

**EFFECT OF GREEN FREIGHT TRANSPORT PRACTICES ON  
THE OPERATIONAL COSTS OF FREIGHT FIRMS IN KENYA**

**BY**


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## DECLARATION

This research project is my original work and has been submitted for examination in this or any other university.

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## **ABBREVIATIONS AND ACRONYMS**

<b>DRP</b>	Disaster Recovery Plan
<b>EDI</b>	Electronic Data Interchange
<b>EU</b>	European Union
<b>GSCM</b>	Green Supply Chain Management
<b>KIFWA</b>	Kenya International Freight & Warehousing Association
<b>NRBV</b>	Natural Resource Base View
<b>OECD</b>	Organization for Economic Cooperation and Development
<b>PLC</b>	Public Listed Companies
<b>SGR</b>	Standard Gauge Railway
<b>SPSS</b>	Statistical Package of Social Sciences
<b>STRRB</b>	Special Transportation Research Report Board
<b>TQEM</b>	Total Quality Environmental Management

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## **ABSTRACT**

The recent changes in business dynamics on merchandised goods and cargo transportation have impacts on the business operational costs. On the other hand, the study of Green Freight Transport Practices and freight firm's operational costs pursued knowledge and environment friendly business practices. The benefits realized by the study are promotion of sustainable development in the economy, environmental protection and sustainable operational costs. The study sought to determine the effects Green Freight Transport Practices on Operational costs of freight firms operating in Kenya. The study objectives were; to determine the level of adoption of green freight transport practices by freight firms and to establish effects of green freight transport practices on operational costs. The study explored seven practices which were distribution strategies and transport practices, reverse logistics, warehouse and green building, eco-design and packaging practices, internal management, cooperation with customers and external management practices. The study adopted descriptive research design in obtaining information about the study topic. The study population comprised 141 licensed freight firms who are members of Kenya International Freight and Warehouse Association (KIFWA). The firms were sampled and data were collected using questionnaires and analyzed using descriptive and inferential analysis. The study found out that the practices were averagely implemented to a moderate extent except for internal management practices and external collaboration practices which were implemented to a small extent. The study found a positive correlation between the green freight transport practices and operational costs. The study concluded that increase in green freight transport practices lead to the positive effect on poerational costs. The study also recommended that proper budgetary consideration and plan should be considered before any freight firm undertake any green freight transport practices decision.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

Freight transport is a process in which commodities and merchandise goods and cargo are conveyed. Dablanic (2001) states that freight transport is the transportation of commodities done by professionals in both urban and rural set up. On the other hand, green freight transport practices are means of pursuing knowledge and practices that leads to decisions which are ecologically and environmentally friendly. These practices are meant to protect the environment while sustaining natural resources for future generations. The approach to achieve green freight transport practices goes beyond strategic urban planning since the effect becomes visible in traffic level and are only causal chain in green freight transport practices. (Baubly, 2007; Jukabaukas & Vasilis V. (2007) noted that larger investments annually are spent in maintaining and improving the freight transport systems to benefit passengers and freight transport players along internal market. At operational level, freight operational costs can distort the distribution of labour as a human resource in a country and therefore can negatively affect development and even dwarf the economic growth of a country.

The effect of green freight transport practices on operational costs is anchored on three theories. One of these theories is the transaction cost theory which is generally accepted as a useful framework for analyzing general transport and logistical decision at the operational level (Hobbs 1996). This theory tries to predict how the level of uncertainty in the operational costs affect the choice of either to insource or outsource a particular green initiative by a decision maker (Aubert & Weber, 2001). The second theory is the agency theory which provides the means to justify the establishment of alliances between the freight firms and their stakeholders within the freight transport (Blancero & Ellram, 1997). The third theory is the Natural Resource-based View (NRBV) which focus primarily in discovering the firm's competitive advantage based on its resources while linking this resources with pollution prevention and firm's profitability.

The freight transport industry is one of the key industries which is critical in the development agenda of Kenya. Kenya is a third world country with cities like Nairobi, Kisumu and Mombasa. The freight transport industry plays a role in economic development of these cities and other surrounding towns. This industry has

a strong link with other sectors of the economy like power, transportation, construction and telecommunication. The freight transport volume is expected to rise by almost 70% for every ten years, this is according to the European freight analysis framework (European transport and energy commission, 2006). Consequently, Creedy (2006) expressed that green issues can have positive impact on the operational cost of freight firms in the cities and specifically in the urban planning. It's therefore necessary for freight firms to embrace green practices to be competitive in the market and amicably play a critical role in social and economic growth of a country.

### **1.1.1 Green Freight Transport Practices**

Green freight transport practices are practices involving both the environmental and eco-friendly practices for sustainable resource usage. The practices involve the movement of commodities within a region. The Organization for Economic Cooperation and Development, OECD (2003) states freight transport is part of every day's life as citizens of a country use and consumes commodities produced within and outside the host country. The green freight transport on the other hand enable the citizens to access products through convenient deliveries to their destinations.

The study explored seven green freight practices namely, distribution strategies and transport practices, reverse logistics, warehouse and green building, eco-design and packaging practices, internal management practices, cooperation with customers and external management (Lieb & Lieb, 2008; McKinnon, 2010). These practices have been highlighted by various studies and some of the benefits realized by freight firms from these practices are; promotion of sustainable development in the economy, environment protection, social responsibility, and generally sustainable operational cost (Nykanen, Minken, Ramjrudi, Mathews & Monzo, 2001).

### **1.1.2 Operational Costs**

Operational costs of any business entity is defined as the expenses associated with the maintenance and administration of a business daily (Kenton & Murphy, 2019). The operational costs elements on green freight transport are cost of goods sold, operating expenses and overhead expenses for example delays in delivery, scrap cost, productivity cost, capacity utilization cost and product associated quality cost. The green freight transport operational costs are part of physical infrastructure and facilities that aid in the movement of people from one point to the other. The

infrastructures and facilities promotes the development in firms' production and operational efficiencies as argued by Margarita (2004).

Operational costs of freight firms have implications which are not limited to the delivery rate, volume of delivery in warehouses, scraps and delivery quality of firm's products, variety of product line and capacity utilization. These implications are part of daily routine of freight firms as they carry out their duties. These routines are means through which these freight firms incur operational cost in their administration, incurred expenses and cost of goods sold (Stevenson, 2009). The study use the operating ratios to measure the efficiencies of freight firms. The ratios shows the management efficiency as they try to keep the cost low while trying to increase the revenues.

### **1.1.3 Green Freight Transport Practices and Operational Costs**

The green freight transport is part of transport industry, it is therefore an important component of an economy as it impact on the development and social welfare of a population. When the green freight transport system is not effective enough, it can have negative effects on operational costs in terms of reduced or missed opportunities. Consequently, green freight transport practices enhance environmental sustainability and optimizes transport strategies. In this way, the operational costs can be used as a strategic move to boost transportation efficiency and economic development. Green freight transport practices can assist in addressing pollution issues and climate change challenges (Button & Hensher, 2000). The adoption of green freight transport practices improves the firm's competitive advantage through subsequent reduction of operational costs to the firm while increasing the firm's profitability. The freight firms can realize this through reducing supply expenses, cutting on operational cost, modernizing its the marketing efforts, use of virtual technologies, consolidating difference departmental functions and lastly focusing on quality of the firm's products into the market.

The values of green freight transport practices are increasingly becoming important because of environmental awareness by freight firms on effect on operational costs (Sara, Zorzini, Enrico, Guido & Micheli, 2012). The effect of these practices are enhanced through reduced capital investment and improved service delivery (Onyango, 2009). The robustness and effectiveness of freight transport firms within

the supply chain can be enabled by gaining competitive advantage through superior customer's service delivery, enhanced green freight transport practices and low operational costs (Stevenson, 2009). However, the concept of green freight transport practices can be poorly implemented when freight firms lack legal backing in the transport sectors. This can result in perceived high operational costs involved in the adoption of green freight transport practices. Consequently, green freight transport practices pose challenges for freight firms. These challenges can be solved by closely evaluating the whole supply chain of freight firms and adopting green freight transport practices that best suit their needs (Creedy, 2006).

#### **1.1.4 Freight Firms in Kenya**

Kenya has 892 freight firms operating within its boundary, this is according to the Kenya International Freight & Warehousing Association (2020). Some of top freight transport companies listed include AA of Kenya, Civicon Ltd, Air Transport, Apple logistics, Jambo logistics limited, Nadson Freight & Logistics, Trade link logistics, Seaborne international limited, Aero group logistics limited, Freight net Kenya, Gibron limited as stated by Administrator Freight net (2018). These firms have come up with a group network subsidiaries and agents to support their operations in Kenya. The freight firms offer a range of clearance, forwarding and logistics services to various customers within the country. These firms are members of Kenya International Freight and Warehouse Association (KIFWA). It is a requirement of KIFWA for these firms to regularly provide such services in a total green-field environment as stated by KIFWA Administrator (2018). The association also ensure that the information and statistics affecting members or their business are relayed to the government agencies for policies formulation and implementation (Muendo, 2014).

The freight transport industry in Kenya is a joint venture between the government and the public. The decisions and policies in this sector are made by the state agencies under the ministry of transport. The diversity of these decisions and policies on freight transport requires coordination as a comprehensive freight program (R.W. Ebert, 1998). The services offered by these firms include but not limited to cargo handling, warehousing, logistics on tracks being hired by their clients, freight forwarding, customs clearing and handling of petroleum products as stated by KIFWA

Administrator (2019). There are disputes concerning policies issues in the freight transport sector in Kenya. These disputes arise due to lack of clear role of the government in the freight transport sector. The diverse government programs and policies on the Standard Gauge Railway (SGR) directives over cargo transportation to inland ports have been the greatest challenge. Other challenges experienced by players in this sector are periodic road congestions, lack of proper police traffic control, regulations on the use of transport facility like the weighbridge (R.W. Ebert, 1998) and as well as overpricing (fees and taxes change on the users of the public facility).

The study has come up with some of the solutions to these challenges. One of the suggestion is the application of the principle of good governance whereby some of the freight transport services are offered at a cost i.e. congestion cost, environmental cost and accident cost. Other suggestions are weight limits measures by tracks as well as tracks design dimensions. On the part of environmental pollution, there should be trading emission permits levied on tracks and safety regulation costs. The high way excise duty revenue can also be introduced to cater for the maintenance of the freight transport facilities (R.W. Ebert, 1998).

## **1.2 Research Problem**

The freight transport fulfils the mobility of commodities and citizens of a nation, as a result of a derived demand (Sustainable Cities Commission, 2011). On the other hand, green freight transport practices have positive impacts on the sustainability of cities and freight firm's competitiveness (Creedy, 2006). Green freight transport is critical to the freight firm's profitability and sustainability in the market. This fact has influence most freight firms to include green freight transport practices in their daily routine work of clearing, forwarding and other logistical services.

On a keen evaluation of the Kenyan situation concerning freight transport, the country relies more on the imported commodities which have prompted the increased use of freight transport within the country. Since the Kenyan society relies more on the freight transport, fuel economy and use of cargo tracking systems are being implemented by freight firms as part of green freight transport practices used to minimize the effects of pollution emissions, congestions on roads, accident cost and other negative economic effects on freight firms (Khafra, 2012).

The researcher is not aware of current studies documented on the effect of green freight transport practices on operational costs of freight firms in Kenya. However, a study by Khafra (2012) on the challenges of the green supply chain on the operational cost of firms in Mombasa, Kenya. The study found out some of the challenges were environmental cost, transport levies and tricked government policies and programs. Another study was conducted by Obiso (2011) on green supply chain management by independent petroleum marketing firms, it was established that majority of these firms did not appreciate the need to invest in green practices as these practices have no significant impacts on operational cost. The study established that green freight transport practices like the use of tracking devices and fuel cut-outs techniques are used to curb the problem of theft rather than to reduce the effect on the operational costs (Muendo, 2014).

The area of study requires the attention for more research to be done on the effect of green freight transport practices on operational costs of freight firms in Kenya. The existing studies on this area are not exhaustive to establish the effect of green freight practices on the operational costs of freight firms in Kenya. This study will be an effort towards examining the effect and full fill the gap in this research area. The study sought to find answers to these research questions; what are the green freight transport practices employed by freight transport firms in operating in Kenya? Do green freight transport practices affect the operational cost of freight firms in Kenya?

### **1.3 Research Objectives**

The general objective of study was to determine effects of green freight transport practices on operational costs of freight firms in Kenya.

The study specific objectives were;

- (i) Determine the level of adoption of green freight transport practices by freight firms in Kenya.
- (ii) Establish the effects of green freight transport practices on operational costs of freight firms operating in Kenya.

### **1.4 Value of the Study**

The study can be applied in evaluating the effectiveness of freight firms on their operations costs in Kenya with regards to the implementation of green freight



transport practices. The study takes a keen look at these green freight practices and eventually determine their effects on various freight firms.

The study contributes immensely on the Natural Resource Base View as a theory where the emphasis is based on a specific green freight transport practice as a resource used by freight firms to gain a competitive advantage. The firm can apply such practices as a resource to prevent pollution, dangerous environmental emissions and minimize resource usage as an effort to reduce natural resources depletion.

The government agencies and other ministries will benefit from the finding of the study as it will allow them to come up with policies on track weight limits, policies limiting pollution emissions and vehicles designed facilities. On the other hand, scholars will benefit from the study as it contributes to the theory establishing the effects of green freight transport on the operational cost and subsequently bridge the gap in the existing literature while suggesting areas for further studies.

Green freight transport has grown consistently over the years due to competition by firms on green philosophy and on the need to maximize profit. Many firms attest to the importance of green freight transport practices on the sustainability of the environment and reduced operational costs (Lieb & Lieb, 2010). Other reasons for the immense growth over the years are cost-cutting, expansion of market coverage by firms and quick response to market demand.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter constitutes an overview of available literature relating to the effects of green freight transport practices on freight firms operational costs. The chapter is structured into; Theoretical foundation of the study, variables of the study, empirical review, conceptual framework, summary and knowledge gap.

#### **2.2 Theoretical Foundation of the Study**

Theories give an explanation to some of the occurrences by generating explanations about them. These occurrences are perceived to have occurred in the past and also influence how we interact with the world in the future (Gill & Johnson, 2002). The study major on three theories namely; transaction theory, natural resource-based view and agency theory.

##### **2.2.1 Transaction Cost Theory**

The transactional cost theory tries to analyze and explain the reason why certain firms operations are performed by the firm and other outsourced (Sara, Jacobson & Ragan Petrie, 2012). The theory proposition that uncertainty in green freight transport practices is likely to impact on the operational cost of freight firms. This can only be limited by a decision maker on whether to outsource or insource some of these green freight transport practices during their implementation. The theory implies that when the transactional cost is low than buying and selling of good are preferred by the market players.

This theory provides a framework for analyzing general transport and logistics decision (Anderson, 1997). It is therefore used in freight transport to predict whether certain economic tasks including green freight transport practices can either be outsourced to other market players. It is also applicable in predicting the outcome of whether to insource or outsource certain decisions of hierarchical governance. This involves considering the freight firms transactions not only as of the transaction of buying and selling but also as emotional interaction and informal exchange of gifts (Williamson, 1985).

### **2.2.2 Agency Theory**

The theory was explored by Jensen and Meckling in 1976. The authors illustrated how the outside shareholders cannot control the manager's actions on cost thus leading to the agency problem. The theory gives the justification as to why the alliances are formed between freight firms and other service providers within the transport industry (Blaker & Ellram, 1997). The theory analyses the relationship existing between the principal and the agent as applied in the freight firm client relationship. The principal normally delegates work to agents in anticipation that the agent will work to the best of his interest (Sara et al., 2012). The pursuit of similar interest is not always evident between the two parties, otherwise, the agency problem will rise which might require necessary attention to solve.

The theory makes the assumptions that the buying and selling firms share valuable know-how with each other and their relationship is pegged on high investment return (Dyer and Singh, 1998). However, a joint investment by freight firms occur at a certain operational cost and the operational cost can jointly be shared between the freight firms and their clients. The principal-agent relationship can culminate into self-interest where the two key players work ways to maximize their objectives in the relationship.

### **2.2.3 Natural Resource-Based Theory**

The theory was introduced by Hart (1995) in his research work. The theory has over the years become a theoretical theme in the operation management field. The theory focused on discovering the firm's competitive advantage based on natural resources available to the firm. Barnsley (1991) applied the theory as it was intended to be used in discovering with each other the link between pollution prevention and firm profitability.

The theory is relevant to this study as it emphasizes that, for a firm's resource to provide an opportunity for sustainable competitive advantage, a resource must be valuable, rare, and immutable and it is supported by tacit skills (Barnsley, 1991). The theory provides freight firms with evidential ability to use their natural resources to prevent pollution, reduce natural resource input requirements, simplify transactionally, reduce compliance to policies cost and liability cost. The freight firms and NRV issues lie in the understanding that not all firms, resources

are likely to provide a competitive advantage and these resources should be associated by effective clean technological commercialization (Harts, 2007). The improvement in environmental performance can effectively reduce firms operational cost through pollution prevention strategies. This implies the effective use of natural resources increases economic benefits to freight firms.

### **2.3 Elements of Green Freight Transport Practices**

Green freight transport practices are part of supply chain and logistics strategies that enhance environmental sustainability while distributing goods and services (Sara et al., 2012). The practices refer to a collection of technologies used by freight firms to improve their efficiency and provide them with means to benchmark and track their performance. The green practices are discussed as follows:

#### **2.3.1 Distribution and Transport Execution Practices**

These practices are aimed at availing the products to clients within the supply chain. The plans to avail products to clients can either be intensive, exclusive and selective distribution. These plans depend on business and market location sites. Some of these practices are freight consolidation, reduced vehicle idling time, use of internet communication technology (ICT) application. These elements support operational functions like route planning, fleet tracking and tracing (Lieb & Lieb, 2010). The elements are normally used to improve efficiency and effectiveness of freight firms operations along various routes.

Freight consolidation is an element that helps freight firms deliver more goods using one means of transport enhance making transportation efficient in reducing carbon dioxide emission in air and also reduces operational costs per kilometre of transported merchandise (Gupta & Baghchi, 1987). Additionally, the route planning and scheduling help in reducing carbon dioxide emissions and saves time spent on the road. Indeed, distribution and transport execution practices are acknowledged and practised by most freight firms they are supported by government policy requirement, need to reduce rising fuel cost usage and the desire to enhance firms' image ( Lieb & Lieb, 2008; McKinnon, 2010).

### **2.3.2 Warehouse and Green Building Practices**

These practices are resource-efficient and benefit not only the freight firms but also individuals working in a warehouse facility. The practices are preferred by many freight transport client since they dictate that distribution centres should be located near urban zones to ease transportation in and out of the building (Holdway et al., 2002). Warehousing and green building practices lies mainly in the construction industry, the elements of these practices are and not limited to use of recycled concretes, steel and asphalts and energy-efficient lighting systems, materials handling equipment and finally work place environment (Sara et al., 2012). The practices reduce the consumption level of natural resources, increase staff health and productivity in the workplace. The practices add market value to the freight firm's portfolio by protecting biodiversity, ecosystems while ensuring improved air quality and water quality.

There are many projects towards green building practices, these include installations of skylight and clerestory windows used as a source of the interior illumination in a distribution facility. The sources of natural energy are less polluting and are part of programs meant towards sustainable development (Hilty et al., 2006). Solar energy initiative is one of the green warehouse practices and a source of alternative energy source. Similarly, energy-efficient equipment and water systems that minimizes water usage while promoting the use of grey waters are also part of the warehouse and green building practices (Lieb & Lieb, 2010).

### **2.3.3 Reverse Logistic Practices**

Reverse logistic is defined by Council of Logistics Management (1993) as a process to plan, implement, efficiently and effectively control the cost of raw materials flow, inventories both processed and in-process, informational flow to capture value (Sara et al., 2012). Generally, reverse logistic practices refer to the recycling of used products to their point of origin through logistics.

There have been many considerations to the reverse logistic approach in the recent past, this has been as a result of environmental awareness and logistics sustainability in terms of greening approach. Lieb and Lieb (2010) states that many global third party logistic firms have made a great commitment to environment sustainability and green freight transport practices for so many years.

The reverse logistic elements implemented by freight firms include remanufacturing, refurbishment, container hauling and use of recycled packaging materials (Muendo, 2014). These reverse logistics elements benefit freight firms by adding value to their corporate image, allow better applicability of green freight transport practices legislation and assist to establish the reverse distribution of consumption of products and services (Leite, 2003).

#### **2.3.4 Eco-design and Packaging Practices**

These practices entail sustainable and ecologically friendly materials usage and designs used by freight firms to minimize their operational cost. There are six elements of these practices; they include use of flexible packaging materials, printing inks, repackaging, low carbon logistics, sourcing for packaging materials and waste minimization (Holdway et al., 2002). The practices involve measures meant to come up with the products that minimize the rate of raw materials usage while encouraging the use of renewable energy sources (Muendo, 2014).

These practices benefit the freight firms as they minimize the negative effects on the environment while promoting the use of biodegradable materials (Muendo, 2014). The practices also optimize freight load through load consolidation and this has been in practice by freight firms for many years. Continued reduction in weight and volume of packaging has led to efficient cargo handling and reduction in material wastage (Sara et al., 2012).

#### **2.3.5 Internal Management Practices**

These are practices involving policies, procedures and processes used by the freight firms' management to achieve internal control and best organizational practices. The practice is part of human resource roles in the organization. These roles are carried out by managers and staff members of freight firm. The elements of this practice include personnel training and development on the targeted environmental issues, compliance with the environmental sensitive laws and regulations for environmental sustainability (Lieb & Lieb, 2010). The seven internal control procedures used by freight firms are separation of staff duties, installations access control, auditing procedures, standardizing documentation, trial balances, accounts reconciliation and approval authority.

Murphy and Poise (2003) stated that freight firms use formal and informal policies to manage their internal green practice issues. The strategies used are based on the degree of formality of these organizations. Freight firms employ highly trained personnel to serve high-end customers through the use of innovative service delivery solutions. Freight firms focus on staff training and development to make them sensitive to internal management practice and environmental sustainable issue. The freight firms normally set appropriate environmental targets on greening and establish their priorities on these issues (Lieb & Lieb, 2010).

### **2.3.6 Cooperation with Customers**

This is an innovative process practised by firms in product research and development innovation process. The customers provide information to firms which they use in an innovative efficient process manner and develop a product into the market (Sanchez et al., 2015). The practice benefits freight firms as they spend less time and money to achieve innovation. They also use customers as their external agents with regards to new product development. In the market, the intensity of freight firm innovative ability increases with the increase in their investment portfolio.

Freight firms collaborate with customers on the green freight transport initiatives, the key issues are on logistics and transport activities (Sara et al., 2012). For instance, the freight firms' customers are involved in the warehousing and inventory handling of products as well as the mapping the whole supply chain for value creation, cost-saving and service improvement opportunities. The areas of cooperation in the freight transport with customers are efforts on carbon dioxide reduction, vehicle fleet improvement and recovery policies of end products (Lieb & Lieb, 2010).

### **2.3.7 External Collaboration Practices**

External collaborations are the component of work with the capability of either sharing information or document. External collaboration are initiatives like group membership programs and partnership with the freight firms' suppliers. The variable in consideration by the freight firms and their business partners are based on energy consumption, waste production and management and pollution control before venturing into this practice (Sara et al., 2012). Besides, collaboration with

other key player like third party logistics, non- government organization and government agencies on issues of green freight transport policies should be procedural and periodic audit should be done on these issues (Lieb & Lieb, 2010).

The common external collaboration goal is a knowledge sharing on the improvement of customer's service, fleet efficiency, carbon dioxide emission and use of an alternative source of energy. The external collaboration practices benefit the freight transport firms by improving their transport efficiency, optimizes freight routes as well as freight loads (Sara et al., 2012). Other benefits cited by Littler et al., (1995) includes the ability of knowledge sharing, risk reduction in product development, the higher speed of product development and high responsiveness to customer needs.

## **2.4 Empirical Review**

Many green initiatives research had been conducted so far by researchers in the logistics and transport industry (Creedy, 2006; Zhu & Sharkis 2004; Zhu et al., 2008) classified the green freight transport practices as the distribution and transport execution strategies, reverse logistics, warehouse and green building, internal management practices, eco-design and packaging, cooperation with customers and external management practices. The findings of these studies were on the tangible and intangible benefits of adopting green practices which were to enhanced cooperate image, increased efficiency and effectiveness.

The study on the adoption of green initiatives and environmental performance by Public Listed Companies (PCL) in Malaysia (Aziz et al., 2003) found out that the effect of green initiatives on environmental performance is still moderate in public listed companies. Another study by Fadhili (2015) concerned by the green practices in hospitality and tourism industry in Lamu County- Kenya established that eco-design building practice was most preferred followed by waste management and need for clean air. Jurian (2010) study research on the impacts of the adoption of green operational practices on the performance of Malaysian automotive industry, found out that for the firms to increase their competitiveness in the market, they need to adopt green practices in their operations. The green practices were identified to be green supply chain, lean six sigma and finally green balanced scorecard. The firms that adopted these practice benefited from reduced



waste cost and green innovations. Omange (2010) researched on the impacts of green supply chain management on competitiveness of commercial banks in Kenya. The practices investigated by the researcher were environmental collaboration, green purchasing and green production among other practices. These practices were found to increase operational efficiency, increase customer's base and reduce waste level.

## **2.5 Summary and Knowledge Gap**

The use of green freight transport practices has been supported by many theories including agency theory, transaction cost theory and natural resource-based view among others. Green freight transport practices are part of supply chain and logistics strategies that enhance environmental sustainability while distributing goods and services (Sara et al., 2012). The practices refer to a collection of technologies used by freight firms to improve their efficiency and provide them with means to benchmark and track their performance.

Green freight transport practices investigated by the study were distribution strategies, warehouse and green building, reverse logistics, eco-design and packaging practices, internal management, cooperation with customers and external management practices (Lieb & Lieb, 2008; McKinnon, 2010). Not many studies have been conducted on the green freight transport practices but the few studies conducted so far have no consistency on the effects of these practices on the operational costs. Some of the studies were Jurian (2010) on the adoption of green operational practices on performance of Malaysian automotive industry and Aziz et al. (2003) on the green initiative adoption on the environmental performance of public listed companies. Lin Ho (2008) examined six factors that influence the adoption of green innovation on the logistics service providers. The six factors were technology, organization and environmental dimensions among other factors.

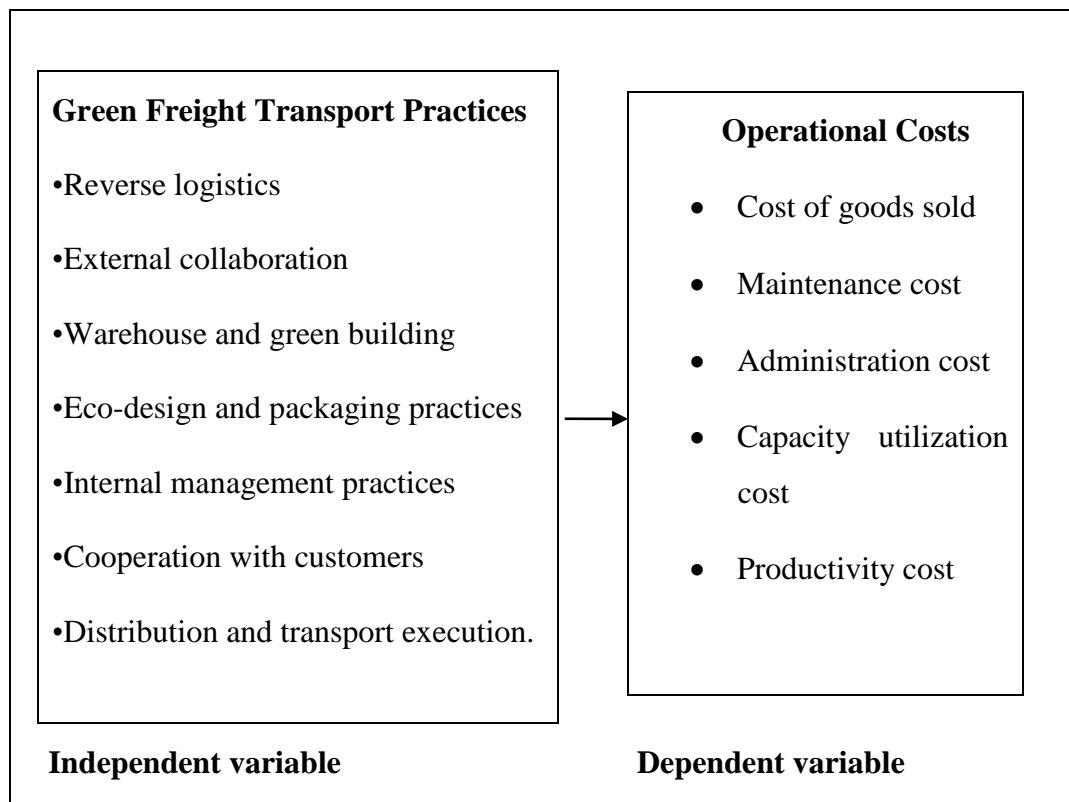
Kenyans have mostly conducted studies on logistics and supply chain, little research work have been done on the green freight transport practices and operational costs. Some of the studies on the topic were done by Omanga (2010) which was on the green supply chain management and the competitiveness of commercial banks in Kenya. Fadhili (2015) also researched on the green practices

in the hospitality and tourism industry in Lamu County Kenya. These two studies among others done in Kenya were directly link to the study topic of this research.

## 2.6 Conceptual Framework

The conceptual framework analyzes the proposed relationship between green freight transport practices and operational. The green freight transport practices are distribution and transport execution, warehouse and green building, reverse logistics, eco-design and green packaging, internal management, cooperation with customers and external management. The dependent variable is the operational cost. The operational costs factors includes the cost of goods sold, maintenance cost, administration cost, productivity cost, capacity utilization cost.

**Figure 2.1: Conceptual Framework**



## 2.7 Research Hypothesis

Based on the literature review, the study proposes the following hypothesis to explain the relationship in Figure 1, the conceptual framework.

**Hypothesis:** Green freight transport practices have direct effect on the operational costs of freight firms.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The chapter describes the methodology adopted by the researcher to carry out the study. It described into details the research design, population of the study, sample design, data collection instruments and lastly techniques of data collection.

#### **3.2 Research Design**

The descriptive cross-sectional survey research design was employed for the study. This enabled the researcher to gather a large volume of data aimed at finding the existing relationship between the research variables. The study was explanatory and lacks enough empirical evidence. Therefore, a descriptive approach was adopted focusing on freight firms in Kenya. The descriptive sampling approach was used to collect data to answer the questions concerning the current status of the subject matter of the study (Mugenda & Mugenda, 2003). The approach was to help the researcher generalize the findings of the larger population by singling out existing characters and trends of the research variables.

#### **3.3 Population of Study**

The population for the study was all the freight service providers based in Kenya. There were 892 freight firms registered and operating in Kenya, this is according to the Kenya International Freight & Warehousing Association (KIFWA), (2020).

#### **3.4 Sample Size and Sampling Technique**

The sample is representative of the study population. A sample of 141 freight firms operating in Kenya was considered meaningful inference for the study (Mugenda & Mugenda, 2003). The sample size is a function of the population and at least 141 firms from the population were considered meaningful for the study.

The random sample technique is easier to use and as well as accurate in data representation. The technique was used by the researcher to easily extract a research sample from a larger population. In this case, the firms used for the study were chosen by chance and each member of the population under the study had an equal chance of being selected (Westlander, 2000).

### 3.5 Data Collection

Primary data for the study was collected through a self administered questionnaire. The questionnaires were divided into three sections representing various variables of the study. These sections were structured with open-ended questions. The first section of the questionnaire provided the bio-data of the respondent for example the company name and the age bracket of the respondent. The second section provided the extent of agreement or disagreement with the adoption of green freight transport practices by the freight firms. This section was divided into seven subsection. Lastly, the third section provided the extent to which the operational costs had performed over the years of the freight firms operation.

The questionnaires were administered through drop and pick method. The researcher picked on any of the logistics department staff to respond to the questionnaire. The chosen respondents were given the explanations for the study while being assured of their response confidentiality and anonymity. The researcher sought the consent of the respondent and collected the questionnaires from them.

### 3.6 Operationalization of Study Variables

This is the conceptual process of linking study variable with the concept of the study. It defines the measure of variables used in the study as follows;

Table 3.1 Operationalization of Study Variables

Variable	Sub-variables	Indicators	Source
Green Freight Transport Practices  <b>(Independent Variable)</b>	Distribution and transport execution practices	-Freight consolidation -Vehicle scheduling/ cross-docking - Mode of transport selection -Use of Transport Management Systems (TMS) -Fleet tracking and tracing ( real-time visibility)	Murphy & Poist (2008); Fraruk et al. (2002)
	Warehousing and green building practices	-Staff health and safety consideration -Energy-efficient lightening	Murphy & Poist (2008); Fraruk et al. (2002)

		<p>systems</p> <ul style="list-style-type: none"> <li>-Energy-efficient equipments</li> <li>-Use of recycled concrete, steel and asphalt</li> </ul>	
	Reverse logistics practices	<ul style="list-style-type: none"> <li>-Refurbishment activities</li> <li>-Reuse of containers</li> <li>-Recycling packaging materials</li> <li>-Remanufacturing activities</li> </ul>	Murphy & poise (2008); Pappis (2008)
	Eco-design and packaging practices	<ul style="list-style-type: none"> <li>-Repackaging &amp; Waste minimization</li> <li>-Use of flexible packaging materials</li> <li>-Reduced weight and volume packaging of the material</li> <li>- Low carbon logistics</li> <li>- Printing ink techniques ( ISO standards for printing industries)</li> <li>-Green Sourcing of packaging material</li> </ul>	Lieb & Lieb (2010); Zhu & Sarkis (2010)
	Internal management practices	<ul style="list-style-type: none"> <li>-Personnel training and development programs</li> <li>-ISO 14000 certification on environmental management</li> <li>-Housekeeping practice on firms operations and record-keeping</li> <li>-Separation of duties (does one person completes the work)</li> <li>-Standardization of documentation</li> <li>-Approval authority/ power to bid in a contract</li> <li>Installation access control</li> </ul>	Lieb & Lieb (2010); Zhu & Sarkis (2010).
	Cooperation with customers	<ul style="list-style-type: none"> <li>-Inventory and Warehouse handling</li> <li>-Mapping of reverse logistics</li> <li>-Vehicle fleet management on minimizing freight transport cost</li> </ul>	Lieb & Lieb (2010); Zhu & Sarkis (2010)

		-Branch cooperation -Disaster Recovery Plans (policies)	
	External collaboration practices	-Group membership programs (Membership card) -Collaborative energy consumption - External data sharing (EDI) -Compliance on policies and tax obligations ( digital invoicing) -Pollution control	Lieb & Lieb (2008); Fraruk et al. (2001)
<b>Operational cost (Dependent Variables)</b>	Cost of goods sold	-Purchases -Direct labour -Utility cost (lightening of the plant) -Freight in and freight out cost -Inventory cost	Kulmola, (2005)
	Repair and Maintenance cost	-Overhead expenses ( crew and marketing cost) -Operation expenses cost	Kenton & Murphy (2019)
	Administration cost	-Benefits and wages -Sales commission -Accounting fees and information costs	Kenton & Murphy (2019); Hargrare (2019)
	Capacity utilization cost	-Capital stock cost -Resource stock utilization -Primal technical capacity (Technical efficiency related cost)	Nelson, (1989)
	Productivity cost	-Utility cost of production facility -Payments on equipment -Operating lease cost -Prime cost (business production expenses)	Hargrare (2019); Alam, (2001)

### **3.7 Reliability and Validity**

These are concepts used to evaluate data quality. Reliability refers to the consistency of a measure used in the research process. This was realized by the researcher in the study through the internal consistency test using Cronbach's Alpha. For example, the researcher statistically calculated and consistently got the same result for the test designed to measure the same feature. The Cronbach's Alphas test ranges in values from zero to one. Values closer to one indicates higher internal consistency and values closer to zero indicates values of low internal consistency (Litwin, 2003)

The validity, on the other hand, checked whether the scores measured represent the variables they were intended to measure, the criterion Validity test was done to whether the scores on the measurement have convergent validity or discriminant validity based on the previous data. (Mugenda & Mugenda, 2003).

### **3.8 Data Diagnostics**

These are test done by the researcher on the primary data to investigate faults or errors associated with findings of the results (Westlander, 2000). Through the use of Statistical Packaging of Social Science (SPSS), the outputs in Tables and graphs were diagnosed for these errors and faults before the researcher made any conclusion on his findings. The diagnosis done were as follows;

Normality; Shapiro- Wilk test was used to assess the data numerical mean. This test is appropriate for a small sample. The test showed the significant correlations between the green freight transport practices on the operational costs when the significant value was greater than 0.05 and vice versa.

Multicollinearity; The appropriate test for this diagnosis was Variance Inflation Factor (VIF). The test tried to investigate whether the predictor variables were highly correlated with each other. The assumption is relevant for multiple linear regression. Through the SPSS the variance inflation factor values should be below 10.00 and the best case value is below 5.00.

Autocorrelation; the Durbin – Watson test was appropriate for this research data diagnosis, it is used to refer to the level of degree of correlation between the values of the same variables across different observations in data. The test was appropriate for statistics range values ranging from 0 to 4. Whereby values close to 2 suggest less

autocorrelation while values range closer to 0 or 4 suggest either greater or negative autocorrelation.

Homoscedasticity; the appropriate test for this diagnosis was Koenker test. When it describes the situation whereby the relationship between the independent and dependent variables are the same across all values of independent variables then it is referred as homoscedasticity i.e. the residuals values of the simple distribution of primary data have the same variance. The opposite is heteroscedasticity in which the standard error is biased and inconsistency leading to incorrect conclusions about the significance of the regression coefficient. This may result in omission variables, non-constant coefficient of data and lastly non-linear data.

### 3.9 Data Analysis

The distributed questionnaires were collected and checked for consistency and accuracy. The researcher used the descriptive statistics to analyze the responses since the study was self explanatory. The researcher also used the Statistical package for social sciences (SPSS) to assist in data analysis.

The bio-data from the questionnaires were organized and tabulated and to effectively interpret the outcome. The level of adoption green freight transport practices was analyzed using means and standard deviations. A multiple regression analysis model was used to establish the relationship between the Green Freight Transport Practices and operational cost of freight firms. The multiple regression analysis model was in form of;

$$\hat{Y} = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dots + b_7X_7 + \epsilon$$

Where;  $\hat{Y}$  = Dependent variable (Operational cost)

$a$  = Constant

$b_1 - b_7$  = Coefficient of the independent variables

$X_1 - X_7$  = Are the research control variables and they represent;

$X_1$  = Distribution and transport execution practices

$X_2$  = Warehouse and green building practices



$x_3$  = Reverse logistics practices

$x_4$  = Eco-design and packaging practices

$x_5$  = Internal management practices

$x_6$  = Cooperation with customers

$x_7$  = External collaboration practices

$\varepsilon$  = Error term

## CHAPTER FOUR

### DATA ANALYSIS, FINDINGS AND DISCUSSIONS

#### 4.1 Introduction

The chapter contains results of data collected, analyze findings, interpret and present results in line with study objectives. SPSS was used to generate both the descriptive and inferential statistics presented in the chapter. The study targeted a sample of 141 freight firms. From the sample, 75% of the questionnaires were satisfactory filled and returned while 25% were not returned. The response rate was good for the generalization of the study findings.

#### 4.2 Demographic Characteristics of the Respondents

This section presents data on the respondents which include; respondents' designation, the duration of the respondents have been in the firm and the period the freight firms have been in the operation. These are discussed in the following subsections:

##### 4.2.1 Designation of the Respondent

This section established the designation of the respondents concerning the three categories as shown in Table 4.1 This was used as a measure of involvement of the respondents in the firm's activities.

Table 4.1 Respondents Designation

	Frequency	Percent	Cumulative Percent
Logistics supervisor	43	30.5	30.5
Distributors	71	50.4	80.9
Financial staff	27	19.1	100
Total	141	100	

Source: Research Data (2020)

Table 4.1 shows that 30.4% of respondents were logistics supervisors, 50.4% were distributors while 19.1% were financial staff members. This shows that all the respondents were directly involved in freight transport operations and were conversant with the study topic.

#### 4.2.2 Duration of Service at the Firm

The section was to establish the duration respondents had been in the organization as a measure of experience. The outcome was as shown in Table 4.2.

Table 4.2 Duration of Service

	Frequency	Percent	Cumulative Percent
Less than five years	41	29.1	29.1
5-10 years	68	48.2	77.3
over 15 years	32	22.7	100
Total	141	100	

Table 4.2 showed that majority of the respondents had been in service for their for period ranging between 5-10 years at 48.2%. Another 29.1% category of the respondents had been operating in their respective firms for a period less than five years while only 22.7% of the respondents were in their respective freight firms for over 15 years of operation. These data facts had implications that the respondents had worked in their respective positions for quite good time and are therefore knowledgeable enough to guide the research findings.

#### 4.2.3 Length of Freight Firms Operations

The analysis of the duration the freight firms had been in operation is presented as shown in Table 4.3.

Table 4.3 Length of Freight Firms Operation

	Frequency	Percent	Cumulative Percent
Under 10 years	52	36.9	36.9
10-15 years	36	25.5	62.5
Over 15 years	53	37.6	100
Total	141	100	

Source: Research Data (2020)

Form Table 4.3, most of freight firms had been operational for over 15 years at a percentage of 37.6 %. Another 36.9% of the freight firms were in operation for period below 10 years while 25.5% of the freight firms had been in existence for a period between 10- 15 years. This showed that majority of freight firms operating in Kenya had been in operation for over 10 years. Hence, respondents were well informed on the green freight transport practices operations.

### 4.3 Adoption of Green Freight Transport Practices

The study examined the extent to which freight firms have adopted green freight transport practices. The seven main green freight transport practices were namely; distribution and transport execution practices, warehouse and green building, reverse logistics, eco-design and packaging practices, internal management cooperation with customers' practices and external collaboration practices.

To adequately cover the green freight transport practices, the constructs were broken into statements which were measured in a 5 point Likert scale that is; 5 = very great , 4 = great extent, 3 = moderate extent, 2 = small extent and 1 = not at all. The findings are discussed in the following subsection.

#### 4.3.1 Distribution and Transport Execution Practices

The second green freight transport practice that was investigated was the warehousing and green building practices. The results are shown in Table 4.4.

Table 4.4 Distribution and Transport Execution Practices

	Mean	Std. Deviation	Ranking
Freight consolidation to various destination	3.48	1.073	2
Vehicle scheduling/ cross docking	3.43	0.988	5
Use of transport Management System (TMS) applications	4.35	0.757	1
Mode of transport selection	3.45	1.017	4
Fleet tracking and tracing/ real-time transport visibility	3.46	1.086	3
Average	3.47	1.080	

Source: Research Data (2020)

From Table 4.4, the distribution and transport execution practices were moderately implemented (overall mean 3.47). Use of transport Management System (TMS) application was implemented to great extent (mean 4.35). Freight consolidation to various destination, vehicle scheduling/ cross-docking, mode of transport selection, fleet tracking and tracing/ real time transport visibility were all implemented to a moderate extent (mean 3,48, 3.43, 3.35, 3.46) respectively.

The findings showed that despite the moderate implementation of distribution and transport execution practices, use of transport Management System (TMS) application

was highly rated as it mostly enhancing transparency and accountability. The practices generally enabled freight firms to optimise freight operational costs.

### 4.3.2 Warehousing and Green Building Practices

The second green freight transport practice that was investigated was the warehousing and green building practices. The results are shown in Table 4.5.

Table 4.5 Warehousing and Green Building Practices

	Mean	Std. Deviation	Rank
Consideration of staff safety and health	3.28	1.008	1
Use of recycled concrete, steels and asphalts in building facilities	2.67	0.714	3
Use of recycled concrete, steels and asphalts in building facilities	2.51	0.593	4
Safe handling equipment like cranes	2.74	0.859	2
Average	3.01	0.934	

Source: Research Data (2020)

Findings Table 4.5 shows the four sub-variables of warehouse and green building practices were implemented to a moderately extent (overall mean 3.01). Consideration of staff safety and health was moderately implemented at mean 3.28. The other three sub-variables; Use of recycled concrete, steels and asphalts in building facilities, Use of recycled concrete, steels and asphalts in building facilities and safe handling equipment like cranes were implemented to a small extent (mean 2.67, 2.51, 2.74) respectively.

The staff safety and health consideration were of moderate value to the freight firms as it enhances operational efficiencies. The value attached to staff well-being and the government strict regulation on occupational safety might have attributed to the research findings. The other three sub-variables were implemented to a small extent due less value attached to them and the respondents insensitive to the values derived from these factors by the freight firms.

### 4.3.3 Reverse Logistics Practices

The third green freight transportation practice for which the study investigated the extent of adoption is the reverse logistics practices. The results are displayed in Table 4.6.

Table 4.6 Reverse Logistic Practices

	Mean	Std. Deviation	Rank
Recycling packaging materials	1.63	0.832	4
Refurbishment activities	1.93	0.875	2
Reuse of containers	3.23	1.402	1
Remanufacturing activities of recycled wastes	1.74	0.983	3
Average	1.69	0.908	

Source: Research Data (2020)

Table 4.6 shows the research findings on reverse logistics practices which are implemented to a small extent (mean 1.69). The reuse of containers was moderately implemented at a mean of 3.23. The rest of the sub-variables; Recycling packaging materials, refurbishment activities and remanufacturing activities of recycled wastes were implemented to a small extent (mean 1.63, 1.93, 1.74) respectively. The reuse of containers was highly implemented among the other sub-variables due to the operational costs implications attributed to backhauling and the high cost attached to the acquisition of the new container by suppliers. This was a strategic move by freight firms on their effort to waste prevention.

#### 4.3.4 Eco-design and Packaging Practices

The next set of practices that were investigated for the extent of adoption are Eco-design and packaging practices. The results are displayed in Table 4.7.

Table 4.7 Eco-design and Packaging Practices

	Mean	Std. Deviation	Rank
Freight load consolidation to various customers	3.12	0.788	1
Continuous reduction of weight and volume of packaging materials	2.62	1.144	6
Low carbon logistics or use of alternative energy for locomotion	2.92	1.022	2
Print ink technology, applying (EU) printing standard	2.74	0.628	4
Sourcing packaging materials which are environment friendly	2.78	0.775	3
Use of biodegradable packaging materials as company policy	2.73	0.706	5
Average	2.93	0.747	

Source: Research Data (2020)

In Table 4.7, the eco-design and packaging practices were implemented to a moderate extent (overall mean 2.93). Freight load consolidation to various customers was implemented to a moderate extent by freight firms (mean 3.12). The other sub-variables; Continuous reduction of weight and volume of packaging materials, Low carbon logistics or use of alternative energy for locomotion, Print ink technology, applying (EU) printing standard, Sourcing packaging materials which are environment friendly and use of biodegradable packaging materials as company policy were implemented to a small extent (mean 2.62, 2.92, 2.74, 2.78, 2.73) respectively.

The result showed a lack of overall importance to the green environmental matters concerning eco-design and packaging practices. Freight load consolidation to various customers was highly preferred among the other sub-variables due to its benefit of immediate fulfilment of retail orders while reducing time and operational administration costs. The bias misinterpretation of the eco-design and packaging practices by the freight firms prevented the practice success in the public domain as the practice is not communicated well in the organisations.

#### 4.3.5 Internal Management Practices

The fifth set of practices that was investigated for the extent of adoption are internal management practices whose finding are shown in Table 4.8.

#### 4.8 Internal Management Practices

	Mean	Std. Deviation	Rank
Personnel training and development programs	2.57	1.117	3
Adoption of efficient housekeeping practices i.e. record keeping	2.58	1.029	2
Separation of duties (Can one person complete a task?)	2.48	1.066	5
ISO 14000 certification on environmental management	2.38	1.046	7
Installation of access control like security checks	2.40	1.089	6
Standard documentation used as forms and invoices	2.76	0.97	1
Approval authority and power to bid in a contract	2.56	1.117	4
Average	2.57	1.117	

Source: Research Data (2020)

From Table 4.8, internal management practices were implemented to a small extent (overall mean 2.57). The sub-variables were also implemented to a small extent. Personnel training and development programs, adoption of efficient housekeeping practices i.e. record keeping, separation of duties, ISO 14000 certification on environmental management, installation of access control like security checks, standard documentation used as forms and invoices and approval authority and power to bid in a contract (2.57, 2.58, 2.48, 2.38, 2.4, 2.76,2.56) respectively. The low response of low implementation showed the advance technicalities involved in internal management practices. The respondents might have not been aware of the practices or lacked knowledge on their implementation as the practices were mostly implemented at the freight firms strategic level of management.

#### 4.3.6 Cooperation with Customers

The sixth set of practices that was investigated for the extent of adoption are the cooperation with customers. The findings are shown in Table 4.9.

Table 4.9 Cooperation with Customers

	Mean	Std. Deviation	Rank
Inventory and warehouse handling on backhauling	2.84	1.016	2
Mapping of reverse logistics / recovery policies on Disaster Management Plan (DRP)	2.94	1.196	1
Membership to eco-design industrial park	2.57	0.943	5
Branch cooperation to optimize routes usage	2.69	1.145	3
Vehicle fleet management to minimise risk and freight transport cost	2.65	1.159	4
Average	2.75	1.088	

The research findings in Table 4.9 shows that cooperation with customers was implemented to a moderate extent (overall mean 2.75). The sub-variables were implemented to a moderate extent. Inventory and warehouse handling on backhauling, recovery policies on Disaster Management Plan (DRP), membership to eco-design industrial park and branch cooperation to optimize routes usage had a mean of 2.84, 2.94, 2.57, 2.69, 2.65) respectively. These practices were deployed by freight firms to minimise the empty miles hence reducing capacity utilization cost. The practices reduced time wasted by freight firms through enhanced cooperation within the supply routes. The moderate implementation of the practices showed the need for effort by freight firms to fully realize the benefits.



### 4.3.7 External Collaboration Practices

The sixth set of practices that was investigated for extent of adoption are the cooperation with customers. The findings are shown in Table 4.10.

Table 4.10 External Collaboration Practices

	Mean	Std. Deviation	Rank
Group membership programs like membership cards	2.78	0.811	4
Partnership with suppliers through EDI	2.90	0.74	1
Policies and tax compliance with relevant bodies	2.80	0.813	3
Coordinated transportation	2.86	0.798	2
Pollution control on guides of waste collection	2.70	0.808	5
Average	2.74	0.810	

Table 4.10 shows the findings of external collaboration practices which were implemented to a small extent (overall mean 2.74). The sub-variables like group membership cards, partnership with suppliers through EDI, policies and tax compliance with relevant bodies, coordinated transportation and Pollution control on guides of the waste collection were all implemented to small extent mean were at (2.78, 2.90, 2.80, 2.86, 2.70) respectively.

The need for freight firms to compromise on their policies to collaborate was experienced in the low tally of external collaboration practices. Freight firms need the ability to get people to collaborate when required. The low implementation in the practices might be due to the competition among the freight firms and the cultural mismatch between the freight firms.

### 4.4 Operational Costs

The study also sought to establish the effects of green freight transport practices on operational costs. The construct was broken down into 5 items relating to operation cost sub construct which were also rated using a Likert scale. The reliability test used was Cronbach's Alpha test which yielded a value of 0.551 implying strong internal consistency among the 5 costs items. The operational costs were investigated for the effects of the green freight transport practices and the result findings are shown in Table 4.11.

Table 4.11 Operational Costs

Operational Cost	Mean	Std. Deviation	Rank
Cost of goods sold	3.32	0.776	1
Administration cost	2.97	0.703	5
Capacity utilization cost	3.02	0.810	4
Repair and maintenance cost	3.17	0.724	3
Productivity cost	3.22	0.658	2
Average	3.14	0.734	

Source: Research Data (2020)

Table 4.11 shows the responses on the effect of green freight transport practices on the five operational costs at a moderate extent (overall mean 3.14). The cost of goods sold variables are used as a measure of profitability by the freight firms. The sub-variables of cost of goods sold investigated were affected to a moderate extent. The cost of goods sold is normally determined by labour and supplier cost factors. Consequently, the administration costs show that the respondents engaged moderately with their freight firms. The administration costs were mostly affected by short and long terms administration obligation like outsourcing as well as the use of technology along the supply chain.

Capacity utilization cost was moderately affected by the green freight transport practices (overall mean 3.02). The capacity utilisation cost depends mostly on market demand and production scheduling of freight firms. The repair and maintenance cost had high response due to expenses attached to the practice. The freight firms had the option of either acquiring equipment parts with minimal maintenance or equipment with longer operating cycle and this minimise repair and maintenance cost on freight firms operations. Lastly, the productivity cost was affected to a moderate extent together with its sub-variables; utility cost of a production facility, operating lease cost, payments on equipment and prime cost. The need to reduce the use of energy by freight firms prompted green freight transport practices by freight firms. This enabled freight firms to cut down on fuel energy and electricity usage hence saving in utility cost.

## 4.5 Green Freight Transport Practices and Operational costs

The second study objective was establishing the relationship existing between the green freight transport practices and operational costs. To achieve this objective, multiple linear regression was undertaken.

### 4.5.1 Data Diagnostics

Data diagnostic was done by the researcher to checked whether was suited for regression analysis and data reliabilty. Some of the tests done cheked if there was any data violation to regression assumptions. The tests checking for regression assumptions performed on the data are discussed as follows.

#### Testing for Normality

Shapiro-Wilk test statistic computed in Table 9.12 was used to test for the data normality as shown.

Table 9:12 Test for Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residuals	.074	141	.054	.988	141	.266

a Lilliefors Significance Correction

Step 1: Hypothesis

H<sub>0</sub>: Residuals exhibits a normal distribution with a mean of zero

H<sub>1</sub>: Residuals does not exhibit a normal distribution with a zero mean

Step 2: Level of significance, that is  $\alpha = 0.05$

Step 3: Decision rule;

Reject the null hypothesis if p- value greater than 0.05

Step 4: Test statistics

Shapro-Wilk statistic = 0.0988 and p- value = 0.266

Step 5: Decision rule

Since it was evidenced from the analysis that the p- value (0.266) is greater than the significance level at (0.05), this implied that the residuals follow a normal distribution with a mean of zero therefore null hypothesis is rejected.

### **Checking for Multicollinearity**

To check for multicollinearity, the researcher checked at the Variance Inflation Factors (VIF) of distribution and transport execution practices, warehouse and green building practices, reverse logistic practices, eco-design and packaging practices, internal collaboration, cooperation with customers and external collaboration practices were ( 1.048, 1.009, 1.042, 1.026, 1.058, 1.02 and 1.118 ) respectively. All the VIFs were all at a satisfactory level, that is, less than 5. This show that multicollinearity doesn't affect the data and therefore we can trust coefficient and P-values of the research variables.

### **Testing for Autocorrelation**

The Durbin Watson test was conducted to test for the presence of autocorrelation in the data as follows;

Step 1: Stating the hypothesis

H<sub>0</sub>: No autocorrelation

H<sub>1</sub>: There is autocorrelation

Step 2: Level of significance,  $\alpha = 0.05$

Step 3: Rule for decision

Number of independent variables (K) = 7, number of observations (N) = 141.

On Durbin Watson table,  $d_l = 1.617$  and  $d_u = 1.831$

Step 4: The test statistics, Table 4.17 shows Durbin Watson statistics  $d = 1.625$

Step 5: Conclusion

The test was inclusive as the computed  $d$  (1.625) lies between  $d_l$  (1.617) and  $d_u$  (1.931).

## Heteroscedasticity Test

The micro syntax championed by Gwilym Pryce on Breusch- Pagan and Koenker was run on SPSS and the findings below were displayed.

Run MATRIX Procedure

Regression SS 25.0277

Residual SS 206.3940

Total SS 231.4218

R – Square 0.1081

Sample Size (N) 141

Number of Predictors (P) 7

Breusch – Pagan for heteroscedasticity (CHI – SQUARE df = P) 12.514

Level of significance of Chi – Square df = P (H<sub>0</sub>: Homoscedasticity) 0.849

Koenker test for for heteroscedasticity (CHI – SQUARE df = P) 15.249

Level of significance of Chi – Square df = P (H<sub>0</sub>: Homoscedasticity) 0.329

..... END OF MATRIX .....

The researcher preferred the Koenker heteroscedasticity test because of the small sample size of the study population.

Step 1: Testing for hypothesis

H<sub>0</sub>: No heteroscedasticity

H<sub>1</sub>: Heteroscedasticity present

Step 2: Level of significance,  $\alpha = 0.05$

Step 3: Rule of Decision making

Reject the null hypothesis if P – value is less than 0.05

Step 4: Testing statistics

In the computed SPSS output, Koenker test statistics = 15.249 and the P- value = 0.0329

## Step 5: Conclusion

The data is homoscedastic, since the P- value (0.0329) was found to be less than the level of significance (0.05). The null hypothesis is therefore rejected.

According to these diagnostic tests, it was evidenced that the assumptions of regression were not violated and hence it is safe to proceed with regression analysis.

### 4.5.2 Correlation Analysis

Table 4.13 showed the Pearson moment, the correlation analysis between the green freight transport practices (dependent variable) and operational costs.

Table 4.13: Correlation Analysis

		OPS	DTE	WGB	RL	EDP	IMP	CWC	ECP
Pearson									
Correlation	OPS	1	0.306	0.073	-0.26	0.186	-0.049	-0.151	0.078
	DTE	0.31	1	-0.058	-0.063	0.111	-0.142	-0.14	0.107
	WGB	0.07	-0.06	1	0.053	0.021	-0.026	0.142	0.029
	RL	-0.26	-0.06	0.053	1	-0.035	0.173	0.003	0.05
	EDP	0.19	0.111	0.021	-0.035	1	0.009	0.194	0.11
	IMP	-0.05	-0.14	-0.026	0.173	0.009	1	-0.037	-0.076
	CWC	-0.15	-0.14	0.142	0.003	0.194	-0.037	1	0.158
	ECP	0.078	0.107	0.029	0.050	0.110	-0.076	0.158	1.000

Correlation is significant at the 0.001 level (2 – tailed)

Source: Research Data (2020)

Operational costs (OPS), Distribution and transport execution practices (DTE), Warehouse and green building practices (WGB), Reverse logistics practices (RL), Eco-design and packaging practices (EDP), Internal management practices (IMP), Cooperation with customers (CWC) and External collaboration practices (ECP).

The correlation between operational costs and distribution and transport execution practices is 0.306 which showed a positive correlation. The operational costs correlate with the remaining variables that are, warehouse and green building practices, reverse logistics, eco-design and packaging practices, internal management, cooperation with customers and external management practices ( $r = 0.07, -0.26, 0.19, -0.05, -0.15$  and  $0.07$ ) respectively.

### 4.5.3 Regression Analysis

The regression analysis was used as a tool in establishing the relationship between the independent variables (green freight transport practices) and dependent variable. The independent variables investigated by the researcher were distribution and transport execution, reverse logistics practices, eco design and packaging, internal management practices and finally external management practices while the dependent variable was operational costs of freight firms operating in Kenya. The regression model summary result obtained is shown in Table 4.14.

Table 4.14 Model Summary

Model	R.	R. square	Adjusted R. square	Std. Error of the Estimate	Durbin-Watson
1	0.462 a	0.214	0.17	0.20229	1.625

Source: Research Data (2020)

Table 4.14 above shows the coefficient of determination ( R. square) is 0.214 and R. is 0.462. This indicates that green freight transport practices explained 21.4 % of the variation in operational costs. The coefficient of correlation (r) is 0.462. It is therefore evidenced that there is a positive correlation existing between green freight transport practices and operational costs. The significance of the coefficient of correlation was tested in the following way.

Step 1: Hypotheses testing

Ho: (There is no significance between GFTP and operational costs)

H<sub>1</sub>: (There is significance existing between GFTP and operational costs)

Step 2: Significance level,  $\alpha = 0.05$  (two tailed test)

Step 3: Rule of Decision

On degree of freedom;  $n - 2 = 141 - 2 = 139$ ; therefore,  $t_{0.05, 139} = 1.983$

Reject the null hypothesis if the calculated t- value does not fall in the region  $-1.983 \leq t \leq 1.983$ .

Step 4: Testing statistics

$$t = r\sqrt{(n-2) / (1-r^2)} = 0.462\sqrt{(141-2) / (1-0.214^2)} = 6.144$$

## Step 5: Conclusion

From the calculations, t- value (6.144) is within the rejected region. The researcher therefore rejects the null hypothesis, this implies that the relationship existing between the green freight transport practices and operational costs is significance.

The study findings on the variance analysis was to check on the overall significance of the model and it is shown in Table 4.15.

Table 4.15 Model ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.48	7	0.211	5.166	0.000b
	Residual	5.442	133	0.041		
	Total	6.922	140			

a. Dependent Variable: Operational cost

b. Predictors: (Constant), external collaboration practices, warehouse and green building practices, reverse logistics practices, eco-design and packaging practices, distribution and transport execution practices, internal management practices.

The ANOVA model is shown in Table 4.15. The model indicates the sum of squares and the overall significance level of the regression model ( F- test). According to this regression analysis, the predicted relationship under the model is statistically significant at  $p \leq 0.05$  (sig. 0.0000). This shows that the model between green freight transport practices and operational costs is statistically significant. The model coefficient is shown in Table 4.16.



Table 4.16 Model Coefficient

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.449	0.287		8.546	0.000		
Distribution and transport execution practices	0.12	0.039	0.25	3.119	0.002	.954	1.048
Warehouse and green building practices	0.072	0.046	0.121	1.558	0.012	.999	1.009
Reverse logistics practices	-0.116	0.036	-0.253	-3.225	0.002	.960	1.042
Eco-design and packaging practices	0.1	0.046	0.173	2.179	0.031	.975	1.026
Internal management practices	0.016	0.04	0.031	0.389	0.698	.945	1.058
Cooperation with customers	-0.074	0.034	-0.176	-2.163	0.032	.895	1.118
External collaboration practices	0.044	0.048	0.072	0.905	0.367	.969	1.032

A Dependent variables: Operational cost

Table 4.16 showed analytical model coefficients of independent variables. The t-column test the significance of individual dependent variables in the model. That is, null hypothesis regression that there was no significance relationship existing between dependent and independent variables. The model found the following variables to be significant, distribution and transport execution practices, reverse logistics, eco-design and packaging practices and cooperation with customers at p- value less than 0.05. Otherwise, only internal management practices and external collaboration practices were not significant.

The linear regression model was fitted as follows from the model

$$\hat{Y} = 2.45 + 0.12x_1 + 0.07x_2 - 0.12x_3 + 0.01x_4 + 0.02x_4 - 0.07x_4 + 0.04x_7$$

Where;

$\bar{Y}$  = Operational costs

$x_1$  = Distribution and transport execution practices

$x_2$  = Warehouse and green building practices

$x_3$  = Reverse logistics practices

$x_4$  = Eco-design and packaging practices

$x_5$  = Internal management practices

$x_6$  = Cooperation with customers practices

$x_7$  = External collaboration practices

From the above regression model, the following explanation can be given. Simultaneously, increase in (independent variables), distribution and transport execution practices, warehouse and green building practices, eco-design and packaging practices and external collaboration practices by 0.12, 0.07, 0.01, 0.02 and 0.04 respectively will increase a percentage mean of operational costs. Consequently, increase of reverse logistics and cooperation with customers practices by 0.12 and 0.07 will reduce mean operational costs.

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATION**

### **5.1 Introduction**

This chapter gives detailed study summary, conclusion and the researchers' recommendations. It also provides a brief on future research suggestions.

### **5.2 Summary of Findings**

The researcher examined the effect of green freight transport practices based on mean operational costs of freight transport firms in Kenya. The field of study was a major contributor of freight firms revenue as most of these firms deals with the freight transport.

The freight firms involved in the study were mostly small and medium enterprises. The researcher adopted a descriptive research design to obtain information about the topic. The study comprised of 141 freight firms operating and licensed in Kenya under the organization of Kenya International Freight and Warehouse Association (KIFWA). The questionnaires were used to collect data which were analyzed using mean, standard deviation and multiple regression analysis. The questionnaire findings were analyzed in accordance to the study objectives.

#### **5.2.1 Level of Adoption of Green Freight Transport Practices**

From the findings, most of the respondents were distributors counting 50% of the total population. The majority of the respondent's service duration to their respective firms was 5 - 10 years which comprised about 48.2 % of the respondents. Additionally, most of the freight transport firms had been in existence for over 10 years.

This study investigated seven green freight transport practices. Distribution and transport execution practices were moderately implemented with a mean of 3.47 and a standard deviation of 1.080. The sub-variables of distribution and transport execution practices were also moderately implemented as the practice enhance more of transparency and accountability. Moreover, transport and green building practices were also moderately implemented with an average mean of 3.01 and a standard deviation of 0.933. The only sub variable which was moderately implemented under

this practice was the consideration of staff safety and health as it mostly enhances the firm's operational efficiency.

Reverse logistics was implemented at a moderate extent with a mean of 1.69 and a standard deviation of 0.908. The reuse of containers was the only sub variable of the reverse logistics practices implemented to a moderate extent with a mean of 3.23. This was due to the high operational cost involved in this practice while the backhauling and high cost of acquiring a new container. Eco-design and packaging practices were implemented to small extent with an overall mean of 2.93 and a standard deviation of 0.747. Freight load consolidation was the only sub variable of eco-design and packaging practice which was moderately implemented by the freight firms. The internal management practices were also implemented to a small extent with an overall mean of 2.57 and standard deviation of 1.117. The respondents seem to be unaware of the practice due to its strategic technicalities involved in the practice. Likewise, cooperation with customers and external collaboration practices were also implemented to a small extent with the overall mean of 2.75 and 2.75 respectively. The two practices minimize time wastage and cultural mismatch among the freight firms.

### **5.2.2 Relationship Between Green Freight Transport Practices and Operational Costs**

Study second objective was to determine relationship between green freight transport practices and operational costs of freight firms in Kenya. In order to achieve the objective, the multiple regression was used to determine the relationship. The regression analysis found that there was a positive correlation between the two study variable; green freight transport practices had a positive effect on operational costs. Hence, any change on the green freight transport practices will either increase or decrease the mean operational costs.

Generally, the study was significant with the F- test (sig 0.000),  $p \leq 0.05$ . All the green freight transport practices were significant with the p- values less than 0.05 except the internal management practices and the external collaboration practices which had p- values of 0.367 and 0.698 respectively. The regression analysis also indicated that 21.4 % of the variations in operational costs is explained by the variation in green freight transport practices. From the model coefficient obtained, five variables had a

positive coefficient with exception of reverse logistics and eco-design and packaging practices. Consequently, green freight transport practices enhance environmental sustainability and optimize transport strategies. This way, the operational costs can be used as a strategic move to boost transportation efficiency and economic development. Green freight transport practices can assist in addressing pollution issues and climate change challenges (Button & Hensher, 2000). The robustness and effectiveness of freight transport firms within the supply chain can be enabled by gaining competitive advantage through superior customer's service delivery, enhanced green freight transport practices and low operational costs (Stevenson, 2009).

### **5.3 Conclusions of the Study**

The study hypothesized that green freight transport practices have a direct effect on the operational costs of freight firms. On the analysis the study outcome confirmed the hypothesis. This is in line with the Sara, Zorzini, Enrico, Guido and Micheli (2012) study on the value of green freight transport practices increasingly becoming important because of environmental awareness by freight firms on their effect on operational costs. The freight firms operating in Kenya have been very innovative in their operations and they have adopted various green freight transport practices to reduce their operational costs. The study reveals that almost 99% of the freight firms practised green freight transport practices to reduce operational costs, improve their profitability, conserve the environment and gain competitive advantage. The study objective established the extent of implimentation of green freight transport practices by freight firms in Kenya. The outcome of the analysis established that most of the practices were implemented to a moderate extent. The green freight transport practices analyzed were distribution and transport execution practices, warehouse and green building, reverse logistics, eco-design and packaging, internal management, cooperation with customers and external collaboration practices. The study, however, concluded that there were variations to the level of implementation to these practices.

The second study objective established the relationship between the green freight transport practices and operational costs of freight firms. The results of the finding is shown in Table 4.16, there was a positive correlation between the green freight transport practices and the operational costs. This is in line with Stevenson (2009)

findings that the robustness and effectiveness of freight transport firms within the supply chain is enabled through gain of competitive advantage by offering superior customer's service delivery, enhanced green freight transport practices and low operational costs. Contrary to this, Creedy (2006) established that failure by freight firms to adopt green freight transport that best suit their needs pose challenges, which can be solved by closely evaluating the whole supply chain of freight firms and subsequently adopting the green freight transport practices that best suit their needs. The correlation between operational costs and distribution and transport execution practices is 0.306 which shows a positive correlation. The operational costs correlate with the remaining variables; warehouse and green building, reverse logistics, eco-design and packaging, internal management, cooperation with customers and external collaboration practices (  $r = 0.07, -0.26, 0.19, -0.05, -0.15$  and  $0.07$ ) respectively.

#### **5.4 Recommendations of the Study**

Based on the study findings, the study makes various recommendations. The study found out that there are green freight transport practices which are not implemented fully, therefore, for the freight firms to enhance their operations, it is recommended that there should be a policy framework put in place for freight firms to adopt these practices. These will enable freight firm to achieve their desired operational outcome.

The fact that green freight transport practices have a positive influence on mean operational costs prompted the need for freight firms to increase their investments in green freight transport practices to optimize in improving their profitability and as well have a competitive edge. The study, therefore, recommend a proper budgetary plan for freight firms to be undertaken in order for them to adopt green freight transport practices. Finally the study also recommends that the freight information system be given adequate attention for timely customers' feedback on green freight transport practices issues. It is also crucial for freight firms to monitor and evaluate green freight transport practices for them to ensure excellent performance in their mean operational costs. The process should be timely to freight firms.

#### **5.5 Suggestions for Further Study**

This research study focused on the effects of green freight transport practices on the operational costs of freight firms operating in Kenya. There is need for future studies to explore others topics ralated to this study inorder to expand the knowledge on this

topic. The first suggestion would be to determine the relationship existing between the green freight transport and other key performance indicators of freight firms' operations. Further studies should also be conducted to establish challenges facing the adoption of green freight transport practices among the logistics providers. A study should also be done on how the challenges facing green freight transport practices should be addressed by freight firms. Finally, research should be conducted to enable the comparisons between green freight transport practices on the freight firms' performance.

The freight transport firms and transport industry players should consider how the variables like the government interventions and corporate social responsibility impacts on the adoption and implementation of green freight transport practices. They should as well set the minimum standard of qualification for the personnel employed either directly or indirectly within the industry to enhance the quality of their operation and image. The firms operating within the industry should consider in future, to outsource some of their non-core activities to avoid conflict of interest between their employees and other service providers while discharging their duties.

### **5.6 Limitations of the Study**

The research was limited by the prevailing epidemic, that is Covid- 19 during the entire study period. Another limitation was that about 25% of the respondents were reluctant to give information sought by the researcher as they feared the information might be used for other purposes even after the assurance of confidentiality. Additionally, the study was limited to seven green freight transport practices. These practices might not be exhaustive list of green freight transport practices adopted by all freight firms operating in Kenya.

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## APPENDIX I: QUESTIONNAIRE GUIDELINE

### Declaration

This research aim at understanding how the impacts of green freight transport practices on the operational cost of freight firms. The study results will be confidential and are only meant for academic purpose. You are requested to give your responses to the spaces provided in the questionnaire where applicable.

### PART A: Demographics and Respondents Profile

1. Name of the company.....

2. What is your designation in the organization?

- (a) Logistics Supervisor      (b) Distributors      (c) Finance staff

3. The length of continuous service within the organization.

- (a) Less than 5 years      (b) 5 – 10 years      (c) Over 10 years

4. How long has your company been in operation?

- (a) Under 10 years      (b) 10 – 15 years      (c) Over 15 years

### PART B: Green Freight Transport Practices

5. Please indicate the extent to which your organization has adopted green freight transport practices? Use Likert scale to weigh your responses 1-not at all, 2-small extent, 3-moderate, 4-great extent and 5-very great extent.

<b>Distribution and transport execution practices</b>	1	2	3	4	5
1. Freight consolidation to various destination					
2. Vehicle scheduling/ cross-docking					
3. Use of transport Management System (TMS) applications					
4. Mode of transport selection					
5. Fleet tracking and tracing/ real time transport visibility					

<b>Warehousing and green building practices</b>	1	2	3	4	5
1. Considerations of staff's safety and health					
2. Use of recycled concrete, steels and asphalts in building facilities					
3. Use of energy efficient lightings like solar energy					
4. Safe material handling equipment i.e. lifting cranes					
<b>Reverse logistics practices</b>	1	2	3	4	5
1. Recycling packaging materials					
2. Refurbishment activities					
3. Reuse of containers ( backhauling)					
4. Remanufacturing activities of recycled wastes					
<b>Eco-design and packaging practices</b>	1	2	3	4	5
1. Freight load consolidation from various customers					
2. Continuous reduction of weight and volume of packaging materials					
3. Low carbon logistics or use of alternative energy for locomotion					
4. Print ink technology ( applying EU printing standards)					
5. Sourcing of packaging materials which are environment friendly					
6. Use of biodegradable packaging materials as a company policy					
<b>Internal management practices</b>	1	2	3	4	5

1. Personnel training and development programs					
2. Adoption of efficient housekeeping practices i.e. record keeping					
3. Separation of duties (Can one person complete a task?)					
4. ISO 14000 certification on Environmental Management Protection					
5. Installation access control like security checks					
6. Standard documentation used as forms and invoices					
7. Approval authority and power to bid in a contract					
<b>Cooperation with customers</b>	1	2	3	4	5
1. Inventory and warehousing handling on backhauling					
2. Mapping of reverse logistics / recovery policies on Disaster Management Plan (DRP)					
3. Membership to eco-design industrial park					
4. Branch Cooperation to optimize routes usage					
5. Vehicle fleet management to minimize risk and freight transport cost					
<b>External collaboration practices</b>	1	2	3	4	5
1. Group membership programs for example membership cards and fees					
2. Partnership with suppliers through EDI					
3. Policies and tax compliance with relevant bodies					
4. Coordinated transportation					

5. Pollution control on guides of waste collection					
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**PART C: Operational Cost**

6. What extent of effects does green freight transport practices have on the following operational cost variables?

<b>Operational cost variable</b>	1	2	3	4	5
<b>1. Cost of Goods sold</b>					
• Purchases					
• Direct labour					
• Utility cost (lightening of the plant					
• Freight in and freight out cost					
• Inventory cost					
<b>2. Administration cost</b>					
• Benefits and wages					
• Sales commission					
• Accounting fees and information costs					
<b>3. Capacity utilization cost</b>					
• Capital stock cost					
• Resource stock utilization					
• Primal technical capacity (Technical efficiency-related cost)					
<b>4. Repair and Maintenance cost</b>					
• Overhead expenses ( crew and marketing cost)					

• Operation expenses cost					
<b>5. Productivity cost</b>					
• Utility cost of the production facility					
• Operating lease cost					
• Payments on equipment					
• Prime cost (business production expenses)					

**THANK YOU VERY MUCH FOR YOUR COOPERATION.**



## APPENDIX II: FREIGHT FIRMS IN KENYA

1. Inchcape shipper's ltd
2. Civicon ltd
3. Apple logistics
4. Nadson Freight and Logistics
5. Trace Link Logistics ltd
6. Gibron LTD
7. Freight net Kenya ltd
8. Ocean Freight (E.A.) ltd
9. Hellmann Worldwide logistics
10. Jambo ltd
11. Cargo Elegance logistics ltd
12. Transnet freight services
13. Royal Transmotors ltd
14. Urgent Cargo hauling ltd
15. Signon freight ltd
16. Victoria International Logistics
17. Panal freighter ltd
18. Tradewide logistics ltd
19. Easton Cargo link ltd
20. Nzoia freighter ltd
21. Bahari logistics ltd
22. Dean logistics ltd
23. Astral aviation ltd
24. Global handler and logistics ltd
25. Jasper logistics ltd
26. Kenlloyd logistics ltd
27. Mara Sabba (K) ltd
28. Rapid Kate services ltd
29. Roma Construction ltd
30. Sasa logistics ltd
31. Swift link logistics services ltd
32. Andy forwarders ltd
33. CMC CGM Kenya ltd
34. Highland Forwarders
35. Interfreight East Africa ltd
36. Safman
37. Sahal forwarders ltd
38. Dap logistics ltd
39. GTS cargo logistics ltd
40. Highland forwarders ltd
41. First cargo freight forwarders
42. Hardy general construction ltd
43. Goldwell forwarders ltd
44. Demco logistics ltd
45. Eromo stores ltd
46. Freightwell express ltd
47. Kenya logistics network ltd
48. Hardy general construction ltd
49. Hellman W. Logistics ltd
50. Hindi construction CO. ltd
51. Homeland forwarders ltd
52. Workshop (K) ltd
53. Bamburi Cement ltd
54. ARM cement ltd
55. Bahari forwarders ltd
56. Kilimanjaro construction ltd
57. King cargo agencies ltd
58. Bidco oil ltd
59. Konike logistics ltd
60. Lagtect ltd
61. Landmark holding ltd
62. Brookside dairy ltd
63. Les Amis ltd
64. Marge Investment ltd
65. Mechanics Cargo system ltd
66. Malicons ltd
67. Manikin services ltd
68. Mountain freight ltd
69. Nanak sikh Bansal ltd
70. Pobon cargo ltd
71. Plan freight ltd
72. Raw construction ltd
73. Raycargo service ltd
74. Rising freight ltd
75. Runway motors ltd
76. Rupra construction Co. ltd
77. Sigma orange LLC
78. Skylight cargo ltd

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|------|-------------------------------|------|--------------------------|
| 79.  | Space freighter internal ltd  | 114. | Freearm mattress ltd     |
| 80.  | Spartan forwarders ltd        | 115. | Freight wings            |
| 81.  | EarthLink forwarders ltd      | 116. | G.M. Corgo ltd           |
| 82.  | Cross ocean ltd               | 117. | Podwin ltd               |
| 83.  | Express Kenya ltd             | 118. | Phil logistics ltd       |
| 84.  | Fame forwarders ltd           | 119. | Bemms ltd                |
| 85.  | Fast lane forwarders ltd      | 120. | Bulk Traders ltd         |
| 86.  | Future freight Co. ltd        | 121. | Slope Agencies ltd       |
| 87.  | Gemini Freighter ltd          | 122. | Universal Freight ltd    |
| 88.  | Georgina Agencies ltd         | 123. | Nampack Kenya ltd        |
| 89.  | Simson freighters ltd         | 124. | Mombasa Containers ltd   |
| 90.  | Speedex logistics ltd         | 125. | Pan Africa logistics ltd |
| 91.  | Supper freight ltd            | 126. | Freight in time ltd      |
| 92.  | Super construction ltd        | 127. | Great lakes port ltd     |
| 93.  | Superior construction Co. ltd | 128. | Kappa oil refineries ltd |
| 94.  | Construction Masters (K) ltd  | 129. | Ray plywood ltd          |
| 95.  | Corner garage transport ltd   | 130. | T& L Logistics ltd       |
| 96.  | Cross ocean ltd               | 131. | Gallins logistics        |
| 97.  | DHL Global forwarders ltd     | 132. | Highland forwarders ltd  |
| 98.  | Tabaki freight forwarders     | 133. | Implex forwarders ltd    |
| 99.  | Taurus construction Co. ltd   | 134. | Move and Pick ltd        |
| 100. | Telecom construction ltd      | 135. | Salmond Freight ltd      |
| 101. | AA Kenya                      | 136. | Freight Cargo ltd        |
| 102. | Seaborne internal ltd         | 137. | Smart trader's ltd       |
| 103. | Apple ltd                     | 138. | Unga group ltd           |
| 104. | Air transport forwarders ltd  | 139. | Union logistics ltd      |
| 105. | Civicon ltd                   | 140. | Agility logistics ltd    |
| 106. | Aero group ltd                | 141. | Airsea logistics ltd     |
| 107. | Global Forwader ltd           | 142. | Cargo nest ltd           |
| 108. | Dean logistics ltd            | 142. | East Africa Chain ltd    |
| 109. | Kensshade forwarders ltd      | 143. | Mid Ocean ltd            |
| 110. | DAL Express ltd               | 144. | Tata ltd                 |
| 111. | East Africa cable ltd         | 145. | Abba motors ltd          |
| 112. | Mambati rolling mill          |      |                          |
| 113. | Film line ltd                 |      |                          |



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Nairobi, Kenya

20<sup>th</sup> April, 2020

**TO WHOM IT MAY CONCERN**

**RE: INTRODUCTION LETTER**

This is to certify that **JARED OTIENO AGWENY (REG. NO. D61/10094/2018)** is a bona fide student of the University of Nairobi, pursuing a degree in Masters of Business Administration (MBA). As part of the fulfillment of the requirement of the course, he is undertaking a study titled **"EFFECT OF GREEN FREIGHT TRANSPORT PRACTICES ON OPERATIONAL COSTS OF FREIGHT FIRMS IN KENYA."**

You have been selected as one of the respondents in the study. The purpose of this letter therefore, is to kindly request you to assist and facilitate in carrying out the study in your organization by answering the questions in the attached questionnaire.

Data and information obtained through this exercise is purely for academic purpose and will be treated with utmost confidentiality. In case of any questions or clarifications, he can be reached on 0731376796 or [agwenyj5@gmail.com](mailto:agwenyj5@gmail.com).

Your assistance and cooperation will be highly appreciated. Thank you very much in advance.

Yours Faithfully,

  
Dr. Stephen Odock,  
Coordinator, School of Business, Mombasa Campus

