Assessment on Operational Efficiency Constraints: The case of Selected Dry Cargo Road Transport Operators along Addis Ababa-Djibouti Corridor.

By
Mintesnot Haile

A Thesis Submitted to Addis Ababa University School of Commerce in Partial Fulfilment of the Requirements for the Degree of Master of Art in Logistics and Supply Chain Management.

Advisor
Dr. Busha Temesgen

June,2022
Addis Ababa, Ethiopia

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Declaration

I, the under signed, declare that this thesis entitled '*An Assessment on Operational Efficiency Constraints: The case of Selected Dry Cargo Road Transport Operators along Addis Ababa-Djibouti Corridor.*' is my original work and to the best of my knowledge has not been presented for a degree by any other person, and that all the sources of material used for the thesis have been duly acknowledged. I have carried out this study with the guidance and support of my advisor Dr. Busha Temesgen.

Declared by:
Mintesnot Haile

_____

Date & Signature

Statement of Certification

This is to certify that the thesis carried out by Mintesnot Haile on the topic entitled: '*An Assessment on Operational Efficiency Constraints: The case of Selected Dry Cargo Road Transport Operators along Addis Ababa-Djibouti Corridor.*' is his original work and is suitable for submission for the award of Master of Art Degree in Logistics and Supply Chain Management.

Advisor: Dr.Busha Temesgen

_____

Date & Signature

Addis Ababa University School of Commerce

This is to certify that the thesis carried out by Mintesnot Haile, entitled *'An Assessment on Operational Efficiency Constraints: The case of Selected Dry Cargo Road Transport Operators along Addis Ababa-Djibouti Corridor.'* and submitted in partial fulfillment of the requirements of the Degree of Master of Art in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

The purpose of this study is to assess constraints on operational efficiency of cross-border dry cargo transport operators in Ethiopia. Road freight transport has so far remained to be the major means of transport in Ethiopia but the operators in this sector regarded as inefficient. Since the significance of road freight transport operators in economic development is very high it is important to avoid constraints and improve their operational efficiency.

In this study, both descriptive and explanatory research design is used and Primary data was collected from employees of transport operators through questionnaires and interview. Out of 172 questionnaires distributed, 169 (98%) complete responses returned and data were analyzed through descriptive statistics and inferential analysis methods.

The correlation result show that Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability are among the variables that are statistically significant for this study. Role of service providers, fleet size and road condition have connections with the efficiency of road transport operations, but they are statistically insignificant. The study concluded that, there is positive and significant relationship between constraints and operational efficiency of transport operators. Hence, those constraints of transport operations have a considerable impact on road freight transport operators' efficiency.

Finally, the study recommended freight transport operators to assess their operational problems regularly and develop an efficient transport management system. Government and other stakeholders also should build the capacity of freight transport operators through human development programs and allocating resources.

Key terms: ***Cross Border, Fleet stock age, Road Freight Transport, Operational Efficiency, Terminal and parking***

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List of Acronyms/Abbreviations

FTA- Federal Transport Authority

EMA- Ethiopian Maritime Authority

ECC- Ethiopian Customs Commission

TraOpMa = Transport operation management system

FlStock= Fleet stock age,

UICT = Use of ICT

RR= Rules and regulations

TP= Terminal and parking availability

CHAPTER ONE

1. INTRODUCTION

The chapter begins with an introduction to the study's background and a description of the research problem, followed by the study's objectives, which divided into two categories: general and specific. The research topics, significance, and scope of the study discussed in this chapter. The study's delimitations reviewed next, followed by a description of terms for the terms used in the study, and finally an explanation of the study's organization.

1.1. Background of the study

Freight transportation is a necessity in the globalized world we live in. Companies are becoming more dependent on goods from all over the world, and the need for well-coordinated transportation is growing. It is the backbone of import and export trade and plays a significant role for economic growth and social development of any country by directly contributing to GDP and creating job opportunities. (Amrith, 2013)

Road freight transport connects all supply chain actors at the local, national, regional and global levels and due to its flexibility and capability to provide door-to-door services; it connects production, distribution and consumption. (World Bank and IRU, 2018).

In many parts of the world, the trucking industry contributes significantly to the economy through transportation efficiency. The industry has seen intense competition as the many small players in this highly fragmented market struggle to make profits in the face of increasing demand and rising costs. This competition has caused profit margins to shrink industry wide (Sutherland and Keopke 2012).

Road transport is the primary form of transportation, and it is especially vital in developing countries that lack alternative inland transportation options such as trains or inland waterways. In this environment, road transport is the only means of accessing regional and global markets for landlocked developing countries (LLDCs). (World Bank and IRU, 2018).

According to Zerilli and Cook (2010), most of African countries have low productivity of the trucking industry and a low-capacity use with a high proportion of trucks running empty back to the port because of a structural trade deficit of the landlocked countries. Ethiopia is one of the African landlocked countries that shares the freight transport trucking problems.

In Ethiopia, the trucking industry is the most dominant freight transport and logistics system which handle over 90% of national and 97% of import -export freight of the country with little other computing modes at present. However, it has been adversely affected by high transport costs due to

inefficiency of the transport operators and other stakeholders involved (Afro Consulting and Trading PLC. 2014)

In Ethiopia road freight transport operators categorized as domestic road freight transport operators, who operate in the various regions of the country and cross border road freight operators, who operate with in the country as well as they operate by crossing the Ethiopian border. (Federal Transport Authority, 2019)

According to Asrat (1996) road freight transport operators' efficiency refers to transport operators' efficiency in terms of maximization of serviceability, vehicle utilization, load factor, distance covered, uplifted passenger or freight, revenue per vehicle and minimization of fuel consumption, oil consumption, garage status, tyre expense, spare parts expense, maintenance cost, and other costs that are used to achieve efficiency, cost effectiveness and profitability in transport operation.

According to McKinnon (2015) operational inefficiency in the road freight transport resulted in higher transport cost, which in turn led to the prices to be inflated and the business competitiveness to be impaired. The road freight transport operators' efficiency measured by productivity or profitability. The profitability of freight transport operators depends on efficient operations.

According to a study by Afro Consult & Trading PLC (2014) cross border dry cargo road transport operators in Ethiopia are key for the movement of import and export cargos but they are unable to meet the growing demand of the manufacturing industry, trade, agriculture and other sectors of regular suppliers. Therefore, cross border dry cargo road transport operators regarded as inefficient.

The country is highly dependent on road freight transportation for goods delivery and the significance of road freight transport operators in economic development is very high. Therefore, it needs to improve their operational efficiency.

Freight transportation demand is derived from economic activities that are expected to rise in the future, and hence improving the operational efficiency of transport operators will have a significant impact on the country's development. Therefore, this paper will try to shade some light on the constraints of cross border road freight transport operators' efficiency and find solutions for enhancing freight transport operational efficiency.

1.2. Statement of the Problem

The growing Ethiopian economy demands road freight transport services to increase at a high rate. Trucking services should be more responsive to the growing economic activities and secure the profitability of individual import and export companies. In such an environment, road freight transport operators must fill customer orders accurately, quickly and efficiently.

According to a study by Afro Consult & Trading PLC (2014) the road freight industry in Ethiopia is poorly developed and remains an obstacle to the competitiveness of export in the international market, fast delivery of import goods to production and consumption areas; and generally, to the realization of economic development of the country. This is partly due to the underperformance of road freight transport operators.

There are many possible internal and external constraints that contribute to the inefficiency of road freight transport operators. The internal constraints are poor transport management system of transport operators; lack of using IT technologies; old aged trucks and shortage of trucks .The external constraints are poor road infrastructure; absence of well- secured terminals; inconsistent rules and regulations; poor services by service providers at custom checking points and at loading and unloading places.

According to Federal Transport Authority (2019) annual report transport, operators are inefficient and their performance is unsatisfactory and customers were affected by high costs of transport due to their inefficiency.

Even if, the above researches identified that road freight transport operators are inefficient but they did not mention the constraints related to the inefficiency of transport operators and hence there is lack of academic studies related to constraints for the inefficiency of transport operators.

According to EMA (2019) in Ethiopia, the road freight transport has so far remained to be the major means of transport to meet the huge growing demand of international, national and regional freight. Therefore, it needs to give particular emphasis for the road freight transport sector in order to enhance efficiency and effectiveness.

Since road freight transport challenges are dynamic, it requires continuous problem-solving studies. Therefore, this research will bridge the existing research gaps and help to use the findings for developing efficient transport operators and increase the performance level of road freight transport in Ethiopia.

Road freight transport operators are important and key contributors to the development of our economy. Therefore, considering their importance, this research intended to examine the constraints of cross border dry cargo road transport operators' efficiency and suggest possible recommendations to address those constraints and improve road freight transport operational efficiency.

1.3. Research Questions

i. What are the major constraints that affect the operational efficiency of cross border dry cargo road transport operators?
ii. Which factor highly affect the operational efficiency of cross border dry cargo road transport operators?
iii. What measure should be taken to improve the operational efficiency of cross border dry cargo road transport operators?

1.4. Research Objectives

1.4.1. General Objective

The main objective of this research is to assess the constraints on operational efficiency of cross-border dry cargo transport operators in Ethiopia. The study will have the following specific objectives based on this objective. -

1.4.2. Specific objectives

i. To examine constraints that affect the operational efficiency of cross border dry cargo road transport operators in Ethiopia.
ii. To prioritize the key constraints that affect the operational efficiency of cross border dry cargo road transport operators.
iii. To forward possible measures that will improve the operational efficiency of cross border dry cargo road transport operators.

1.5. Significance of the study

The primary advantage of this study is for the researcher i.e. one of the requirements to get Masters of Art Degree in Logistics and Supply Chain Management. The second, it will have practical significance for identifying operational efficiency of cross border dry cargo road transport operators and their contribution for the development of the country. In addition, the study helps stakeholders to know the constraints of cross border freight transport operators' efficiency and how these constraints will affect the freight transport industry as a whole. Even though the study done for academic purposes, it will be helpful to gain information and knowledge about the efficiency of road freight transport industry of Ethiopia.

The study will also help government and policy makers to improve freight transport planning and to develop policy frameworks or make decisions that enhances the efficiency of cross border dry cargo

road transport operators. Furthermore, the result of the study will generate important findings that can be helpful for solving the existing problems. Additionally, this study will serve as a point of reference for researchers who need to assess constraints of transport operators or road freight transport system and the impact of those constraints on the economic activities of the country.

1.6. Delimitation/Scope of the Study

The study's conceptual scope was on constraints related to operational efficiency of cross border dry cargo road transport operators in Ethiopia. The study examined the existing transport management system of cross border dry cargo transport operators, the operational efficiency of transport operators and the effects of operational inefficiency. The geographical scope of this study delimited to cross border dry cargo transport operators who are actively operating along Addis Ababa –Djibouti corridor.

1.7. Limitation of the Study

This study planned to incorporate some valuable information by visiting the transport operation along Addis –Djibouti corridor but it was only possible to visit cargo loading and unloading operation at kality dry port due to financial and time constraints. Moreover, there was a plan to include the opinion of some of the expert's from regulatory bodies through interviews; however, it was difficult to find most of them since they were out of the office. Therefore, I tried to include only the opinion of experts from Ministry of Transport. These are major limitations of the study.

1.8. Definition of Terms and Concepts

***Cross-border transport*:** involves the activities, infrastructures, and flows that support the passage of passengers and freight across an international border (Anderson, 2013).

Driver: is a central component of road transport services, being the ambassador of his company towards the clients, the road users, the control authorities, and the competitors(World Bank, 2017).

Dry Cargo: is a term that used to describe goods that are solid and dry (Malcolm Tatum, 2020).

Freight Transport: refers to the actual movement of goods from one location to another using a means of transport and a transport infrastructure (Tolga Bektas, 2017).

Operational efficiency*:* means that, goods or services created or delivered faster, cheaper, better, fresher, with few defects, and so on. (Tyson Macaulay, 2017)

Road transport: is one of the transport modes which involves the use of motor vehicles like cars, Lorries, buses, bicycles, trucks and animals (Bongdap Nansel , 2020)

Transport Operator: is a natural or legal private or public person who carries goods and/or People by road for reward (Law Insider, 2020).

***Transport corridors*:** represent an accumulation of flows and infrastructures of various modes and their development is linked with economic, infrastructural, and technological processes(Rodrigue et al., 2019).

***Terminal*:** Any location where freight and passengers either originate, terminate, or handled in the transportation process. Terminals are central and intermediate locations in the movements of passengers and freight(Rodrigue et al., 2019).

1.9. Organization of the study

To introduce and develop the arguments summarized here in detail, the thesis comprises five chapters. These chapters are constituted as follows. The first chapter highlights the introductory parts of the study that included background of the study, problem statement, research question, objective of the study, scope of the study, significant of the study, delimitation of the study, as well as definitions of terms are included.

The second chapter included literature review, which deals with the literatures that are relevant to this study. It has an introduction, theoretical review, empirical review and the conceptual framework of the study.

The third chapter presented research methodology, which deals with the research type, the design of the research, the participants of the study, the sources of the data, the data collection tools/instruments, the procedures of data collection and the methods of data analysis.

The fourth chapter dealt with results and discussion (data presentation, analysis &interpretation). It summarized the results of the study and interpreted or discussed the findings. The last chapter included summary, conclusion and recommendation, which presented the findings, conclusions, limitations of the study and recommendations.

CHAPTER TWO

2. Review of Related Literature

2.1. Introduction

This chapter provides a review of literatures on topics related to the research problem. It examined what various scholars and authors have discussed about the basic concepts on constraints of road freight transport operators' efficiency in Ethiopia.

Although, it is not possible to find direct researches conducted in Ethiopia on the subject area, some related studies, which made in other parts of the world reviewed to interpret and utilize the information in the context of Ethiopia.

2.2. Concepts and Definitions

According to Maganga (2013), road transportation is defined as the movement of goods or people from point A to point B using the physical road network. Road transport by truck is often the initial and the final stage of freight transport.

According to Craig (2010), transportation by road can be grouped into the transportation of goods and transportation of people. The nature of road transportation of goods depends, apart from the degree of development of the local infrastructure, on the distance the goods are transported by road, the weight and volume of the individual shipment, and the type of goods transported. For short distances and light, small shipment vehicles may be used. For large shipments, even if less than a full truckload a truck is more appropriate.

Road freight transport refers to the transportation of all types of goods using trucks, which involves the utilization of route, vehicles and operations. It is governed by an agreement between the shipper or his agent and the carrier or the service provider. It could be specific between the shipper and the carrier or general zonal, regional, national and international movement of cargo through efficient system usage, regulations and agreed upon carrier contract (Afro Consult and Trading PLC, 2010).

Road freight transport, or trucking, is essential to modern economies, occupying a unique socioeconomic position linking supply to demand and linking many industrial sectors. Road transport is a key contributor to economic development and integration. Its flexibility and capabilities make it indispensable to development strategies and integration processes (World Bank, 2009).

The flexibility of the road transport sector, its ability to ensure door-to-door transport and its cost effectiveness allowed the sector to gain a significant share of the transport market compared to other modes. Indeed, road transport is a part of most supply chains, at the very least always providing first and last mile connectivity (IRU, 2014).

According to Keshav (2012) the merits of road transportation including convenience, suitable for perishable goods within a shorter time at lower cost, low investment requirement, and more flexible than other modes. It has also its own disadvantage, including unsuitable for long distance and for heavy loads, irregular, risky/prone to accident, and lack of uniformity in charge or fair for road transport.

2.3. Theoretical Literature

2.3.1. Constraints of Road Freight Transport Operators efficiency

The theory of constraints is an overall management philosophy introduced by (Goldratt, 1984). It is a management paradigm that considers all managed systems to be constrained by a small number of restrictions in attaining more of their objectives. Internal or external constraints can exist in a system. There is always at least one restriction, and the theory employs a concentrating method to locate it and restructure the rest of the organization around it.

Theory of constraints adopts the common idiom which states' a chain is as strong as its weakest link'. This means organizations are vulnerable, because the weakest part always damages them or adversely affect the outcome. Steps to be followed to address the problem, according to this theory are:

- Identify the system constraints which prevent the obtaining of goals;
- Describing how to exploit system's constraints;
- Subordinating everything else to the above decision; and
- Evaluating system constraints.

The road freight transport operation can suffer from several characteristics that compromise its efficiency and effectiveness, among them, a high level of informality paired with a low level of professionalism, bad condition of vehicles, and weak professional representation resulting in large part from the atomization of the industry (World Bank and IRU, 2014).

The operational efficiency of transport operators can be affected by different constraints. These constraints may come from both the external and internal environments in which the transport firm operates. Any transport company that wants to effectively manage its operational efficiency should identify the influence of those internal and external constraints.

The internal constraints are due to organizational in efficiency including human, financial, technological, size and age of vehicle. The external constraints are due to stakeholders (customers and regulatory bodies') inefficiency, road infrastructure condition and the legal frameworks.

2.3.3.1 Internal constraints

The internal constraints refer to anything within the company and under the control of the company. These constraints are due to organizational in efficiency. Internal constraints that affect operational efficiency includes management system, technological, size and age of vehicle.

2.3.3.1.1 Transport Management system

Optimal plans must be supported by effective operations in trucking companies, within the port or destination. Getting the correct cargo/freight on the correct truck at the correct time takes flawless planning. To achieve success, a strategic transportation plan must be in place to ensure lower costs and improved customer service levels. (Shukla, et al., 2011).

Professional capacity is one of the key constraints for efficiency, safety and security of transport operations at all levels. A good driver is the result of a combination of personal skills and training. There are still countries where the professional driving license is obtained without any specific training. However, a good driver is not enough for a transport operation to be efficient; adequate infrastructure and vehicle and competent managers are other essential factors. In many countries in the developing world, there is no specific training for transport managers; neither are their accredited institutions to provide such training. In addition, a more recent problem in this area is that in many developed countries there is a shortage of truck drivers because the profession is not attractive (wages too low compared to the number of conditions to comply with). (IRU, 2018)

2.3.3.1.2 Vehicle stock age

In many developing countries, vehicles are obsolete or not properly maintained. They generate relatively high amounts of pollution and are unsafe. In some instances, the legislation does not provide for mandatory regular technical inspection; and often, the rules on weights and dimensions are not enforced. These results in inefficient operation (because of frequent breakdowns), high costs and risk for the safety on the roads, as well as a limitation of the access to the market (e.g., the shipper would not allow its just-in time cargo to be loaded on an unreliable truck. (WB, 2018)

2.3.3.1.3 Fleet size

A transportation fleet is a capital-intensive asset for a logistics/transportation company or manufacturer. Optimizing the size of a fleet is crucial for efficient and cost-effective operations. It is not uncommon for a logistics company to oversize its fleet, which can result in a low utilization rate. Additionally, all too often in paratransit and regular bus services, larger vehicles than necessary are used in anticipation of few occasions when they might be needed. An agency may also need to tradeoff between the cost per trip versus the seating capacity. All of these situations reflect the need for proper methods to determine and optimize the fleet size and composition. (Mourafetis and Kamat 2014).

2.3.3.1.4 Use of ICT technologies for fleet management

The usage of information communication systems can be seen in almost every activity in the logistics industry, such as transportation, warehousing, order processing, material management, fleet management and procurement. It is suggested that passing information to all businesses in the supply chains via ICT will improve performances. These systems allow the information exchange in real time improving the ability of planning transport and logistics activities and the level of customer service. (Ayantoyinbo and Benedict, 2015)

2.3.3.2 External constraints

External elements are those factors outside and under no control of the company. The external constraints are due to stakeholders (customers and regulatory bodies') inefficiency, road infrastructure condition and the legal frameworks.

2.3.3.2.1 Role of Service Providers

Service providers may have a negative impact on freight Transport operation efficiency by creating delays at custom checking points and at loading and unloading places.

Regardless of the type of truck services, the freight delay caused by in efficient operations at custom checking points and at loading and unloading places has a direct impact on driving hours, fleet efficiency, and scheduling of warehousing activities all with cost to the national economy. (Qing Miao, et al, 2011)

The late arrival of supplies at factories, warehouses and shops can also impair their operating efficiency and sales performance. Shippers, particularly those employing just-in-time management techniques, expect freight carriers to deliver goods on time, in the right amount, and in undamaged condition. (McKinnon et al, 2006)

2.3.3.2.2 Terminals and Parking sites availability

The lack of adequate truck parking facilities on or near national highways is a major problem for the trucking industry, Lack of adequate truck parking facilities can affect the safety of truck drivers who want or need to use such facilities in several ways: drivers may continue to drive without rest and recovery from fatigue. Consequently, the failure to rest, and thus, the failure to recover from fatigue, can result in fatigue related crashes and fatalities. In addition, many drivers who cannot find legal and safe parking end up parking illegally on the roadside and on ramp shoulders leading to and from truck parking areas, posing hazards to oncoming traffic because of obstructed visibility to oncoming traffic and trucks attempting to accelerate and merge into oncoming traffic (McKinnon,2015)

2.3.3.2.3 Road condition

The development and maintenance of physical infrastructure is key driver for both domestic and international trade, which in effect leads to economic growth and poverty reduction. Markets accessibility and volume of trade are largely dependent on the quality of infrastructure and especially transport which facilitates the physical movement of people and goods. Road transport continues to be the dominant mode of goods transport in developing countries and offers the only real alternative worldwide for many localized final delivery operations. Road networks have not kept pace with growth in demand. Kilometre lengths are limited and construction standards are often low (Wasike, 2001).

Deterioration of transit roads in the country, leading to high vehicle operating costs (VOCs) and high road transport costs, has been a matter of serious concern to the government because of the heavy dependence of the national economy on this mode. An efficient low-cost road transport system is of critical importance for the development of all sectors of the economy (Kifle et al., 2000).

2.3.3.2.4 Rules and regulations

Informality negatively affects the efficiency of road transport services, impacting among others the reliability and predictability of services, road safety and prices. Also, informality reduces revenues to the transport sector. In many parts of the world and in particular in emerging economies, to further liberalization of the road transport sector without qualitative criteria for entry, and in the absence of transitional and accompanying measures, the road transport market has often been dominated by informal transport operators and sometimes also by intermediaries. These are players that managed to penetrate the freight and commercial distribution markets to an extent where they became a compulsory partner but with little value added and without legal existence. (Londonokent, 2009)

2.3.2. Road Freight Transport Operation Management

Transport Management refers to those methods or techniques found to be the foremost effective and practical means in achieving transportation objectives like low costs, timely delivery of transportation-related information to the remainder of the enterprise and customers, increase transportation velocity while making optimum use of the firm's resources (Stock & Lambert, 2001).

According to Belew (2014), transport operation management is the implementation of goals and plans formulated. This determines the efficiency of moving products. The progress in techniques and management principles improves the moving load, delivery speed, service quality, operating costs, the usage of facilities and energy saving. Transport has a dynamic nature due to global market. As a result, the Transport Company need an effective information and control system.

Road freight transport is more flexible and versatile than other modes of transport because of vast networks of roads. It can offer point-to-point service between almost any origin and destination. Its

flexibility and versatility enabled the road freight transport to become dominant in many countries of the world. (Yibeltal, D and Belew, D, 2020)

Due to the trend of globalization, the importance of transport in logistics management has increased in various fields due to resource efficiency in recent decades. The ability to move goods rapidly, securely, and economically is viewed as important to the success of enterprises and the stability and competitiveness of a country in a globalized economy(Debela, 2013).

The transport management system makes goods and products movable and provides timely and regional efficacy to promote value-added under the least cost principle. A good transport management system could provide better logistics efficiency, reduce operation costs, and promote service quality. The improvement of transportation systems needs effort from both the public and private sectors. A well-operated logistics system could increase both the competitiveness of the government and enterprises(Clark, 2014).

The role freight transport management plays in the logistics system is more complex than carrying goods for the proprietors. Its complexity can take effect only through high-quality management. Using a well-handled transport system, goods could be sent to the right place at right time to satisfy customers' demands. It brings efficacy, and also it builds a bridge between producers and consumers(Clark, 2014).

Freight transport management offers a whole spectrum of services catering to cost, time and reliability priorities and has consequently taken an increasingly important role within commodity chains(Rodrigue et al., 2019).

It is also very important for businesses in creating time, place, and quantity utility, in addition to enabling larger-scale production, geographic specialization, and increased competition(Roberts, 2012). The growth of the amount of freight being traded as well as a great variety of origins and destinations promotes the importance of international transportation as a fundamental element supporting the global economy(Rodrigue et al. 2019).

2.3.3. Road Freight Transport Operators Efficiency

Road freight transport operators' efficiency refers to transport operators' efficiency in terms of maximization of serviceability, vehicle utilization, load factor, distance covered, uplifted passenger or freight, revenue per vehicle and minimization of fuel consumption, oil consumption, garage status, tyre expense, spare parts expense, maintenance cost, and other costs that are used to achieve efficiency, cost effectiveness and profitability in transport operation (Asrat, 1996).

Freight Best Practice identified five Key Performance Indicators (KPIs) to measure vehicle operating efficiency: vehicle-fill, empty running, and time utilization, deviations from the schedule and fuel efficiency. Vehicle fill can be measured by weight, volume and deck length. On the other hand, empty running indicates the marketing strategy and level of networking and cooperation within the regime. Time utilization indicates what a vehicle is doing at any one time. Deviation from schedule indicates delays and lost time that can result for a number of reasons such as: lack of drivers, delays in loading at the depot, delays at the collection point, traffic congestion, vehicle breakdown, and route dislocation. Fuel efficiency is a useful measure in terms of liters per kilometers per vehicle. (Freight Practice, 2009)

The most efficiency measurement of transport of transportation focuses on capacity and conduction of the transport system as well as issues such as travel time, cost, and safety to achieving the ultimate goal or criteria that is to increase mobility(McMullen, 2010).

According to Niklas (2011), transport efficiency is defined as "a set of utilization measures of time, space, vehicle, fuel and driver in the movement of goods". (Asrat, 1996) also stated thirteen basic principles that are used to achieve efficiency, cost effectiveness and profitability in transport operation. These are maximization of serviceability, vehicle utilization, load factor, distance covered, uplifted passenger or freight, revenue per vehicle and minimization of fuel consumption, oil consumption, garage status, tyre expense, spare parts expense, maintenance cost, and other costs.

Inefficient transport operations tend to be more environmentally damaging. Where freight transport costs are higher as a result of inefficient operation, prices throughout the economy are inflated and business competitiveness impaired. Therefore, the level of efficiency needs to measured, the main causes of inefficiency identified and corrected at all levels of freight policy-making and the main goal must be to improve the efficiency of the freight transport system. (McKinnon, 2015)

According to Temesgen (2006) in freight transportation, there is little uniformity in efficiency measurement, especially across the five modes. For many of the operators, a large number of measures are financial, with multiple versions of revenue, expenses, and revenue-related ratios, along with the before and after effects of taxes, interest, depreciation, insurance and other costs.

According to Londono (2014) fundamental measures of performance of the road freight transport industry in low and middle-income countries include (1) number of vehicles, (2) fleet composition, (3) number of vehicles per thousand people, (4) average of empty trips, (5) average distance traveled per truck, per year, (6) average number of ton-kilometers/ truck/ year, and (7) number of vehicles per billions of GDPs.

Hence, in this study road freight transport operation efficiency refers to cross border dry cargo transport operators' efficiency in terms of number of vehicles, distance coverage, volume of freight transported, minimizing the cost of operation and others to improve their productivity.

2.4. Empirical Literature Review

2.4.1. Constraints Road Freight Transport Operators efficiency

Kent, Pilar Londono. (2010) published an essay titled "Freight Transport for Development Toolkit: road freight "in which he discovered that Trucking is the primary means of freight transportation in the majority of the world's low- and middle-income countries. The road freight transportation business has a complicated and fragmented structure. The efficiency of international road transport services has been hampered by cumbersome regulatory environment, lack of intermodal services, lack of adequate interface, fragment road inspections and cumbersome customs procedures that result an excessive long transit period. Especially, the landlocked countries pay additional transit charges amounting to about 20 % of the value of goods transported, making many commodities less competitive in the world market (Londono, K, 2010)

World Bank (2009) published a report titled "Road Freight Industry in Low- and Middle-Income Countries" in which it mentioned that, In Mexico trucking represents 70% of the freight bill by volume and 80% by value. The Central American registered trucking industry benefits from an integrated system recognized by the member countries. There are a number of issues with old trucks that lack the technical standards for quality of service and information technology. There are security concerns, organized crime, uneven infrastructure development, and a fragmented trucking industry.

ECA (2009) published a report titled "Africa Review Report on Transport" in which it stated that, Transit times in most African countries transport corridors are long due to factors such as unclear and sometimes conflicting rules and regulations, inefficient service providers, roadblocks, as well as cumbersome administrative and customs procedures. These have created a serious challenge to transport facilitation and trade on the continent. It leads to excessive traffic delays, resulting in a substantial increase in transport costs.

Kamuruchi, G. (2013) in his book titled "Factors Influencing Cargo Transportation by Road" stated that, In Kenya, road transportation is a key economic sector in providing essential services for exporters and importers engaged in international and regional trade. However, it has been adversely affected by exceptionally high transport costs due to a wide range of factors, including inadequate competency of the transport operators both in terms of quantity and quality leading to high loss of life, numerous accidents; low discipline and productivity of drivers and other operators; poor infrastructure; and, rampant corruption along the Mombasa- Nairobi transit transport corridor that handles most of

the region ‘s export and import cargo. He concluded that factors like the institutional, legal, human resources and involvement of the different stakeholders lead to an increase in cargo transportation as well as in transit costs.

Elias W. (2011) in his study titled “Optimization of Facility Locations with Special Emphasis on Dry Ports, Terminals, and Other Logistics Centers to Promote Efficient and Effective Supply Chain Systems in Ethiopia” mentioned that, Vehicle availability and utilization are critical features of efficient and effective transportation system management. Vehicles are expensive and should ideally be available However, in Ethiopia due to a variety of problems such as bad roads, border delays, weighbridge checks, customs delays at the roadside and at the destination, inadequate loading and unloading scheduling, road accidents, single driver operation, and congestion, utilization is reduced.

2.4.2. Road Freight Transport Operation Management

World Bank (2009) published a report titled “Road Freight Industry in Low- and Middle-Income Countries” in which it mentioned that, in Africa the road freight transport sector has shown remarkable resilience in the face of difficult operating environment where operating costs are high and both vehicle and capacity utilization is low. Such high costs result from inadequate regulatory environment, or by government oversight, excessive government regulations on market entry, lack of efficient logistics and management expenditures. Existing trade is therefore, performed at a very high cost because of poor service than those of other regions of the world.

Asnake, T. (2013) in his Master’s Thesis titled “Road Freight Transport in Ethiopia with Special Emphasis on Addis Ababa Djibouti Corridor” stated that, In Ethiopia, there is free entry and exit in road freight transport market, government is not involved in route assignment or tariff set up. In principle, the market is accessible to any private person or company that wants to offer service. However, the road freight transport management is very poor and characterized by a situation of ‘imperfect competition’ due to the presence of the large conglomerates of operators which in different ways exert some oligopolistic influence on the road freight market and do not stimulate the entrance of individual operators (Asnake, 2006).

2.4.3. Road Freight Transport Operators Efficiency

Vittaldasa, P and Aditya, K. (2015) on their book titled “Performance Measures for Truck Transport.” Mentioned that, the efficient use of resources, the specified output, and adaptability are critical components of any operations system, especially in the trucking industry. As a result, the trucking system places a premium on three distinct metrics: resource measures, output measures, and

adaptability measures. Each of these sorts of efficiency measures has distinct properties and influence each other's.

European Union (2012) on its report "Road Transport a change of Gear" stated that in Europe, road transport is part of the lifeblood of their economy. It delivers goods across Europe fast, efficiently, flexibly and cheaply. To increase efficiency, the EU seeks to ensure well-functioning open markets and uniform technical standards, and encourages the development of an integrated trans-European network and a better use of infrastructure by using intelligent transport systems. The EU also set a series of social provisions for professional drivers' working conditions, which also contribute to road safety and underpin fair competition among operators. The rules fix a daily driving period of no more than nine hours, with a break of at least 45 minutes after 4.5 hours of driving.

World Bank (2009) published a report titled "Road Freight Industry in Low- and Middle-Income Countries" in which it mentioned that, in Asia, China has the world's most dynamic logistics industry, with economic growth continuing over 10% per annum, driving trade and demand for freight transport and putting massive demands on the country's infrastructure. The road freight fleet has expanded in large numbers, 80 % are own-account operators, 14% private transporters and 6% state-owned for hire. In India, which has the second largest road network in the world, the road freight industry represents 4.7 % of GDP and is expected to grow at 9.9% per year but the economic crisis may curb this growth. The industry is highly fragmented, competitive, and low cost, with high vehicle utilization and massive overloading.

Asnake, T. (2013) in his Master's Thesis titled "Road Freight Transport in Ethiopia with Special Emphasis on Addis Ababa Djibouti Corridor" stated that, road transport is the most expensive of all motorized modes of transport in Africa. It is adaptable to nearly all kinds of movement of people and goods. Road transport in Africa accounts for over 80% of all freight and passenger movements accounting for an average of about 80% in terms of ton-km and is therefore, essential for the operation of the African trade. As countries increase their output, stimulate trade and personal incomes, the demand for freight and passenger road transport will continue to grow at a rate of 4-6% per year. Roads and Road transport services in Africa are broadly characterized by high cost and low-quality service due to a substantial backlog of road maintenance, rehabilitation and weak institution and an inadequate network.

Asnake, T. (2013) also mentioned that, Private transport operators could no more be able to operate efficiently to achieve their own objectives as per the regulation they are established. The operators are not modernizing their fleet to provide efficient services and they often become obstacles to the safety of services and the efficiency of the economy. This is because individual owners are most intractable

and uncooperative, most of the association management is not competent and the concerned regulatory body could not be able to provide adequate attention to effectively monitor and improve their operations.

Raballand, G, et al. (2008) in their book titled "The impact of regional liberalization and harmonization in road transport services" they mentioned that, in Zambia, the road freight transport serves about 71%, railway 24% and pipeline 5%. Zambia is known for its efficient and competitive road freight transport sector where WB had given an award in 2008. Road freight transport operators are organized only in the form of transport companies who have their own fully organized garage and supply of spare parts. In Zambia, life span of a vehicle is limited to 12 years by legislation. Individual vehicle in Zambia daily covers 410 km, whereas the annual distance coverage per vehicle is about 130,000km. Hence, a single truck can cover 1,500,000km in its life span.

Nathan Association PLC (2013) published a book titled "Development of a National Logistics Strategy for Ethiopia: Diagnostic Analysis of the Current Logistics System" in which they mentioned that in Ethiopia, like in many developing countries, the trucking industry is dominated by small private operators: they are fragmented, unorganized and unsafe, although some establish and regroup under associations to maximize their profit/income and safeguard their common interest.

2.5. Research Gaps

Related to Ethiopian Freight transport, only few researches had been conducted by different authors at different times. For instance, (Debela,2013) in his research entitled "Logistics Practices in Ethiopia" identified that freight transport in Ethiopia is characterized by very low density and quality of transport infrastructure, inadequate number of vehicles and old aged trucks used to meet the transport demand of the country. The road freight transport operators lack capacity in terms of skilled human resource, management skills. The transport operators are fragmented and the in efficiency of customs authority causes a lot of delays at checkpoints. The number of checkpoints is too much and also there is lack of infrastructures and services to link producers to consumers.

(Asnake ,2013) also in his research entitled "Road Freight Transport in Ethiopia" identified the problems of Ethiopian Freight transport and he mentioned that commercial road freight transport is performed under difficult conditions due to vehicular and regulatory problems. Though the average growth of registered vehicles in the last fifteen years had been about 5%, the fleet is quite small.

Among the total dry cargo vehicle's size 74.35% constitute vehicles with off-take capacity less than 12 tons, the stock of freight transport vehicles has an average age well over 15 years and suffer from old age, the role of foreign capital investment in the dry cargo freight transport sector is extremely restricted.

Yibeltal and Belew (2020) in their research entitled "Cross border Dry Cargo Transport Operation Performance in Ethiopia" stated that most of the cross border dry cargo road transport operator, particularly Associations have no operation performance target and did not properly measure and record operation performance using key performance indicators. The overall operation performance of the operators is low to medium; particularly associations' have low operation performance compared to Companies and Private Owners.

Unfortunately, these researchers do not observe the constraints on road freight transport operators' efficiency. As far as the student researcher concerned, no research had been conducted on constraints related to road freight transport operators' efficiency. Therefore, the researcher wants to fill this gap.

2.6 Conceptual Framework

This study will focus on assessing constraints on cross border dry cargo road transport operators' efficiency, along Addis Ababa-Djibouti corridor. It has different independent variables (constraints) that will be assessed against the dependent variable (transport operators' efficiency).

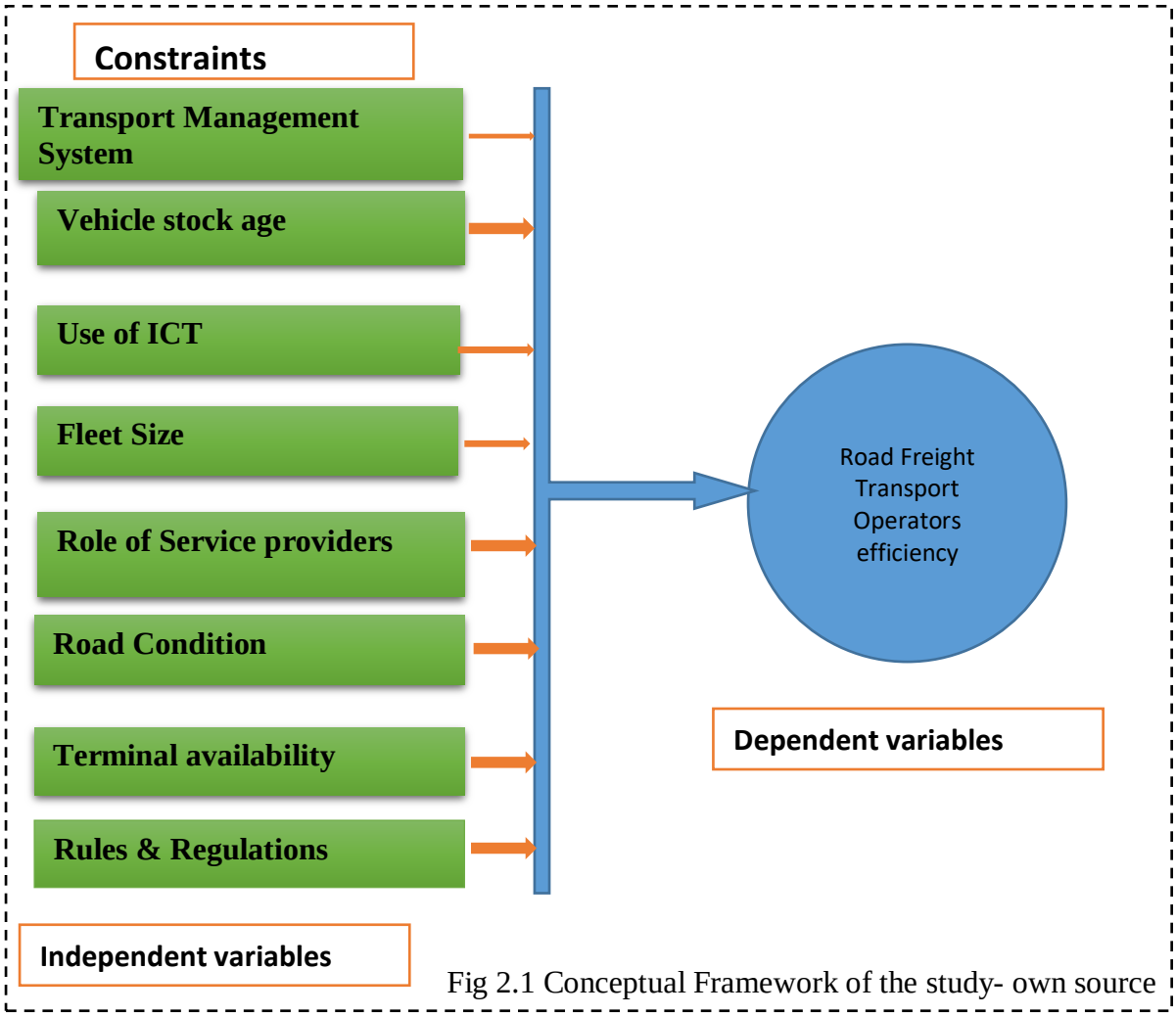


Fig 2.1 Conceptual Framework of the study- own source

CHAPTER THREE
3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a discussion of the research methodology that was used in this study. It discusses effective approaches equipped during the research process and structured into study area, research design, target population and sampling method, method of data collection and research instruments, validity and reliability test, data analysis techniques and ethical consideration. This is important in ensuring that the study addresses the set objectives and in turn answers the research questions on which it is founded.

3.2 Description of the Study Area

Ethiopian road freight transport operators operate in three legal forms: Individual truck owners, transport companies, and associations given levels as level-1A&B, level-2A&B, level- 3A&B, level 4 and special cargo vehicles with trucks of carrying capacity of 20 tons and above.

The transport operators are licensed and registered legally based on clear criteria like carrying capacity, truck age, number of trucks the company has. The level is given by the federal transport authority for the operators to operate either local or cross-border freight transport service since 2013.

According to FTA (2019) there are 103 cross-border dry cargo transport operators from these 72 of them are transport associations which registered as level-1A&B (25 associations), level-2A&B (24 associations) and level- 3A&B (23 associations) transport operators, 22 of them are individual truck owners which registered as level 4 freight transport operators and 9 of them are transport companies which registered as level 1A freight transport operators.

3.3 Research approach

There are three types of research approaches, qualitative, quantitative and mixed approach. For this study, the combination of both quantitative and qualitative research approaches are used in order to attain the objectives of the study. The qualitative approach helps to create the theoretical description of the study while the quantitative approach used to set up the numerical aspects. Thus, the researcher used these two approaches in combination that helps to offset the shortcomings of each approach. The use of quantitative and qualitative approach in combination provides a better understanding of research problems than either approach alone (Kothari, 2004).

3.4 Research design/type

In this research both descriptive and explanatory research methods are used to assess constraints on cross border dry cargo transport operators' efficiency. Descriptive research will be used to describe, analyze and interpret the constraints and explanatory research will be used to establish cause and effect relationship between constraints and transport operators' efficiency.

3.5 Sampling design

The sampling design includes the total population under study, sampling frame, sampling units, sampling techniques and sample size.

3.5.1 Target Population

The population is defined as "all possible cases" to which the research can be applied (Rosen 2019). Participants in this study will be employee of cross-border dry cargo transport operators who are operating along Addis Ababa –Djibouti corridor.

According to FTA (2019), each transport operator should have a minimum of one Manager, one Operation Manger and one Dispatch Officer to be registered legally and licensed as a transport operator. Therefore, the researcher considered 309 employees from all cross-border dry cargo transport operators as a target population, which is 216 employees from transport associations, 66 from individual truck owners and 27 sample from transport companies. Experts from responsible governmental organizations and Ethiopian heavy vehicles drivers involved as the universe of this research.

3.5.2 Sample size

The sample size is determined using information obtained from Individual truck owners, transport companies, and associations.

As Kumar (2011) mentioned if the level of confidence is 95%, the sample size will be applicable. Therefore, the researcher used a level of confidence of 95%.

Since the study's population is already known i.e. 309, the sample size calculated based on (Yamane, 1967) formula below to determine the number of users who should be included in the sample.

$$n = \frac{N}{1+N\,(e2)}$$

Where:

e is the desired level of precision (i.e. the margin of error),

N= population size (the number of employees = 309)

n= described sample size

$$n = \frac{n}{1 + N(e2)} \qquad n = \frac{309}{1 + 309(0.0025)} = \frac{309}{(1+0.8)} = \frac{309}{(1.8)} = \mathbf{172}$$

Therefore, the researcher took 172 sample respondents.

Sampling Frame

The sampling frame of this research includes professional employees of cross border dry cargo transport operators in Ethiopia.

Sample Frame				
N.o	**Name of the organization (Strata)**	**Population**	**Sample size**	
1	Transport associations	216	n1= n/N x 172= 00	= 216/309 x 172= 120
2	Individual truck owners	66	n2= n/N x 172= 00	=66/309 x 172= 37
3	Transport companies	27	n3= n/N x 172= 00	=27/309 x 172= 15
	Total Population	**309**		**172**

3.5.3 Sampling unit

The sampling unit of this research was 172 and the researcher took 120 sample respondents from transport associations, 37 sample respondents from individual truck owners and 15 sample respondents from transport companies.

The respondents were managers, operation managers and dispatch officers from transport operators. In addition, experts from government organizations and Ethiopian heavy vehicles drivers working on the corridor were respondents on this study.

3.5.4 Sampling technique

The transport operators under this study are divided in to three stratums and the stratums are transport associations, individual truck owners and transport companies. Sample size in each stratum varies according to the relative importance of the stratum in the population and the researcher selected 120 sample respondents from transport associations, 37 sample respondents from individual truck owners and 15 sample respondents from transport companies using proportionate stratified sampling techniques for the three stratums. The technique of drawing this stratified sample is known as Stratified Sampling. Stratification is the technique by which the population is divided into subgroup/strata.

The population is heterogeneously stratified and sampling conducted separately in each stratum and then random sampling used to select each individual from different organizations.

The researcher randomly selected 40 managers, 40 operation managers and 40 dispatch officers respectively from 216 employee of transport associations, 12 managers, 12 operation managers and 12 dispatch officers selected from 66 employee of individual truck owners and 5 managers, 5 operation managers and 5 dispatch officers selected from 27 employee of transport companies .

Additionally, Sample respondents of experts and drivers purposefully selected for an interview from Ministry of Transport and logistics, Ethiopian customs commission, Ethiopian Maritime Authority and Ethiopian heavy vehicles drivers working on the corridor. Employees of transport operators who chosen from various strata represent the study's population.

3.6 Sources of Data

3.6.1 Primary source

The primary source of data are obtained from the sample population of transport Associations, Companies and Private owners through questionnaires. Additional Data also obtained from Ministry of Transport and logistics, Ethiopian customs commission, Ethiopian Maritime Authority and Ethiopian heavy vehicles drivers working on the corridor.

3.6.2 Secondary source

Secondary sources of data are obtained from document review and reports of transport associations and companies, the statistical abstracts and annual report of the Federal Transport Authority, Ministry of Transport, Ethiopian customs Commission, publications, unpublished materials and internet and others, which are relevant to the study.

3.7 Data Collection methodology

Relevant data for this research collected from the respondents face-to-face or in person.

3.8 Data collection instrument

Relevant data for this research are collected from questionnaires, and interview. Both close and open-ended questionnaires prepared and given to the sample respondents who selected from **transport operators** that help the researcher to collect the data from a wide range of samples. **Interviews** also used to get rich and valuable information from sample respondents selected from **governmental organization experts** and **drivers** who involved in the sector.

3.9 Data analysis methods

The collected data from various sources are analyzed to achieve the stated objectives using descriptive statistics and inferential statistics (regression model) with the application of SPSS and other statistical

software. The findings are interpreted based on the type of data acquired depending on the research design. The quantitative data are interpreted using tables, graphs/charts, ratios and percentages. On the other hand, the qualitative data is interpreted in the form of statements.

3.9.Reliability and Validity test

3.9.1. Reliability Test

Reliability is the extent to which a study's operations can be repeated, with the same results (Yin 1994); also Reliability involves the accuracy of the chosen research According to Wiedersheim-Paul and Eriksson, (1991). According to Bryman and Bell, (2007), reliability analysis is concerned with the internal consistency of the research instrument. As multiple items in all constructs were used, the internal consistency/reliabilities of HSCC described by Information sharing, Joint decision making, and resource sharing and Relief performance metrics dimensions were Resource ,output and flexibility and Humanitarian supply chain challenges explained by legal and policy, socio-economic, infrastructural, internal and integration challenges were included.

Cronbach's Alpha using SPSS and the reliability values for all constructs are confirmed as greater than 0.7 (greater than 70%), which are considered acceptable (Nunnally, 1978). All the reliability values for variable items were presented on Appendix A.

Table 3.1 Cronbach's alpha

Variables	Cronbach's Alpha	Items
Transport operation management system	0.72	4
Fleet stock age	0.72	3
Service providers	0.75	3
Use of ICT	0.71	4
Rules and regulation	0.71	3
Road freight transport operator's efficiency	0.73	4
Fleet size	0.73	3
Road condition	0.71	3
Terminal and parking availability	0.74	3

Source: survey data 2022

3.9.1. Validity Test

Validity means an instruments ability to measure what is meant to be measured (Wiedersheim-Paul and Eriksson, 1991). According to Malhotra, (2010), there are three types of validity in a study: content validity, predictive validity, and construct validity. This study address content validity through the review of literature and adapting instruments used in previous research and the construct validity using expert opinions and advisor comments to evaluate the questioners for making sure the relevant constructs are properly included in the questions.

CHAPTER FOUR

4.RESULTS, DISCUSSION, AND INTERPRETATION

4.1. Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The collected data was analyzed in line with the objectives. The analysis results were presented in tables.

4.2. Response Rate of Instrument

Table: 4.2 Response rate of respondents

Sample		
	No.	%
Number of questionnaires distributed	172	100
Returned questionnaires	171	99.4
Incomplete questionnaires	2	1.1
Total usable questionnaires	169	98.2

Source: survey data 2022

Out of the total expected respondents of 172 the researcher managed to collect 171 responses while 1 respondent was unable to return the response on time. On the other hand, from the collected questioners 2 of the questioners are incomplete and discarded from the analysis. The total usable questioner was 169 hence this is enough to proceed with study based on the suggestion made by (Cooper & Schindler, 2003) and the study sample of size equal to or above 30 is statistically sufficient for generalization.

4.3. Respondents' Demographic Information

The demographic information of the respondents collected includes the respondent's gender, age, education level, current position and years of experience in transportation sector.

Table 4.3 Profile information of respondents

Indicator		Frequency	%
Gender	Female	78	46.2
	Male	91	53.8
	Total	169	100
Age	18-30 years	57	33.7
	31-40 years	60	35.5
	41-50 years	40	23.7
	Above 50 years	12	7.1
	Total	169	100
Education	Certificate	6	3.6
	College Diploma	21	12.4
	Degree	127	75.1
	Second Degree and Above	15	8.9
	Total	169	100
	Manager	54	32

Job Position	Operation Manager	60	35.5
	Fleet Dispatcher	55	32.5
	Total	169	100
Experience	0-2 years	5	3
	2-4 years	46	27.2
	4-6 years	55	32.5
	Above 6 years	63	37.3
	Total	169	100

Source: Survey data 2022

4.3.1. Gender of Respondents

According to the response gathered during the study (53.8%) were male while the remaining (46.2%) of the respondents were females.

4.3.2. Age of Respondents

In terms of age, the majority of respondents are between the ages of 31 and 40 years old (35 percent) and 18 and 30 years old (34 percent). On the other hand, a considerable number of respondents are between the ages of 41 and 50 years old, with just a tiny group of respondents beyond 50 years old.

4.3.3. Educational background of the Respondents

Regarding their educational background 75.1 percent of the respondents were first degree holders while the remaining (12.4 %) were college diploma holders. On the other hand 8.1 % respondents hold second degree and above. The remaining of the respondents are certificate holders.

4.3.4. Job position Respondents

The responses on the position of their job that respondents are working are evenly distributed among the three positions. Manager, Operation Manager, and Fleet Dispatcher received 32 percent, 35.5 percent, and 32.5 percent, respectively, in this category.

4.3.5. Work Experience of Respondents

Where working experience of respondents is concerned higher percentage of the respondents close to (37.28 %) were having experience more than 6 years. Around 32 % of respondents served between 4-6 years. Respondents with lower experience range of up to 2 years score (2.9 %).

4.4. Descriptive Analysis of Fleet Operations

Respondents' response on fleet operations includes responses of total number of truck owned, fleet age, distance covered per month, average trip per month and the volume of freight transported per month.

Table 4.4 Fleets Operations Information

Indicators		Frequency	Percent
Total no of trucks	up to 100 Trucks	42	24.9
	101 up to 200 Trucks	64	37.9
	201 up to 300 Trucks	33	19.5
	Above 300 Trucks	30	17.8
	Total	**169**	**100.0**
Fleet Age	Less than 5 years	2	1.2
	5 to 10 years	117	69.2
	10 to 15 years	46	27.2
	more than 15 years	4	2.4
	Total	169	100.0
Distance per Month	2000-4000 km	74	43.8
	4000-6000 km	50	29.6
	6000-8000 km	22	13.0
	above 8000 km	23	13.6
	Total	**169**	**100.0**
Average Trip per month	Less than 2 times	67	39.6
	3 times	65	38.5
	4 times	37	21.9
	Total	**169**	**100.0**
Freight Volume per month	1000-4000 ton	74	43.8
	4000-8000 ton	65	38.5
	8000-12000 ton	22	13.0
	12000-16000 ton	8	4.7
	Total	**169**	**100.0**

Source: Survey data 2022

Regarding the total number of trucks owned by transport operators, the majority (37.9 %) of respondents responded that they have 100 to 200 trucks. The age of trucks is concerned the majority (69.2%) of respondents responded that their fleets age is between 5 and 10 years.

Regarding the distance covered by the trucks owned by transport operators, the majority (43.8 %) of respondents responded that, the trucks covered 2000 to 4000 km per month. The average trip of trucks is concerned the majority (39.6%) of respondents responded that trucks average trip per month is less than two. The majority (43.8%) respondents' responded that, the volume of freight transported by their organization is 1000 to 4000 ton per month.

4.5. Descriptive Analysis of constraints of dry freight transport operation

To examine constraints that affect the operational efficiency of cross border dry cargo road transport operators in Ethiopia. Based on this, respondents gauge their response using five scale Likert responses namely: strongly agree (1), agree (2), neutral (3), disagree (4) and strongly disagree (5).

The Mean was used as a measure of central tendency. According to Neuman, (2007) interval measurement scale is used to analyze liker scale data. Likert scale items are created by calculating a composite score (sum or mean) from four or more type Likert-type items; therefore, the composite

score for Likert scales should be analyzed at the interval measurement scale. Furthermore, for Likert scale data from 1 (Strongly agree) to 5 (Strongly Disagree).

4.5.1. Transport operation management system

Four variable items were used to test the existence of transport operation management systems.

The distribution of respondents' responses on the practice is shown on the following Table 4.5

Table 4.5 Transport operation management system

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Transport operation management system	The organization has experienced experts related to freight transport management	2	22	14	84	47	3.90	0.99	3.32	1.15
	The organization has organized drivers control system	25	62	16	57	9	2.78	1.21		
	The organization has organized fleets control system	16	57	21	44	31	3.10	1.31		
	The organization coordinates its services with stakeholders	11	25	27	83	23	3.49	1.10		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

The following analyses were conducted based on table 4.5 above.

The first question asked if respondents' companies follow or employ experts in the field of fright transportation management. According to the results, 49.7% of respondents agreed with the item and 27.81 percent strongly agreed with the item, while less than 15% of respondents objected or strongly disagreed with the question. The remaining respondents had no opinion on the subject.

The second question inquires about their organization's use of a well-organized driver control system. The majority of respondents did not use the driver control system, with 36.69 percent disagreeing and 14.79 percent strongly disagreeing, and 33.73 percent and 5.33 percent agreeing and strongly agreeing, respectively. The remaining respondents were indifferent. Regarding their company's fleet management system, 26% and 18.34% agreed and strongly agreed, respectively ,33.73 % and 9.47 % disagree and strongly disagree respectively on the other hand 12.43% are neutral. The final item is stakeholder coordination, and the survey results suggest that more than half of respondents agree, close to 20% disagree, and 16% are indifferent in the topic.

4.5.2. Fleet stock age

There are three items in the fleet stock age that can be used to verify its existence. The distribution of respondents' responses on Fleet stock age is shown on the following Table 4.6

Table 4.6 Fleet stock age

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Fleet stock age	Old aged trucks have high turnaround time	73	32	50	14		2.41	1.49	3.52	1.25
	Old aged trucks have higher operational costs	12	11	4	79	63	4.01	1.14		
	Old aged trucks generate high amount of pollution	4	19	11	47	88	4.16	1.11		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation Source: Survey data 2022

Based on the above table 4.6, the following analyses were carried out-.

About 43.2 percent of respondents strongly disagree that old, aged trucks have a long turnaround time, while 18.93 percent disagree, 29.59 percent are undecided, and 8.28 percent agree. This shows that more than half of the respondents disagreed on the idea, this is also exhibited from the mean value that indicated 1.43. The second question examines whether older trucks have greater operating costs. The majority of respondents agree, with 46.75 percent agreeing and 37.28 percent strongly agreeing. The remaining replies are 7.1 percent, 6.51%, and 2.37 percent, respectively, with strongly disagree, disagree, and neutral. The last question on the list is if old trucks pollute the environment significantly. Old, rusted trucks pollute the environment, according to 52.07 percent of respondents who strongly agree and 27.81 percent who agree. On the other hand, 2.37 strongly disagree with 11.24 just disagreeing, leaving 6.51 percent neutral.

4.5.3. Fleet size

The fleet size was measured using three items that were used to evaluate respondents on the fleet size effect on the dry cargo cross border transportation operation, according to the data obtained during the study.

Table 4. 7 Fleet size

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Fleet size	Volume of freight transported increases when more vehicles are available	10	16	18	65	60	3.88	1.17	3.95	1.07
	Larger fleet size avoid fixed costs associated with fleet underutilization	4	20	19	73	53	3.89	1.05		
	Real-time dispatching improves fleet efficiency	2	18	12	71	66	4.07	1.00		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation Source: Survey data 2022

Based on the above table 4.7, the following analyses were carried out:-

Throughout the study, respondents were told that *the volume of freight transported increases when more cars are available*, and 38.46 percent agreed and 35.5 percent strongly agreed, whereas 5.92 percent and 9.47 percent disagreed. Nearly 10% of respondents are indifferent with the statement. When the statement *"larger fleet size avoids fixed costs associated with fleet underutilization"* was presented to respondents, 43.2 percent and 31.36 percent agreed and strongly agreed, respectively, whereas 2.37 percent and 11.83 percent disagreed. The remaining respondents are entirely neutral. Regarding whether real time dispatching improves fleet efficiency respondents are in agreement and their ratio is 42.01 % agree and 39.05% strongly agree the remaining are disagree with close to 11 % while as few as 7 % are undecided.

4.5.4. Use of ICT

There are four items in the use of ICT that can be used to verify its existence.

Table 4. 8 Use of ICT

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Use of ICT	There is adequate technological facility to expedite information flow between clients and operation staffs	17	58	37	39	18	2.90	1.18	2.75	1.14
	The organization provides customers information about the departure and arrival of their shipments online	10	50	28	55	26	3.22	1.20		
	There is enough telecommunication infrastructure to help road freight transport operations	28	85	34	13	9	2.35	1.02		
	The organization uses fleet management technology to control trucks along Addis Ababa-Djibouti corridor	27	80	23	26	13	2.51	1.16		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

Based on the above table 4.8, the following analyses were carried out-

According to the results about the use of adequate technological facility 23 % of respondents agreed and 10 % strongly agreed, while 10% and 34 % of respondents disagreed and strongly disagreed respectively. The remaining respondents had no opinion on the subject.

Regarding online shipment information update for customers 32 % of respondents agreed and 15% strongly agreed, while 29% and 5 % of respondents disagreed and strongly disagreed respectively. The remaining respondents had no opinion on the subject.

Regarding their company's fleet management system, 26% and 18.34% agreed and strongly agreed, respectively. The remaining 33.73 percent and 9.47 percent are against the concept, with the latter indicating disagree and strongly disagree on the other hand 12.43% are neutral.

The final item is stakeholder coordination, and the survey results suggest that more than half of respondents agree, close to 20% disagree, and 16% are indifferent in the topic.

4.5.5. Role of Service providers

The role of service providers section has three items that can be used to validate their existence on the respondent's organization. The distribution of respondents' replies on the role of service providers is shown by the following Table 4.9.

Table 4. 9 Role of Service providers

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Role of Service providers	There is short waiting time at loading and unloading places	90	40	22	8	9	1.85	1.15	2.10	1.24
	There is on time payment for transportation service given to customers	67	43	8	32	19	2.37	1.45		
	The customs offices facilitate goods clearance process timely	63	61	18	21	6	2.09	1.14		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

Based on the above table 4.9, the following analyses were carried out:-

According to the result, 53.2 % of respondents strongly disagree about the timing during loading and unloading, while 23.6 % disagree, 13.02 % are undecided, and 4.73 % agree while 5.33 highly agree about the short waiting time during loading and unloading. The second question investigates whether consumers are paid on time for transportation services provided. 18.93 %of respondents agree, with 11.2 % strongly agreeing. With strongly disagree, disagree, and neutral, the remaining responses are 39.6%, 25.4 %, and 4.7 %, respectively. The last question on the list is if customs offices help expedite the processing of goods. Almost half of the respondents disagree with the fact that customs clearance processes affect the process, with 37.2 percent strongly disagreeing and 36.09 percent disagreeing, according to the response. On the other hand, 3.5 % strongly disagree, 12.4 % agree, and 10.6 % are undecided.

4.5.6. Road condition

The road condition was measured using three items that were used to evaluate respondents on the effect of the road quality on the dry cargo cross border transportation operation.

Table 4. 10 Road condition

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Road condition	There is organized road traffic management along Addis Ababa-Djibouti corridor.	83	46	21	10	9	1.91	1.15	1.94	1.09
	The Road along Addis Ababa-Djibouti corridor is safe and secure	78	59	20	11	1	1.80	0.93		
	There is timely repair and maintenance of damaged roads on the corridor	77	31	30	30	1	2.09	1.18		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

Based on the above table 4.10, the following analyses were carried out-

The respondents were questioned if the Addis Ababa-Djibouti route has coordinated road traffic management. 27.2 percent disagreed, with 49.1 percent strongly disagreeing, while only over 12% agreed. Nearly 12.4 percent of those polled are indifferent with the remarks.

When asked how they felt about the statement "The road along the Addis Ababa-Djibouti corridor is safe and secure," 46.1 percent strongly opposed and 34.9 percent disapproved, respectively, while 6 percent agreed. The rest of the respondents are completely neutral.

Respondents are divided on whether damaged roads on the corridor are repaired and maintained on time, with 45.5 percent strongly disagreeing and 18.3 percent disagreeing, while the balance are in agreement with close to 17.7% and an equal percentage uncertain.

4.5.7. Terminal and parking availability

Terminal and parking availability was measured using three items that were used to evaluate respondents on the effect of terminal and parking availability on the dry cargo cross border transportation operation.

Table 4. 11 Terminal and parking availability

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Terminal and parking availability	There are adequate terminal facilities and necessary equipment along Addis Ababa-Djibouti corridor	55	78	22	14		1.97	0.89	2.08	0.94
	There are enough parking facilities along Addis Ababa-Djibouti corridor	40	67	28	30	4	2.36	1.10		
	There are secure and safe terminals parking areas along Addis Ababa-Djibouti corridor	53	88	17	10	1	1.92	0.84		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

Based on the above table 4.11, the following analyses were carried out:-

The respondents were given a statement if *there are adequate terminal facilities and necessary equipment along Addis Ababa-Djibouti corridor*. 32.54 % strongly disagree and 46.15 % disagree, while only over 8% agreed. Nearly 13 % of those polled are indifferent with the remarks.

When asked how they felt about the statement “There are enough parking facilities along Addis Ababa-Djibouti corridor," 23.6 percent strongly opposed and 39.6 % disapproved, respectively, while 17.7 percent agreed and 2.3 % strongly agree. The rest of the respondents (16.5%) are completely neutral.

Respondents are divided on whether there exists secure and safe terminals parking areas along Addis

Ababa-Djibouti corridor, with 31.3 percent strongly disagreeing and 52 percent disagreeing, while 10 % are neutral only 5.92% agree.

4.5.8. Rules and regulation

The rules and regulation section has three items that can be used to validate their effect on the respondent's organization.

Table 4. 12 Rules and regulation

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Rules and regulation	laws and regulations of freight transportation are transparent & applicable	59	82	13	15		1.91	0.881	2.25	1.16
	The rules and regulations' set by regulatory bodies are flexible	49	50	25	29	16	2.49	1.323		
	Transport operators are aware of new rules and regulations timely	53	55	23	25	13	2.35	1.273		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

Based on the above table 4.12, the following analyses were carried out-

When the statement 'laws and regulations of freight transportation are transparent & applicable' 48.5 % of respondents strongly disagree about laws and regulations applicability and transparency, while 34.9 percent disagree, 7.6 % are undecided, and 8.8 % agree .

The second statement investigates whether the rules and regulations' set by regulatory bodies are flexible. 17.1 % of respondents agree, with 9.47 % strongly agreeing. With strongly disagree, disagree, and neutral, the remaining responses are 28.9 %, 29.6 %, and 14.7 %, respectively.

The last question on the list is transport operators are aware of new rules and regulations timely. Almost more than half of the respondents disagree with the fact that they do not have awareness of new rules and regulations timely, with 31.3 % strongly disagreeing and 32.54 % disagreeing, according to the response. On the other hand, 7.6 percent strongly disagree, 14.7 % agree, and 13.6 % are undecided.

4.5.9. Road freight transport operator's efficiency

Respondents were asked regarding Road freight transport operator's efficiency and the variable has four items and the first item is about the organization delivers Shipments to its clients timely.

Table 4. 13 Road freight transport operator's efficiency

Variable items		N=169								
		SD	D	N	A	SA	Mean	StD	Grand Mean	Grand StD
Road freight transport operator's efficiency	The organization delivers Shipments to its clients timely	37	52	22	50	8	2.64	1.25	3.04	1.20
	The organization has enough number of trucks to give transport service	30	31	11	74	23	3.17	1.36		
	The organization manages effectively its operational costs	13	64	25	64	3	2.88	1.06		
	The organization evaluates its vehicle productivity	10	28	30	75	26	3.47	1.12		

SD=strongly disagree D=Disagree NS=Neutral A=Agree SA=Strongly Agree F=Frequency SD= Standard deviation

Source: Survey data 2022

Based on the above table 4.13, the following analyses were carried out-

According to the results, 29.6 % of respondents agreed with the item and 4.7 percent strongly agreed with the statement, while 21.8% of respondents strongly disagreed with the statement moreover 30.77 % in disagreement with the statement. The remaining respondents had no opinion on the subject.

The second query inquires about whether the organization has enough number of trucks to give transport service. The majority of respondents agree that their respective organizations have enough trucks, with 43.7 percent agreeing and 14 percent strongly agreeing, on the other hand 17.7 percent and 18.3 percent disagreeing and strongly disagreeing, respectively. The remaining respondents were indifferent.

Regarding managing operational costs, 37.8% and 1.7 % agreed and strongly agreed, respectively. The remaining 37.73 percent and 7.47 percent are against the concept, with the latter indicating disagree and strongly disagree on the other hand 14.43% are neutral.

The final item is evaluations of vehicle productivity, and the survey results suggest that more than half of respondents agree, close to 20% disagree, and 16% are indifferent in the topic.

4.6.Relationship between constraints and road freight transport operator's efficiency

The degree and direction of a linear relationship between two variables is described via correlation analysis.

The correlation is used to demonstrate test scale validity by demonstrating a significant relationship between it and another accepted scale for a related construct; to demonstrate reliability consistency of measurement on two occasions, to show internal consistency of scale items, and to support hypotheses that predict the relationships between variables.

Table 4.14 Interpretations and characteristics of correlations

	Correlation	Directions	Form	Degree
Small	0.10-0.29	Positive Vs Negative	Linear Vs Non-linear	Strength
Medium	0.30-0.49			
Large	0.50-1.00			

Source: Beech, 2006

Pearson's Product-Moment Calculator Correlation is the most well-known and widely utilized correlation for interval data. (Beech, 2006).

Table 4.15 Correlation Matrix between Road freight transport operator's efficiency and Constraints

N=169		Road freight transport operator's efficiency
Transport operation management system	Pearson Correlation	.394**
	Sig. (2-tailed)	0.000
Fleet stock age	Pearson Correlation	.167*
	Sig. (2-tailed)	0.030
Service providers	Pearson Correlation	-0.136
	Sig. (2-tailed)	0.079
Use of ICT	Pearson Correlation	.404**
	Sig. (2-tailed)	0.000
Rules and regulation	Pearson Correlation	.204**
	Sig. (2-tailed)	0.008
Fleet size	Pearson Correlation	0.004
	Sig. (2-tailed)	0.961
Road condition	Pearson Correlation	0.111
	Sig. (2-tailed)	0.149
Terminal and parking availability	Pearson Correlation	.197*
	Sig. (2-tailed)	0.010
**. Correlation is significant at the 0.01 level (2-tailed).		

Source: Survey Data, 2022

Table 4.15 shows the results of the correlation matrix analysis between each indicator of the constraints (i.e., Transport operation management system, Fleet stock age, Service providers, Use of ICT, Rules and regulations, Fleet size, Road condition, Terminal and parking availability) and the efficiency of road freight transport operators.

As can be seen from the study's findings, the Pearson correlation test for the efficiency of road freight transport operators reveals that only five of the eight variables are statistically significant for this study. Although the remaining three variables (service providers, fleet size, and road quality) have connections with the efficiency of road transport operations, they are statistically insignificant.

4.7.Regression Analysis of Road freight transport operator's efficiency

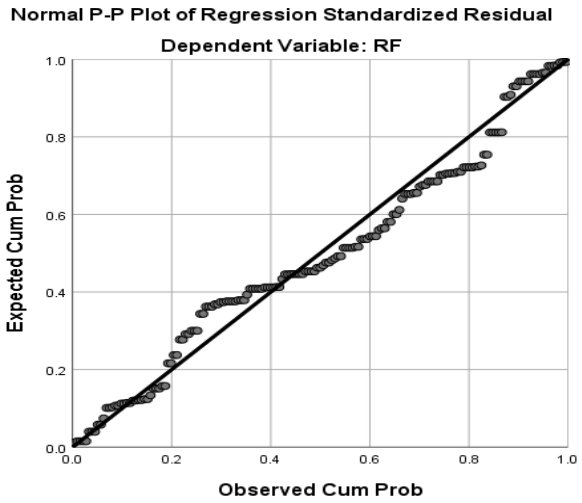
4.7.1. Linear Regression Assumptions

First, regression analysis is sensitive to outliers. Outliers can be identified by standardizing the scores and checking the standardized scores. Second, the main assumptions of regression are normality, homoscedasticity, and absence of multicollinearity. Normality can be assessed by examining a normal P-P plot. If the data form a straight line along the diagonal, then normality can be assumed. To assess homoscedasticity, the scatterplot of standardized residuals verses standardized predicted values can be created. If the plot shows random scatter, the assumption is met. However, if the scatter has a cone shape, then the assumption is not met. Multicollinearity can be assessed by calculated variance inflation factors (VIFs). VIF values higher than 10 indicates that multicollinearity may be a problem.

1. Linearity Assumption

The P-P plot compares the observed cumulative distribution function (CDF) of the standardized residual to the expected CDF of the normal distribution. Simple linear regression is based on finding the straight line on a scatter graph that 'fits 'the scatter points best, i.e. as closely possible (Robert B. Burns and Richard A. Burns, 2008). Regression procedures assume that the dispersion of points is linear. Where the amount of scatter around the line varies markedly at different points and forms a pattern, then the use of regression is questionable.

Figure 4.6 Model Assumptions of linearity



Source: Survey Data, 2022

As we can see from the above output graph , the regression line sloping from bottom right to top left, which indicates a positive relationship between the dependent and independent variables. Moreover; The P-P plots look like a diagonal line; dots lie almost exactly along the diagonal line. Therefore, this assumption is fulfilled.

2. Multicollinearity

Multicollinearity assumption states that independent variables should not be related to each other. According to (Dillon, 1993) when independent variables are highly correlated, there is overlap or sharing of predictive power. This may lead to the paradoxical effect, whereby the regression model fits the data well, but none of the predictor variables has a significant impact in predicting the dependent variable (Robert, 2006). This is because when the predictor variables are highly correlated, they share essentially the same information. Thus, together, they may explain a great deal of the dependent variable, but may not individually contribute significantly to the model. The impact of multicollinearity is, therefore, to reduce any individual independent variable's predictive power by the extent to which it is associated with the other independent variables (r > .85) (Beyan, 2014).

Table 4.16 Multicollinearity Test of Independent Variables

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Transport operation management system	0.911	1.098
	Fleet stock age	0.962	1.040
	Use of ICT	0.856	1.168
	Terminal and parking availability	0.869	1.151
	Rules and regulation	0.827	1.209
a. Dependent Variable: Road freight transport operator's efficiency			

Source: survey data 2022

A more precise approach to check whether or not a given explanatory variable has a strong relationship with the other explanatory variables (an issue of multicollinearity exist in the model), is Tolerance and VIF (variance inflation factor) are the good indicators. For example, Tolerance less than 0.1 (10%) hint at multicollinearity, and VIF (variance inflation factor) > 10 also implies multicollinearity. So that VIF must be between 1up to 10 otherwise VIF <1 or >10 indicates multicollinearity existence (Robert, 2006).

The above table 4.16 show that both the tolerance and variance inflation factor (VIF) are greater than 10%, and below 10 respectively. Therefore, this assumption is fulfilled.

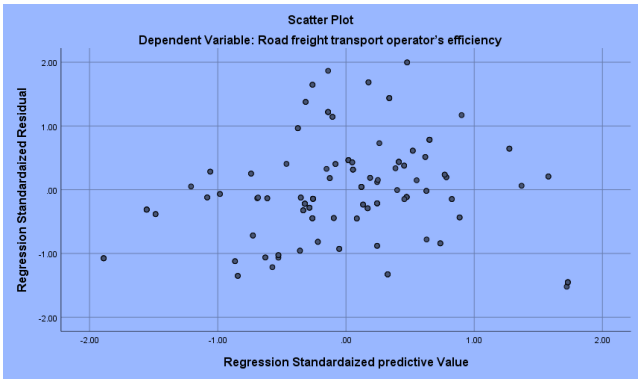
3. **Homoscedasticity**

Homoscedasticity assumption elaborates that the variance of the residuals about the predicted dependent variables scores should be the same for all predicted scores. Error variance is assumed the same across all values of other variable.

As it can be seen from graph, the dots, which are scattered evenly, is the indication of a homogeneity assumption (Mat Roni, 2014).

It could be checked that residuals do not vary systematically with the predicted values by plotting the residuals against the values predicted by the regression model. And looking for any evidence that residuals vary in a clear pattern.

Figure 4.7 Test of Homoscedasticity



Source: survey data 2020

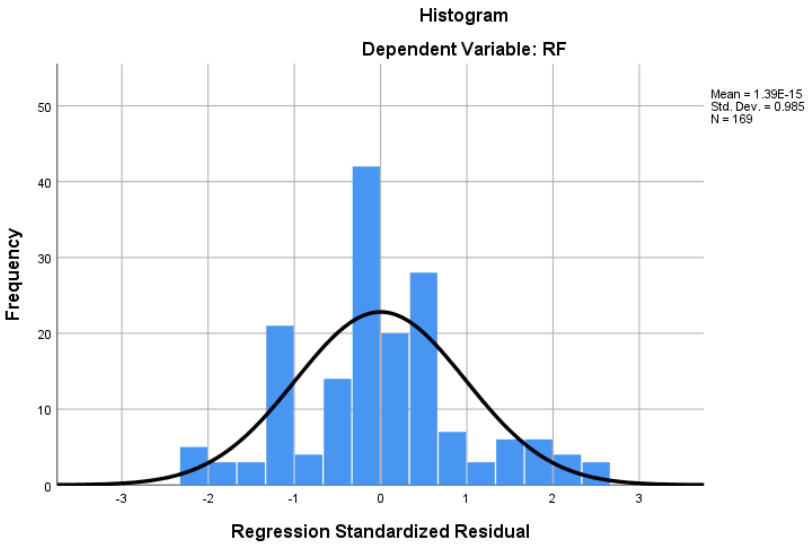
The above figure 4.7 shows, the data points appeared randomly distributed with a fairly even spread of residuals at all predicted values. This scatterplot is a result of what a scatterplot might look like if the assumption of homoscedasticity is met.

The data points seem to funnel towards both the negative of the x-axis, and also toward the positive of x-axis indicating that there is equal variability in the residuals at higher predicted values and at lower predicted values. This suggests that the model is equal accurate in estimating both lower values and higher values. Thus, the assumption of homoscedasticity is met.

4. Normally distributed residuals

A histogram of the residuals (errors) in a model can be used to check that the residuals are normally distributed about the predicted dependent variables scores.

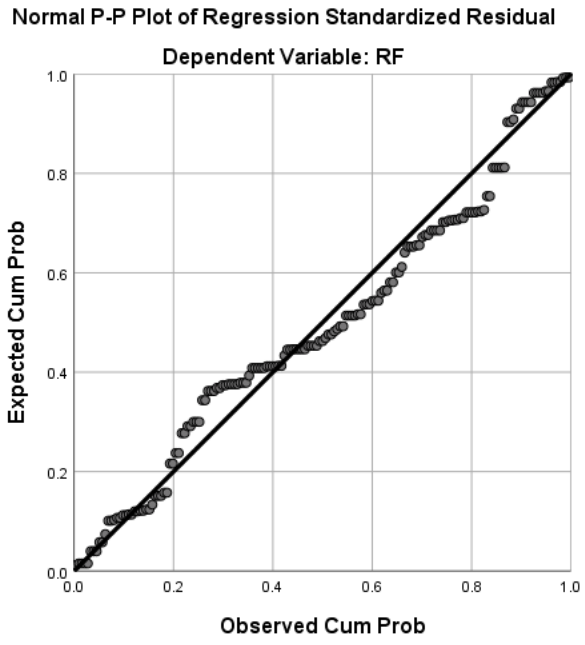
Figure 4.8 Normality Distribution Histogram



Source: Survey Data, 2022

The above histogram on figure 4.8 shows that, the distribution is normal.Additionally, a P-P plot can be used to show normal distribution.

Figure 4.9 Normality Distribution P-P Plot



Source: Survey Data, 2022

As it could have been seen from figure 4.9, the expected and observed cumulative probabilities are matched perfectly. This suggests that the residuals are seamlessly normally distributed. So in this survey result, the assumption of normality is not violated.

5. **Durbin-Watson coefficient**

Durbin-Watson coefficient tests for serial correlation between errors (Field, 2005). A rule of thumb is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside of this range could be cause for concern. Field, (2009) suggests that values under 1 or more than 3 are a definite cause for concern. As indicated below on table 4.20 Durbin-Watson result is 1.66.It shows that the result is between 1.5 to 2.5 ranges. Thus, there is positive autocorrelation between dependent and independent variables in the model.

4.7.2. Regression Model

For the purposes of determining the extent to which the explanatory variables predict the variance in the explained variable, linear regression analysis was conducted. Regression analysis is a statistical method through which one can analyze the relationship between a dependent or criterion variable with the set of independent or prediction variable/s. Unlike correlation, however, the primary purpose of regression is prediction (Marczyk G, DE Matteo D, and Festinger D, 2005).

Table 4.20 Regression Model Summary

Model Summary [b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.641[a]	.411	.374	.25378	1.66
a. Predictors: (Constant), Transport operation management system, Fleet stock age Use of ICT, Rules and regulations, Terminal and parking availability					
b. Dependent Variable: efficiency of road freight transport operators.					

Source: Survey Data, 2022

The above model summary table 4.20 shows how much of the variance in efficiency of road freight transport operators is explained by the explanatory variables considered in the model.

The Adjusted R Square value on the model summary table is a representation of the correlation between the observed values of the dependent variable, i.e. efficiency of road freight transport operators, and the values of the same dependent variable predicted by the regression models.

The Adjusted R Square value obtained indicates that 41.1 % of the variation in the efficiency of road freight transport operators can be explained by the combined variance in the dimensions of the independent variable, namely Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability. Whereas the remaining 58.9 % of the

variations on efficiency of road freight transport operators is explained by factors not considered in this model.

ANOVA test shows the acceptability of the model from statistical perspective. Accordingly, the regression row indicates the extent of variation explained by the model, whereas the residual row indicates information about the variation that is not accounted for the model, i.e. variation on the dependent variable explained by factors not included in the model.

Table 4.21. F statistics

F	Sig.
14.517	.000[b]

On the above table 4.21, it is clearly indicated that the computed F statistic is 14.517 with an observed significance level of 0.000, implying the statistical fitness of the regression model to the data.

4.7.3. Regression Coefficients of efficiency of road freight transport operators

The independent variables Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability were computed with the dependent variable efficiency of road freight transport operators.

Table 4.22 Coefficients of efficiency of road freight transport operators

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.865	.439		1.573	.000
	Transport operation management system	.326	.085	.327	4.789	.000
	Fleet stock age	.281	.075	.180	2.707	.000
	Use of ICT	.371	.077	.282	4.000	.000
	Terminal and parking availability	.365	.089	.057	.814	.000
	Rules and regulation	.387	.084	.120	1.677	.000
a. Dependent Variable: efficiency of road freight transport operators						

Source: Survey Data, 2022

When it comes to the predictive power of the independent variable's dimensions, a closer examination of the coefficients reveals that all five of the independent variable's dimensions, namely Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability, have statistically significant beta values.

Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability were all found to have coefficients of.326, .281, .371, .365, and.3870, respectively.

From the sample results, we can conclude that the limits of transport operation operations have a considerable and favorable impact on road freight transport operators' efficiency. The following generic regression model formulas have been created based on the aforementioned results shown in the table.

The overall efficiency of transportation operations is represented by the regression equation. The formula that is generated is as follows:

Efficiency of road freight transport operators =

.865 +. 326 TraOpMa + .281 FlStock + .371 UICT+ .365RR+ **.**3870TP+ **€**

Where: TraOpMa = Transport operation management system

FlStock= Fleet stock age,

UICT = Use of ICT

RR= Rules and regulations

TP= Terminal and parking availability

€= Error term

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter deals with summary of the findings, conclusions and recommendations. The main purpose of the study was to assess the constraints on operational efficiency of cross border dry cargo transport operators. To achieve the objective of the study, relevant literatures were reviewed, quantitative, and qualitative data were collected through questionnaire and interview filled by employees and other respondents. The data collected through questionnaire were presented, analyzed, interpreted and discussed using statistical package for social science (SPSS 24.0) version. Thus, based on the analysis summary of the findings are provided, conclusions drawn, and recommendations forwarded for stakeholders in road freight transportation sector and researchers who are interested to conduct in-depth study on this issue.

5.2. Summary of Major Findings

The research aims at assessing the constraints on operational efficiency of cross-border dry cargo transport operators in Ethiopia. Accordingly, to meet this objective, the researcher has developed a questionnaire from the relevant literature to collect and analyze the opinions of the study sample. The following findings are obtained:-

- The grand mean score of the items on the variable i.e. transport operation management system (3.32) indicated that most of employees agreed with the presence of good transport management system in their organization.
- The grand mean score of the items on the variable i.e. fleet stock age (3.52) indicated that most of employees agreed that old age trucks have low turnaround time, high operational costs and high amount of pollution.
- The grand mean score of the items on the variable i.e. fleet size (3.95) indicated that most of employees agreed that fleet size have an impact on the volume of freight transported, on fixed costs associated with fleet underutilization and on fleet efficiency.
- The grand mean score of the items on the variable i.e. use of ICT (2.75) indicated that most of employees disagreed with the availability of adequate ICT facilities and an application of information technology to communicate their customers.
- The grand mean score of the items on the variable i.e. the role of service providers (2.10) indicated that most of employees disagreed with on time payment for transportation service given, short waiting time at customs checkpoints and at loading and unloading places.

- The grand mean score of the items on the variable i.e. road condition (1.94) indicated that most of employees disagreed with availability of organized traffic management, safe and secure road and timely repair and maintenance of roads along Addis Ababa-Djibouti corridor.
- The grand mean score of the items on the variable i.e. terminal and parking facilities (2.08) indicated that most of employees disagreed with availability of safe, secure and adequate terminal and parking facilities along Addis Ababa-Djibouti corridor.
- The grand mean score of the items on the variable i.e. rules and regulations (2.25) indicated that most of employees disagreed with availability of flexible and transparent road freight transport laws and awareness creation on new rules and regulation by regulatory bodies.
- The correlation result show that there is positive and significant relationship between constraints (transport operation management system, fleet stock age, use of ICT, rules and regulations, terminal and parking availability) and operational efficiency of transport operators. Hence, those constraints of transport operations have a considerable impact on road freight transport operators' efficiency
- The correlation result also show that the role of service providers and fleet size have connections with the efficiency of road transport operations, but they are statistically insignificant.
- The Pearson correlation test for the efficiency of freight transport operators showed that only five of the eight variables (Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability) are statistically significant for this study. Although the remaining three variables (service providers, fleet size, and road quality) have connections with the efficiency of road transport operations, they are statistically insignificant.
- The regression analysis indicated that 41.1% of the variation in the efficiency of road freight transport operators explained by the combined variance in the dimensions of the independent variable, namely Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability. Whereas the remaining 58.9 % of the variations on efficiency of road freight transport operators is explained by factors not considered in this model.
- The regression analysis revealed that coefficient of determination of the model suggested that the predictive power of the independent variable's dimensions, a closer examination of the coefficients reveals that all five of the independent variable's dimensions, namely Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability, have statistically significant beta values.

- The main assumptions of regression i.e. linearity, normality, homoscedasticity, and absence of multicollinearity showed that, the independent variables are not highly correlated or related to each other and also there is a positive relationship between the dependent and independent variables and those variables are normally distributed.
- The regression analysis based on Durbin-Watson result is 1.66.It shows that the result is between 1.5 to 2.5 ranges. Hence, the variables are normally distributed.
- ANOVA test in this model clearly indicated that the computed F statistic is 14.517 with an observed significance level of 0.000, implying the statistical fitness of the regression model to the data.
- The regression coefficient of the model were also .326, .281, .371, .365, and.387, respectively for Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability. Thus, they have the power to affect the efficiency of road freight transport operators.

5.3. Conclusions

This section presents the conclusion of the study based on the study objectives. The study concludes that :-

- Most of transport operators owned old age trucks and this leads to low truck turnaround time, high operational costs and high amount of pollution for the environment.
- Most of transport operators do not have adequate ICT facilities and do not use information technology to communicate their customers.
- Most of transport operators do not get on time payment for transportation service they given
- There is long waiting time at customs checkpoints and at loading and unloading places due to inefficiency of service providers.
- There is lack of organized traffic management system along Addis Ababa-Djibouti corridor therefore; the road is not safe and secure. The road lacks timely repair and maintenance.
- Terminal and parking facilities along Addis Ababa-Djibouti corridor are not adequate, safe, and secure.
- There is lack of flexible and transparent road freight transport laws and lack of awareness on new rules and regulation set by regulatory bodies.
- The independent variables are not highly correlated or related to each other but they are normally distributed.
- There is a statistical fitness of the regression model to the data.

- Transport operation management system, Fleet stock age, Use of ICT, Rules and regulations, Terminal and parking availability are among the variables that are statistically significant for this study and they have connections with the efficiency of road transport operations.
- Role of service providers, fleet size and road condition have connections with the efficiency of road transport operations, but they are statistically insignificant.
- There is positive and significant relationship between constraints and operational efficiency of transport operators. Hence, those constraints of transport operations have a considerable impact on road freight transport operators' efficiency.

5.4. Recommendations

In order to reduce the impact of the constraints and improve the operational efficiency of road freight transport operators who are operating along Addis Ababa Djibouti corridor this study recommends the following measures

- Transport operators should develop an efficient transport management system that has well experienced experts, good communication, well-trained and organized drivers and fleet control system in order to bring operational excellence in freight transport services.
- Transport operators should increase the number of new trucks with the necessary fleet management technology to use resources efficiently.
- Service providers found at ports, customs check points, warehouses, loading and unloading places should give efficient services.
- Government should develop better transport infrastructures (roads, terminals and parking) on Addis Ababa- Djibouti corridor in order to have efficient, safe and reliable movements of import and export goods.
- Government should support and encourage transport operators to build their capacity through human development and supply of information and resources.
- Government and Transport operators should develop standards related to freight transport operations, facilities and equipment.
- Government should develop a policy that controls the implementation of freight transportation rules and regulations.

5.5. Suggestion for Further Study

This study focused on assessing constraints on the operational efficiency of road freight transport operators along Addis Ababa-Djibouti corridor and the data are collected from transport operators around Addis Ababa, but for the future studies should have to consider expanding this scope along the corridor including sources from dry ports, checkpoints, warehouses and loading and unloading places.

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APPENDIX 1: QUESTIONNAIRE

Addis Ababa University

School of commerce

Department of Logistics and supply Chain management

(Questionnaires to be filled by Transport Associations, Transport Companies and Individual Truck Owners)

Introduction:

This research is designed to fulfill an academic requirement for MA degree program in Logistics and Supply Chain Management at Addis Ababa University. The objective of the study is to assess the constraints of cross border dry cargo road transport operators' efficiency.

Your response is very crucial for the success of this study. Hence you are requested kindly to give a response by putting "√" mark in the given box that you are selected as answer accurately and honestly among the given alternative or by describing your opinion in the space provided. Your comment and suggestions are keeping confidential.

Thank you for your cooperation!

Mintesnot Haile

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Section I: Background Information

1. Gender: Male ☐ Female ☐
2. Age: 18–30-year ☐ 31–40-year ☐ 41-50 year ☐ Above 50 years ☐
3. Highest level of Education achieved

   Primary School ☐ Secondary School completed ☐ Certificate ☐

   College Diploma ☐ Degree ☐ Masters &above ☐
4. Work experience in transport sector:

   0–2-year ☐ 2–4-year ☐ 4-6 year ☐ above 6 years ☐
5. Current Job position:

   Manager ☐ Operation manager ☐ Fleet Dispatcher ☐
6. Based on the road freight transport operator license given by FTA, in which type of category your organization operates?

A. Transport association ☐

B. individual truck owner ☐

C. Transport company ☐

7. How many trucks your organization has? Please specify----------

8. What is the average fleet age in your organization?

   < 5 years ☐ 5-10 years ☐ 5-15 years ☐ >15 years ☐

9. On the average how long distances your fleets cover per month? In Km

   2000-4000 ☐ 4000-6000 ☐ 6000-8000 ☐ above 8000 KM ☐

10. What is the average number of vehicles trip frequency along Addis Ababa Djibouti corridor per a month?

    < 2 times ☐ 3 times ☐ 4 times ☐ 5 times ☐

11. What is the average volume of freight do you transported per month? By ton

    1000-4000 ton ☐ 4000-8000 ton ☐ 8000-12000 ton ☐ 12000-16000 ton ☐

Section II: Questions

Please, indicate the degree of agreement that fits the situation in your company best by putting tick mark (√) in the box. Please, tick per statement based on a five-point scale Where 1 = strongly disagree(SDA), 2 = disagree(DA), 3 = Neutral(N), 4 =agree(A), 5 = strongly agree(SA).

1. The following are some of the key constraints you may encounter while doing your business. Using Likert scale 1-5 please specify the level of your agreement about impact those constraints have on the operational efficiency of your organization. Please tick appropriately.

No	Items	SDA (1)	DA (4)	N (3)	A (1)	SA (5)
Transport operation management system						
1	The organization has experienced experts related to freight transport management					
2	The organization has organized drivers control system					
3	The organization has organized fleets control system					
4	The organization coordinates its services with stakeholders					
Fleet stock age						
1	Old aged trucks have low turnaround time					

2	Old aged trucks have higher operational costs					
3	Old aged trucks generate high amount of pollution					
Fleet size						
1	Volume of freight transported increases when more vehicles are available					
2	Larger fleet size avoid fixed costs associated with fleet underutilization					
3	Real-time dispatching improves fleet efficiency					
Use of ICT						
1	There is adequate technological facility to expedite information flow between clients and operation staffs					
2	The organization provides customers information about the departure and arrival of their shipments online					
3	There is enough telecommunication infrastructure to help road freight transport operations					
4	The organization uses fleet management technology to control trucks along Addis Ababa-Djibouti corridor					
The Role of Service providers						
1	There is short waiting time at loading and unloading places					
2	There is on time payment for transportation service given to customers					
3	The customs offices facilitate goods clearance process timely					
Road condition						
1	There is organized road traffic management along Addis Ababa-Djibouti corridor.					
2	The Road along Addis Ababa-Djibouti corridor is safe and secure					
3	There is timely repair and maintenance of damaged roads on the corridor					
Terminal and parking availability						
1	There are adequate terminal facilities and necessary equipment along Addis Ababa-Djibouti corridor					
2	There are enough parking facilities along Addis Ababa-Djibouti corridor					
3	There are secure and safe terminals parking areas along Addis Ababa-Djibouti corridor					
Rules and regulation						

1	laws and regulations of freight transportation are transparent & applicable					
2	The rules and regulations' set by regulatory bodies are flexible					
3	Transport operators are aware of new rules and regulations timely					
Road freight transport operator's efficiency						
1	The organization delivers Shipments to its clients timely					
2	The organization has enough number of trucks to give transport service					
3	The organization manages effectively its operational costs					
4	The organization evaluates its vehicle productivity					

APPENDIX 2: INTERVIEW QUESTIONS

Interview questions to be filled by government officials and experts

These interview questions are prepared to gather reliable information about constraints of cross border dry cargo road transport operators' efficiency from government officials and experts.

Organization's Name……

Address……

1. What is the authority and responsibility of your organization in the Ethio-Djibouti corridor?

   ……
   ……
2. What is your observation about the existing situation related to road freight transport operation along the corridor?

   ……
   ……
3. How do you see the operational efficiency of cross border dry cargo road transport operators in Ethiopia in terms of distance coverage, freight uplifted, vehicle utilization, operation cost and others?

   ……
   ……
4. What are the main internal/organizational related constraints that affect cross border dry cargo road transport operators' efficiency?

   ……
   ……...
5. What are the main external constraints related to stakeholders and others regulatory bodies that affect cross border dry cargo road transport operators' efficiency?

   .....
   .....