SUSTAINABLE TRANSPORT PRACTICES AND LOGISTICS EFFICIENCY

CASE STUDY: MAERSK UGANDA

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A DISSERTATION SUBMITTED TO KYAMBOGO UNIVERSITY GRADUATE SCHOOL IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS OF SCIENCE IN PROCUREMENT AND SUPPLY CHAIN MANAGEMENT OF KYAMBOGO UNIVERSITY

MARCH, 2021

DECLARATION

I declare that this dissertation is my original work and has not been published or submitted to any University or Institution of higher learning for any award.

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APPROVAL

This is to certify that this dissertation has been done under our supervision and has met the dissertation-requirements of Kyambogo University and is now ready for submission.

Date.....Signature.....

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DEDICATION

To my wife; Mrs. Ssenkungu Hellen, my parents; Kabogoza Edward, Nalubega Cossy, Naluwooza Madrine, Nakachwa Ruth and lastly to my friends; Richard, Emmanuel, Sharon, Fred, Nicholas and Marvin

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

OECD…… Organization for Economic Cooperation and Development.

EST…… Environmentally Sustainable Transport.

UNEP……. United Nations Environment Programme.

NDCs……. Nationally Determined Contributions.

HLAGST……. High-level Advisory Group on Sustainable transport.

UNFCC…… United Nations Framework Convention on Climate change.

RPM……. Revolutions Per Minute.

GPS……. Global Positioning Satellite.

TSPs……. Telematics Service Providers.

GPS……. Global Positioning System.

CEP……. Circular Error Probability.

GSM……. Global system for Mobile.

OBD……. On-Board Diagnostics.

DTCs…… Diagnostics Trouble Code.

TCU……. Telematics Communications Unit.

EEC……... European Economic Community.

PI……... Progressive Insurance.

GNSS…… Global Navigation Satellite System.

AVL……...Automatic Vehicle Location.

GIS…… Geographic Information System.

AGPS……. Assisted Global Positioning System.

RFID……. Radio Frequency Identification.

LPI……. Logistics Performance Index.

IEA……International Energy Agency.

PM……. Particulate Matter.

NOX……. Oxides of Nitrogen.

VOC…… Volatile Organic Compounds.

NO2……Nitrogen Dioxide.

SO2……. Sulfur Dioxide.

CO……. Carbon monoxide.

IGES……...Institute for Global Environment Strategies.

TSP……. Total Suspended Particles.

SPM……Suspended Particulate Matter.

O3……Oxone.

CARB……. California Air Resources Board.

WHO…..…… World Health Organization.

USEPA……US Environmental Protection Agency.

WBCSD…… World Business Council for Sustainable Development.

GHG……. Green House Gas.

EFV…… Environmentally Friendly Vehicles.

ABSTRACT

This study sought to determine the effect of sustainable transport practices on logistics efficiency in the context of Maersk Uganda. The study was guided by the theory of constraints and focused on addressing three objectives which included; to determine the effect of Eco-driving training practice on the logistics efficiency of Maersk, to assess the effect of telematics on the logistics efficiency of Maersk and to examine the effect of stakeholder engagement on the logistics efficiency of Maersk. The study adopted a case study research design and a sample of 48 staff was considered for the survey. The study used questionnaire and interview methods of data collection and data was analysed using descriptive analysis and regression statistics with help of SPSS 23.0. Descriptive statistics were used to describe the response rate, respondent's characteristics and characteristics of Maersk while regression analysis was used to establish the direct effect of eco-driving training practice, telematics and stakeholder engagement on the logistics efficiency. The study found out that eco-driving training has a significant effect on logistics efficiency of Maersk ($r = 0.292$ and PValue<0.05). The study also found out that telematics adoption has a significant effect on the logistics efficiency of Maersk ($r = 0.496$ and PValue<0.01). Furthermore, the study also established that stakeholder engagement has a significant effect on logistics efficiency of Maersk ($r = 0.320$ and PValue<0.05). The study therefore concluded that when Maersk drivers and staff are equipped with all eco-driving techniques and they understand them well, it will increase logistics efficiency of Maersk. It was further concluded that Maersk should focus in details on the use of telematics because through telematics, Maersk can be able to monitor its vehicles on the road and also behaviours of their drivers while driving which helps to reduce on accidents, pollution and fuel consumption thus improvement in logistics efficiency. With regards to stakeholder engagement on logistics efficiency, it was concluded that stakeholders should be involved in decision making concerning sustainable transport thus improving logistics efficiency of Maersk. The study recommended that Maersk should improve on equipping and testing all its drivers with up-to-date eco-driving practices. It further recommended Maersk to adapt to Journey management technology and also upgrade its telematics system to 5G network. Lastly the study recommended Maersk to use social media networking and Online collaborative platforms to enable interactions among all stakeholders thus improvement in stakeholder engagement in decision making concerning sustainable transport of Maersk

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The current study effort sought to determine the effect of sustainable transport practice on logistics efficiency a case of Maersk Uganda. The sections that followed in this chapter presented the background of the study, problem statement, Purpose of the study, objectives of the study, research hypotheses, scope of the study, significance of the study and conceptual framework, definition of terms.

1.1 Background to the study

The background to this study was drawn from historical perspective, theoretical, conceptual and the contextual perspective as discussed below.

1.1.1 Historical background

The concept of sustainable transport has been known for many years in the world. In 1990s sustainable transport was known as an improving tool which helps to improve and sustain social and economic benefits (Kuhlman & Farrington, 2010). Sustainable transport framework structure has been changing over decades but its main structure involves the economic element which potrays the social benefits and the sustainability bottlenecks (Roth & Kåberger, 2002). From this, it is noted that the interest of embedding sustainability in the transport system is dated back to the early 1990s.

Organization for Economic Cooperation and Development (OECD) evolved the Sustainable transportation concept in 1994 when it embarked on a project to ensure that the all-transport system was environmentally friendly (Mavi & Mavi, 2019). A stable change in sustainable transportation

in Vancouver was brought in by the OECD Conference which aimed at ensuring sustainability in transportation (Brown et al., 2012). The OECD conference gave rise to different Principles in transport sustainability such as; equity in accessibility to transport, assurance of health and safety to all transport users, participation of the all society I planning, preventing pollution and economic well-being (OECD, 2010).

On the other hand, logistics concept evolved from the 19th century and it was explained by military as the process that involves planning and movement of troops (Rutner et al., 2012). Logistics concept was introduced in 1964 as a concept that is only concerned with just movement of goods. Logistics had three main pillars that supported it, as given in Beattie (2017); Location – ‘‘adding value to the customer's service by moving goods between locations which will achieve the best value to the customer’’. Time element – ‘‘improving customer's value by helping in the reduction of time". Pattern – ‘‘Value addition by focusing on the exact desire of the customer".

1.1.2 Theoretical background

In this study, the theory of constraint was adopted to guide the study. In the manufacturing industry, a constraint means a bottleneck (Şimşit et al., 2014). The Theory of Constraints has got an approach that ensures proper improvement across the all system so as the bottlenecks are eliminated (Spector, 2011). Theory of constraints assumes that every system has got many linked activities from which constraints can be traced (i.e. constraint node is the "weakest point link in the chain of these activities") (Dechter, 2003). It helps an organization to prioritize the key elements it should improve in order to achieve efficiency across the whole system (Van Wyngaard et al., 2012). It should be noted that the activity considered to be on top is always the over weighing constraint (Bicheno et al., 2001). Emergency situations that require immediate improvements, the

theory of constraints is the best methodology to opt for because it enables the organization to identify the bottlenecks and then come up with strategies on how to reduce on them (Spector, 2011).

The theory therefore helped to focus on the weakest points of the transport sustainable practices which are bottlenecks for logistics efficiency and also entire company (Gupta & Kline, 2008). Therefore, this integrated management philosophy changes the way of thinking of managers and become an important tool for solving root problems (Kerr et al., 2015). This theory helps to identify different limiting factors also known as constraints which helps an organization now to come up with different strategies on how to improve these bottlenecks until they are no more (Holyoak & Thagard, 1989). The theory of constraints helped to identify the important limiting factors under stake holder engagement such as low levels of networking, low levels of transparency and less information, decisions taken from customers of Maersk. The theory of constraints also helped to focus on the limiting factors under eco-driving such as low team work among the staff to ensure sustainability, Maersk drivers also may not understand thoroughly well what they are being trained in and hence acting as constraints that hinder Maersk as an organization in achieving a sustainable transport system. The theory of constraint helped to focus on the weakest points of how Maersk implements telematics such as challenges on changing technology since telematics technology keeps on changing. In general, the theory of constraints helped to focus on the weakest points of how Maersk as an organization practices sustainability using the eco-driving, telematics and stakeholder engagement element. This is because Maersk has tried to implement different practices (such as eco-driving, telematics and stake holder engagement) to ensure sustainability in transportation in order to improve on its logistics efficiency, but however much it has implemented all these sustainable elements, inefficiencies are still seen in its logistics such as environment

pollution, accidents and increasing fuel consumption. Therefore, this theory of constraints helped to map all the weakest points (constraints) in implementation of eco-driving, telematics and stake holder engagement so as to enable Maersk to reduce on the environmental pollution, accidents and high fuel consumption. Therefore, this theory was very important in this study because Maersk has tried to ensure sustainable transportation practices but still faced with challenges such as pollution, accidents and high fuel consumption, which has made it still be inefficient in its transportation system which has affected its logistics efficiency (Vatalis et al., 2013).

1.1.3 Conceptual background

The concepts that guided this study were; sustainable transport practices as independent variable and logistics efficiency of Maersk as a dependent variable.

Sustainable transportation means allowing the easy and safe access of environment needs while putting in consideration the people's health (Nishimura, 1996). Sustainable transport is a transportation system that considers the social cost (Litman & Burwell, 2006). It should be noted that, when the social costs is related to the transport system, then sustainable transport is achieved in logistics and hence ensuring logistics efficiency (Dobranskyte-Niskota et al., 2007).

Richardson (2005) in the view on sustainable transport practices basing environment, economy, and society, tends to portray the eco-driving, use of telematics and engagement of people within sustainable transportation. It should also be noted that the vision of sustainable transport is guided by different principles that fall within the critical three elements of sustainable transport as stipulated by (Barth & Boriboonsomsin, 2009);

- Eco-driving (safety and pollution prevention),
- Use of telematics (efficiency, affordability, accessibility),

- Stakeholder engagement (pollution prevention, decision making engagement).

According to Caban et al., (2019) and Rakotonirainy & Haworth, (2011), provision of safety training and expertise, equipping workers with competencies that can help them work safer, formation of learning team concepts and ensuring compliance of the truck drivers are all part of the eco-driving training programme. Eco-driving training involves driver's adoption to acceptable driving style standards (Allison & Stanton, 2019). Eco-driving training practice is recognized as a tool that minimizes costs and a great weapon to pollution (Fussler, 1996). Eco-driving is also seen as a technique which aims at minimizing fuel consumption, pollution (Ho et al., 2015).

Tracking and monitoring working conditions of truck drivers involves in a composition of telecommunications which means the exchange of information and informatics that means processing data and hence a consolidated service that combines Global Positioning System technology, wireless communication technology broadly known as Telematics (S. H. Chang & Fan, 2016). Telematics is globally observed as a technology used to transmit, receive and store data concerning the current status of the vehicle and the goods its carrying (Song et al., 2012) (Wahlstrom et al., 2017).

Stakeholder engagement in sustainability transport means a process through which different stakeholders contribute towards sustainable transportation in terms of decision making (Ward, 2001). The main aim of stakeholder participation is to enhance sustainability embracing in all transportation practices (Berlie & Berlie, 2010).

Efficiency is present in innovation and management concept, but its definition is not yet clear and it might prove more difficult than expected to define it (Hardin, 2008). Efficiency in logistics means movement and delivering the right item, with the right price, in the right place within the

right time (Frota Neto et al., 2008). Logistical efficiency refers to how effectively a business conducts its operations to ensure that it achieves its targets at relatively low cost (Kirby, 2015).

Measuring efficiency in logistics is viewed from the point of an organization and then also from the point of the customers to this organization (Mejías et al., 2016). Logistics efficiency can be measured from the strategic, tactical and operational level within an organization in terms of the activities and systems (Deville et al., 2014) (Chan, 2003). Measuring and monitoring logistics efficiency of reverse logistics should also be put in consideration (Park & De Prabir, 2004). In measuring logistics efficiency, companies can measure, economic, cost and quality efficiency (Andrejić et al., 2016).

Mariano et al. (2017) analysed and reported on the relationship between sustainable transport practices and logistics efficiency and the findings showed a significant effect of adoption of sustainable transport practices on logistics efficiency. Bempong (2019) also carried out research on the effect of sustainable transport practices on transport operations of companies and findings showed that there is a significant effect. The study by Jimenez & Flores (2014) suggests that, for organization to achieve efficiency in logistics, they should make sure that they invest all their resources and effort towards ensuring sustainability in their transportation system. From different studies discussed, it is possible to note the importance of use of eco-driving, use of telematics and stake holder engagement in transport sustainability which enables to improve logistics efficiency.

1 1.1.4 Contextual background

This study context was Maersk located in Kampala, Uganda. The Company is working in Marine Services, Transport business activities. Maersk Uganda Ltd is located at 5th Street Industrial Area, P.O.Box 28687, Kampala Uganda. Maersk transport & Logistics division has responsibilities of

inland services, container shipping, freight forwarding, supply chain services. Transport and logistics sustainable practices of Maersk Uganda aims at reducing social costs and conserving the environment. Since it aims at having net-zero CO2 emissions by 2050, it has implemented the following transport and logistics practices specifically on land to ensure sustainability across its transport system in order to improve on its logistics efficiency (MAERSK 2019);

- Provision of safety training and expertise
- Formation of learning team concepts
- Ensuring compliance of the truck drivers
- Tracking/ Telematics
- Stakeholder engagement
- Employee relations
- Monitoring working conditions of truck drivers

Provision of safety training and expertise, equipping workers with competencies that can help them work safer, formation of learning team concepts and ensuring compliance of the truck drivers are all part of the eco-driving training programme as evidenced from the annual report of Maersk Uganda (Annual report, 2019). And therefore, this means that Maersk has provided safety training and equipping workers with competencies that can help them work safer, formed learning team concepts and ensured compliance of the truck drivers in order to improve on logistics efficiency. Maersk has also implemented the use of telematics from which it is tracking all the movements of its vehicles and containers both on sea and on land (Annual report, 2019). Maersk is tracking all its transport activities with the help of the Global positioning system (GPS) which are installed throughout all its vehicles and hence improving on its logistics efficiency. Maersk has also implemented the strategy of stakeholder engagement in order to take in decisions from different

stakeholders on how to reduce on pollution, reduce on accidents and minimize on fuel consumption by vehicles of the company which in turn ensures efficiency in all its logistics operations (MAERSK 2019).

It should be noted that Maersk is faced with different challenges in implementing eco-driving techniques, using telematics and embracing stakeholder engagement which in turn has affected its logistics efficiency.

1 1.2 Problem statement

In a bid to reduce on pollution, accidents and fuel consumption rate, Maersk has tried to implement different sustainable transport practices such as the adoption of eco-driving techniques, use of telematics and stake holder engagement (MAERSK 2019). But however much it has implemented all these sustainable transport practices, there is still low logistics efficiency stipulated by increment in pollution, accidents and fuel consumption (MAERSK 2019). From the interview with the logistics staff to establish the intensity of the problem at the organization, it was noted that Maersk faces challenges in implementing the eco-driving sustainable transport practice for instance some drivers think that this kind of training is unnecessary, there is staff resistance to change and difficulty to keep results for a long period of time. In implementing the stakeholder engagement, Maersk faces a challenge of poor networking with some stakeholders most especially the customers and this has negatively affected its sustainable transport practice of stakeholder engagement because some decisions are not taken up from some stakeholders. Maersk also faces a challenge of changing technology in using telematics since telematics requires innovative technology and thus has affected its bid to ensure a sustainable transport system which has in turn reduced its logistics efficiency (Annual report, 2019). Maersk's logistics efficiency is still a

challenge with pollution, fuel consumption still high and the drivers still registering minor and major accidents while on the road (MAERSK 2019). Although several scholars such as Díaz-Ramirez et al. (2017), Wang et al. (2015), Narassimhan et al. (2018) have noted that sustainable transport practices can be a remedy to these challenges, there is still low evidence in the Ugandan context especially at Maersk. This research therefore sought to establish the effect of sustainable transport practices on logistics efficiency with the aim of helping Maersk to improve on its sustainability transport practices adopted in order to improve on its logistics efficiency.

1.3 Purpose of the study

The purpose of this study was to assess the effect of sustainable transport practices on logistics efficiency with a specific focus on Maersk Uganda.

1.4 Objectives of the study

1. To determine the effect of Eco-driving training practice on the logistics efficiency of Maersk.

2. To assess the effect of telematics on the logistics efficiency of Maersk.

3. To examine the effect of stakeholder engagement on the logistics efficiency of Maersk.

1.5 Research hypotheses

The study was guided and tested on the following hypotheses;

I. H1: Eco-driving training practice has significant effect on logistics efficiency of Maersk

II. H1: Use of telematics has significant effect on logistics efficiency of Maersk

III. H1: Stakeholder engagement has significant effect on logistics efficiency of Maersk

1.6 Scope of the study

1.6.1 Content scope

The study was limited to sustainable transport practices and specifically; Eco-driving training practice, Telematics and stakeholder engagement and how each of these practices affect Logistics efficiency.

1.6.2 Geographical scope

This research was carried out at Maersk Uganda located at 5th Street Industrial Area P.O BOX 28687 Kampala because it's a logistics company that embraces transportation of goods. This included assessing the transportation and logistics practices of Maersk Uganda.

1.6.3 Time scope

The study was done for the period of 12 months, January to 20th December 2020.

1.7 Significance of the study

The importance of this study may be to provide relevant information to Maersk Uganda on how it can make its transport system totally sustainable after seeing the effectiveness of the current control systems.

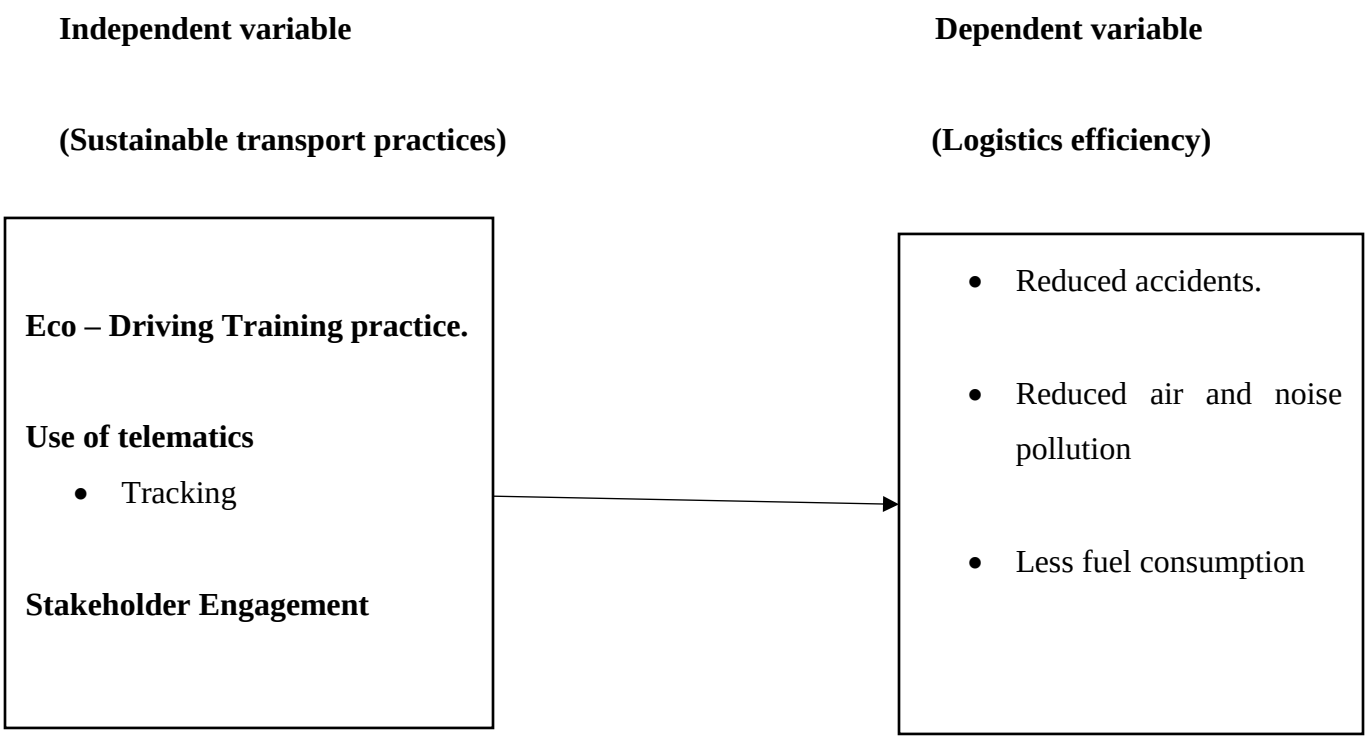
Maersk as a whole organization may benefit from this research in the way that it will help them to revise their transport sustainable systems worldwide.

Citizens of Uganda may benefit because from this research when accident are reduced, air and noise pollution is reduced and as a result improved standard of living is realized.

Academicians and scholars may find this study very useful in their research and also knowledge and concept development.

1.8 Conceptual framework

A conceptual framework was developed in order to help structure the research and to identify different variables for measurement (Tamene, 2016). The conceptual framework below highlighted the relationship between sustainable transport practices which was an independent variable and Logistics efficiency of Maersk as a dependent variable as illustrated in Figure 1 below.



Adopted and modified from Buenk et al. (2019) Sustainable transportation assessment

Figure 1: A conceptual framework of sustainable transport practices and logistics efficiency

In this conceptual framework, sustainable transport practices have been classified into three practices: Eco-driving, telematics and stakeholder engagement and their effects on the logistics

efficiency of Maersk. In this study the measure for sustainable performance in transportation is logistics efficiency which is measured by reduced accidents, reduced air and noise pollution and less fuel consumption. And therefore, this portrays that any bottleneck or constraint in the implementation of the sustainable transport practices (eco-driving, telematics and stakeholder engagement) affects the logistics efficiency of Maersk Uganda (Nge, Rattanawiboonsom, Mahmood, & Rurkwararuk, 2016).

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed appropriate literature related to the study concepts from referenced books, journals, periodicals, reports, dissertations and thesis. The reviewed literature examined how eco-driving training practice, telematics and stakeholder engagement affect logistics efficiency of logistics companies. The review began with understanding the theory of constraint and how it applies within sustainable transport practices and logistics efficiency. This was followed by the review of the concepts of this study and the studies supporting relationships that was examined in this study. And lastly a summary of a literature gap was included.

2.1 Theoretical framework

The theoretical background of this study was rooted into understanding the existing theoretical lenses and learning literature especially literature on sustainable transport practices as well as relational literature. This study was attached to the theory of constraint as further explained in this chapter.

2.1.1 The theory of constraint

Theory of constraint is wide and rich theory that can be applied to different fields such as procurement, supply chain management, logistics, stores, project management, accounting, production and sales (Şimşit et al., 2014). It was developed by Goldratt in the late 1970s and it is embraced with the philosophy of the on-going improvement and thinking process(Rahman, 1998). Theory of constraints is a management philosophy that enables an organization to identify its weakest point within its system and then come up with the improving strategies on how to address

these weakest points identified(Watson et al., 2007). According to Şimşit et al. (2014) the theory of constraint helps an organization to change the way of thinking of all its staff and hence seen as a solving methodology. Emergency situations that requires immediate improvements, the theory of constraints is the best methodology to opt for because it enables the organization to identify the bottlenecks and then come up with strategies on how to reduce these bottlenecks (Watson et al., 2007).

The inventory control systems such as Materials requirement planning (MRP), Just in time (JIT) are shaped by the capacity constraints an element of theory of constraint (Kim et al., 2008). In this study, main bottlenecks and differences were determined as well as giving solutions to minimize or remove the bottlenecks. In addition, the study also explained how the techniques complement each other. The Theory of Constraints has got an approach that ensures proper improvement across the all system so as the bottlenecks are eliminated (Watson et al., 2007). Theory of constraints assumes that every system has got many linked activities from which constraints can be traced (i.e. constraint node is the "weakest point link in the chain of these activities") (Dechter, 2003).

The theory therefore was relevant to this study because it helped to focus on the weakest points of the transport sustainable practices which are bottlenecks for logistics efficiency and also entire company. This theory also helped to identify different limiting factors also known as constraints which helps an organization now to come up with different strategies on how to improve and eliminate the bottlenecks until they are no more.

2.2 Sustainable transport practices

Organization for Economic Cooperation and Development (OECD) in 1994 brought in a motion of how to ensure sustainable transport in the society and this gave rise to the aspect of sustainable

transport which aimed majorly on pollution reduction (Schade & Schade, 2005). Sustainable transport is referred to as a changing process that ensures a balance between resource use, technology and the life of the people in the society (Girardon, 2019). Sustainable transport practice is portioned into three major aspects: social, economic, and environmental (Beattie, 2017). The need for sustainable transport is due to the increased globalization around the world (Fuglestvedt et al., 2010). Sustainable transport aims at achieving the needs in transportation without affecting the future needs of the society (Ellis, 2010). Tolley (2003) suggest that sustainable transportation practice implementation involves wide investigation within the all transport system in order to add value to the transport chain.

Moving away from different perspectives how sustainability concept is applied, it must be noted that sustainable transport involves more than just concern for environment and ecology (Environmental Protection Agency, 2004). Sustainability in transport is the connection between an ecological (environment), economic and social-cultural (community) system, as illustrated below in figure 1. In an economic development society, there is the concern for economic growth in relation with ecological resources. Economy grows within the limits of the capacity of the environment. In relation with this, there is development process that emphasizes the community needs to be met like satisfying basics of human needs while putting in consideration the resources. A third process type is one that strives for maximum economic development, ignoring care for ecological aspects. Sustainable development therefore will be achieved when these three types of development interact

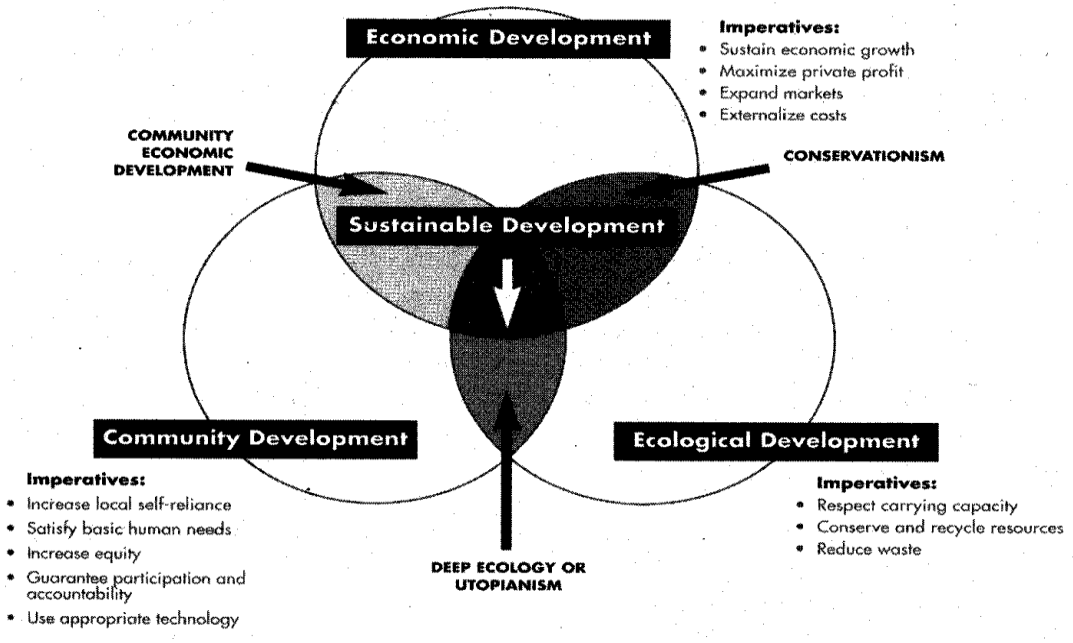


Figure 2: Three development processes, with possible interaction schemes as stipulated by (Zuidgeest et al., 2000).

Different countries across the world have put in place different sustainable transport practices which has helped them to reduce on pollution, accidents and fuel consumption (Attah, 2010). In consideration of every organization's perspective towards logistics efficiency while putting in consideration sustainability, organization have come up with different sustainable transport practices that enable them to achieve logistics efficiency (Haque et al., 2013). Some of these sustainable transport practices have been challenged and considered to have a negative impact to the society and argued for more effective practices (Ivanov, 2017).

2.3 Logistics efficiency

Transport is part of the supply chain that manages and optimizes physical distribution of goods and information from one point to another ("Dyn. Logist.," 2011). Logistics efficiency is

concerned about cost, efficiency, and service quality (Bichou & Gray, 2004). Logistics is not only concerned about just achieving economic efficiency but also reduce safety hazards and pollution (van der Spoel et al., 2012). Logistics can be studied from three dimensions such as efficiency, effectiveness and differentiation (Fugate et al., 2010). The applications of the transport system are generally positive to logistics efficiency (Rodrigue et al., 2001).

It should be noted that fuel consumption is a key element of logistics and it can be used to determine its efficiency (Fu, 2017). Several researchers have examined fuel consumption reductions with the companies that are efficient in logistics (Greening et al., 2000). Many accidents are attributed to the transport system of the different organizations and therefore the increasing accidents are due to the unsustainability of the transport structure of organizations (Issa, 2016a). European report found that the world is not doing enough to ensure that sustainability is adhered to in the transport system and this has led to increment in the rate of emissions, accidents and fuel consumption (European TSC, 2018). Air pollution controls is a priority in many countries and hence they are in position to control greenhouse gas emissions (Colvile et al., 2001).

2.4 Eco – driving training practice.

Equipping drivers with eco-driving skills, helps to reduce environment pollution, accidents and fuel consumption arising from the logistics environment (Huang et al., 2018a). Eco-driving training is the adoption of a driver to a certain acceptable driving style (Allison & Stanton, 2019). Therefore it is seen as an approach that minimizes costs in terms of pollution, accidents and fuel consumption (Fussler, 1996). Eco-driving is a driving style which helps organisations to receive logistics operations in their operations (Ho et al., 2015). Eco-driving training practice is one of such measures aimed at managing driving techniques of the driver while on the road and it includes

driving and vehicle maintenance rules, which if followed leads to greenhouse gas emissions reduction, reduced noise, improved road safety, enhanced driving skills, and reduced costs of accidents (H. Lee et al., 2010). The eco-driving training aspect has been implemented in different organizations across Europe (DZENISIUK, 2017). The main way to minimize transportation related greenhouse gas emissions, accidents and fuel consumption is to not drive cars, an option that is most efficient is by altering and monitoring driving style of the drivers (Zarkadoula et al., 2007).

Eco-driving concept is extended to include strategic and tactical decisions that drivers make (Hibberd et al., 2015). Strategic decisions involves selecting a vehicle that minimizes fuel and also continuous maintenance of the vehicle (Vaezipour et al., 2015). Tactical decisions involves decisions made by drivers on changing routes especially a decision between a busy area and not a busy area (Jamson et al., 2015). Worldwide across the globe, there is a difference in how different drivers from different companies understand the eco-driving concept and thus this has caused again the increasing pollution of company vehicles to the environment since all drivers globally understand it differently (Boriboonsomsin et al., 2010). Most organizations lack established guidelines and rules on how to achieve eco-driving and this is a challenge they are finding because this has made them not to be effective and hence reducing on their logistics efficiency (Allison & Stanton, 2019).

Eco-driving involves training of drivers and key staff in transport in order to improve on the logistics efficiency of the firm (Mikami & Furukawa, 2018). Logistics efficiency is achieved by the organization when drivers and staff are trained and equipped with all the necessary skills to ensure sustainable transport (Ericsson, 2008). Safety training and expertise development in

transport over decades has been recognized as a the best tool on how to improve sustainability in the transport system in order to ensure efficiency in logistics (Grespan et al., 2019). In line with the present research from different researchers, employee training and expertise development in line with sustainability is very vital in improving logistics efficiency as well as increasing productivity (Khan et al., 2011).

2.4.1 Eco-driving training and logistics efficiency

From the research carried out by Díaz-Ramirez et al. (2017) In Colombia ascertained that fuel consumption is one of the key variables of logistics efficiency and it can be improved by training and equipping drivers with all the eco-driving skills. This is because driver's experience, errors, speed, and weight –capacity ratio as tools for eco-driving were found to be highly relevant in reducing fuel consumption with reductions of 6.8% and 5.5% being obtained (Díaz-Ramirez et al., 2017). This is in agreement with Saboohi and Farzaneh (2009) who found out that excess fuel consumption is voided through implementation of optimal driving strategy which is subject to eco-driving and hence this improves the logistics efficiency of the organization. In addition, the study by Lai (2015) on the effects of eco-driving motivation, knowledge and reward intervention on fuel efficiency also ascertained that eco-driving training helps the organization to reduce on its emission levels and fuel consumption. This study used the theory of Motivation-Opportunity-Ability (MOA) to construct the regression model and results showed fuel efficiency improvement of 10% after the adoption of the eco-driving technique.

From the research carried out in Australia and Hong Kong, it was observed that after equipping drivers with all required eco-driving skills and techniques, organizations can be in position to register immediate and significant reductions in fuel consumption and CO2 emissions which enables them to improve their logistics efficiency hence eco-driving having a significant effect on

logistics efficiency (Huang et al. 2018). These findings continued to urge a necessity of organizations to develop quantitative eco-driving patterns that can be embedded in the vehicles in order to have automatic improvements accompanied with continuous training programs. And also the study by Alvarez-Coello et al. (2018) on eco-driving techniques applied in a transport fleet in Ecuador ascertain that equipping drivers with eco-driving techniques and skills enables to generate a total fuel reduction of 8% and reductions in emissions between 11% and 51%.

Alam and McNabola (2014) stipulate that eco-driving training policy implementation has achieved fuel consumption and pollution reductions ranging from 5% to 40%. In their study, their interests was to assess the eco-driving policy and its benefits towards an organization in terms of logistics efficiency. The results of their study reported that eco-driving training policy has a significant potential to reduce pollution and fuel consumption of an organization thus improving on its logistics efficiency. This is also supported by Ho et al. (2015) who carried out a study on what eco-driving can do for sustainable road transport in Singapore and the results showed achievement of fuel consumption and emission reductions above 10%. Hence the study concluded that eco-driving is worth a mitigation measure to be adopted to ensure efficient sustainable transport system thus improving logistics efficiency.

Not only the above studies agree that eco-driving training has a significant effect on logistics efficiency also the study on energy and emissions impacts of a freeway-based dynamic eco-driving system by Barth and Boriboonsomsin (2009) is in agreement with the above. In their study, advices were provided to all drivers and approximately 10-20% fuel savings and emissions reductions was registered which enabled a significant increase in logistics efficiency. Also in the study by af Wåhlberg (2007) it was found out that the effect of eco-driving training of drivers on logistics

efficiency is very strong with about 2% reductions in fuel consumption within 12 months and 2% reductions in accidents hence improved logistics efficiency.

Accidents are very common in developing countries. This is confirmed by the study carried by Issa (2016) in Saudi Arabia who assessed the effect of driver's personal characteristics on road accidents. The results showed that 80% of the accidents are related to human factors and the report concluded that responsibility of accidents tend to decrease with the highly educated and trained drivers and hence this improves on logistics efficiency.

The study carried out from United kingdom by Clarke et al. (2010) ascertained that 65% of the total accidents in the United kingdom were due to excessive speed by the drivers, excessive alcohol and failure of the drivers to wear their seat belts. All these are elements of eco-driving and once the drivers are trained and equipped with the skills, they can be in position to reduce on accidents rates and hence increase in logistics efficiency of an organization. From this research it was noted that most of the accidents were caused by the young drivers since young drivers were the most group that lost control on bends while on road and most especially in rural areas and at night than older drivers. And this portrayed that drivers with experience after the long-time of training and equipping them with all the necessary skills, they can be in position to reduce on the rate of accidents while on the road thus enabling the organization to improve on its logistics efficiency.

In addition, the study by McKenna et al. (2006) is in agreement with the above after discovering that skilling of drivers help them to reduce on their risk taking in terms of being exposed to accidents while on the road which improves on the logistics efficiency of an organization. This study was examined by three experiments of which all of them demonstrated a decrease in the rate of accidents of the drivers while on the road. Also the study that examined the relationship between cognitive failures, driver's errors and accidents in Iran found that the driver's errors while on the

road and cognitive failures had a strong effect on accidents. Therefore this shows that eco-driving training has a significant effect on accidents thus affecting the logistics efficiency. This study recommended the use of a driving-oriented cognitive failure scale to help identify the errors produced by drivers.

The study that compared the effect of eco-driving training (higher – order driving and vehicle handling skills) in relation to driving performance (accidents) found out that in relation to road driving, drivers that were trained with higher-order driving skill showed a statistically significant improvement in relation to reducing accidents and this was followed by increase in hazard perception, safer attitudes while on the road. And hence this shows a significant effect of eco-driving training on logistics efficiency of an organization.

As noted from the above, most of the research has showed that accidents tend to reduce with well implemented eco-driving training program, but the research carried out by Katila et al. (2004) on the effects of driver training on slippery road accidents is in contrary with this. The study found out that training and equipping of drivers with the eco-driving skills and techniques does not necessarily guarantee that they are confident enough to control accidents most especially on slippery roads and therefore the study concluded that the important factor is how the drivers use these skills and for what purpose. In addition to this, the study by Deffenbacher et al (2000) also ascertained that drivers with a lot of anger are very prone to cause accidents while on road though the study found out that when these drivers are well trained with cognitive-relaxation, they can be in position to reduce on their anger and hence minimizing on the rate of accidents. From this it is noted that while training and equipping drivers with eco-driving skills companies need to do it continuously in order to always pamper the drivers with the necessary knowledge and also to keep reminding them every month, week and days.

From the research carried out on 91 delivery van drivers of the Hamburger Wasserwerke (HW) in 2003, it showed that after the training and skilling of these drivers, pollution levels, fuel consumption reduced by 5.8%, accident damage reduced by 40% and pollution levels also reduced drastically (Crundall et al., 2010). Nissan's eco-driving scheme was highly successful with the results achieved being 18% fuel economy improvements which helped them to achieve a high efficiency in their logistics system(Yamanashi, 2010). It is argued that drivers who adopt to a managed eco-driving driving style, logistics efficiency is increased since fuel use and greenhouse gas emissions is reduced (Boriboonsomsin et al., 2011).

Allison & Stanton, 2019 ascertained that with the adoption of eco-driving training practice, organisations are in position to reduce emissions by 15% and fuel consumption by 5% thus improving logistics efficiency. Energy consumption, greenhouse gas emissions, accidents and fuel consumption from transportation are minimized with adoption of eco-driving behaviours by the drivers which enables the organization to improve on its logistics efficiency (Ma et al., 2012). Ford company adopted the eco-driver training program with different partners for over 10 years to develop fit-for-purpose training programme for its different drivers, and after, the training programme was tested on over 7,000 participants basing on psychological interviews and questionnaires and the company revealed excellent logistics efficiency that portrayed reduced environment pollution, reduced accidents and reduced fuel consumption (Luther & Bass, 2011)

2.5 Telematics

The development of the technology system in the 1990s sparked a wave of optimism and, in retrospect, unrealistic expectations to revolutionize all aspects of life and business activity (European TSC, 2018). Telematics is embedded with the use Global Positioning Satellite (GPS)

technology to track all the activities of logistics (S. H. Chang & Fan, 2016). GPS technology evolved from the military base of United States from where the GPS was used to locate vehicles, soldiers, supplies and their enemies in the U.S. military (Cho et al., 2006). Global positioning system tracking is a tool in telematics and on-board diagnostics (OBD) (Ashby, 2005). Telematics is now being recognized and used by different organizations and thus development in wireless and mobile communication technology (Baecke & Bocca, 2017).

Telematics technology system is used to monitor the driver while on the road (Piquer & Teraphongphom, 2013). Telematics is used to monitor these elements; Start of journey and its end; speed; location of the vehicle; acceleration and braking; cornering on road; Seatbelt use while in car; Fuel consumption of the vehicle (European TSC, 2018). A more advanced telematics system can map drive different conditions which include; driving at night, heavy traffic and situations of bad weather (Agarwal, 2017). Minimizing risk means managing the risk proactively through different measures across the organizations (KOS-ŁABĘDOWICZ, 2017). Telematics helps to identify and reduce risks across road safety issues and also issues specific to the organizations and drivers (Ball, 2006). It is urged by different researchers that telematics systems in transport are able to; improve the efficiency of traffic management, improve and ensures traffic safety, use existing transport infrastructure more effectively and efficiently, protect the environment better, improve cooperation between the private sector and public transport providers, and allow for more effective competition within the transport services sector'' (Wahlstrom et al., 2017).

Telematics device location in the car affects the results, this is because the telematics tools pick up mostly by the moving of a vehicle (Duri et al., 2002). This arises when the telematics tool is installed in the car than being very close to a wheel path (Baecke & Bocca, 2017). The study by

Alalwan et al. (2017) urge that most African countries lack access to quality information technology which in turn hinders there economic and social development. Global Positioning System is used to determine expenses, time sheets which in turn reduces fuel consumption and also increase employee driving efficiency and effectiveness hence improved logistics efficiency (Grewal et al., 2000). More functions of the GPS-based systems include; alarms and gives notifications, gives information on fuel consumption, monitors temperature, offers direct communication with drivers and operators, controls drivers' working time, analysis of the driving behaviours, proposing eco-driving skills, cooperation with other information systems, report on greenhouse gas emissions, records journeys on toll roads and reporting bumps (Rai, 2019).

2.5.1 Telematics and logistics efficiency

The research by Mikulski (2010) presented a new approach to solve transport problems such as pollution, fuel consumption and accidents and from his research it was found out that telematics offers a high opportunity to an organization to minimize the negative impacts of transport to the environment. And hence telematics was found out having a significant effect to logistics efficiency. In addition to this, a research carried out in Bangkok showed that the adoption of telematics using the current real-time air quality monitoring system and nanotechnology being linked by the Global positioning system (GPS) allows continuous provision of the pollution levels which enables organization awareness and public participation. This enables an organization to come up with strategies on how to reduce on the pollution levels and hence improving on their logistics performance (Pummakarnchana et al., 2005).

Furthermore the study carried out by Wu et al. (2010) in California showed that telematics in terms of tracking using the Global positioning system (GPS) has a significant impact on the pollution levels of firms. From this study, performance of the GPS data loggers were evaluated and the

findings portrayed that all the GPS devices showed promising performance on monitoring the time location patterns in terms of pollution. This is in agreement with the study by Meinrenken et al. (2020) in Michigan, USA who urged that the use of the use of the Global positioning system (GPS) helps an organization to achieve the highest emission reductions in transportation.

The study carried out in Ethiopia found out that organizations that use the Vehicle On-Board Diagnostic (OBD-II) to monitor vehicle emission information and Assisted Global Positioning System (A-GPS) to get location of the vehicle at real-time concerning pollution, they are in position to reduce their emissions level in the environment which enables the organization to improve its logistics efficiency (Abera et al., 2016). Also the research by Miya et al. (2010) in Japan ascertained that the use of GPS tracking system in the vehicles helps to reduce pollution levels. From their findings, experiments conducted from Yokohama-shi and Tokyo showed an average reduction in emissions by 57.4% with adoption of the GPS tracking system to track specifically the emissions level of the drivers while on the road.

In addition to the above the study by Sivasakthi et al. (2017) on an Intelligent Control System for Emission Level and Tracking System Using Gas Sensor and GPS found out that the GPS tracking system with combination of other tracking technological systems (telematics) helps to reduce on pollution levels. This was concluded on the basis that vehicles with installed GPS system and other technological systems were able to detect any pollution/ emission that could arise while the driver was driving and an indicator could come on the screen of the vehicle that a limit has been breaches and the vehicle will stop after a period of time. And when the vehicle stopped, the GPS had to locate the nearest service location in order to solve the problem at hand. This enabled to reduce on emissions and hence improved logistics efficiency.

The study by Beusen et al. (2009) on using on-board logging devices to study the longer-term impact of an eco-driving course in Belgium showed that 10 cars that were equipped with on-board logging device that helps to record the speed of the car with the use of the GPS tracking system for a period of 10 months registered a fuel consumption reduction of 5.8%. And from this, it's noted that there will be an increment in the logistics efficiency of an organization after the adoption of the telematics tracking system. This is in agreement with the study conducted by Wang et al. (2015) in Beijing that also ascertained that vehicles with a tracking system for pollution levels and fuel consumption reduction can be in position to reduce on the pollution levels and fuel consumption reduction hence improving the logistics efficiency of the firm.

The study in Portugal on estimating fuel consumption from GPS data also showed that vehicles with a tracking system were in position to reduce on fuel consumption and emissions since all the routes were under plan and the drivers were being monitored on their movements and hence fuel consumption, pollution is reduced (Vilaça et al., 2015). From this study, data was collected from 17 drivers using the SenseMyCity crowd sensor and results showed that drivers with the tracking system were in position to reduce on their fuel consumption levels and emissions. This is in support with the study by Jovičić et al. (2010) in the City of Kragujevac that aimed to assess the potential of vehicle route optimization using the GPS system to reduce fuel consumption and emissions. The findings of this study showed a 20% reductions in fuel consumption and emissions which in turn portrays an increase in the logistics efficiency. Thus this evidence that a well implemented telematics system has a significant effect on the logistics efficiency of an organization.

The study on reduction of fuel consumption by early anticipation in the United Kingdom Showed a significant reduction in fuel consumption in particular situations of 50% and in entire drive while on the road 4%. This study investigated the vehicles with the GPS based tracking system and their

impact on fuel consumption of the vehicles while on road. This is also in agreement with the findings of Mansour et al. (2011) in Lebanese who showed that fuel consumption levels and CO2 emissions rate of the Lebanese vehicles reduced with the use of the GPS tracking system. In addition to these finding, also the study by Chang et al. (2015) positively argued that technology deployment in vehicles has a significant effect on fuel consumption and emissions reduction. The study analysed vehicles based on Vehicle-to-Infrastructure and the results showed a reduction in delay by 27% and a reduction in CO2 emissions & fuel consumption by 11%.

Vehicle tracking helps to reduce on the rate of accidents as affirmed by the study carried out by Mounika and Chepuru (2019) in India on vehicle tracking and monitoring system using GPS and Global System for Mobile Communications (GSM). From this study, it was ascertained that use of the tracking system in vehicles, helps to detect alcohol consumption easily and hence minimizing on the accidents rate thus improving on the logistics efficiency since accidents are reduced. This is in agreement with Abinaya and Devi (2014) whose study found out that for accident reductions and vehicle security enhancement, there is need for companies to implement ignition control or vehicle tracking and locking. From this study it was also found out that tracking (telematics) helps to find the exact location of the accident and then with the help of the wireless network an emergency vehicle can be sent in order to reduce human life.

The study carried out by Sarkar and Mohan (2019) in India on review of autonomous vehicle challenges also was in support with the above findings. This study found out that the technologies embedded in the vehicles in terms of tracking (Global Positioning system) are a better solution to the increasing accidents of vehicles while on road. Though the study added that the GPS system must be reliable for it to be effective. In addition to this, the study by Sane (2016) also found out that real time vehicle tracking and accident detection with the GPS tracking system helps to avoid

situation of accidents and human life loss. All these studies are in agreement with Desai et al. (2014) who also in their findings found out that telematics in terms of tracking has a significant effect on the logistics efficiency of an organisation since it helps the organization to minimize accidents.

A survey on accident detection, tracking and recovery of vehicles by More and Patil (2008) ascertained that in most accidents human life is lost due to no medical facility is reached to these people in time and also that most accidents happen because drivers are not tracked while on road. Therefore, this study recommended organizations to install tracking devices in their vehicles such that they can reduce on the accidents rate and even on life loss of the causalities. Therefore this shows that telematics has a significant effect on the logistics efficiency of the organization. The study also by Rani et al. (2018) in India on a review of vehicle tracking and accident detection system using Accelerometer also evidenced that installation of the tracking device system in the vehicles helps to reduce on the accident rates. In 2014, a research on drivers in Scotland using the telematics technology showed an improvement of 75% in driving (European TSC, 2018). A 2015 research report showed fleet telematics brought in reductions in pollution by 30% thus improving logistics efficiency (European TSC, 2018).

2.6 Stake holder engagement

Stakeholder engagement has become popular in environmental policy practice instruments (Chilvers & Longhurst, 2016). In 2012, a document called, 'The Future We Want', aimed at enhancing the participation and efficiency engagement of stakeholders in the implementation of sustainable transport' (UN, 2012). According to Chi et al. (2014), stakeholders have many different responsibilities such as decision making, technical expert and an outside influencer. According to Franklin (2020), the relationship between stakeholder engagement and logistics efficiency

portrayed a significant effect of stakeholder engagement on logistics efficiency. The study by Herremans et al. (2016) on stakeholder relationships, engagement, and sustainability reporting found that the social, economic and environmental sustainability aspects were associated with the company's stakeholder engagement strategy.

2.6.1 Stakeholder engagement and logistics efficiency

According to Chakravarty et al. (2009) in their study on sharing global CO2 emission reductions among one billion high emitters found out that for organizations to reduce projected emissions by 2030, they require engagement of 1.13 billion high emitters. From their findings it is noted that stakeholder engagement has a significant effect on pollution levels of an organization thus affecting logistics efficiency. This is also continuum with Narassimhan et al. (2018) who in their study identified Institutional learning, administrative prudence, appropriate carbon revenue management and stakeholder engagement as key ingredients for a successful reduction of emissions. The study was carried out in California, Québec, South Korea and conclusions showed that stakeholder engagement had a significant effect on pollution levels.

Greg Marsden et al. (2020) point out that the failure in the transport field to reduce on pollution levels caused by vehicles required new approaches and research. Their study concluded that for organizations to achieve low emissions level, they should improve on their transparency and welcome participation of the all population. This shows a relationship between stakeholder engagement and logistics efficiency in terms of pollution levels. Stakeholder dialogues enables organizations to realize reductions in pollutions (Tuinstra et al., 2003). In this study stakeholder dialogues were central to the project and the results showed that use of knowledge and technical know – how of different experts were important elements in emissions reduction. The study also by Barisa and Rosa (2018) on scenario analysis of CO2 emission reduction potential in road

transport sector in Latvia was in agreement with the above research. This is showed from its findings where it confirmed that knowledge-base and modelling capacity policy decision-making in the transport sector helps to reduce on pollution levels and fuel consumption with results showing a significant effect of scenario analysis on emission reductions.

The study by Lam et al. (2019) further ascertains that stakeholder engagement approach reduce pollution levels of an organization. In this study a big data computation text analysis approach was used to compare concerns towards air pollution among three stakeholder groups which include; government, environmental groups (NGO) and the news media in Hong Kong, between 2002 and 2012. The findings of the study showed that stakeholders focus heavily on the emissions and they come up with different strategies on how to reduce the emissions which help an organization to reduce on its emissions. In addition to the above, the study by Vianna and Fraga (2018) that focused on stakeholder engagement for decision-making on urban air pollution control concluded that involving stakeholders in different aspects of the environment helps in proper decision making which enables organizations to reduce on pollution levels. In this study data was collected from the local stakeholders of Salvador, Bahia-Brazil and results showed dialogue among the local stakeholders helped to reduce pollution levels in the society. Thus portraying a significant effect of stakeholder engagement on pollution levels.

Furthermore, the study by Fuchs (2008) that discussed the relationship of sustainable information provision with fuel consumption, also ascertained that involvement of different stakeholder's decisions in sustainable development helps to reduce on the fuel consumption rate of the vehicles of the organization. A study by Schröder et al. (2019) on advancing sustainable consumption and production in cities presented a trans disciplinary research and stakeholder engagement framework to address fuel consumption and emissions. The findings of the study showed that an integrative

approach in-terms of stakeholder participation towards ensuring reduced fuel consumption and emissions rate yielded good results. Therefore this also shows a significant effect of stakeholder engagement on fuel consumption and emissions reduction. This is also in support with the study by Lai (2015) who from the findings confirmed that stakeholder engagement in terms of knowledge information got from people enables the organization to improve on its fuel efficiency by 10%. This study continued to assert that with the adoption of stakeholder engagement, emission levels are also reduced. Stakeholder engagement and participation in sustainability aspects bleeds pressure to the firms and hence quick responses is receive from the organization thus emission reduction and improved operational logistics performance (S. Y. Lee & Kim, 2015). Also the study by Ranganathan and Bali Swain (2018) found out that global reductions in emissions can be achieved by improving on the engagement of all stakeholders in sustainability decision making.

The study by Marletto and Mameli (2012) aimed at investigating the relationship of a participative procedure for transport sustainability and accidents rate observed that engaging all stakeholders in making decisions concerning transport sustainability is a strategic choice that enables organizations to reduce on accident rates. Stake holder involvement in Italy was obtained through a national sample survey accompanied by a deliberative multi-criteria analysis. The findings of the study revealed that citizens are more oriented towards reducing accidents and pollution levels.

2.7 Literature Gap

Analysing the studies above on sustainable transport practices and logistics efficiency, it is possible to verify the need for more literature to enlarge the debate on this topic. Most of the studies focused on sustainable transport practices such as eco-driving training, tracking and there effect on emissions, fuel consumption and accidents, case studies of different countries other than Uganda. In relation to this observation, studies on stakeholder engagement and logistics efficiency

are few. Therefore, research presenting an overview of sustainable transport practices inclusive of eco-driving training, telematics and stakeholder engagement developed by Maersk Uganda in ensuring logistics efficiency was absent. Considering this, the main objective of this research was defined: to assess the effect of sustainable transport practices on logistics efficiency with a specific focus on Maersk Uganda.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the methodology adopted in the study. It contains the research design, study area, study population, sample size, tools for data collection, and sources of data, analysis of data and presentation and limitation to the study.

3.1 Research design

Research design is a plan that provides the all framework for collecting data (Hollweck, 2016)**.** It is also defined as a plan that chooses subjects, research sites and data collection procedures (Grösser, 2013).

A case study research design was adopted in this study to provide an in-depth study of the research problem and to investigate the nature of relationship between study variables while focusing on the dynamics of the case, within its real-life context. In addition, the study used both the quantitative and qualitative approaches.

The quantitative approach was adopted to enable measurement of the study variables whereby analysis was carried out using statistical procedures (Apuke, 2017). It emphasizes the selection of sample size to quantify a phenomenon for the total population.

The qualitative approach enabled the study to provide detailed explanations on the relationship between study variables to enrich the quantitative measurements. Creswell contends that qualitative research applies an open approach to enquiry, describing and interpreting some human phenomenon as stipulated by (Levitt et al., 2018)**.**

3.2 Study area

The study area was on Maersk Uganda located in Kampala, Uganda. Company is working in Marine Services, Transport business activities. Maersk Uganda Ltd is located at 5th Street Industrial Area, P.O. Box 28687, Kampala Uganda with a total number of 50 members of staff from the logistics, ocean shipping, customer service, information technology and sales department.

3.3 Study population

Population is defined as a collection of elements about which references are wished to be made (Atatah et al., 2016). Target population is a large population from which a sample population is selected (Gooch, 2011)**.** The population for this study comprised of 50 staff of Maersk Uganda from the logistics, ocean shipping, customer service, information technology and sales department.

3.4 Sample size

The sample size for the study comprised of 48 members of the staff from logistics, ocean shipping, customer service, information technology and sales department. The sample size was determined with the help of Yamane's formula of sample size determination as stipulated by Krejcie & Morgan (1970) represented in Table 3.1.

Sample size = N / (1+N (e^2)) Where

e = 0.05 (margin of error)

N = Population

Table 3. 1: Sample Distribution

Departments	Population	Sample size	Sampling technique
Logistics	32	30	Stratified random sampling
Shipping	5	5	Purposive random sampling
Customer relations service	3	3	Simple random sampling
Information technology	4	4	Purposive sampling
Sales department.	6	6	Purposive sampling
Total	**50**	**48**	

Source: Primary data

3.5 Sampling technique

A sample is a section within a population that is chosen to represent the whole population (Freedman, 2004)**.** The essence of sampling was to obtain data from a smaller particular sample which in turn increases efficiency by allowing generalisations to deduce about the population without necessarily having to examine every member.

Stratified random sampling was used to select samples from the population strata. Stratified random sampling is a variation of simple random sampling in which the population is partitioned into relatively homogeneous groups called strata and a simple random sample then selected from each stratum, the results from the strata are aggregated to make inferences about the population (Patten et al., 2018).

Simple and purposive sampling methods was used to select sample elements for interviews. In Maersk therefore, each department was considered as a strata and a random sampling was used to select staff from each department.

3.6 Sources of data

The study relied on primary sources of data. Primary data was gathered from respondents using a structured self-administered questionnaire and personal interviews (Hox & Boeije, 2004).

3.6.1 Secondary data

The secondary data refers to data obtained from the secondary sources (Johnston, 2014). The data was collected from the, internet, literature review, journalists, reports and other resource centres which backed up quantitative data.

3.6.2 Primary data

Primary data is the data obtained from primary sources (Aitrs, 2012). The researcher got information directly from the field where the study was carried out.

3.7 Data collection instruments

3.7.1 Questionnaire

Questionnaire is a carefully designed instrument for collecting data in accordance with the specifications of research questions (Nardi & Nardi, 2018)**.** Questionnaires were used to collect data from the respondents using structured questions. These contained both closed and open-ended questions. Closed ended questions were helpful in getting precise responses while open-ended questions were used to get detailed information on the subject matter. The questionnaires were developed on a five-point Likert scales measuring from strongly agree as response 1 to Strongly Disagree as response 5. This is because the Likert scale is used in any situation, measuring intensity of opinion, easy to understand and does not force the participants to give a particular answer on a topic that they might not be comfortable dealing with (Haque et al., 2013). All questions were arranged in one direction and all the constructs were operationally defined.

3.7.2 Interview guide

Interviews guides were used on the randomly selected staff from the department because it is easy to fully understand someone's impressions or experiences, or learn more about their answers to questionnaires. An interview guide is a tool used by a researcher to obtain data through face to face or oral communication (Katuna, 2019). An interview allows the researcher to ensure that the information collected from the interviewee is in line with the study because he/she is always available for immediate guidance (Moeckli, 2011)**.**

3.8 Data collection procedure

A letter of introduction to collect data was obtained from Graduate school Kyambogo University. The researcher got permission from Maersk Uganda where data was collected. After being authorized the subjects were sensitized about the tests that was being done. The researcher then went to the field and the introductory letter was presented to the respondents on request. At the start of every interview, confidentiality was guaranteed to respondents.

3.9 Validity and reliability of data

3.9.1 Validity of the data

To ensure the validity of the research instruments, the study temperate the tools to fit the objectives. This catered for language clarity, relevance and comprehensiveness of the content and standard length of questionnaire. Norland (1990) defines validity as the correctness and reasonableness of data as cited by (LaBoskey, 2004)**.**

Face and construct validity of instruments were ascertained by first of all discussing the questionnaire and interview schedule drafts with the supervisor to ensure that all relevant constructs were captured. The content validity of the instrument was determined to find whether

the instrument was worthy executing for pre-test and thus the study. Content Validity Index was determined using the formula developed by Crocker as stipulated by (Horgas et al., 2008).

$$CVI = \frac{\text{Total Number of items rated as relevant by all respondents (17)}}{\text{Total Number of items in the Instrument (24)}}$$

$$= \mathbf{0.708}$$

Therefore, the content validity index 0.708 was above the threshold of 0.7 implying that the questionnaire was valid and worthy for data collection as per Yusoff (2019)

3.9.2 Reliability of the data

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Tiberious et al., 2016)**.** To ensure reliability of the research instrument, the questionnaires were pretested on few respondents who formed the resultant sample of the study and identified irregularities on the items included in the instrument. Afterwards the Cronbach's alpha coefficients was determined as a measure of scale reliability and all items with Cronbach's alpha of above 0.7 were considered reliable and consistent for further data collection and analysis.

Table 3. 2: Reliability Statistics

Variables	Cronbach's Alpha	N of Items
Eco-driving training practices	.763	6
Use of telematics	.744	3
Stakeholder's engagement	.767	3
Logistics efficiency	.797	5

Source: Primary data

From the table it was found that all the variables had an alpha above the threshold of 0.7 implying that the items in the research instrument were considered reliable for data collection as supported by Kurian (2014).

3. 10 Data presentation and data analysis

The study used both qualitative and quantitative data analysis techniques.

3.10.1 Quantitative data analysis

Quantitative data analysis involved use of descriptive statistics such as frequency distribution, percentages, mean and standard deviation especially when analysing sample characteristics. Besides, regression analysis was used to address the research objectives which sought to establish the effect of independent variable on a dependent variable (Huang et al. 2018).

The study developed simple regression models basing on sustainable transport practices that were adopted in the study and presumed to predict the levels of logistics efficiency using a linear regression question, $\mathbf{y = a + \beta x + e}$

$$\mathbf{LE = a + \beta ED + e}$$

$$\mathbf{LE = a + \beta UT + e}$$

$$\mathbf{LE = a + \beta SE + e}$$

Where, LE represents Logistics efficiency, UT represents use of telematics, SE represents stakeholder engagement.

3.10.2 Qualitative data analysis

For qualitative data, it was edited, summarised and analysed using content analysis where data collected was presented in themes for easy interpretation as supported by (Elo et al., 2014).

3.11 Limitations to the study

There was a problem of hiding the information by the respondents due to desire to keep the secrets of the company which was solved by promising the respondent and management not to disclose the information concerning the company to any unauthorized person.

Inadequate funding as a result of limited support was a major problem and this was solved by the researcher through soliciting support from the family members, friends and relatives who enabled the researcher conduct the research effectively.

CHAPTER FOUR

PRESENTATION OF DATA, ANALYSIS AND INTERPRETATION OF FINDINGS

4.0 Introduction

The study examined the effect of sustainable transport practices on logistics efficiency. This chapter discusses presentation, analysis and interpretations of the study findings as per specific objectives that guided the study. It therefore presents response rate, respondents' characteristics, descriptive statistics and lastly regression statistics.

4.1 Response rate

The study ensured that all the 48 questionnaires respective of the sample were issued out to the respondents. However, only 46 questionnaires were returned fully answered and ready for analysis. This constituted a response rate of 95.8% which was an excellent response rate as per Baruch and Holtom (2008). This was as a result of willingness by most of the respondents to avail information. The study targeted to interview 6 members of senior management however, only 4 respondents participated in the interview constituting 67% response rate

4.2 Background information

The study gathered background information of the respondents in order to determine the respondent's characteristics. Respondents were asked to indicate their gender, age, marital status, education levels, period of service and department.

4.2.1 Gender of the respondents

The study required respondents to indicate their gender so as to determine the number of both female and male who participated in the study and the findings are presented in Table 4.1 below.

Table 4.1: Gender of the respondents

Gender of the respondents	Frequency	Percent
Male	33	71.7
Female	13	28.3
Total	**46**	**100.0**

Source: Primary data

From the above Table 4.1, the majority of respondents in the study were male who constituted 71.7% of the sample and female constituted only 28.3%. This implies that Maersk was hiring more of men than women because of the hectic and heavy work involved in Logistics.

Table 4.2: Age bracket of the respondents

Age bracket of the respondents	Frequency	Percent
18-25	3	6.5
26-35	27	58.7
36-45	16	34.8
Total	**46**	**100.0**

Source: Primary data

The results in Table 4:2 indicated that respondents who were between 18-25 years were only 6.5% which constituted the least percentage. Those that lied in between 26-35 years were 58.7%, and

respondents who were in the age bracket of 36-45 years were 34.8%. This implied that majority of the employees hired at Maersk are people in their youthful stage.

4.2.2 Marital status of the respondents

The study required respondents to indicate their marital status and the results were as follows below

Table 4. 3Marital status of respondents

Marital status of the respondents	Frequency	Percent
Single	13	28.3
Married	30	65.2
Divorced	3	6.5
Total	**46**	**100.0**

Source: Primary data

The results in the above Table 4.3 indicates that majority of the respondents were married constituting a percentage of 65.2, Those that were single were 28.3% and the respondents who were divorced were only 6.5%. This implied that majority of the staff at Maersk were married and reasonable enough to make stunning decisions in regards to logistic efficiency

4.2.3 Level of education

The study also required the respondents to indicate their level of education so as to determine their level of understanding of the concepts under study and the Table 4.4 below presents the results.

Table 4. 4: Level of Education

Level of education	Frequency	Percent
Certificate	2	4.3
Diploma	16	34.8
bachelor's degree	18	39.1
master's degree	10	21.7
Total	**46**	**100.0**

Source: Primary data

The Table 4.4 above indicates that respondents with certificate constituted the least percentage (4.3%) while Bachelors holders constituted the majority percentage (39.1%). In addition, Diploma holders were 34.8% and Master's holders were 21.7%. This implied that majority of the Staff at Maersk were qualified to respond to the key issues that were asked in the questionnaire.

4.2.4 Number of years at work

The respondents were required to indicate the number of years spent with the organization and the results are presented below

Table 4. 5: Number of years at work

Number of years of work	Frequency	Percent
1-2 years	21	45.7
3-4 years	15	32.6
over 3 years	10	21.7
Total	**46**	**100.0**

Source: Primary data

From the results in Table 4.5 above, it can be observed that majority of the respondents had served at Maersk Uganda for a period between 1 to 2 years (45.7%). Respondents who had served between 3 to 4 years were 32.6% and only 21.7% of the respondents served for over 3 years. This implied that majority of the respondents had stayed for reasonable time with the organizations and were informed of the operations of the organizations.

4.2.5 Department of the respondents

The study required the respondents to indicate the department to which they belonged and the results are presented in the Table 4.6 below.

Table 4. 6: Department of the respondents

Department of the respondent	Frequency	Percent
logistic staff	28	60.9
shipping staff	5	10.9
customer relations service staff	3	6.5
information technology staff	4	8.7
sales staff	**6**	**13.0**
Total	**46**	**100.0**

Source: Primary data

Table 4.6 above indicates that majority of the respondents were logistic staff (60.9%). This was further followed by sales department who constituted 13%. Respondents who were from the shipping department constituted 10.9%. Only 8.7% were from information technology and 6.5% were from customer relations service staff which constituted the least percentage of the sample.

4.3 Presentation and analysis of findings

The study findings are presented as per the study objective as presented below.

4.3.1 Presentation and analysis of findings on Eco-driving training practices at Maersk

Respondents provided their views on the extent to which they either agreed or disagreed that Maersk applied Eco-driving training practices in line with items presented in the Table 4.7 below.

Table 4. 7: Descriptive statistics on Eco-driving training practices

Items	Mean	S D
Maersk drivers are trained to avoid rapid acceleration in order to attain logistics efficiency	4.43	.583
Maersk drivers are provided with skills to maintain a constant speed and avoid pumping the accelerator to reduce fuel consumption and accidents.	4.15	.788
Maersk drivers are trained to anticipate traffic conditions and plan before driving to reduce fuel consumption.	3.91	.915
Maersk drivers are trained to accelerate and decelerate smoothly, avoiding aggressive braking in a bid to reduce accidents and fuel consumption.	4.41	.686
Maersk drivers are trained to respect speed limits in order to reduce accidents and fuel consumption.	3.98	.977
Maersk staff make an appointment with a repair technician if Check Engine light is illuminated to reduce pollution and accidents.	3.54	1.130
GRAND MEAN	**4.07**	

Source: Primary data

It can be observed from Table 4.7 above that majority of the respondents agreed to the items that were chosen to measure the extent to which Maersk adopted Eco-driving training practices to improve logistic efficiency with all items registering a mean score above the average of 3.00. However, there was a notable variation on how respondents perceived different items as seen in the varying mean scores in Table4.7 above. For instance, the findings indicate that Maersk drivers are trained to avoid rapid acceleration in order to attain logistics efficiency with a mean score of 4.43 and Standard deviation of 0.583. The findings also indicate that majority of the respondents agreed that Maersk drivers are provided with skills to maintain a constant speed and avoid pumping the accelerator to reduce fuel consumption and accidents (Mean=4.15, S. D=0.788). Furthermore, the respondents also agreed that Maersk drivers are trained to anticipate traffic conditions and plan before driving to reduce fuel consumption represented by a mean score of 3.91 and S.D of 0.915. There was also agreement that Maersk drivers are trained to accelerate and decelerate smoothly, avoiding aggressive braking in a bid to reduce accidents and fuel consumption (Mean=4.41 and S. D=0.686). In addition, a mean score of 3.98 and S.D of 0.915 was registered indicating that respondents agreed that Maersk drivers are trained to respect speed limits in order to reduce accidents and fuel consumption. Lastly a mean score of 3.54 and S.D of 1.130 indicated that respondents agreed that Maersk ensures that all its drivers have driver license.

4.3.2 Presentation and analysis of findings on the use of Telematics at Maersk

The study also required the respondents to indicate the extent to which they agreed or disagreed to the items that were chosen to measure the level of adoption of telematics at Maersk in a bid to improve logistic efficiency and the results are presented in the Table 4.8 below.

Table 4. 8: Descriptive statistics on adoption of Telematics

Items	Mean	SD
Maersk integrates with fuel card providers via tracking system to reduce fuel consumption.	4.48	.505
Driver behavior is monitored by Maersk via the trucking system in order to improve logistics efficiency by reduced accidents, pollution and fuel consumption.	4.22	.941
Maersk tracking system allows staff to build up a fleet maintenance calendar, set up a maintenance vendor database, schedule servicing and keep track of maintenance cost to improve logistics efficiency.	4.20	.453
GRAND MEAN	**4.30**	

Source: Primary data

From the Table 4.8 above it is observed that there is use of Telematics at Maersk with majority respondents in agreement with the items that were presented to them in the research instrument that measured the extent to which use of telematics was applied in their organization. However, there was a notable variation on how respondents perceived the items. For instance, in regards to whether Maersk integrates with fuel card providers via tracking system to reduce fuel consumption registered a mean score of 4.48 and standard deviation of 0.505. In addition, a mean score of 0.422 and standard deviation of 0.941 was registered on whether driver behaviour is monitored by Maersk via the trucking system in order to improve logistics efficiency while a mean score of 0.20 and standard deviation of 0.453 was registered on the extent to which Maersk tracking system

allows staff to build up a fleet maintenance calendar, set up a maintenance vendor database, schedule servicing and keep track of maintenance cost in order to improve logistics efficiency.

4.3.3 Presentation and analysis of findings on stakeholder engagement at Maersk

The respondents were required to agree or disagree to the items that were chosen to measure the level of stakeholder engagement at Maersk and the results are presented below.

Table 4. 9: Descriptive statistics on level of Stakeholder engagement

Items	Mean	SD
Maersk maintains government – led consultations to improve logistics efficiency.	4.17	.608
Maersk top manager's opinions and ideas concerning pollution, accidents and fuel consumption receive serious considerations.	4.26	.612
Maersk is able to reduce fuel consumption, pollution and accidents through engaging stakeholder's decisions towards logistics efficiency.	4.04	.842
GRAND MEAN	**4.16**	

Source: Primary data

From Table 4.9 above, it is observed that majority of the respondents agreed to the items that were chosen to measure the extent to which Maersk adopted stakeholder's engagement in a bid to improve logistic efficiency with all items registering a mean score above 3.0. However, in line with whether Maersk top manager's opinions and ideas concerning pollution, accidents and fuel consumption receive serious considerations registered a mean score of 4.26 and S.D of 0.608 which ranked the highest. This was followed by the extent to which respondents agreed to whether

Maersk maintains government – led consultations to improve logistics efficiency with a mean score of 4.17 and S.D of 0.608. Lastly respondents also agreed that Maersk is able to reduce fuel consumption, pollution and accidents through engaging stakeholder's decisions towards logistics efficiency with a mean score of 4.04 and S.D of 0.842.

4.3.4 Presentation and analysis of findings on the level of logistic efficiency at Maersk

The study required respondents to agree or disagree to the statements that were presented to them in the research instrument on their perception of logistic efficiency and the results are presented in Table 4.10 below.

Table 4. 10: Descriptive statistics on perception of Logistic efficiency at Maersk

Items	Mean	SD
Maersk has never received any complaint from the community on pollution.	4.43	.544
Maersk vehicles do not make un-wanted noise while on the road.	4.46	.657
Maersk has laid down procedures followed to reduce air and noise pollution.	4.48	.505
There is manifestation of hard work by managers and staff in responding to air and noise pollution reduction.	4.35	.482
There is a reduction in the overall cost on fuel used by Maersk vehicles.	4.50	.506
GRAND MEAN	**4.44**	

Source: Primary data

According to Table 4.10 above. Most of the respondents perceive Maersk logistic efficiency to be high as observed in the mean scores of various items that were chosen for the study which were

all above the average. Respondents agreed that Maersk has never received any complaint from the community on pollution (Mean=4.43 and S. D=0.544). It can also be observed that respondents also agreed that Maersk vehicles do not make un-wanted noise while on the road with a mean score of 4.46 and S.D of 0.657. In addition, a mean score of 4.48 and S.D of 0.505 indicated that Maersk has laid down procedures followed to reduce air and noise pollution. Furthermore, respondents also agreed that there is manifestation of hard work by managers and staff in responding to air and noise pollution reduction with a mean score of 4.35 and S.D of 0.482. In line with whether there is reduction in the overall cost on fuel used by Maersk vehicles registered a mean score of 4.50 and standard deviation of 0.506.

4.4 Regression analysis

In a bid to address the study objectives, the study adopted regression analysis in order to establish the direct effect of each independent variable on the dependent variable. Specifically, the regression analysis was run to establish the effect of Eco-driving training practices on logistic efficiency, to establish the effect of telematics on logistic efficiency and to establish the effect of stakeholder engagement on logistic efficiency. The regression results are therefore presented in the tables below.

4.5.1 The effect of Eco-driving practices on logistic efficiency

The first objective of the study sought to establish the effect of Eco-driving practices on logistic efficiency at Maersk. In order to address this objective, a regression analysis was conducted and the results are presented in Table 4.12 below.

Table 4. 11: Regression results on the effect of Eco-driving training practices on logistic efficiency

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.636	.403		9.013	.000
	Eco driving practices	.198	.098	.292	2.021	.049

R	R Square	Adjusted R Square	F	Sig.
.292	.085	.064	4.086	0.049

a. Dependent Variable: Logistic efficiency

b. Predictors: (Constant), Eco driving practices

Source: Primary data

From the table, it can be observed that the model fitted well the data and was statistically significant (F-value =4.086 and P-value <0.05). In the model summary, it was established that Eco-driving practices significantly explain 6.4% variations in logistic efficiency with 93.6% being as a result of other factors. The coefficient results also indicated that a unit increase in Eco-driving practices would lead to 0.292 increase in logistic efficiency (Beta=0.292).

Therefore, the predictive model developed from the findings is LE =3.636+0.292ED where LE is logistics efficiency and ED is Eco-driving practices.

The findings are in continuum with the qualitative data that was collected from an interview with the logistics officer of Maersk who had this to say;

> *"We at Maersk one of the principles we uphold is safety. We consider the safety of both our drivers and our client's items. To achieve this, we equip our drivers with economic driving techniques and also offer them refresher courses to build on their capacity. This has initiative has benefitted us a lot and we have seen a rapid development in the logistic efficiency over years. We have gained trust of our clients and many drivers are willing to work for us. There has been a reduction in fuel consumption, emissions, accidents and damage costs compared to years back when we had taken extension of driving training practices to our employees something we celebrate for today."*

Hypothesis test

From the finding it was established that Eco-driving practices have a significant effect on logistics efficiency. As a result, the study accepted the hypothesis that stated that eco-driving training practices has a significant effect on logistics efficiency of Maersk.

4.5.2 The effect of telematics on logistic efficiency

The study conducted a regression analysis to address the second objective that sought to establish the effect of telematics on logistic efficiency at Maersk. This was done to establish the extent to which telematics determines the changes in logistic efficiency and the results are presented in Table 4.13 below.

Table 4. 12: Regression results on the effect of telematics on logistic efficiency

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.640	.479		5.513	.000
	Telematics	.420	.111	.496	3.791	.000

R	R Square	Adjusted R Square	F	Sig.
.496	.246	.229	14.369	0.000

a. Dependent Variable: Logistic efficiency

b. Predictors: (Constant), Telematics

Source: Primary data

From the table it can be observed that the model fitted well the data (F-value of 14.369 and P-value <0.00). The model summary shows Adjusted R^2 of 0.229 which indicates that use of Telematics significantly explains 22.9% variations in logistic efficiency while 77.1% of the changes in logistic efficiency is explained by other factors. This implied that any effort put forward by Maersk to adopt Telematics would result into 22.9% increase in Logistic efficiency. From the coefficient table, results indicate Beta of 0.496 which implies that a unit increase in the use of Telematics would cause 0.496 increase in Logistic efficiency.

Therefore, the predictive model developed from the findings is LE =2.640+0.496UT where LE is logistics efficiency and UT is use of telematics.

The findings also receive support from the findings from an interview with the officer in charge of Information and Computer technology who had this to say;

> *"It is our policy to insert tracking systems into all our logistic vehicles. Some of the tracking systems we use are those that track fuel consumption and distance coverage. These systems have helped our organization so much to reduce on sale of fuel by the drivers on their way to delivery of items. Secondly, there is reduced misuse of company vehicles for personal use. Years back, drivers could divert vehicles to carry out their personal activities which cause the company a lot of money for maintenance and also led to breakdown of some vehicles which cause a lot of inefficiencies in logistics. Therefore, I presume logistic efficiency is indeed affected by use of telematics".*

Hypothesis test

From the findings it was revealed that use of telematics has a significant effect on logistics efficiency with P-value < 0.05. The study therefore accepted the hypothesis that stated that use of telematics has significant effect on logistics efficiency of Maersk.

4.5.3 The effect of stakeholder engagement on logistic efficiency

In a bid to address the third objective that sought to examine the effect of stakeholder engagement on logistic efficiency at Maersk, the study also conducted a regression analysis and the results are presented in Table 4.14 below.

Table 4. 13: Regression results on the effect of stakeholder engagement on logistic efficiency

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.490	.430		8.117	.000
	Stakeholders involvement	.229	.102	.320	2.237	.030

R	R Square	Adjusted R Square	F	Sig.
.320	.102	.082	6.854	0.030

a. Dependent Variable: Logistic efficiency

b. Predictors: (Constant), Stakeholders involvement

Source: Primary data

Results presented in the Table above indicates that the model was a good fit for the data (F-value of 6.854 and P-value <0.05). The model summary table indicates that 8.2% variations in Logistic efficiency is significantly explained by Stakeholder engagement. This implies that any effort taken by Maersk to improve on Stakeholder engagement would result into 8.2% changes in Logistic efficiency. Furthermore, Beta of 0.320 shows that a unit increase in Stakeholder engagement causes an increase of 0.320 in Logistic efficiency.

Therefore, the predictive model developed from the findings is LE =3.490+0.320SE where LE is logistics efficiency and SE is stakeholder engagement.

This finding also receive support from the data gathered during an interview with the manager of business operations who had the following to say;

> *"We operate amidst many stakeholders who include clients, suppliers, government, and competitors. These stakeholders have different interests however it is in our policy to respect the interests of all the stakeholders. For example, our clients want on-time delivery of their items with no or very minimal damages this therefore calls for logistic efficiency. To understand our stakeholders' interests, we often call for stakeholders' meeting every after six months. Stakeholder engagement has really benefited our organization to an extent that today we are ranked within the top five logistic companies in Uganda. I can therefore boldly confirm to you that stakeholder engagement affects logistic efficiency."*

Hypothesis test

From the findings it was also revealed that stakeholders' engagement has a significant effect on logistics efficiency, therefore, the study accepted the hypothesis that stakeholder engagement has significant effect on logistics efficiency of Maersk.

4.5.4 The effect of sustainable transport practices on logistic efficiency

In a bid to achieve the general purpose of the study that aimed at establishing the effect of sustainable transport practices on logistic efficiency, a multiple regression analysis was conducted in which the sustainable transport practices that were chosen for this study which included; Eco-

driving practices, use of telematics and stakeholder engagement were both combined and regressed against logistic efficiency. As a result, the findings are presented in Table 4.15 below.

Table 4. 14: A multiple regression results on the effect of sustainable transport practices on logistic efficiency

Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.707	.601		2.841	.007
	Eco driving practices	.188	.085	.276	2.199	.033
	Telematics	.373	.116	.441	3.209	.003
	Stakeholders involvement	.089	.099	.124	.898	.374

R	**R Square**	**Adjusted R Square**	**F**	**Sig.**
.582	.339	.292	7.174	0.001

a. Dependent Variable: Logistic efficiency

b. Predictors: (Constant), Stakeholders involvement, Eco driving practices, Telematics

Source: Primary data

From the results presented in Table 4.15 above, it was observed that the regression model was a good fit for the data (F value =7.174, P-value <0.05). It was found out that sustainable transport

practices significantly explain 29.2% variations in logistic efficiency with 70.8% explained by other factors. This implied that any effort undertaken by Maersk to increase sustainable transport practices would result into an increase in logistic efficiency. However, from the results it can be observed that use of telematics was a highest contributor towards logistic efficiency amongst the three sustainable transport practices that were chosen in this study (Beta =0.441) and it was found that the contribution of stakeholders' involvement was not significant (P-value >0.05).

Therefore, from the findings presented on the Table 4.15, the predictive model developed by the study is LE = 1.707+0.276ED+0.441UT+0.124SE where LE is Logistics efficiency, ED is Eco-driving practices, SE is Stakeholder engagement.

4.6 Hypotheses Testing

The study predetermined hypotheses were:

From the finding it was established that Eco-driving practices have a significant effect on logistics efficiency. As a result, the study accepted the hypothesis that stated that eco-driving training practices has a significant effect on logistics efficiency of Maersk.

From the findings it was revealed that use of telematics has a significant effect on logistics efficiency with P-value < 0.05. The study therefore accepted the hypothesis that stated that use of telematics has significant effect on logistics efficiency of Maersk.

From the findings it was also revealed that stakeholders' engagement has a significant effect on logistics efficiency, therefore, the study accepted the hypothesis that stakeholder engagement has significant effect on logistics efficiency of Maersk.

CHAPTER FIVE

SUMMARY, DISCUSSION OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND AREAS OF FURTHER STUDY

5.0 Introduction

This study sought to examine the effect of eco-driving training, use of telematics and stakeholder engagement on logistics efficiency. Therefore, this chapter presents the summary, conclusions, recommendations and areas for further research.

5.1 Summary of findings

The study found out that Maersk highly equips its drivers with eco-driving practices through training with a grand mean of 4.07 being the average of 3. In addition to this, most of the respondents agreed that Maersk drivers are trained to avoid rapid acceleration in order to attain logistics efficiency and this registered the highest mean score of 4.43. The regression results also showed a significant effect of eco-driving training on logistics efficiency of Maersk. The Pearson's coefficient also indicated that there was a significant relationship between Eco-driving practices and logistic efficiency.

The study also found out that there was a high level of adoption of telematics in Maersk with a grand mean of 4.30 being the average of 3. Most of the respondents agreed that Maersk integrates with fuel card providers via tracking system to reduce fuel consumption with a highest mean score of 4.48. The regression results showed a significant effect of telematics adoption on the logistics efficiency of Maersk with Pearson's coefficient also indicating a significant relationship between use of telematics and logistic efficiency.

The study found out that there was a high level of involvement of stakeholders in making decisions concerning sustainable transport with a grand mean of 4.16 being the average of 3. Most of the respondents here agreed that Maersk top manager's opinions and ideas concerning pollution, accidents and fuel consumption receive serious considerations which registered the highest mean score of 4.26. The regression results also showed a significant effect of stakeholder engagement on logistics efficiency of Maersk, thus the involvement of stakeholders in making decisions concerning sustainable transport increases efficiency in logistics of Maersk. The Pearson's coefficient also indicated a significant relationship between stakeholder's engagement and logistic efficiency.

5.2 Discussion of findings

5.2.1 The effect of eco-driving training practices on logistics efficiency of Maersk

The study established that Maersk makes an effort in equipping its drivers with different eco-driving practices which leads to an increase in its logistics efficiency. The study established that eco-driving training practices affects logistics efficiency. It was established that organizations that adopt eco-driving training practices are also observed to report an increase in logistics efficiency.

The finding is supported by Huang et al. (2018) who also in their study about the effect of eco-driving practices on logistics efficiency established that there was a positive significant relationship between eco-driving training practices and logistics efficiency. This finding of the study is also supported by interview responses of Maersk that argued out that there has been a reduction in fuel consumption, emissions, accidents and damage costs.

Ho et al., (2015) also agrees that eco-driving with focus on driving style to save energy and enhance environmental quality repeals benefits that include fuel/energy savings of up to 16%. This

was in continuum with the findings of this study where majority of the respondents attributed that Maersk drivers are trained to accelerate and decelerate smoothly, avoiding aggressive braking in a bid to reduce accidents and fuel consumption (Mean=4.41).

5.2.2 The effect of telematics on logistics efficiency of Maersk

The study established that use of telematics effects logistics efficiency with 22.9% variations in logistics efficiency being explained by use of telematics (Adjusted R^2=0.229). Therefore, the study confirmed the hypothesis. This provides a supporting evidence to address the general concern of most logistics managers who often have no answers as to why there have been varying logistics efficiency. It is therefore observed that firms that use telematics within their transportation sector are observed to register logistics efficiency.

Studies have reviewed that the adoption of telematics can be a solution to the increasing variations in logistics efficiency of logistics companies with this study providing an evidence that telematics plays a significant role of improving logistics efficiency. This is also supported by the study carried out in Ethiopia which found out that organizations that use the Vehicle On-Board Diagnostic (OBD-II) to monitor vehicle emission information and Assisted Global Positioning System (A-GPS) to get location of the vehicle at real-time concerning pollution, they are in position to reduce their emissions level in the environment which enables the organization to improve its logistics efficiency (Abera et al., 2016).

Also findings of Francfort (2016) established that telematics has a significant effect on logistics efficiency since the study showed that after the adoption of the telematics, there was statistically meaningful reductions in accidents. The study in Portugal on estimating fuel consumption from GPS data is also in support of the findings of this study since it showed that vehicles with a tracking

system were in position to reduce on fuel consumption and emissions (Vilaça et al., 2015). This is also supported by a 2014 research on drivers in Scotland using the telematics technology that showed an improvement of 75% in logistics efficiency (European TSC, 2018)**.**

5.2.3 The effect of stakeholder engagement on logistics efficiency of Maersk

In the study the effect of stakeholder engagement on logistics efficiency of Maersk was evaluated. The evidence demonstrated that stakeholder engagement affects logistics efficiency. It was found out that 8.2% variations on logistics efficiency is explained by stakeholder's engagement. It was also established that Maersk top manager's opinions and ideas concerning pollution, accidents and fuel consumption receive serious considerations (Mean=4.26). These findings provide supporting evidence to the constraints theory that emphasizes the need for organizations to improve and eliminate the bottlenecks in logistics. It was therefore established that stakeholder's engagement would enable the organizations to eliminate the bottlenecks hence improving on logistic efficiency.

The findings are in line with the study by Lam et al. (2019) who ascertained that stakeholder engagement approach reduce pollution levels of an organization. Furthermore, the study by Fuchs (2008) that discussed the relationship of sustainable information provision with fuel consumption, also ascertained that involvement of different stakeholder's decisions in sustainable development helps to reduce on the fuel consumption rate of the vehicles of the organization. Also the study by Marletto and Mameli (2012) aimed at investigating the relationship of a participative procedure for transport sustainability and accidents rate observed that engaging all stakeholders in making decisions concerning transport sustainability is a strategic choice that enables organizations to reduce on accident rates.

5.3 Conclusion

The findings of this study demonstrated evidence that sustainable transport practices affect the logistics efficiency of an organization. With the increasing accidents, pollution and fuel consumption affecting logistics companies, the adoption to eco-driving training practices, use of telematics and stakeholder engagement can aid in combating these challenges and gaining a competitive advantage.

The findings specifically revealed that eco-driving training practice has a significant effect on logistics efficiency. It indicated that when Maersk drivers and staff are equipped with all eco-driving techniques and they understand them well, this will increase logistics efficiency of Maersk since the all staff is going to be trained on how to reduced accidents, pollution and fuel consumption while driving.

The study further concluded that Maersk should focus in details on the use of telematics because through telematics, Maersk can be able to monitor its vehicles on the road and also behaviours of their drivers while driving which helps to reduce on accidents, pollution and fuel consumption thus improvement in logistics efficiency. This was from the findings that demonstrated that telematics had a significant effect on logistics efficiency.

The study also revealed that stakeholder engagement has a significant effect on logistics efficiency. Therefore, this stipulates that when all stakeholders are involved in decision making concerning sustainable transport, it helps the organization to put in consideration different key aspects of views by different stakeholders thus being in position to reduce on their accidents, fuel consumption and affordability, pollution.

5.4 Recommendations

Due to the increased globalization and the changing technology, logistics companies across the whole world are faced with a challenge of ensuring sustainability in their transport and logistic operations.

Therefore, this study recommends that Maersk should improve on equipping all its drivers with eco-driving practices by holding monthly sessions on eco-driving in order to embrace them with all necessary knowledge on how to reduce accidents while on road, reduce fuel consumption and pollution. And it should be noted that while reducing on fuel consumption, there is assurance on affordability by the customers since reduced fuel consumption minimizes costs. Maersk should also develop an electronic app that must be installed to phones and laptops of all staff. This will help Maersk staff to be reminded continuously on what to do. In addition to this, Maersk should make sure that it tests the trained drivers and the best ones should be recognized accordingly. To ensure efficient and Up-to-date eco-driving practices, Maersk should keep on updating these practices every after six months.

Furthermore, the study recommends that Maersk should improve on its use of telematics to efficiently monitor its vehicles and drivers thus improving on its logistics efficiency. Maersk can improve on its telematics implementation through adapting to Journey management technology which fully integrates journey management by fleets. Journey management technologies enables organization to track their vehicle's journeys from the planning stage until the final destination of the vehicle. Maersk should also adopt to Upgrading from 4G to 5G networks which provides different more experience in terms of bandwidth, faster data uploads, and feedback downloads

resulting in more real-time data sets and gaining real-time driver safety, fleet maintenance and fleet efficiency all at the same time.

Maersk should improve on its online collaborative platforms with stakeholder in order to ensure that all decisions are considered concerning sustainable transport to ensure logistics efficiency. Maersk should focus on using technology to engage different stakeholders such as social media networking (Facebook, twitter, emails and watsup). Online collaborative platforms enable interaction between an organization and its target audience through a Web site or virtual space. These platforms feature tools that allow users to communicate, share information, and work together, while also promoting transparency, participation, and collaboration. Moreover, online collaborative platforms can allow for constant feedback to stakeholders about how their input is being used, which we have learned is critical to maintaining engagement. Maersk should also adapt to grassroots community organizing efforts which take a local level, ground-up approach to facilitating interaction and engagement between Maersk and their target audiences thus enabling Maersk to get feedback on the behaviours of their drivers while on the road and pollution rate and hence coming up with a way forward.

5.5 Suggestion for further study

Since the variables of sustainable transport practices did not predict logistics efficiency 100%, therefore more areas of further research concerning other factors affecting logistics efficiency should be carried out.

There is also little understanding of the side effects of new eco-driving technologies instructions and telematics technologies on driver safety performance which in turn affects the logistics efficiency of an organization. The main research questions that remain unanswered in eco-driving

and telematics are; how new in-vehicle eco-driving and telematics systems may influence behaviours of the driver while on the road. Therefore, further studies should attempt to study the effect of new eco-driving and telematics technologies on logistics efficiency on other logistics companies.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Dear Respondent,

My name is **Ssenkungu Clive,** a student of Kyambogo University conducting research on "Sustainable transport practices and logistics efficiency" at Maersk Uganda in particular. I kindly request you to take some time and give your honest opinion and response to the questionnaire below in order to support my research and build a body of knowledge in the area of study. Any relevant information provided will be treated with utmost confidentiality as it is only going to be used for academic purposes. Your cooperation is highly appreciated.

SECTION A: Demographics Characteristics

1. Gender of respondents

Male ☐ Female ☐

2. Age group

18-25 ☐ 26-35 ☐ 36-45 ☐ Over 46 ☐

3. Marital status

Single ☐ Married ☐ Divorced ☐

4. Level of Education

Certificate ☐

Diploma ☐

Bachelors Degree ☐

Masters Degree ☐

Others (specify).....

5. Number of years spent in the organisation

1-2 years ☐

2-4 years ☐

5 years ☐

6. Category of Respondents

Logistics staff ☐

Shipping staff ☐

Customer relations service staff ☐

Information technology staff ☐

Sales staff ☐

For sections B, C, D and E, the following statements relate to your opinion about the effect of Sustainable transport practices on logistics efficiency of Maersk Uganda. For each of the statements below, please indicate the extent of your agreement and disagreement by ticking in the space provided below;

KEY:

Strongly Disagree-SD	**Disagree-D**	**Not sure-NS**	**Agree-A**	**Strongly Agree-SA**

SECTION B: **Eco-driving training practice and logistics efficiency in Maersk.**

8. To what extent has your company implemented eco-driving training practices in an effort to improve logistics efficiency?

(Use the scale of: 1- Strongly Disagree, 2- Disagree, 3- Not sure, 4- Agree, 5- Strongly agree)

S/N	Eco-driving training practices	SD	D	NS	A	SA
1)	**Safety training and expertise provision**					
B1	Maersk drivers are trained to avoid rapid acceleration in order to attain logistics efficiency					
B2	Maersk drivers are provided with skills to maintain a constant speed and avoid pumping the accelerator to reduce fuel consumption and accidents.					
B3	Maersk drivers are trained to anticipate traffic conditions and plan before driving to reduce fuel consumption.					
B4	Maersk drivers are trained to accelerate and decelerate smoothly, avoiding aggressive braking in a bid to reduce accidents and fuel consumption.					
B5	Maersk drivers are trained to respect speed limits in order to reduce accidents and fuel consumption.					
B6	Maersk staff make an appointment with a repair technician if Check Engine light is illuminated to reduce pollution and accidents.					

2)	**Compliance of the truck drivers**					
B7	Maersk ensures that all its drivers have driver license					
B8	Maersk drivers are medically certified every after a specified period of time.					

SECTION C: Telematics and logistics efficiency in Maersk

To what extent has your company implemented telematics in an effort to improve logistics efficiency?

(Use the scale of: 1- Strongly Disagree, 2- Disagree, 3- Not sure, 4- Agree, 5- Strongly agree).

S/N	**Response**	**SD**	**D**	**NS**	**A**	**SA**
	Tracking					
C1	Maersk integrates with fuel card providers via tracking system to reduce fuel consumption.					
C2	Driver behavior is monitored by Maersk via the trucking system in order to improve logistics efficiency by reduced accidents, pollution and fuel consumption.					
C3	Maersk tracking system allows staff to build up a fleet maintenance calendar, set up a maintenance vendor database, schedule servicing and keep track of maintenance cost to improve logistics efficiency.					
C4	Maersk staff carryout walk around checks on vehicles before the start of the journey to reduce accidents.					

SECTION D: Stakeholder engagement and logistics efficiency in Maersk

To what extent has your company implemented stakeholder engagement in an effort to improve logistics efficiency?

(Use the scale of: 1- Strongly Disagree, 2- Disagree, 3- Not sure, 4- Agree, 5- Strongly agree).

S/N	Response	SD	D	NS	A	SA
D1	Maersk considers information from customers to improve logistics efficiency.					
D2	Maersk maintains government – led consultations to improve logistics efficiency.					
D3	Maersk top manager's opinions and ideas concerning pollution, accidents and fuel consumption receive serious considerations.					
D4	Maersk is able to reduce fuel consumption, pollution and accidents through engaging stakeholder's decisions towards logistics efficiency.					

SECTION E: Logistics efficiency in Maersk

This section focuses on the extent to which logistics efficiency in terms of reduced accidents, air and noise pollution, fuel consumption and affordability have been attained at Maersk.

To what extent has your company reduced accidents, air and noise pollution, fuel consumption and affordability in its logistics operations? (Use the scale of: 1- Strongly Disagree, 2- Disagree, 3- Not sure, 4- Agree, 5- Strongly agree).

S/N	**Reduced accidents**	**SD**	**D**	**NS**	**A**	**SA**
E1	All drivers arrive from their journey when they are okay without any minor accident.					
E2	There is an assurance that no damages are marked on vehicles upon their arrival					
S/N	**Reduced air and noise pollution**	**SD**	**D**	**NS**	**A**	**SA**
E3	Maersk has never received any complaint from the community on pollution.					
E4	Maersk vehicles do not make un-wanted noise while on the road.					
E5	Maersk has laid down procedures followed to reduce air and noise pollution.					
E6	There is manifestation of hard work by managers and staff in responding to air and noise pollution reduction.					

S/N	Less fuel consumption and affordability	SD	D	NS	A	SA
E7	There is a reduction in the overall cost on fuel used by Maersk vehicles.					
E8	Maersk margin has increased because of less expenditure on fuel.					

THANK YOU

APPENDIX II: INTERVIEW GUIDE FOR RESPONDENTS

Dear Sir/Madam,

I am Ssenkungu Clive conducting a study on "**Sustainable transport practices and logistics efficiency using a case of Maersk Uganda"** as a partial fulfillment of the requirement for award of a Masters of Science in procurement and supply chain management of Kyambogo University. The information given will be treated with maximum sincerity and for academic purposes only. Your contribution will be highly appreciated. Therefore, you are required to answer the following questions: -

1. **Introduction Questions**

i. For how long have you worked in this organization?

ii. Which department are you from?

iii. Are you familiar with sustainable transport practices in Maersk?

iv. Is sustainable transport one of the fundamental aspects in your company?

2. **Eco-driving training practice and logistics efficiency**

i. Do you equip your drivers with economic driving techniques?

ii. How do you evaluate your drivers to find out their effectiveness in application of eco-driving techniques?

iii. How does eco-driving training practice affect logistics efficiency of Maersk?

3. **Telematics and logistics efficiency**

i. Does your company use telematics or tracking system in its logistics operations?

ii. In your own opinion how does telematics affect logistics efficiency?

4. Stakeholder engagement and logistics efficiency

i. How do you understand stakeholder engagement?

ii. Does your company value stakeholder decisions towards sustainable transport?

iii. How does stakeholder engagement affect logistics efficiency of Maersk?

5. Challenges of achieving sustainable transport

i. What challenges are embedded in achieving sustainable transport in your company?

ii. What suggestions can you put forward to overcome the above challenges in your organization?

END

Thank you for your cooperation