 out of 160 WBGRR countries in the LPI 2016 survey (2016). The rank is measured against other countries such as Uganda and Rwanda that are landlocked. In addition, our country, Ethiopia, scored 96 out of 144 countries in the World Economic Forum (WEF) global competitiveness index on four metrics, such as functional institutions, infrastructure scored 125 out of 144 countries, technical readiness scored 133 out of 144, and macroeconomics scored 95 out of 144 countries. In addition, the Global Competitiveness Index for Ethiopia indicates that the performance of logistics is poor relative to other economies under different metrics MTSB (2013).

Some previous Role of Rail Transport to multimodal operator studies have been conducted (Banomyong, R. (2000); Rondinelli, D. and Berry, M. (2000); Vishwakarma, K.R. (2010); and Teshome, T. (2017)) their research finding shows that there is a positive the role of rail transport has a positive relation to multimodal operation. These studies were conducted across a range of all transportation not only rail transport and organizations in foreign countries and their empirical studies have some different conclusion. However, there is a lack of research specifically related to factors that predict or limit role of rail transport to multimodal operator performance. Such evidence

indicates the researcher to investigate specifically the role of rail transport on multimodal operator performance.

Despite the above observations, particularly in terms of the importance of rail transport efficiency, the company's revenue increased significantly, claims that it takes 3 days to handle it, and because of the unavailability of truck 9560 boxes, they are not filled for seven days. However, when the rail activity was registered, 14030TEU and 38468TEU were respectively transported within two years. On average, 324 trucks are faced with accidents. In doing so, the available information is inadequate to identify the subject understudy. Therefore, this study is intended to filled this information gap by analyzing the role of rail transport performance in the Modjo Dry Port multimodal operator (Ethiopian Shipping and Logistics Service Enterprise).

1.3. Research Question

- What is the major role of rail transport of multimodal operator performance?
- What is the delivery performance of rail transport for multimodal operator performance at container terminal?
- Which mode of transportation is cost effective between multimodal transport operation and rail transport with relationship between terminal ownership status and container dwell time?
- What is the multimodal transport operation liability and insurance performance during damage or loss of goods while in transit?

1.4. Objective of the study

1.4.1. General Objective

The general objective of this study is to assess the Role of Rail transport performance for multimodal operator performance of Ethiopian Shipping and Logistics Service Enterprise.

1.4.2. Specific Objective

This research has the following specific objectives to achieve its general objective.

- To describe the major role of rail transport of multimodal operator performance.
- To assess the delivery performance of rail transport for multimodal operator.
- To identify the cost effectiveness of multimodal transport operation and rail transport with relationship between terminal ownership status and container dwell time.
- To analyze multimodal transport operation liability and insurance performance during damage or loss of goods while in transit.

1.5. Scope of the study

After the merger of three separately operating companies, the Ethiopian Shipping and Logistics Company is the result and has an immense duty to provide importers and exporters with sea transport and logistics services. Different modes of transport are used to transport multimodal freight from abroad to Ethiopia via the port of Djibouti.

The main modes of transportation systems used in the distribution of cargo are among these rail, water and road transport systems. However, this study only focused on the role of rail transport in the multimodal transport activity of containerized cargo from Djibouti to the dry port of Modjo and on the population size assumed, and only specifically takes into account the multimodal transport operation, i.e. Multimodal department and employees of Modjo dry port service. Despite the time and budget constraints, the analysis concentrated only on the import side of the multimodal transport system's containerized cargo and therefore did not cover the export side of the multimodal transport system.

1.6. Significance of the study

The study aimed to increase understanding of existing stocks of information relevant to rail transport and the performance of multimodal operators. In order to analyze the delivery efficiency of rail transport, the results are also expected to provide a clear picture for government (policy makers), various stakeholders, academics, and enterprise top management. The multimodal operator allows for an efficient operation with access to multiple means of transport to help the economy and regional growth and to increase the freight flow in the national transit port system. It helps to increase the company's strength and decrease the company's weakness in multimodal transport operations.

Besides, this study will be a step-stone for further studies in the field of Role of Rail transport performance for multimodal operator performance. Adding this study will enrich the existing shortage of literatures hence giving a better understanding on the role of rail transport performance for multimodal operator performance.

1.7. Organization of the study

The paper was organized into five chapters: Chapter one describes background to the study, statement of the problem, research objectives, research hypotheses, scope and limitation of the

study, the significance of study and organization of the thesis. Chapter two was a review of the literature on Role of Rail transport performance for multimodal operator performance of Ethiopian Shipping and Logistics Service Enterprise. Chapter three describes the methodology of the research that clearly indicates the way the researcher conducts the study. Chapter four of this study illustrate the result and discussion of the research findings whereas chapter five of this study come up with summary, conclusion and recommendation.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Theoretical Literature Review

The theoretical part of the literature covered the topics concept and definition of multimodal and freight transport related experience on rail and the multimodal operator performance.

2.1.1. The Concept of Multimodal Transports Operations

The establishment of international transport operations and container services have led to the growth of world trade (Cullinane et al, 2005). The United Nations Convention on Trade and Development (UNCTAD, 1981) was defined the concept of 'Multimodal Transport' as:

> "*the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multimodal transport operator to a place designated for delivery situated in a different country*".

Therefore, the idea of multimodal transport, promoting the operation of origin-to-destination freight transport under the responsibility of a single operator using more than one mode of transport, is a normal containerization extension (Hayuth, 1987; D'Este, 1996; & Muller, 1999). In many least developed countries, however, the inland transport system aspect of international freight transport impedes international trade (UNCTAD, 1994). For many years, transport companies engaged in international trade have developed and developed new technology to enable more efficient delivery across multiple modes of transport.

International multi modal transport means the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multi modal transport operator to a place designated for delivery situated in a different country (United Nation Convention on International Multimodal Transport of Goods, 1980). According to Alderton, (1995) the multimodal system is an optimization process of the location, movement and storage of resources from the point of origin, through various economic activities, to the final consumer. An integrated movement of freight that involve at least two modes of transport under a single through rate with a goal of providing seamless transport system from

point of origin to the final destination under one billing and liability is known as intermodal transport (Brewery, et al ,2001).

The emergence of modern transport systems, such as containerized transport and other unitization of goods, has led to changes in transport operations. Under a single bill of lading or contract, even the service offered in various transport modes, such as ships, road vehicles and railways, cannot be unpacked for verification until the commodity has been placed in a container (UNCTAD.org, 2001). Multimodal transport is the effective and quicker transfer of cargo from one location to another. To this end, by using trucks, trains, ships, and aircraft, more than one form of vehicle is needed to transport goods from origin to destination.

2.1.2. Types of Multimodal Transport Operator

Multimodal transport operator could either group based on the organizational capacity and structure. There are four types of multimodal transport operators (UNCTAD, 1980).

1) Vessel Operating Multimodal Transport Operators (VO-MTO)

Marine transport could be made either having owning or chartering of ship. The owner is usually limiting the responsibility from the time cargo is reached at port of loading up to the port of where the goods are going to be discharged. If the ship owner is extending his responsibility beyond the port where the goods is discharged and combination of the modes of transportation qualifies the ship owner as vessel operating multimodal transport operator (VO-MTO). Here the vessel operating Multimodal Transport Operator (VO-MTO) is issuing a single Multimodal Transport document and takes uniform liabilities for the entire transport. This could also be done by having or not having other means of transport. Transportation could simply arrange by sub-contracting this activity to those companies having such facilities

2) Non-Vessel Operating Multimodal Transport Operator (NVO-MTO)

Other transport operator, such as freight forwarder, Stevedoring and tallying companies, Custom brokers who will not themselves have the vessels but they own one of means of transport either Trucks, Airplane or Railways and arrange door to door transport Services by using two or more mode of transport, they simply sub contract the ocean voyage, which they don’t own or operate the vessel. These operators more over act as logistics provider value added service such as FCL/LCL, Handling customs formalities and documentation. Also the implementation of Multi modal transport legislation in many region and their flexible operation as well as their accessibility is most

of small-scale shipper those especially operated inland locked countries has encourage to take carrier role and get an advantage.

3) Provide services related to transport but without having any means of transport.

Those operators are made either by freight forwarders, stevedoring or tallying companies, custom brokers which in addition to their auxiliary activities extend their services as a multimodal transport operator service. Hence the main feature of this operator is that their main activities are related to transport service.

In addition to above multimodal activities could be carried out by those business entities which do not necessarily own vessels and are established with the exclusive aim of providing multimodal transport service. To sort out above, multimodal transport operator may possess or may not claim means of transport or handling equipment or compartment stop or yards or holder cargo station and warehouse. Consequently, in order to satisfy their legally binding commitment, some of them enter subcontracting concurrence with individual Unimodal transport providers.

2.1.3. Benefits of Multimodal Transport

The cost and quality of transport services will have considerable impact on the development of national production as well as foreign trade activities. With the introduction of multimodal transport, the transport industry has been experiencing a revolutionary phase both in cost savings and service quality upgrading (UNCTAD Secretariat, 1994b).

The utilization of multimodal transport infers generally basic changes covering new trade and transport practices. Different measures are expected to execute multimodal transport, from the smoothing out of business guidelines to the development of transport infrastructure. The upgrade of three principal components it's fundamental for an effective and efficient multimodal transport system. These components are commercial practices, administrative requirements and transport infrastructure (Banomyong, 2000).

And also, according to Gray and Kim, (2001), consider the five determinants factors to successful multi-modalism. These are standardization, expenditure, interchange points, types of carrier, organizational coordination and role of government-deregulation and other encouragement.

Several literatures have explained this multimodal/intermodal transport as useful, cost effective, time management, efficient, and play a great role to port performance and regional economic

developments. As per Foolchand, (2006), the effectiveness of activities decides the adequacy of infrastructure that is given. For its successful demand the technological improvement in shipping particularly through containerization, ship design, cargo handling equipment, multimodal facilities, road and rail transport, port structure, port investments and inland transportation.

According to Dewan, et al, (2006) described successful implementation of multimodal transportation requires government coordination, technology, infrastructure, information system and knowhow of logistics management theory and practices.

2.1.4. Multimodal Transport Requirements

Several entities involved in transportation can be termed as the operator in the multi modal system. If they have signed a multimodal contract, they assume the responsibility of an operator. They also issue multimodal transport documents to the merchants.

2.1.4.1. Basic Requirements for Being Multimodal Transport Operators

1) ***Operational Qualifications for MTOs***

Having financial capability, expertise and an international network of agents or offices might be the three most important ones. (UNCTAD, 1997). These are:-

- Financial Capability: - An MTO should be financially capable of meeting all his commitments, including his liability to the consignor.
- Expertise and Competence of Personnel: - To handle such a business, it is obvious that a high level of expertise and competence is required. Knowledge about trade facilitation measures is also of great importance for MTOs, because by taking advantage of these measures their MT operations could be made more efficient and effective.
- An International Network of Agents or Offices: - Multimodal transport is by nature an international business. MTOs cannot confine their operations to just a local area. Therefore, it is necessary for MTOs to establish subsidiaries or agents at different ports or places covered by their MT operations all over the world.

2) Different Qualified MTOs

Although the essential requirements or qualifications for a Multimodal Transport Operator are basically same no matter whether it is a VO-MTO or a NVO-MTO. This can be reflected in the following representative examples (UNCTAD, 1997).

- Liner Shipping Companies: - Since a single liability regime covering the entire MT trip applies in multimodal transport operations, an MTO should be financially capable to meet the claims that might arise during the MT process. Liner shipping companies have such financial capability to meet claims. In terms of expertise and competent staff needed for MT activities, liner shipping companies have been in the position of knowing multimodal operations better than many others, because they have been involved in this business since the inception of the concept.
- Freight Forwarders: - Since freight forwarders have been engaging in the arrangements of all segmented transport all the time, which constitutes the fundamental part of multimodal transport, they are already familiar with multimodal operations.

The upgrade of three main elements is necessary for an efficient multimodal transport system. These elements are commercial practices, administrative requirements and transport infrastructure.

1) Commercial Practices

- Merchant: -There are no international conventions in force governing contracts for the international sale of goods, so disputes and misunderstanding have often arisen between buyers and sellers, mainly because of different interpretations about the terms used in the contracts. In order to avoid such situations which, hinder the smooth flow of international trade, the International Chamber of Commerce (ICC) has introduced standardized trade terms known as INCOTERMS (ESCAP, 1992).
- Banking practices and documentation system: - In the financing of such sales, the banks were accustomed to receiving a bill of lading issued once the goods were on board the ship (Brooke & Buckley, 1985). An update of the rules released at the end of 1993 (UCP 500) clarified the situation with regards to the banking procedure by indicating that unless the letter of credit stated the contrary; the following types of transport documents are to be recognized by banks: Article 23: Marine/Ocean bill of lading Article 24: Non-negotiable seaway bill Article 25: Charter bill of lading Article 26: Multimodal transport document Article 27: Air transport document Article 28: Road, rail or inland transport document Article 29: Courier and post receipts and Article 30: Transport documents issued by freight forwarders.

2) Administrative Requirements

- Trade facilitation: - One of the main problems that occurs in international trade is that each country has its own rules and procedures concerning the import and export of goods. For this reason, According to FALPRO, trade facilitation is done through the streamlining of the information flow mainly on three levels: (a) Simplification: The reduction of the amount of information required by the various authorities to an absolute minimum. (b) Normalization: The reduction of variants of formalities, procedures and documents both at the national and at the international levels. This mainly concerns, transport documents, INCOTERMS, payment conditions and trade documents. (c) Harmonization: The harmonization of statistics of streamlining of the transmission of data using EDI.
- Customs: - In all countries Customs play a major role in enforcing laws at the nation's borders. The globalization of the world economy has placed increased pressure on the world's Customs administrations. Merchants have demanded faster, more standardized and uniform service while governments require more revenues. At the same time Customs must produce trade statistics and enforce other agency laws (i.e., health, intellectual property, etc.) at the nation's border.

3) Transport Infrastructure

Where transport infrastructure is poor, the development of multimodal transport may not be easy. In order to be able to gain maximum benefit from multimodal transport, infrastructure that is capable of handling containers must be in place. To remain competitive, exporters and/or importers must be able to reduce transportation costs that are included in the goods' delivered price. In order to improve or eliminate such hidden costs, it is essential to improve the quality of a region's or a country's international transport and logistics capabilities. Therefore, efficient operations of transport modes and intermodal facilities, resulting from reduced physical barriers and institutional interference, and from simplified legal regimes, is the necessary precondition for effective improvement of international trade and transport. These improvements will lead to the existence of a mature multimodal transport system in that region or country.

2.1.4.2. Requirements to improve multimodal transport and logistics services

Infrastructure and Technologies: -

According to Breda (2009) Containerized cargo also requires less but better qualified personnel in ports, where reforms are still pending in many developing countries. It further requires port, rail and

road infrastructure, as well as the corresponding regulations and labor regimes. Like containerization in previous decades, information and communication technology (ICT) is today radically changing the way in which international trade and transport are conducted. Electronic means of communication are used to exchange information, enter into contracts and trace goods during transit.

Increased competition and private sector participation empirically tend to encourage investment in infrastructure and the introduction of new technologies. The public sector maintains an important role with regard to investment in public infrastructure such as national telecommunication systems or access to ports. Here, Governments may have to invest themselves, or they may concession the construction and operation of infrastructure, in which case a new regulatory role of the public sector is required.

- Logistics information systems: -The Advance Cargo Information System (ACIS) is a logistics information system designed to improve transport efficiency by tracking equipment and cargo on transport modes (rail, road, lake/river) and at interfaces (ports, internal clearance depots) and by providing information in advance of cargo arrival.

Security and safety

In the case of transport and international logistics, corruption, theft and accidents not only imply a direct cost, but also reduce the competitiveness of exports. Especially at ports and other nodes where cargo is shifted from one mode to another, security risks are particularly high. Uncertainty and also weak legal systems are thus a particular obstacle to multimodal transport, where often an original carrier located in a foreign country is supposed to cover the entire risk of the entire transport chain.

Facilitation

Coherent trade and transport facilitation measures are necessary for the development of international logistics and multimodal transport services. The international movement of cargo and vessels involves a potentially large number of controls and inspections and to the extent that such controls take too long, or their duration varies arbitrarily, this becomes an impediment to the planning and operation of services.

Legal aspects

In view of the absence of international uniform regulation of liability, there has been a proliferation of diverse national, regional and subregional laws and regulations on multimodal transport. The lack of a global uniform regime has obliged developing countries to resort to solutions at the regional and/or subregional level. To reap the maximum benefits of modern technology, a supportive legal framework is required, one which recognizes the legal effect and validity of electronic data messages and thus adequately facilitates their use.

Market access

Trade balances, the available transport mode options and economies of scale have a particularly strong impact on transport costs. The more cargo and transport mode options a service provider has at his disposal, the better he is positioned to choose the most adequate logistics mix of routes, transshipment points, frequencies, speed, volumes and transport modes. Any restrictions that unnecessarily limit his choices will also imply higher costs and lower quality services for the transport user.

2.1.5. Components of Multimodal Transport System

Multimodal refers to transportation of goods between two points by more than one mode of transport. This could be road-rail, road-rail-sea, road-air or any other combination Prabhankar (2016). Multimodal transport is a concept (see Figure 2.1) which places the responsibility for transport activities under one operator, who then manages and co-ordinates the total task from the shipper's door to the consignee's door, ensuring the continuous movement of the goods along the best route, by the most efficient and, cost-effective means, to meet the shippers requirements of delivery. This means simplified documentation, and increasingly by electronic means such as electronic data interchange (EDI).

Origin/ Supplier	→							**Destination /Customer**
Physical Base	Depot	Road/Rail	Terminal	Sea Trunk/ Leg	Terminal	Road/ Rail	Depot	
Commercial System	Cost & Delivery	Pack	Inland Movement	Papers	Port to Port	Papers	Inland Movement	Unpack	Cost &Delivery
Management & Co-ordination	Packing	Container Positioning	Inland Movement	Terminal Operations	Ship Stowage / Route Scheduling				
Flow of Information	Booking	Waybill	Invoice	Manifest	DeliveryInstructions	Release ofCargo			
Liability Network	Forwarder	Road	Rail	Terminals	Sea	Forwarder			

Source: Adapted from D'Este (1996)
Figure 2.1: Components of a multimodal transport system

2.1.6. Transportation Performance Measure

The saying ''what gets measured gets done'' illustrated the importance of the right thing being measured and inappropriate things being left out. If transport organization does not measure that it values, it will end up valuing what can be measured. The selection of indicators would have been on the operation and direction of the organization behavior and affecting performance along these lines become crucial (Margareta Isoreita, 2005). Factor to consider while choosing the most appropriate mode of transport as follows: (Wisner et al., 2005: 300).

Lack of uniform measures, which can be used for all modes, makes it hard to compare alternatives and make a mode choice decision. There are diverse array of concern in many stakeholders. Public sector stakeholders are interested in policy and intra structural issues, whereas private sector are more interested in cost, reliability, and travel time measures ATRI (2011). Freight performance measure is challenged by both on overwhelming abundance of data and by lack of complete data for many important freight system performance functions. Systematic data regarding multimodal freight performance are practically nonexistent ATRI (2011). Selecting measures that best capture the important aspects of the problem at hand is ideal Harrison et al. (2006). The success of performance measures relies largely on the availability of data needed to derive the measure U.S TRB (2004).

The inclusion of performance measures has been helpful for providing tools that support, guide, and justify decisions made by agency planners who operate in an environment of high accountability and transparency. These conditions require objective measures that are helpful in communicating to the public and to policy-makers the course of action that will improve the movement of goods and people. Well-developed performance measures can benefit planners by providing the information needed to make decisions. Moreover, performance measures assist an agency in communicating decisions to the public, increasing accountability to use resources where they are needed, and improving the operational condition of transportation systems. The keys to identifying a performance indicator are that it is measurable, efficient, able to before cast, and easy to understand.

Even if, there are numerous performance measurement variables with their heterogeneous characteristics, the researcher has identified the following variables for research purpose based on the problems identified, the objective seated, the availability of getting data, and easy for operationalization of variables. As a result the measurement variables are forwarded as mobility, reliability, safety and security, infrastructure and cost which are discussed below looking the above different measurement scenarios.

2.1.7. Transportation liability and insurance performance

A key issue within the context of establishing the liability of the MTO for loss of, or damage to, goods the selection between the “uniform” or “network” system of liability. Under the “uniform” system an equivalent liability regime is applied to the whole multimodal transport, regardless of the stage at which the loss or damage occurred. Under the “network” system, the liability of the MTO for localized damage (i.e. damage known to possess occurred during a selected stage of transport) is decided by regardless to the international convention or national law applicable to the ‘unimodal stage of transport during which the damage occurred (UNCTAD, 2001). Different modes have different causes to influence safety, so safety measures are different according to the mode for different modes in the literature (Mullen and Mon sere, 2010). In general, accident rates, fatality rates, and injury rates are directly related to the loss due to accidents. The figures of these rates directly reflect the safety performance of a transportation system. Accident rates at major intermodal terminal s are a subset of the total accident rates, and they should not be a direct reflection of the whole transportation system performance. These measures represent the speed of response for any accident. Since a delay caused by an accident could heavily affect the economic value corresponding with it and, as a result, the customer satisfaction will be harmed by the sluggish

service by the system, a transportation system needs to be very responsive. The number of accidents, fatalities, and injuries are some appropriated performance measures to evaluate the safety of a transportation system (Ming Zhou and Haiyuan, 2004).

2.1.8. The role of transportation in logistics

The role that transportation plays in logistics system is more complex than carrying goods for the propriety. Its complexity can take effect only through highly quality management. By means of well-handled transport system, goods could be sent to the right time in order to satisfy customer demands. Transportation is base of efficiency and economy in business logistics and expands other functions of logistics system performing in logistics activities brings benefits not only to service quality but also to company competitiveness Wen long Yue, (2014). Transportation service plays a central role in seamless supply chain operation, moving inbound materials from supply sites to manufacturing facilities repositioning inventory among different plant and distribution center and delivering finished product to consumers.

2.1.9. Purposes of Dry port for multimodal operation

The purpose of dry port and multimodal transport document is to reduce transshipment with the its attendant handling cost and a minimum and a dry port can reduce empty rail wagon or truck movement by acting as a consolidation center for return loads of export cargo. The consignment increase in load factor may enable some saving to be made in overall transport costs. Dry port encourages the operation of units of train. The major sources of benefits of introducing units train operations in place of traditional goods trains are that shunting costs at the terminals and at the intermediate marshaling yard can be avoided and higher wagon and locomotive utilization rate achieved. The introduction of units is most appropriate when freight flows between two points are substantial, fairly continuous and relative balanced. If substitution use of long-distance road haulage by rail transport can be encouraged, there may be saving to be gained in transport costs. This possibility can be assessed by finding the difference between rail and road through transport cost. Third, national planning will assist to implement, monitor and optimize investment strategies for ports which may only afford to put in low volume equipment. Where national resources are limited the trend should be to develop specialized high-throughput in container terminals.

2.1.10. Dry port in Ethiopia

Ethiopia, which is land locked developing country, was continuously facing the challenge of physical isolation, supply chain related barriers from sea port and the high costs of trading with the rest of the world since the withdrawal of Eritrea. In order to counter those challenges associated with land connection (landlocked) Ethiopia (ESLSE) established several dry ports to take the advantage of inland port. These dry ports have been benefiting the country in saving foreign currency from sea port expenses at Djibouti, minimize transit time and ease of cargo flow. Such port providing services such as customs inspections, documentation of cargo, load/unload, stuff/unstuffed and handling (storage) of import and export cargos (UNDP, Ethiopia, 2017).

Dry port service enterprise was established by council of ministry regulation no.139/2007 with the objective of facilitate the country import and export and minimize the congestion at the port of Djibouti. A dry port is and inland intermodal terminal directly connected by road and rail to sea port and operating as center for transshipment of sea cargo to inland destination. In addition to their role in cargo transshipment, dry port may also include facilities for storage and consolidation and deconsolidation of goods, maintenance of road or rail carriers and customs clearance service. The location of these facilities at dry port relieves competition for storage and customs space at the seaport itself. Container transported from Djibouti port and unloaded to dry ports namely Modjo, Kality, Gelan, Kombolcha, Mekelle, Semera and Diredawa and got services on inland port have been increasing from 19,629 in 2004 to 170,833 in 2011 E.C.

2.1.11. The role of rail transport on the performance of Multimodal Transport Operator

2.1.11.1. International freight transportation

Bektas, (2007) he puts clear that in today's world, intermodal transportation forms the backbone of world trade. It aims at integrating various modes of services of transportation to improve the efficiency of the whole distribution process. It is documented that parallel to the growth in the amount of transported freight and the changing requirements value (supply) chains, intermodal transportation exhibits significant growth. It is said that volumes of containers would be consolidated by land transportation, barges and small feeder vessels. Bektas, (2007) concludes that ports that possess efficient cargo handling systems and intermodal connections are more competitive than competing ports in terms of attracting business.

According to US Department of transport (2006), the value of multimodal transportation like port, rail and roads increased from about $662 billion to about $1.1 trillion in the period of nine years from 1993 to 2003. This is because all organizations move materials. Manufacturers build factories that collect raw materials from suppliers and deliver finished goods to customers; retail shops have regular deliveries from wholesalers; a television news service collects reports from around the world and delivers them to viewers; most of us live in towns and cities and eat food brought in from the country (Waters, 2003).

Rail freight has an important role to play in improving the resource efficiency and sustainability of freight transport within the supply chain. The British rail network has seen considerable growth of freight and passenger activity in the last 20 years, leading to concerns about its capacity to absorb continued growth. A number of infrastructure initiatives focused on increasing capacity and reducing conflicts have been implemented (Woodburn, A.G., 2007).

2.1.11.2. Rail cargo transportation in Ethiopia

Ethiopian Rail way Corporation: The project budget was around 4$ billion, with the Ethiopian section costing 3.4$ billions of which 70% was financed through Export Import Bank of China and 30% of by government of Ethiopia. The cost of the Djibouti section was 878 million, with the money coming from the government of Djibouti. The railway line has double track from 115km from Addis Ababa to Adama, and single track for the remaining 600km to Djibouti. Power supplied through 20 distribution station 17 km, in Ethiopia and 3km in Djibouti (World Bank, 2018).

Ethiopian government has taken several steps to improve the transport infrastructure. Ethiopian railway Corporation (ERC) recently completed the first phase of an extensive railway development program to build modern railway development program to build a modern railway network extending over 5000km. The priority route and the first one to be built is a line linking Addis Ababa to Djibouti, stretching some 752km in total of which 82km are Djibouti. International railway shipments can be fast and efficient especially designed operational practices at both ends of the line, simple transit procedure and efficient logistics facilities and service supporting the line. It is expected that the investment in rail transportation will provide significant economies of scale which result in lower transportation costs, less accident and fewer environmental emissions (World Bank, 2018).

2.2. Empirical Literature Review

Most studies in developed and developing countries have attempted to investigate the role of rail transport in a country's multimodal operator efficiency. Because of Multimodal Operator Efficiency, several of these studies show that the position of rail transport has a strong impact on the economic development of the country.

As per UNECA (2003) empirical evidence, the major weaknesses identified in field of multimodal transport and freight forwarding in Africa were the prevalence of in appropriatelegal framework, need for strengthening national and sub regional forwarding associations, the existence of too many variations in structures among freight forwarders, faulty management systems coupled with poor delegation of power and lack of professional structure in the industry. So as to overcome these problems, priority areas for sub-regional training in Multimodal Transport/Freight forwarding has been identified and a sample training module has been prepared covering thirteen major areas in the field.

Some the researcher has done on researches and case studies on multimodal transport system. According to Amentae, T.K. and Gebresenbet, G., (2015) Customer satisfaction level were measured with five parameters, delivery, liability and insurance, documentation, cost and facilitation on multi modal service performances. The result indicated that majority of the customers were not satisfied with many of the service performances. The top three key challenges of Multimodal Transport System were the challenges of network connectivity, the problem of ICT usage at each and challenges of railways physical infrastructure ranked first, second and third respectively the research held by Lemmi T., Bogale M., (2016) But the study was on perception of customers, therefore, it need checking with different time because there may be change of service quality persons may change their perception in different time and environment. But, internationally have done different research on the topic rail performance of intermodal transport operation. In addition, one can get objective measurements; it's good to verify with data.

According to the study conducted by Belay T. (2016), customer satisfaction was measured with three measurement dimensions such as multimodal transport service value (MMTS), logistics service value (LSV) and customer service quality (CSRQ). The result showed under the descriptive analysis of multimodal transport indicates that the majority of customers are satisfied with regard to variables such as documentation, arrangement of inland transportation, schedule reliability, customs clearance. Contrary to this, World Bank (2017) report shows that Ethiopian logistics service sector

is characterized by long transit time; the business requires obtaining more documents, problems in ICT infrastructure facilities, non-dependable port and customs clearance process and higher transport cost. Research findings are limited to both time and place.

Bubbico et al., (2006), focused on assessing the risk of road and rail transportation cases of hazardous materials transport in Sicily. For each transportation mode, changing route and/or transport modalities and all the combinations of road, rail, and intermodal (road-rail) transport have been calculated and that minimizing the risk has been identified with the aid of the transportation risk analysis tool. Transport cost is also a significant factor for intermodal transportation for competitiveness of shippers. Calculation and minimization of total transportation costs are required to determine an effective, efficient, and economical transportation system. Unit cargo cost per route length is generally accepted as an indicator of economics.

Spiekermann and Neubaer, (2002) gave practical application of transport infrastructure. The study noted that the task of transport is to enable interaction that is the mobility of person and goods for social, cultural or economic activities. In the context of spatial development, the quality of transport infrastructure in terms of capacity, connectivity, travel speed determines the quality of location relatives to other locations that is the competitive advantage of locations, which is usually measured as accessibility.

The multimodal system is ‘an optimization process of the location, movement and storage of resources from the point of origin, through various economic activities, to the final consumer’ (Alderton, 1995, 204). Multimodal transport system helps improve trading efficiency, transforming the relation between international carriers and trading partners. According to Brewer, et.al, 2001 first the capacity of rendering multimodal transport service, particularly by developing countries, i.e., the development of multimodal transport requires globalization of production and liberalization of services which demands higher capabilities for countries to offer reliable and cost-effective transport and logistics services. Therefore, this study seeks to analyze the contribution of Multimodal transport since 2011, due to logistics is an input to much of the economy, that is, industry, commerce, and so on. The performance of logistics impacts productivity in other sectors. Finally, the researchers recommended undertaking of further research focusing on benefits of Multi Modal Transport.

The development of multimodal transport is inter-linked with the transport infrastructure facilitates. Means, the transport infrastructure is poor; the development of multimodal transport may not be

easy (Banomyong, 2000). Infrastructure facilities such as seaports, railway, roads, and airports are supported the multimodal transport services in order to deliver the cargo safely and rapidly (Sanders, 1990). In most of the developing countries, inland transportation are not linking with the port of loading, and this is one of the main obstacles to transport providers, the efficient multimodal transport requires the inter-connectivity between modes (UNCTAD, 2003).

2.3. Literature gap

There are few studies in Ethiopia the significance of railway systems in an economy is paramount. That has led the government to see railway transport as an important alternative in the country's transportation system. First, railways are better suited for serving bulk freight on long distance over 250-300 km and above. Secondly, rail mode of transport is cheaper at critical traffic figure of up to one million tons per year carried for over 1000 km and can be economically sustaining without government subsidy. The estimated cost for the construction of one kilometer railway in Ethiopia is expected to be three million USD.

A review of available resources suggests that little research has been conducted on the multimodal transport system in the context of Ethiopia. In particular, none of the above research works focused on identifying the performance rail transport dimensions of Multimodal Transport system. Therefore, this study is expected to fill the gap mentioned.

2.4. Conceptual Framework

Based upon the literature review the author has identified the basic requirements for addressing the role of rail transport to the multimodal operator performance of Ethiopian Shipping and Logistics Service. The model connects all the theoretical concepts together which ultimately represents the below conceptual framework. The theoretical model is aligned with their search questions; the model emphasizes that multimodal transport system and rail transport has important role in enhancing port performance, and for economic development and taking into account of the growing needs of our country for improvement of international trade. It is imperative to study how rail transport influence multimodal transport performance so to address them in line with country's economic development goals and policies.

The conceptual framework of this study was designed based on concepts, literatures, research problems, methodologies, research objectives and basic research questions. The link or the relationship between the explanatory and outcome variables was drawn in the following diagram.

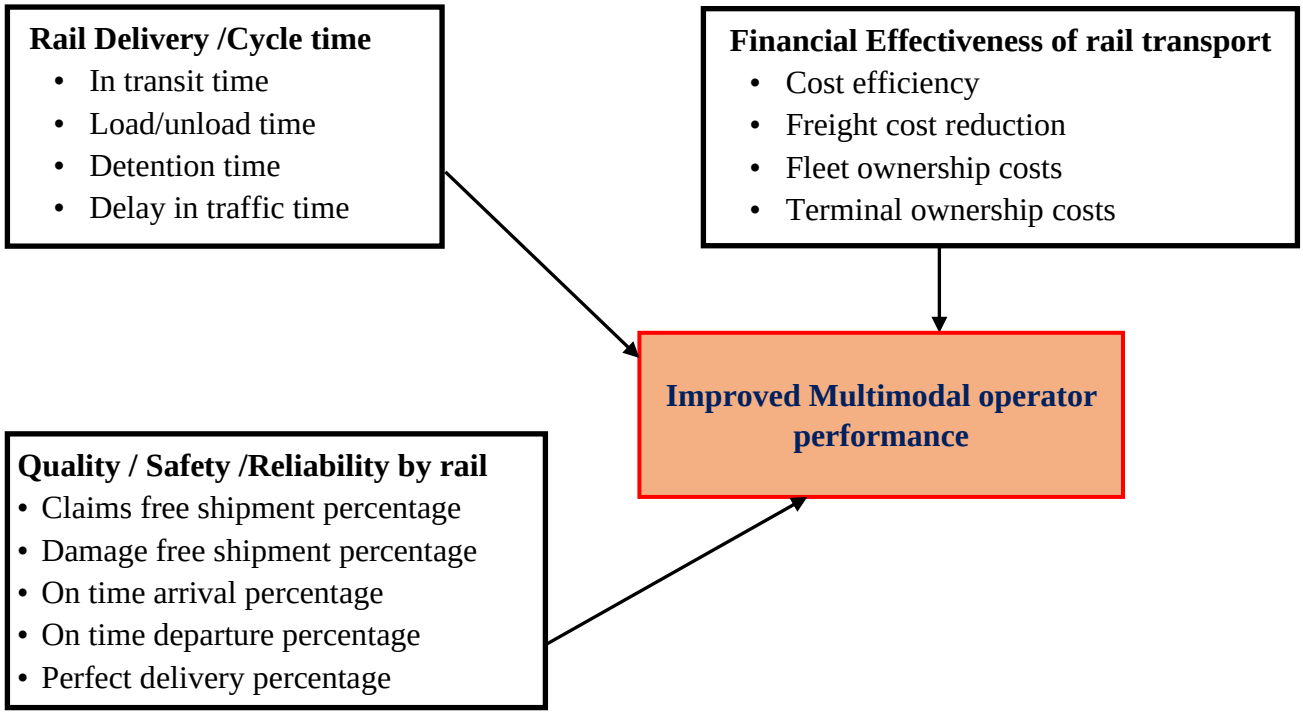

Figure 2.2: Conceptual framework of rail delivery performance
Source: Adopted from Williamson et al. (1990) and Modified by the Author

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Description of Study Area

The study area was on the role of rail to the multimodal operation performance ESLSE at Mojo dry port (MDP). MDP is the largest Port in Ethiopia and currently handles rail transport operation is operating by multimodal operation. Among imported 90% containerized cargo from Djibouti is loaded to Modjo dry port which also by now the rail transport operation is started from Djibouti to Modjo. In 2018/2019 fiscal year, ESLSE MDP handled in excess of 10 million tons of cargo.

The line is dual track between Addis Ababa and Adama and it is electrified, except for the stretch inside the port area (13km). The railway designed to have an operational speed of 120km/hour which could in theory reduce transit time between the ports to Addis Ababa to about six (6) hour compared to 3 days by road. The new railway line should have significant economic impact through

- An ability to move large volumes of cargo import and export of the port in one movement (up to180 Twenty Equivalent Unit (TEU) or 3500 tons of goods per train)
- Potentially reducing transit time to a quarter of what it is through road transport
- Reducing the amount of container demurrage payable to the container owner; and
- Reducing some of the steps needed to clear transit movements through the border between Ethiopia and Djibouti.

3.2. Research Design and Approaches

Depending on the objectives of the study descriptive or explanatory research design was used. According to Kothari (2004) descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else. The researcher chooses the descriptive and explanatory design because the nature of the designs is helpful in describing the current situation of the multimodal performance in detail. Therefore, the research design of this study would be both descriptive and explanatory type of research design.

In order to address the objectives of the study mixed research approach (both qualitative and quantitative research approach) was used, The researcher interested in both numerical data such as

trend of revenues, level of performance but also opinions, perception with respect to about the efficiency of rail transport for multimodal operator in port logistic management and transportation. Hence, by utilizing a qualitative approach a better understanding of the issues related to the efficient functioning of rail transport to multimodal operation on the port and rail interface can be obtained through semi structured interviews.

3.3. Population and Sampling

3.3.1. Population

The total population of the study comprises the entire number of Modjo dry port operation as multimodal transport operator of ESLSE. Therefore, in this study 325 target population constituted Modjo Dry port operation and multimodal department staffs directly related to the multimodal transport operation represent by the sample group, with that of all age groups, educational status and socio-economic who were knowledgeable with issues related for the study.

3.3.2. Sampling Technique

Sample Size Determination

Samplings is process of choosing a smaller and more manageable number of people to take part in the research process and generalize the results to the whole of the research population (Catherine, 2002).

The sample size determined using the Catherine's (2002) formula:

$$n = \frac{N}{1 + N(\mathrm{e})^2}$$

Where n = minimum sample size required for the study

N = the population size = 325

e = is the level of precision (e = 0.05)

$$n = \frac{N}{1 + N(\mathrm{e})^2} = \frac{325}{1 + 325(0.05)^2} = \frac{325}{1.8125}$$

$$n = 179.31 = 179$$

179 + 10% non-response rate = 179 + 17.9= **197**

3.4. Types and Sources of Data

To fulfill the purpose of this research work, both primary and secondary sources of data gathering were employed. For primary data collection purpose, structured survey questionnaires were used. Data collected from ESLSE management multimodal transport system and dry port also employee. The evaluation survey conducted through personally distributed survey.

Secondary data was gather by reviewing different reports of the ESLSE, financial statements, manuals, policy documents, brochure and journals relevant with the study interpret and analyze to assess the role of rail transport for multimodal operator performance.

3.5. Data Collection Techniques

To collect primary data the questionnaires contained the first section is designed to collect respondents' demography and general information, the second section is structured question design to measure the variable of the multimodal transport operator performance in each dimension and with five points Likert scale (1=strongly agree, 2=disagree, 3=neutral, 4=agree and 5=strongly disagree).

The scale is best administered as part of a ESLSE management multimodal transport system and dry port employee meeting. It is important to guarantee the anonymity of the respondent; employees are not asked to sign the questionnaire and no identifying code is placed on the form. The research assistants oversaw collecting the data. The objectives and scope of the research clearly told before data collection to the respondents to create a non-threatening atmosphere where respondents give candid responses.

3.6. Validity and Reliability

Validity represents the extent to which an instrument measures what it supposes to measure (Dawson, 2002). Construct validity of measures was determined for the validation of an instrument. For accurate relationship, among variable construct validity of measures is incredibly essential and it relies on the aptitude of the researcher to appropriately measure the variables. To ensure the content validity, the questionnaires were developed on the basis by reviewing of the existing literature on the area of the study with little modification. In addition, the same set of questions was administered to the respondent so that responses would be like facilitate comparison.

Reliability of the data is the degree of consistency that an instrument demonstrates (John. Creswell, 2014). Reliability test has been done to check whether the scale used questionnaire consistently reflect what it intends to measure or not. Cronbach's Alpha, (1990) is most commonly used to assess the internal consistency of questioner made up of multiple Likert type of scales and items. This research used Cronbach's Alpha reliability test to test the reliability of the collected data, alpha value between 0 and 1 is ranged as normal and above 0.7 alpha value is classed as acceptable reliability value in social science research (Gliem and Gliem, 2003), the closer alpha value to 1, the more data is described as reliable.

Table 3.1: Reliability Statistics.

Cronbach's Alpha	N of Items
.804	40

The above table illustrates the reliability coefficient of all items in the instrument which yielded an alpha value of 0.804 which is greater than the acceptable value of 0.7 this indicates a high level of internal consistency for our scale. This classes our 40 item instrument as internally reliable for having the required degree of consistency.

Table 3.2: Reliability Item-Total Statistics.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Delivery performance (Cycle Metrics)	9.8497	4.805	.536	.532	.701
Financial Metrics	9.8208	3.687	.607	.576	.853
Quality Metrics	10.2543	3.865	.525	.424	.808
Overall Performance of Multimodal	9.9934	4.669	.548	.448	.793

The above table 3.2. presents the value that Cronbach's alpha would be if that particular item was deleted from the scale. According to William and Berry (2010) exhibiting a coefficient of alpha between 0.80 and 0.96 are considered to have good reliability and alpha value between 0.60 and 0.70 indicated fair. To ensure reliability, it is important to have an appropriately sized to achieve statically significant and reliable results. At the time of data screening for accuracy and completeness of all questionnaires were used.

3.7. Method of Data Analysis

The data collected through the questionnaire were process and analyze using the statistical software called Statistical Package for the Social Science/SPSS/. Descriptive statistics method were used to analyze the data. Descriptive statistics enable to describe or compare variables numerically. The median and the mode are the two most used ways of measuring central tendency. These two measures of central tendency were used to analyze and interpret the output of Likert scale questionnaire data collected. In doing so, Correlation Coefficients and Multiple Regression Analysis will be use to analyze the data. The research findings were organizing and present in form of words and numbers by using frequency tables, histogram, charts and simple percentage method. In addition to the inferential analysis were used statistical tools such as coefficient of correlation, multiple linear regression analysis, sample T-test, and ANOVA (analysis of variance). To summarize and create a clear picture for the reader to understand the result of the study figures, tables, and other tools were used.

3.8. Ethical Considerations

The researcher was considering every requirement of research ethics to establish trust with the respondents and approached also informed about the aim of the research. Furthermore, the respondents were informed that their response will be kept confidential and use for academic purpose only, in verbal communication and in writing. After getting the consent of the respondents, they will be provided with a self-administered questionnaire designed for the purpose of this study, so that they complete and return it back. The researcher did not force customers to participate without their willing.

CHAPTER FOUR

4. DATA ANALYSIS, INTERPRETATION AND DISCUSSION

4.1. Introduction

This section deals with the analysis, interpretation and discussion of data collected to determine the Role of Rail Transport to the Multimodal Operator Performance of Ethiopian Shipping and Logistics Enterprise. Therefore, the findings from the questionnaire and the results are discussed as per the objectives in this chapter. It includes a report of results from descriptive analysis like frequency tables and figures that was assessed the Multimodal Operator Performance. It also includes a report of results from correlation of coefficients that describe the relationship of Rail Transport and the Multimodal Operator Performance. Finally, regression analysis would be done to show the strength of its relationship.

4.2. Socio-demographic Characteristics of the Respondents

The personal profile of the respondents is analyzed as per their age, gender, age, educational level, position and Years of experience at ESLSE. Descriptive statistics was performed on the demographic variables as a means of describing the respondents. The final study involved 197 respondents of which 53.5% were female and 46.5% were male, as indicated below in Table 4.1.

Further, majority of the respondents were within the age between 20 – 29 years (39.6%) followed by those with age group 40 – 49 (34.3%). When I assess respondent with their educational level, bachelor's degree (44.9%), diploma level (41.9%), and MA/MSC (12.6%) of the respondents were having from larger to smaller, respectively. As I can see in the Table 4.1. below, the highest proportion of respondents were working on operational level position with 56.3% and the rest position were almost at lowest and slightly similar proportion. Similarly, the highest proportion of respondents were with less than 2 years of experience (36.9%), followed by those with 2 – 5 years and 6 – 10 years (both had the equal value 21.7%), and there are a smaller number of respondents working above 10 years (19.2%) at ESLSE.

Therefore, from the findings of the below demographic results Ican observe that the sample is reasonably representative.

Table 4.1: Summary Profile of the Respondents. (Source: Own Survey Result, 2021)

	Frequency	Percent	Valid Percent	Cumulative Percent
Age				
20 – 29 Years	78	39.6	39.6	39.6
30 – 39 Years	51	25.9	25.9	65.5
40 – 49 Years	68	34.5	34.5	100.0
Total	197	100.0	100.0	
Gender				
Male	91	46.2	46.2	46.2
Female	106	53.8	53.8	100.0
Total	197	100.0	100.0	
Educational Level				
Diploma	83	42.1	42.1	42.1
Bachelor's Degree	89	45.2	45.2	87.3
MA/MSC	25	12.7	12.7	100.0
Total	197	100.0	100.0	
Position				
Executive officer/Director	24	12.2	12.2	12.2
Management level /Middle level	31	15.7	15.7	27.9
Operational level	111	56.3	56.3	84.3
Senior Expert	31	15.7	15.7	100.0
Total	197	100.0	100.0	
Years of Experience at ESLSE				
Less than 2 Years	73	37.1	37.1	37.1
2 – 5 Years	43	21.8	21.8	58.9
6 – 10 Years	43	21.8	21.8	80.7
Above 10 Years	38	19.3	19.3	100.0
Total	197	100.0	100.0	

Further, as clearly described in Table 4.2 below, the mean level of age, gender, educational level, position and years of experience were found 1.95, 1.54, 1.71, 2.76 and 2.23with standard deviation of .862, .500, .681, .864 and 1.146 respectively which is almost very sight higher than the middle value. From the result Ican observe that though majority of them were at the high level still it is not satisfactory.

Table 4.2: Frequencies of Demographic Characteristics. (Source: Own Survey Result, 2021)

		Age	Gender	Educational Level	Position	Years of Experience
N	Valid	197	197	197	197	197
	Missing	0	0	0	0	0
Mean		1.95	1.54	1.71	2.76	2.23
Standard Deviation		.862	.500	.681	.864	1.146

4.3. Descriptive Analysis

4.3.1. Descriptive Analysis of Measuring the role of Rail transport on Multimodal operator of Dry Port performance

This section is made up of the descriptive part of the results. In this section responses obtained on the general consideration of recruitment and selection were presented and interpreted. The results are shown and discussed below:

4.3.1.1. Delivery performance (Cycle Metrics)

Table 4.3: Delivery Performance of rail transport and multimodal transport operation.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean	Std. Deviation
Delivery performance of the multimodal transport operation on accuracy of departure time and promising time by rail transport	Strongly Disagree	21	10.7	10.7	10.7	3.472	1.434
	Disagree	44	22.3	22.3	33.0		
	Neutral	23	11.7	11.7	44.7		
	Agree	39	19.8	19.8	64.5		
	Strongly Agree	70	35.5	35.5	100.0		
	Total	197	100.0	100.0			
Rail delivery operation performance in container terminals improve cargo handling at the port.	Strongly Disagree	40	20.3	20.3	20.3	2.934	1.421
	Disagree	48	24.4	24.4	44.7		
	Neutral	31	15.7	15.7	60.4		
	Agree	41	20.8	20.8	81.2		
	Strongly Agree	37	18.8	18.8	100.0		
	Total	197	100.0	100.0			
Rail delivery operation	Strongly Disagree	9	4.6	4.6	4.6	3.959	1.289

performance in container terminals reduces port congestion	Disagree	33	16.8	16.8	21.3		
	Neutral	14	7.1	7.1	28.4		
	Agree	42	21.3	21.3	49.7		
	Strongly Agree	99	50.3	50.3	100.0		
	Total	197	100.0	100.0			
Rail delivery in container terminals raises dry port revenues	Strongly Disagree	26	13.2	13.2	13.2	3.355	1.405
	Disagree	39	19.8	19.8	33.0		
	Neutral	25	12.7	12.7	45.7		
	Agree	53	26.9	26.9	72.6		
	Strongly Agree	54	27.4	27.4	100.0		
	Total	197	100.0	100.0			
Rail delivery reduces detention time spent idling due to loading and unloading times at each pickup in container terminals	Strongly Disagree	23	11.7	11.7	11.7	3.588	1.477
	Disagree	38	19.3	19.3	31.0		
	Neutral	19	9.6	9.6	40.6		
	Agree	34	17.3	17.3	57.9		
	Strongly Agree	83	42.1	42.1	100.0		
	Total	197	100.0	100.0			
Rail delivery in container terminals improves lowering the cost of logistics	Strongly Disagree	35	17.8	17.8	17.8	3.629	1.577
	Disagree	23	11.7	11.7	29.4		
	Neutral	15	7.6	7.6	37.1		
	Agree	31	15.7	15.7	52.8		
	Strongly Agree	93	47.2	47.2	100.0		
	Total	197	100.0	100.0			
Rail delivery reduces in transit time point to point variability	Strongly Disagree	36	18.3	18.3	18.3	3.218	1.521
	Disagree	44	22.3	22.3	40.6		
	Neutral	16	8.1	8.1	48.7		
	Agree	43	21.8	21.8	70.6		
	Strongly Agree	58	29.4	29.4	100.0		
	Total	197	100.0	100.0			
Rail delivery quicker transit, loading and unloading time	Strongly Disagree	34	17.3	17.3	17.3	3.360	1.537
	Disagree	37	18.8	18.8	36.0		
	Neutral	20	10.2	10.2	46.2		
	Agree	36	18.3	18.3	64.5		
	Strongly Agree	70	35.5	35.5	100.0		
	Total	197	100.0	100.0			
Rail delivery in container terminals improves customer satisfaction	Strongly Disagree	22	11.2	11.2	11.2	3.918	1.440
	Disagree	22	11.2	11.2	22.3		
	Neutral	14	7.1	7.1	29.4		
	Agree	31	15.7	15.7	45.2		
	Strongly Agree	108	54.8	54.8	100.0		
	Total	197	100.0	100.0			
Rail transport increase deliveries per operating hour and ton-mile /km	Strongly Disagree	25	12.7	12.7	12.7	3.127	1.399
	Disagree	60	30.5	30.5	43.1		
	Neutral	23	11.7	11.7	54.8		
	Agree	43	21.8	21.8	76.6		
	Strongly Agree	46	23.4	23.4	100.0		
	Total	197	100.0	100.0			

Average Mean = **3.456** Average Standard Deviation = **.711**

(Source: Own Survey Result, 2021)

Delivery performance of the rail transport to multimodal operator was assessed on the accuracy of departure time and promising time, efficiency on cargo handling, port congestion, and detention time spent idling due to loading and unloading, transit time, customer satisfaction and overall deliveries per operating hour. The results on the assessment are presented in table 4.3.

According to the result the average mean 4.06 which shows that the respondents were agreed on the indicator above mentioned. All variable mean and standard deviation are presented respectively what the respondent were responded. They were agreed that mean of the delivery performance 4.27 and 0.936 delivery performance rail transport reduces in transit time point to variability, 4.21and 0.945 increase deliveries per operating hour and ton-mile, 4.17 and 0.955 improve lowering cost of logistics, 4.15 and 0.829 improve container cargo handling at dry port, 4.06 and 0.869 quicker transit in container loading unloading time, 4.04 and 0.937 improve customer satisfaction, 3.98 and 0.821 reduce port congestion , 3.93 and 0.773 accuracy of departure and promising time, 3.93 and 0.889 reduce detention time spent idling due to the time of container loading unloading at each pick up, 3.85and 0.963 raise dry port revenues.

In summary the average mean shows 3.456 and 0.711 standard deviation of the rail delivery performance highly important for multimodal operator. So that as multimodal operator ESLSE has to focus and recognize on this positive implication that the rail transport. As the secondary data shows that the enterprise was mainly focused on the road transport, congestion had a major impact on scheduling truck fleet. Time also lost, efficiency went to down, and costs rose at the pick time when container lying at Djibouti port. Now these issues were critical for the national logistics strategy to build the rail infrastructure in year of 2018 and after two years somehow resulted in more flexible, customer oriented and cost effective also raises the revenues of the operator because of the rail infrastructure.

4.3.1.2. Financial Metrics

The cost effectiveness of rail transportation with the relationship between terminal ownership statuses adds to the cost of the goods so it should always be kept in mind. Rail transport is comparatively a cheaper mode of transport for carrying heavy and bulky traffic over long distances. In the following table respondents were asked to evaluate the cost effectiveness of multimodal transport system and rail transport with the relationship between terminals ownership status or dry port and container dwell time presented.

Table 4.4: The cost effectiveness of multimodal transport operation and rail transport with relationship between terminal ownership status and container dwell time.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean	Std. Deviation
Rail transports reduce transportation cost for multimodal operator	Strongly Disagree	18	9.1	9.1	9.1	3.345	1.472
	Disagree	62	31.5	31.5	40.6		
	Neutral	25	12.7	12.7	53.3		
	Agree	18	9.1	9.1	62.4		
	Strongly Agree	74	37.6	37.6	100.0		
	Total	197	100.0	100.0			
Cost of multimodal transport is reasonable	Strongly Disagree	26	13.2	13.2	13.2	3.299	1.557
	Disagree	61	31.0	31.0	44.2		
	Neutral	16	8.1	8.1	52.3		
	Agree	16	8.1	8.1	60.4		
	Strongly Agree	78	39.6	39.6	100.0		
	Total	197	100.0	100.0			
Rail transport reduce terminal ownership costs	Strongly Disagree	34	17.3	17.3	17.3	3.279	1.599
	Disagree	51	25.9	25.9	43.1		
	Neutral	16	8.1	8.1	51.3		
	Agree	18	9.1	9.1	60.4		
	Strongly Agree	78	39.6	39.6	100.0		
	Total	197	100.0	100.0			
Rail transport decrease container dwell time and increase volume of cargo traffic	Strongly Disagree	23	11.7	11.7	11.7	3.807	1.553
	Disagree	36	18.3	18.3	29.9		
	Neutral	13	6.6	6.6	36.5		
	Agree	9	4.6	4.6	41.1		
	Strongly Agree	116	58.9	58.9	100.0		
	Total	197	100.0	100.0			
Rail Transportation computing infrastructure ownership costs	Strongly Disagree	31	15.7	15.7	15.7	3.279	1.474
	Disagree	46	23.4	23.4	39.1		
	Neutral	11	5.6	5.6	44.7		
	Agree	55	27.9	27.9	72.6		
	Strongly Agree	54	27.4	27.4	100.0		
	Total	197	100.0	100.0			
Reduce customs brokerage and freight forwarding fees	Strongly Disagree	23	11.7	11.7	11.7	3.690	1.502
	Disagree	37	18.8	18.8	30.5		
	Neutral	12	6.1	6.1	36.5		
	Agree	31	15.7	15.7	52.3		
	Strongly Agree	94	47.7	47.7	100.0		
	Total	197	100.0	100.0			
Infrastructure of multimodal operation have enough dry Port machinery for the service	Strongly Disagree	23	11.7	11.7	11.7	3.421	1.411
	Disagree	45	22.8	22.8	34.5		
	Neutral	12	6.1	6.1	40.6		
	Agree	60	30.5	30.5	71.1		

	Strongly Agree	57	28.9	28.9	100.0		
	Total	197	100.0	100.0			
Lack of an efficient railway system and limited financial resource to get the infrastructure	Strongly Disagree	29	14.7	14.7	14.7	3.843	1.539
	Disagree	21	10.7	10.7	25.4		
	Neutral	13	6.6	6.6	32.0		
	Agree	23	11.7	11.7	43.7		
	Strongly Agree	111	56.3	56.3	100.0		
	Total	197	100.0	100.0			
Reduce Cost of ownership for asset like leasing of rail wagon	Strongly Disagree	28	14.2	14.2	14.2	3.036	1.433
	Disagree	70	35.5	35.5	49.7		
	Neutral	10	5.1	5.1	54.8		
	Agree	45	22.8	22.8	77.7		
	Strongly Agree	44	22.3	22.3	100.0		
	Total	197	100.0	100.0			
Rail transport increase weight utilization of containers	Strongly Disagree	21	10.7	10.7	10.7	3.853	1.444
	Disagree	26	13.2	13.2	23.9		
	Neutral	17	8.6	8.6	32.5		
	Agree	30	15.2	15.2	47.7		
	Strongly Agree	103	52.3	52.3	100.0		
	Total	197	100.0	100.0			

Average Mean = **3.485**Average Standard Deviation = **.992**

(Source: Own Survey Result, 2021)

The Table 4.4 shows above that among 197 respondents the highest mean and standard deviation 3.853 and 1.444 response were responded agreed on rail transport increase weight utilization of containers and the lowest mean and standard deviation 3.036 and 1.433 response were reduce cost of ownership for asset like leasing of rail wagon. As per secondary data shows that cost of rail transportation per ton/ per km has been reduced from average birr 64000 to 32844 Ethiopian birr per FEU so when Icalculate the difference birr 9000 per TEU time per year of imported total container in 2018 and 2019 it is huge amount difference gained from rail transport on average it reduce by 50% of transportation cost to multimodal transport operator.

4.3.1.3. Quality Metrics

In order to evaluate the service quality of rail transport for multimodal operation liability and insurance performance during damage occur and loos of goods while in transit the questionnaire were distributed for Modjo operation dry port staff and multimodal department. The results of this survey are presented in table 4.5 below.

Table 4.5: Analyzing the rail transport and multimodal transport operation liability and insurance performance during damage or loss of goods while in transit.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean	Std. Deviation
Reliability of the multimodal transport operation provide service promised	Strongly Disagree	20	10.2	10.2	10.2	3.782	1.332
	Disagree	18	9.1	9.1	19.3		
	Neutral	26	13.2	13.2	32.5		
	Agree	54	27.4	27.4	59.9		
	Strongly Agree	79	40.1	40.1	100.0		
	Total	197	100.0	100.0			
Cargo safety and liability, notice on time while the cargoes damage and good claim handling on multimodal transport operation	Strongly Disagree	22	11.2	11.2	11.2	3.888	1.316
	Disagree	11	5.6	5.6	16.8		
	Neutral	17	8.6	8.6	25.4		
	Agree	64	32.5	32.5	57.9		
	Strongly Agree	83	42.1	42.1	100.0		
	Total	197	100.0	100.0			
High Tendency of claims free shipment percentage of multimodal operation with rail transport and pace of accident	Strongly Disagree	28	14.2	14.2	14.2	3.513	1.413
	Disagree	22	11.2	11.2	25.4		
	Neutral	33	16.8	16.8	42.1		
	Agree	49	24.9	24.9	67.0		
	Strongly Agree	65	33.0	33.0	100.0		
	Total	197	100.0	100.0			
Damage free shipment percentage of rail transport as compared to road	Strongly Disagree	42	21.3	21.3	21.3	2.914	1.395
	Disagree	42	21.3	21.3	42.6		
	Neutral	36	18.3	18.3	60.9		
	Agree	45	22.8	22.8	83.8		
	Strongly Agree	32	16.2	16.2	100.0		
	Total	197	100.0	100.0			
High distance between accident of multimodal transport for each driver	Strongly Disagree	40	20.3	20.3	20.3	2.878	1.402
	Disagree	54	27.4	27.4	47.7		
	Neutral	25	12.7	12.7	60.4		
	Agree	46	23.4	23.4	83.8		
	Strongly Agree	32	16.2	16.2	100.0		
	Total	197	100.0	100.0			
On time arrival percentage of rail transport is higher than road transport for each shipment	Strongly Disagree	34	17.3	17.3	17.3	3.096	1.357
	Disagree	36	18.3	18.3	35.5		
	Neutral	38	19.3	19.3	54.8		
	Agree	55	27.9	27.9	82.7		
	Strongly Agree	34	17.3	17.3	100.0		
	Total	197	100.0	100.0			
Perfect delivery without defects, including damage, documentation, loss, accidents and claims of any kind for each	Strongly Disagree	81	41.1	41.1	41.1	2.284	1.336
	Disagree	39	19.8	19.8	60.9		
	Neutral	31	15.7	15.7	76.6		
	Agree	32	16.2	16.2	92.9		
	Strongly Agree	14	7.1	7.1	100.0		

delivery, driver and carrier is rail transport	Total	197	100.0	100.0			
There is on time insurance coverage during cargo damage	Strongly Disagree	55	27.9	27.9	27.9	2.645	1.379
	Disagree	47	23.9	23.9	51.8		
	Neutral	30	15.2	15.2	67.0		
	Agree	43	21.8	21.8	88.8		
	Strongly Agree	22	11.2	11.2	100.0		
	Total	197	100.0	100.0			
There is a clear procedure for practical situation when the accidents or losses happen	Strongly Disagree	56	28.4	28.4	28.4	2.721	1.449
	Disagree	42	21.3	21.3	49.7		
	Neutral	31	15.7	15.7	65.5		
	Agree	37	18.8	18.8	84.3		
	Strongly Agree	31	15.7	15.7	100.0		
	Total	197	100.0	100.0			
Rail transport decrease security risk and theft of multimodal shipment	Strongly Disagree	53	26.9	26.9	26.9	2.797	1.414
	Disagree	37	18.8	18.8	45.7		
	Neutral	28	14.2	14.2	59.9		
	Agree	55	27.9	27.9	87.8		
	Strongly Agree	24	12.2	12.2	100.0		
	Total	197	100.0	100.0			
Average Mean = **3.052**Average Standard Deviation = 1**.012**							

(Source: Own Survey Result, 2021)

According to the results of survey average mean of 3.052 and 1.012 standard deviation shows that the respondent were agreed on the indicator what the researcher as a measurement factor. The highest mean for this factor is 3.888 and standard deviation of 1.316 respondent were agreed on cargo safety and liability, notice on time while the cargoes damage and good claim handling on multimodal transport operation. On the other hand the mean resulted neither agree nor disagree on the factor that high distance between accidents, on perfect delivery without defects, including damage, documentation, loss, accidents and claims of any kind for each delivery, driver and carrier is rail transport. In fact, multi modal operator the responsibility to provide insurance coverage on cargo damage until the cargo reaches customers premise. Clearly, service providers that have the responsibility for the cargo along the transport chain, such as multimodal transport operators, will access to the information at an early stage and will be able to comply more easily (UNCTAD, 2003). For damage, liabilities differ depending on the construct understudied.

4.3.1.4. Overall Performance of Multimodal

In order to analyses the role of rail transport for multimodal operator the questionnaire are distributed to the respondent. The results of this survey are presented in table 4.6. Among the description, it found the average mean and standard deviation 3.312 and 0.743 respectively shows that the respondent was agreed above all of factors as the most important factor that determine the role of rail transport for multimodal operator. The respondents were agreed as the role of rail transport has positive impact to efficient utilization of time used, increase cargo flow, increase productivity, increase port operational performance, increases volume of cargo traffic, tonnage of cargo trafficking, increases fleet management or round turn, reduces port congestion and adequate rail and other mode of transportation to multimodal operator.

Table 4.6: Identify the role of Rail transport on the performance for multimodal operator.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean	Std. Deviation
Cargo handling system for multimodal operation	Strongly Disagree	42	21.3	21.3	21.3	2.939	1.376
	Disagree	37	18.8	18.8	40.1		
	Neutral	38	19.3	19.3	59.4		
	Agree	51	25.9	25.9	85.3		
	Strongly Agree	29	14.7	14.7	100.0		
	Total	197	100.0	100.0			
Tonnage of cargo trafficking when transported by rail as compared to truck	Strongly Disagree	44	22.3	22.3	22.3	2.847	1.409
	Disagree	49	24.9	24.9	47.2		
	Neutral	28	14.2	14.2	61.4		
	Agree	45	22.8	22.8	84.3		
	Strongly Agree	31	15.7	15.7	100.0		
	Total	197	100.0	100.0			
Efficient Time used in rail for multimodal operation	Strongly Disagree	38	19.3	19.3	19.3	3.233	1.490
	Disagree	31	15.7	15.7	35.0		
	Neutral	30	15.2	15.2	50.3		
	Agree	43	21.8	21.8	72.1		
	Strongly Agree	55	27.9	27.9	100.0		
	Total	197	100.0	100.0			
Increases in cargo flow transporting rail transport in multimodal operation	Strongly Disagree	25	12.7	12.7	12.7	3.396	1.342
	Disagree	29	14.7	14.7	27.4		
	Neutral	35	17.8	17.8	45.2		
	Agree	59	29.9	29.9	75.1		
	Strongly Agree	49	24.9	24.9	100.0		
	Total	197	100.0	100.0			
Rail transport improves port operational performance	Strongly Disagree	32	16.2	16.2	16.2	3.223	1.418
	Disagree	33	16.8	16.8	33.0		
	Neutral	42	21.3	21.3	54.3		
	Agree	39	19.8	19.8	74.1		

	Strongly Agree	51	25.9	25.9	100.0		
	Total	197	100.0	100.0			
Rail transport increases productivity in cargo handling in the port	Strongly Disagree	36	18.3	18.3	18.3	3.086	1.431
	Disagree	39	19.8	19.8	38.1		
	Neutral	40	20.3	20.3	58.4		
	Agree	36	18.3	18.3	76.6		
	Strongly Agree	46	23.4	23.4	100.0		
	Total	197	100.0	100.0			
Rail transport reduces port congestion	Strongly Disagree	25	12.7	12.7	12.7	3.492	1.350
	Disagree	26	13.2	13.2	25.9		
	Neutral	26	13.2	13.2	39.1		
	Agree	67	34.0	34.0	73.1		
	Strongly Agree	53	26.9	26.9	100.0		
	Total	197	100.0	100.0			
Rail transport increases volume of cargo traffic	Strongly Disagree	18	9.1	9.1	9.1	3.548	1.338
	Disagree	35	17.8	17.8	26.9		
	Neutral	27	13.7	13.7	40.6		
	Agree	55	27.9	27.9	68.5		
	Strongly Agree	62	31.5	31.5	100.0		
	Total	197	100.0	100.0			
Rail transport increases fleet management/ round turn	Strongly Disagree	20	10.2	10.2	10.2	3.675	1.346
	Disagree	23	11.7	11.7	21.8		
	Neutral	31	15.7	15.7	37.6		
	Agree	50	25.4	25.4	62.9		
	Strongly Agree	73	37.1	37.1	100.0		
	Total	197	100.0	100.0			
Adequate rail and other mode of transportation	Strongly Disagree	26	13.2	13.2	13.2	3.685	1.352
	Disagree	14	7.1	7.1	20.3		
	Neutral	22	11.2	11.2	31.5		
	Agree	69	35.0	35.0	66.5		
	Strongly Agree	66	33.5	33.5	100.0		
	Total	197	100.0	100.0			
Average Mean = **3.312**Average Standard Deviation = **.743**							

(Source: Own Survey Result, 2021)

The study revealed that the role of rail transport is an important tool for logistics performance, and it can increase the economic integration by providing access to international and regional market and connecting landlocked countries like Ethio-Djibouti corridor.

4.4. Inferential Statistics

Various statistical methods used for data analysis make assumptions about normality, including correlation, regression, t-tests, and analysis of variance. Before going to analytical tests an

assessment of the normality of data is a prerequisite because normal data is an underlying assumption in parametric testing (Bland M, 2015).

4.4.1. Normality of the Error Term Distribution

Screening data for assessing the normalization of variables is a critical step in multivariate analysis (Hair, 2010). Normality refers to the shape of a normal distribution of the matric variable (Robert, 2006). For variables with normal distribution, the values of skewness and kurtosis are zero, and any value other than zero indicated deviation from normality (Hair, 2010). In order to make regression analysis the researcher was conducted test of normality, test of multicollinearity, test of autocorrelation, and test of correlation.

Table 4.7: Test of Normality

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Overall Performance of Multimodal	.268	.173	-.616	.345
Delivery performance (Cycle Metrics)	-.185	.173	-.697	.345
Financial Metrics	-.421	.173	-.848	.345
Quality Metrics	-.097	.173	-.962	.345

a. Lilliefors Significance Correction

The normality tests are used to determine whether a data set is modeled for normal a distribution is normal or nearly normal. Statistically, two numerical measures of shape – Skewness and excess kurtosis- can be used to test for normality. If Skewness is not close to zero, then the data set is not normally distributed and if Skewness less than – 1 or greater than 1, the distribution is highly skewed (Good Data Corporation, 2007). According to above table 4.7 depicted result shows that all variable are under acceptable range for normality. The index of skewness takes the value zero for a symmetrical distribution. A positive skewness value indicates right skew while a negative value indicates left skew (Tabachnick and Fidell, 2001).

4.4.2. Test of Autocorrelation

Durbin-Watson test, published in 1950, is the best known test for autocorrelation. This assumption requires that the errors terms over time is zero. If the errors are correlated with one another, it is stated that they auto correlated value greater than 2 indicates a negative correlation, whereas the value below two indicates a positive correlation (Andy F., 2009). In order to perform the test, the

researcher used Durbin-Watson in SPSS. As per table 4.8 in the output shown, includes information about the quantity of variance that is explained by predictor variables (delivery performance, financial metrics (cost effectiveness), quality metrics and overall performance). The first statistic, R, is the multiple correlation coefficients between all of the predictor variables and the dependent variable. In this model, the value is 0.879 (87.9%), which indicates that there is a great deal of variance shared by the independent variables and the dependent variables. The next value, R Square, is simply the squared value of R. This is frequently used to describe the goodness-of-fit or the amount of variance explained by a given set of predictor variables. In this table, the value is 0.848, which indicates that 84.8% of the variance in the dependent variable is explained by the independent variables in the model. Thus, the result shows that the predicators identified in this study were factors that high the measure the performance of rail and multimodal operation.

Table 4.8: Model Summary [b] result of Autocorrelation test

Model Summary [b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	Df1	Df2	Sig. F Change	Durbin - Watson
1	.8791[a]	.848	.801	3.04210	.848	105.825	3	80	.000	.084

a. Predictors: (Constant), Delivery performance (Cycle Metrics), Financial Metrics, Quality Metrics.

b. Dependent Variable: Overall Performance of Multimodal

(Source: Own Survey Result, 2021)

4.4.3. Multi-collinearity Analysis

To check whether these predictor variables are highly correlated with each other researcher used Multicollinearity. Statistics indicates that all values of variance inflation factor (VIF) below 10.00 as correlated (Morrow-Howell, 1994). As shown in Table 4.9 below the researcher checked the assumption for multicollinearity among these three independents (predictor) variables and found out that the predicted variables are highly multicollinear. The result of correlation matrix shows that all VIF values are well below 10 and the tolerance level for all variables is above 0.2. This indicating that the assumption is met, and Iare safe to say that variables are strongly correlated.

The output above shows that the VIF may be moderately correlated. Therefore, diagnosing the VIF and tolerance values, multicollinearity is not a problem and this would tell us there is an opportunity to overcome the overall regression analysis.

Table 4.9: Multicollinear Analysis of Independent variables with Overall Performance of Multimodal

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.806	.653		1.235	.219		
	Delivery performance (Cycle Metrics)	-.200	.081	-.191	-2.485	.014	.483	2.072
	Financial Metrics	.249	.059	.332	4.218	.000	.463	2.161
	Quality Metrics	.417	.042	.568	9.904	.000	.869	1.150

a. Dependent Variable: Overall Performance of Multimodal
(Source: Own Survey Result, 2021)

4.4.4. Correlation Analysis

In this section, correlation analysis conducted to assess the Role of Rail transport performance for multimodal operator performance. And to identify the cost effectiveness of multimodal transport operation and rail transport with relationship between terminal ownership status and container dwell time would be done by the correlation analysis technique. This provided correlation Coefficients which indicated the strength and direction of relationship. The p-value also indicated the probability of this relationships significant.

Table 4.10 below shows that there is a positive significant relationship between financial metrics and overall performance of multimodal. Financial metrics is at ($r=0.397^{**}$ $p<0.01$). The correlation between variable was direct which means as financial metrics is good overall performance of multimodal is increases. Thus, the result supports for the main hypothesis states that there is a significant relationship between the cost effectiveness of multimodal transport operation and rail transport with relationship between terminal ownership status and container dwell time. It can be concluded that there is strong relationship between the independent and the dependent variable.

Table 4.10: Correlation Analysis

		Delivery performance (Cycle Metrics)	Financial Metrics	Quality Metrics	Overall Performance of Multimodal
Delivery	Pearson Correlation	1	.718**	.299**	.217**

performance (Cycle Metrics)	Sig. (2-tailed)		.000	.000	.002
	N	197	197	197	197
Financial Metrics	Pearson Correlation	.718**	1	.356**	.397**
	Sig. (2-tailed)	.000		.000	.000
	N	197	197	197	197
Quality Metrics	Pearson Correlation	.299**	.356**	1	.629**
	Sig. (2-tailed)	.000	.000		.000
	N	197	197	197	197
Overall Performance of Multimodal	Pearson Correlation	.217**	.397**	.629**	1
	Sig. (2-tailed)	.002	.000	.000	
	N	197	197	197	197

**. Correlation is significant at the 0.01 level (2-tailed).
(Source: Own Survey Result, 2021)

Similarly, As per Pearson correlation any score from + 0.5 to +1 indicates a very strong positive correlation which means that they both increase at the same time, any score from -0.5 to -1 indicates strong negative correlation which means that as one variables increase the other decrease proportionally and the score of 0 indicate that there is no correlation, or relationship between the two variables. According to M.M Mukaka, et al, 2009 correlation coefficient of zero indicates that no linear relationship exists between two continuous variables, and a correlation coefficient of -1 or +1 indicates a perfect linear relationship. The strength of relationship can be anywhere between -1 and +1. The stronger the correlation, the closer the correlation coefficient comes to ±1. Therefore, this output give us a correlation matrix for four correlation requested above table 4.9 shows that result four unique correlation coefficient there is a positive correlation coefficient number the variables are directly related.

4.4.5. Regression Analysis

The regression analysis was conducted to know by how much the independent variable explains the dependent variable. Therefore, regression analysis of Delivery performance (Cycle Metrics), Financial Metrics, Quality Metrics, and Overall Performance of Multimodal was conducted, and the results of the regression analysis are presented as following:

Table 4.11: Model Summary [b] result of predictor variable over the dependent variable

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	.911[a]	.862	.858	.13590

a. Predictors: (Constant), Delivery performance (Cycle Metrics), Financial Metrics, Quality Metrics.

b. Dependent Variable: Overall Performance of Multimodal

(Source: Own Survey Result, 2021)

Table 4.11 above show that amount for r = 0.911 which explains a strong positive relationship between predictors and Overall Performance of Multimodal. It means that the relationship between delivery performance (cycle metrics), financial metrics, quality metrics in Ethiopian Shipping and Logistics Service Enterprise is very strong, and by increasing the quality of one the other one will increase as well. Further, from the R^2 result in the summary table above it is safe to say that overall performance of multimodal is about 86.2 % dependent over delivery performance (cycle metrics), financial metrics, quality metrics.

Table 4.12: Analysis of Variance (ANOVA[a]) result of predictor variable over the dependent variable

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	87.856	3	21.964	260.401	.000[b]
	Residual	11.555	193	.084		
	Total	99.411	196			

a. Dependent Variable: Overall Performance of Multimodal

b. Predictors: (Constant), Delivery performance (Cycle Metrics), Financial Metrics, Quality Metrics.

(Source: Own Survey Result, 2021)

Table 4.12 above indicates that in the regression model the independent variables delivery performance (cycle metrics), financial metrics, quality metrics significantly predicts the dependent variable overall performance of multimodal ($\boldsymbol{p} < 0.05$). Here, $\boldsymbol{p} < 0.0005$, which is less than 0.05, and indicates that, all independent variables statistically significantly predicts overall performance of multimodal had a good fit with the data. The significance of the overall performance of multimodal for each independent variable indicates the overall factors predicting Ethiopian Shipping and Logistics Service Enterprise.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

The major purpose of the study was to assess the role of rail transport performance for multimodal operator performance. In the review of literature, the researcher explored the two basic constructs of the study: role of rail transport performance and multimodal operator performance in general and their specific components. The review further identified relevant variables to examine in relation to the ESLSE. This review generated four research questions, which were subsequently tested in the pilot and final studies.

In the main study, the researcher described the major role of rail transport of multimodal operator performance and other demographic variables by using adequately valid and reliable instruments. Four approaches were used in this chapter to answer the research questions. First, the descriptive statistics were applied to the demographic variables as a means of describing the respondents and to determine the role of rail transport performance. The descriptive statistics suggested that the mean value is almost very sight higher than the middle value and Ican observe that though majority of them were at the high level still it is not satisfactory. Second, Correlation analysis procedures were applied to the data to examine relationships among the variables within the contexts of ESLSE. The correlational analysis suggested that there is a positive relationship between cost effectiveness of multimodal transport operation and rail transport and terminal ownership status and container dwell time variables. The relationship between cost effectiveness of multimodal transport operation and rail transport and terminal ownership status and container dwell time was confirmed to be significantly positive. Third, Linear regression analysis was used to examine the predictive power of role of rail transport performance and multimodal operator performance and to find out the amount of variance of the independent variables accounted by dependent variables. In this regard, role of rail transport performance was found to contribute significantly predicts to multimodal operator performance.

Regarding the extent to which role of rail transport performance contributes to multimodal operator performance, statistically significant relationships were found between the two variables. The amount of variance accounted by independent variable (delivery performance (cycle metrics),

financial metrics, quality metrics) significantly predicts the level of multimodal operator performance and the variables are normally distributed.

As far as the variation in multimodal operator performance based on delivery performance (cycle metrics), financial metrics, quality metrics was concerned, analysis of variance (ANOVA) indicted that there is a significant difference of multimodal operator performance across independent variables.

5.2. Conclusion

The primary goal of this research was to look into the role of rail transportation in boosting multimodal operator performance. The researcher intends to look into the current rail transport operation at the Modjo dry port container terminal as well. In addition, the study looked into the relationship between rail transportation and the Ethiopian Shipping and Logistics Service Enterprise's expansion as the country's sole multimodal operator.

To answer the given research question, there are a number of criteria to assess performance, including delivery performance metric, financial metrics or cost effectiveness, quality metrics, and productivity or asset usage. Rail delivery performance metric in terms of accuracy of departure and promising time, reduced transit time, reduced detention time, improved cargo handling, reduced port congestion, and increased dry port revenue were among those mentioned in the report.

The cost effectiveness that among them as noted by this study include lack of an efficient railway system and limited financial resource to get the infrastructure and rail transport decrease container dwell time and increase volume of cargo traffic increase the multimodal operator revenues, reduce terminal ownership cost, decrease rail transportation computing infrastructure ownership costs while transporting weighted containers and quality metrics of the rail transport incorporate with perfect delivery without damage is less occurrence of accident while transporting imported goods, cargo safety and decrease security risk and theft of multimodal transport shipment. Secondly, on the quality metrics the respondents are mostly agree on reliability of the multimodal transport operation provide service promised and cargo safety and liability, notice on time while the cargoes damage and good claim handling on multimodal transport operation. Along with this respondents are strongly disagree on perfect delivery without defects, including damage, documentation, loss, accidents and claims of any kind for each delivery, driver and carrier is rail transport. Moreover, the study found the rail mode of transport would boost the economic performance of the Enterprise.

The result of correlation between dependent and independent variables shows, there is a positive correlation. Delivery performance (cycle metrics), financial metrics, and quality metrics are positively and significantly correlated with the overall performance of multimodal. From this result, the highest positive correlation exists in quality metrics followed by financial metrics, and delivery performance (cycle metrics). The other issue is test of significance which indicates the level of significance effect of one independent variable to the dependent variable. According to the result obtained from the test, overall performance has significant relationship with Delivery performance (cycle metrics), financial metrics, and quality metrics while insignificant relationship with overall performance of multimodal which is opposed to p-value cutoff point.

Therefore, the conclusion of this study are that railway performance meet the expectations of the operator and most rail transport in emerging economies was developed to move container from Djibouti port to Modjo dry port reduce freight transport cost, reduce transit time, decrease dwell time, which means that improves dry port operation and increase productivity of the operator.

5.3. Recommendation

The executives should clearly understand the factors that reinforce to assess the role of rail transport performance for multimodal operator performance of Ethiopian Shipping and Logistics Service Enterprise. In view of the research findings as well as one of the purposes of this work, the researcher made the following recommendations on the ways to improve role of rail transport performance at ESLSE:

- The government of Ethiopia should give attention to promote railway sector and infrastructure in order to improve the multimodal operation delivery performance, railway system should be efficient to reduce the dwell time of containers and multimodal operation accident handling, on time insurance coverage should be set a clear procedure for practical situation when accidents happen.
- Customized international multimodal transport performance measuring standard has to be prepared by the enterprise and the service performance level and customers' satisfaction level should be measured periodically. Then based on the result corrective actions should be taken so as to improve the quality of the service.
- The enterprise should gradually exclude the use of trucks for longer distances because roadways are not an advisable mode of transport for long distances due to its cost.

Therefore, the enterprise should introduce a cost and time efficient modes of transport in the multimodal transport chain for longer distances to replace the roadways. Railway transport is the most cost effective and widely implemented land transport system in freight multimodal transport system in the world due to its efficiency and environmental conformity.

- The costs of multimodal transport system should be reduced, especially sea freight and clearance costs. The sea-freight cost should be reduced through introducing planning in to the supply chain which maximize the advance notice to the carrier about the future loads important to maximize assets, including trucks, drivers, containers, and warehousing space and other related facilities.
- The present study should be replicated with larger and nationwide samples of all staff and stakeholder to confirm whether the result could be generalizable beyond the limitations of the present samples.
- As a result successful railways have benefitted the Enterprise and regulatory reforms that enabled quality service and tariff flexibility to meet customer satisfaction. Customer orientation should be a priority for any railway that aspires to regain modal share and railways have a competitive advantage to carry bulk products over long distances at relatively low price, provides better risk management for customers.
- Above all, organization managements should provide necessary facilities, conducive recruitment and selection practice and take actions that provide for the well-being of the employee to improve organizational performance.

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Annex- Questionnaire for Data Collection

Informed consent for the respondents

001 Questionnaire Identification Number: _____

Introduction:

My name is _____, I am working as data collector in a survey conducted by Wro. Meaza Tenkir, to find out the Role of Rail transport to the multimodal operator performance of Ethiopian Shipping and Logistics Service Enterprise. The purpose of the study is to generate information necessary for the planning of appropriate interventions and to truck the trend on behaviors that are associated with Rail transport role responsible for multimodal operator performance.

Therefore, your honest and genuine participation by responding to the questions prepared is highly appreciated and credited in campaigns for improvement of multimodal operator performance. If you are not interested to be part of the study please tell me genuinely, and end the session.

I would like to assure you that your answers are completely confidential. Your name will not be written on this form, and will never be used in connection with any of the information you tell me. You do not have to answer any questions that you do not want to answer, and you may end this interview at any time you want to. However, your honest answers to these questions will help us better understand what people think, say and do about certain kinds of behaviors. I would greatly appreciate your help in responding to this survey. The survey will take about 20-30 minutes to fill the questions.

Would you be willing to participate?"

If yes proceed to next part

Thank you for your cooperation

Section 1: Demographic Information

DIRECTIONS: Circle on the following Demographic Information

1) Age
   a) 20 – 29 Years
   b) 30 – 39 Years
   c) 40 – 49 Years
   d) 50 and above Years
2) Gender
   a) Male b) Female
3) Education level of Respondents
   a) Diploma
   b) Bachelor Degree
   c) MA/MSC
   d) Doctorate (PHD)
4) Position
   a) Executive officer/Director
   b) Management level /Middle level
   c) Operational level
   d) Senior Expert
5) How many years you have worked in ESLSE
   a) Less than 2 years
   b) 2 – 5 years
   c) 6-10
   d) Above 10 year

Section 2: Measuring the role of Rail transport on Multimodal operator of Dry Port performance

DIRECTION: When do you agree or disagree with the following statements?

Strongly Agree = 5 Agree = 4 Neutral =3 Disagree = 2 Strongly disagree = 1

a) Performance of rail transport and multimodal transport operation at Modjo container terminal

S.N	Delivery performance (Cycle Metrics)	1	2	3	4	5
1	Delivery performance of the multimodal transport operation on accuracy of departure time and promising time by rail transport					
2	Rail delivery operation performance in container terminals improve cargo handling at the port.					
3	Rail delivery operation performance in container terminals reduces port congestion.					
4	Rail delivery in container terminals raises dry port revenues					
5	Rail delivery reduces detention time spent idling due to loading and unloading times at each pickup in container terminals.					
6	Rail delivery in container terminals improves lowering the cost of					

	logistics.					
7	Rail delivery reduces in transit time point to point variability					
8	Rail delivery quicker transit, loading and unloading time.					
9	Rail delivery in container terminals improves customer satisfaction.					
10	Rail transport increase deliveries per operating hour and ton-mile /km					

b) The cost effectiveness of multimodal transport operation and rail transport with relationship between terminal ownership status and container dwell time.

S.N	Financial Metrics	1	2	3	4	5
1	Rail transport reduce transportation cost for multimodal operator					
2	Cost of multimodal transport is reasonable					
3	Rail transport reduce terminal ownership costs					
4	Rail transport decrease container dwell time and increase volume of cargo traffic					
5	Rail Transportation computing infrastructure ownership costs					
6	Reduce customs brokerage and freight forwarding fees					
7	Infrastructure of multimodal operation have enough dry Port machinery for the service					
8	Lack of an efficient railway system and limited financial resource to get the infrastructure					
9	Reduce Cost of ownership for asset like leasing of rail wagon					
10	Rail transport increase weight utilization of containers					

c) Analyzing the rail transport and multimodal transport operation liability and insurance performance during damage or loss of goods while in transit

S.N	Quality Metrics	1	2	3	4	5
1	Reliability of the multimodal transport operation provide service promised					
2	Cargo safety and liability, notice on time while the cargoes damage and good claim handling on multimodal transport operation					
3	High Tendency of claims free shipment percentage of multimodal operation with rail transport and pace of accident					
4	Damage free shipment percentage of rail transport as compared to road					
5	High distance between accident of multimodal transport for each driver					

6	On time arrival percentage of rail transport is higher than road transport for each shipment					
7	Perfect delivery without defects, including damage, documentation, loss, accidents and claims of any kind for each delivery, driver and carrier is rail transport					
8	There is on time insurance coverage during cargo damage					
9	There is a clear procedure for practical situation when the accidents or losses happen					
10	Rail transport decrease security risk and theft of multimodal shipment					

D. To identify the role of Rail transport on the performance for multimodal operator

S.N	**Overall Performance of Multimodal**	**1**	**2**	**3**	**4**	**5**
1	Cargo handling system for multimodal operation					
2	Tonnage of cargo trafficking when transported by rail as compared to truck					
3	Efficient Time used in rail for multimodal operation					
4	Increases in cargo flow transporting rail transport in multimodal operation					
5	Rail transport improves port operational performance					
6	Rail transport increases productivity in cargo handling in the port					
7	Rail transport reduces port congestion					
8	Rail transport increases volume of cargo traffic					
9	Rail transport increases fleet management/ round turn					
10	Adequate rail and other mode of transportation					