

**THE EFFECT OF ELECTRONIC CARGO MONITORING ON TRADE
FACILITATION IN KENYA**

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DECLARATION

This project is my original work and has not been presented for a degree or a post-graduate diploma in any other University.

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HDB-C016-2425

This project has been submitted for examination with my approval as the University Supervisor.

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God bless you all.

ABBREVIATIONS AND ACRONYMS

RECTS Regional Electronic Cargo tracking system

GPS Global positioning system

KRA Kenya Revenue Authority

OSBP One Stop Border Post

WTO World Trade Organization

RFID Radio-Frequency identification technology

RTMS Real-time Cargo Monitoring Systems

SCT Single Customs Territory

KNBS Kenya National Bureau of Statistics

DEFINITION OF TERMS

Cargo: These are goods, materials, merchandise or wares carried on board an aircraft, ship, Train or vehicle for which an airway bill or bill of lading or other receipt is issued by the carrier it includes livestock.

Economic bloc: Entity formed by the Customs territories of an association of States and having in its ultimate state the following characteristics: trade is based on the application of rules of origin, to take account of the different Customs tariffs and prevent deflection of trade and the elimination of restrictive regulations of commerce within the bloc (WCO Glossary of International Customs Terms- 2018)

Seal: A device of metal or other material used to join together two ends of a fastening in a secure manner (WCO Glossary of International Customs Terms- 2018)

Smuggling: Customs offence consisting in the movement of goods across a Customs frontier in any clandestine manner, thereby evading Customs control (WCO Glossary of International Customs Terms- 2018)

Track (verb): To follow the trail or movement of someone or something in order to find them or note course.

Trade: This refers to transfer of goods or services from one person/entity (seller) to another person/entity buyer in exchange for money or other goods.

Transit: The process of carrying people or goods from one place to another through or across a customs jurisdiction (European Union Transit Manual, 2016).

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ABSTRACT

Trade globalisation and establishment of economic blocks and agreements have led to increase in export and importation level of goods and services across national boundaries. With the increase of trade volume of businesses, there has been need to introduce appropriate facilitation measures during the transportation process and at the border post to ease the process of cargo movement. The ratification of the World Trade Organization (WTO) Agreement on Trade Facilitation also requires that we implement measures to ensure fast movement of goods in transit. One of the common trade facilitation measures is the electronic tracking of imported cargo transiting through Kenya. The use of technologies, for example, Radio-frequency identification (RFID), to track physical flow of physical goods is one prominent system that is envisaged to improve cross-border trade between countries. RECTS is a web-based integrated system used to monitor transit cargo under customs control (whose taxes have not been paid) in Kenya, Rwanda and Uganda from point of Loading to final destination within the mentioned countries. The study aim was to establish the effect of electronic cargo monitoring on trade facilitation in Kenya. Specific objective was to determine the effect of electronic cargo monitoring on trade facilitation in Kenya and EAC region as well as its effect on customs processes. The research adopted an exploratory research design and focus on the structure of an enquiry with an aim of drawing inferences from a causal relationship of the data. The target respondents were transporters, cargo tracking department officers (transit and monitoring Unit), rapid response team and customs officers at Busia one stop border post with purposive and convenience sampling designs to be employed to aid in identifying the respondents. Given the small population, census approach was adopted. The researcher therefore worked with 95 respondents. Primary data was collected using a semi-structured questionnaire. Secondary data was obtained from the Transit Monitoring unit office of the Kenya Revenue Authority Customs & Border Control department. The findings aimed at determining whether E-monitoring adopted by Kenya Revenue Authority will be able to reduce transit cargo diversion to local market as well as reducing the time taken to clear the cargo at the border points and the collection of duties and fines. The findings indicated that implementation of the ECTS has improved border efficiency, reduced transit time and time taken to clear goods at the border. Finally, the study finding indicated that due to the implementation of the system, clearance of cargo at the border point has been hastened and the collection of duties and fines made easier. Based on the study findings, the study concludes that electronic cargo tracking system has a positive impact on cross-border trade. The study recommends that a further study should be carried out to establish the challenges facing cargo tracking system on cross-border trade between Kenya and other neighbouring countries.

CHAPTER ONE:

INTRODUCTION

1.1 Background of the Study.

Globalisation of trade as well as establishment of economic blocks and agreements has led to an increase in the level of export and importation of goods and services between different countries. With an increase in trade volume of businesses, there has been need to develop a number of trade facilitation measures at the border posts with an aim of improving trade flows among different countries (Djankov et al, 2010). According to Dennis and Shepherd (2011), improvement of trade facilitation measures promotes export diversification by making it much easier for countries to export innovative products that are currently not being exported.

The use of technologies, for example, Radio-frequency identification (RFID), to track physical flow of physical goods is one prominent system that is envisaged to improve the cross-border business activities between countries (Raghu Das & Peter Harrop, 2013). RFID technology uses wireless communications to track objects and collect information about their location and activity. Globally, the use of RFID to track goods has grown at an average rate of 20 percent per annum between 2005 and 2015, significantly higher than the 7 percent growth in flow of goods (Calabrese & Eberhard-Ruiz, 2016). RFID has made it possible for the Kenya Revenue Authority to ensure that all cargo destined to Uganda, Rwanda and Tanzania, whether direct exports or transit goods are electronically monitored along gazetted and geo-mapped routes. In effect, this has led to increased accountability for the goods being exported from Kenya and transiting through Kenya effectively combating illicit and fraudulent trade.

This study was anchored on Indoor Tracking Theory and the GPS Tracking system working theory. The interest on the use of tracking system on cross-border trade has attracted interest from governments, scholars and stakeholders. Lund and Manyika (2016) explored how digital trade is transforming globalisation and found that in the case of governments, the rapid transformation of digital trade introduces factors that need to be addressed including lingering barriers to its growth, appropriate ways of measuring it, and questions about governance and data security. GPS tracking is a method of identifying exactly where something is. A GPS tracking system for example may be placed in a vehicle on a cell phone or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person for example a GPS tracking system can be used by a company to monitor the route and progress of a delivery truck and to monitor high valued assets in transit.

The World Bank's Annual Doing Business report for 2015, highlights that, in Africa, it takes three times as many days, twice as many documents and six times as many procedures in comparison to the high income economies. In Kenya Particularly, the different multiple cross border agencies require different documentation for the same consignment occasioning delays and inefficiencies. These delays have led to the region's logistics costs to be among the highest in the globe. With this negative state it becomes necessary that African countries come up with appropriate measures that will reduce transport costs from remote areas, improve connectivity and facilitate the movement of goods, services and people across borders.

The interest on the use of tracking system on cross-border trade has attracted interest from governments, scholars and stakeholders. Lund and Manyika (2016) explored on how digital trade is transforming globalisation and found that in the case of governments, the rapid transformation of digital trade introduces factors that need to be addressed including lingering barriers to its growth, appropriate ways of measuring it, and questions about governance and data security. Bhero, et al in 2015 undertook a study on the impact of radio-frequency identification system and information interchange on clearance processes for cargo at border posts in the border posts between South Africa and Malawi. The research finding was that simulation model resulted in improvements of up to 82% with regard to transit time.

Locally, Kabiru (2016) sought to establish the electronic cargo tracking system and operational performance at Kenya Revenue Authority and on transporters. The findings were that the major challenge in implementing the system is a slight disconnect between what the revenue collector expects and what the system vendors have set-up

Uganda has been Kenyans' major trading partner for the last two decades with the trade volume increasing from Ksh 6.8 Billion in 1997 to Ksh 52.2 Billion in 2016 (KNBS, 2017). However, there has been a decline in the trade volume between the two countries over the two years because the trade volume had peaked at Ksh 56.5 Billion in 2014 and though this decline has been attributed to increased importation of similar goods from China, the bureaucracy in the transit corridor up to the border point has been an impediment too. Efficiency in the exportation of goods is not only important to the traders but also the revenue authorities in the two countries. Reported cases of diversion of transit cargo being deviated to the local market have occasioned the Kenya Revenue Authority loss of an estimated Ksh 12 Billion worth of taxes annually and this demanded the introduction of real time cargo tracking system to minimise and deter tax evasion through diversion of transit goods. The

process of information processing by the border officials and other intelligence agencies is currently quite taxing and the vulnerabilities associated with container stacking are also quite high. It will be of additional net worth of both cargo owners and customs officials if information on cargo in transit is available in real time to enhance the safety of cargo in transit.

1.1.1 Regional Electronic Cargo Monitoring.

The implementation of the Regional Electronic cargo tracking system (RECTS) commenced on 2nd May 2014 in Nairobi under the single customs territory. The objective was to have an electronic monitoring of transit cargo along the northern corridor for harmonized seamless flow of cargo where customs would effectively track transit goods and export goods. A proper Information Technology infrastructure must be set up to facilitate the smooth running of the RECTS. It must have a proper back-up mechanism given that the information captured on a daily basis is massive (Belissent, 2009). It is paramount that a budget be set aside for proper capacity building for both personnel and stakeholders affiliated with the sector such as transporters and other government agencies involved in the clearance of goods.

The operations involved installing electronic seals on containers, oil tankers or motor vehicles which on a real time basis communicate to the control room via general packet radio services GPRS as the cargo transits the region. RECTs is a system established with an objective to electronically monitor goods while on transit, and control the goods along the northern corridor to the destination. The cargo monitoring process is on real time basis and this is achieved using the Radio Frequency Identification (RFID) and GPS/GPRS technology (Raghu Das & Peter Harrop, 2013). In Kenya, it is a requirement that all outbound trucks/vehicles, tankers and containers loaded with transit goods are fitted with tracking devices for purposes of electronically monitoring and tracking the goods. Further, Musyoka

(2016) asserts that the vehicle is fitted with an electronic seal which reports the truck location and reports on all violations on a real time basis.

RECTS is an initiative whose primary objective is to monitor cargo that is outbound of Kenya's boundaries to ensure that duty is paid and also encourage legitimate and legal trade. The system uses a series of features such as a virtual fence known as the geo-fence that is set-up along gazetted routes used by transporters conveying transit and export cargo. The process starts with the collection of co-ordinates of the gazetted routes that the trucks use, this information is then mapped into the electronic cargo tracking system. If the truck is driven off the geo-fenced route, the system sends out deviation alert which is then dispatched to an enforcement team on the ground to investigate. The use of the RFID allows trucks to be checked only once each way and in the process, cutting crossing times by factors of four or five, from over a day to a few hours. This is quite important, because border post delays restrict trade just like tariffs, while minimisation of clearance and crossing times positively affects firms to export and growth (Volpe et al., 2015).

Electronic cargo tracking has been associated with several benefits to the transporters that include increased efficiency and productivity which results in cost reduction benefits. The system also aids in improved reliability and service quality, usually thought of as tools to retain good customers and grow market share and revenue and lastly there is improved shipment and container integrity, built around a core of security issues (Huanye, 2010). The system similarly present benefits to the public sector in this case the Kenya Revenue Authority. With the implementation of the system, there is improvement in efficiency and effectiveness of operational performance. It is a tool which is double edged with the

expectation that reduction in illicit trade caused by diversion will lead to increased collection of revenue from imports.

1.1.2 Trade facilitation.

One Stop Boarder Post concept is one of the initiatives of the East African Transport and Trade Facilitation Project EATTFP developed by the East African Community together with the Northern corridor transit and Transport Coordination Authority (NCTTCA) in 2004.

Traditional border posts are normally old and separate structures located in remote areas put

Up by the different agencies working at the border with little coordination. Signage to help travellers or freight operators are often non- existent.

OSBP Concept is predicated on four pillars namely:

Legal and institutional Frame work-OSBPs rely on the principle extraterritorial application of laws, which allows a state to extend the application the application of specific laws outside its own territory. The requirement to apply national border controls on foreign territory and the application of joint controls requires a deliberate institutional arrangement that is supportive of OSBP operations. One of the key approaches for promoting coordination of border agencies is through the implementation of the coordinated border management (CBM) concept. Simplification and harmonisation of Procedures-This is meant to reduce redundant formalities that have little impact on reducing the time spent at the border. This also includes training officials from the adjoining countries which helps in fostering cooperation among agencies and countries.

ICT & Data exchange-ICT allows for the efficient use of limited resources to manage borders by facilitating interconnectivity of data within EAC this has been accomplished by use of the real time monitoring system, cargo control system, RTMS Infrastructure-Includes OSBP

facilities such as offices for border officials, operational equipment, warehouses and parking which are appropriate functional

1.1.3 Regional Trade within EAC Partner states

According to Mpata, S (2014), Regional trade refer to trade agreements between two or more partners. The agreements include free trade agreements and customs unions. For example, a single customs territory is described as a stage towards full attainment of the customs union which is achievable through removal of restrictive regulations or minimisation of internal border controls on goods moving between the partner states with ultimate realisation of free circulation of goods. The EAC single customs territory covers partner states namely Kenya, Rwanda, Tanzania and Uganda. Regional trade is a cornerstone of East African community partner states which is guided by the following measures to enhance regional trade.

Trade facilitation-: Partner states have agreed to cooperate in simplifying standardising and harmonising trade information and documentation so as to better facilitation trade in goods.

Customs union protocol-: Objective is to further the liberalisation of intra-regional trade in goods promoting production efficiency in EAC, enhanced domestic, cross –border and foreign investment and promoting economic development and industrial diversification.

Anti-dumping measures-: the EAC has developed anti-dumping regulations as elaborately highlighted in the EAC customs union protocol.

Re-export of goods-: Re exports are to be exempted from the payment of import or export duties. On-Tariff Barriers to trade (NTBs)-: under article 13 of the customs union protocol the EAC partner states have agreed to remove all existing non-tariff barriers to trade and not to impose any new ones.

Regional trade is guided by the East African Community Pillars for enhanced regional integration and the four pillars clearly put focus on regional trade as described below

Customs union-: This has enhanced trade and attracted foreign direct investment hub for the EAC. Common market-: EAC guides the free movement of goods, people, labour, services and capital from one partner state to another as well as rights of establishment and residence without restriction. Monetary union-: EAC is looking forward to attainment of a single currency for daily transactions within the common market. Political Federation-: EAC partner states envisage coming together to form a super state under a single political authority government.

Mpata (2011) opines that in the last three decades, there has been a registered increase in levels of international freight, thanks to globalization with the road transport being a critical link in multi-modal freight supply chains. In African the dependence on road transport is even more pronounced due to most countries being land locked or the absence of an efficient railway lines. As a result, significant portion of road freight are moved along multinational corridors and this has necessitated development of a road network that connect two or more countries like the Northern Corridor in Kenya and the Central Corridor through Tanzania serving Burundi, Democratic Republic of Congo, Rwanda Southern Sudan and Uganda. However, Hoffman et al., (2013) points out that while many economic regions are gradually doing away with customs duties at border posts as a form of shoring up of trade, the opposite is true in Africa, because majority of countries are still dependent on customs duties as their primary source of state income.

Apart from the human and non-human trade tariffs, a lack of effective cross-border freight management systems has led to increased incidences of a lack of transparency from the perspective of the consignor and consignee and also leads to less coordination between the actions of different exporters and importers. In addition, a lack of visibility of transparent operations during the movement of transit goods results in long delays at border posts

accompanied by many corrupt practices, which often go hand in hand (Hoffman et al, 2013). There is therefore a need to integrate different systems operated by different stakeholders along the northern corridor to avoid deliberate manipulation of the process by human operators, who might be difficult to police (Mpata, 2011).

1.1.4 Statement of the Problem.

The need for efficient border posts and capacity to track transit goods has been debated for a long time because of its perceived benefits (Barka 2012; Norov & Akbarov 2009). Efficient cross-border operations are an important component of business activities of any country because all countries need to transact with other business units outside its National boundaries to the increased globalisation of trade. For the cargo owners, cargo transporters and freight forwarders, there is need to have short delays in crossing the border posts while various governments want to maximise the revenue from customs duties and consequently implement stringent measures at the borders to achieve their objective. Transit cargo security is a challenge in Kenya that poses a threat of transit cargo diversion into the local market without paying of taxes. Therefore, development of stringent controls is applied at most border posts to ensure that freight does not leak into or from a country before the required duties have been paid. One of the tools that have been able to avoid leakages of revenue is the tracking of cargo destined to the neighbouring countries. Electronic cargo monitoring is necessarily a pillar of the East African Single Customs Territory aimed at ensuring goods securely arrive at their final destination while intact.

Uganda has been Kenyans' major trading partner for the last two decades with the trade volume increasing from Ksh 6.8 Billion in 1997 to Ksh 52.2 Billion in 2016 (KNBS, 2017). However, there has been a decline in the trade volume between the two countries over the two years because the trade volume had peaked at Ksh 56.5 Billion in 2014 and though this

decline has been attributed to increased importation of similar goods from China, the bureaucracy in the transit corridor up to the border point has been an impediment too. Efficiency in the exportation of goods is not only important to the traders but also the revenue authorities in the EAC countries. Reported cases of diversion of transit cargo being deviated to the local market have occasioned the Kenya Revenue Authority loss of an estimated Ksh 12 Billion worth of taxes annually and this demanded the introduction of real time cargo tracking system to minimise and deter tax evasion through diversion of transit goods. This will be of additional net worth to both cargo owners and customs officials if information on cargo in transit is available in real time to enhance the safety of cargo in transit.

Bhero, et al in 2015 undertook a study on the impact of radio-frequency identification system and information interchange on clearance processes for cargo at border posts in the border posts between South Africa and Malawi. The research finding was that simulation model resulted in improvements of up to 82% with regard to transit time. Locally, Kabiru (2016) sought to establish the electronic cargo tracking system and operational performance at Kenya Revenue Authority and on transporters.

On the basis of the above studies that are close to what the researcher intends to study, although several studies have looked at the various facets of electronic tracking of goods, none has been carried out on the effect of electronic cargo monitoring on trade facilitation at Busia One Stop Boarder Post. Therefore, this gap leads to the following research question, what is the effect of electronic cargo monitoring on trade facilitation in Kenya?

1.2 Research Objectives

General objective

The general objective of this study was to determine the effect of Electronic Cargo monitoring on trade facilitation in Kenya.

Specific objectives

- i. To determine how electronic sealing of transit cargo has affected trade facilitation in Kenya.
- ii. To establish the effect of electronic cargo monitoring on trade facilitation in Kenya.
- iii. To measure the efficiency of Electronic cargo monitoring on information sharing.

1.3 Research Questions

- i. What is the effect of electronic arming of transit cargo on trade facilitation in Kenya?
- ii. How has electronic cargo monitoring affected trade facilitation in Kenya?
- iii. What is the effect of Electronic cargo monitoring information sharing on trade facilitation in Kenya?

1.4 Significance of the Study

The findings of this study will increase the understanding and importance of trade facilitation measures from the point of view of the government agencies, scholars and stakeholders in the business community. For the government agencies such as Kenya Revenue Authority and the Ministry of trade, be able to understand how trade facilitation measures such as the cargo tracking system will boost trade level and government revenues. This is because the establishment of effective trade facilitation measures will influence the level of trade and minimise the use of illegal entry points. Therefore, it is expected that the outcome of the study will assist policy and decision makers in various government institutions and agencies

involved in international trade in understanding the positive impact that cargo tracking system can contribute towards reduction of costs to trade and growth of the economy.

The business community will also benefit from the study because it will make them aware of the different trade measures that have been established to streamline entire trade volume between Kenya and Uganda and how to make use of them to increase their trade volume. In addition, the business people will be able to use the research findings to suggest further measures that they need in order to hasten their cargo tracking system.

To the scholars, the study finding is expected to increase the stock of the theoretical and empirical knowledge on Trade Facilitation and related aspects of trade. The study is expected to form a point of reference and a basis for further research.

1.6 Scope of the Study

The scope of the study means things that the researcher intends to focus on in the research project. In this study the researcher intends to focus on Electronic cargo monitoring along the Northern corridor to track goods under customs control whose taxes have not been paid from port of entry to final destination at the Busia one stop border post. The researcher will focus on Busia OSBP as the case study since the operations are all the same compared to other border stations.

Cargo security to determine real time detection of transit violations such as theft, diversion and dumping. The implementation of electronic cargo tracking system (ECTS) commenced in 2009 and the objective was to have a system where customs would be able to effectively track transit goods and exports. However, the preconceived benefits of the ECTS were not achieved as the standalone ECTS adopted by the East African Community member states

proved to be costly to the transporters and traders. To address the challenges of ECTS, and with single customs Territory SCT already in place the concept of a Regional Electronic Cargo Tracking system was mooted in the year 2014. The study therefore focuses on the implementation of ECTS and RECTS as systems of E-monitoring in the period 2011 and 2017.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction.

In this chapter literature of relevance to the study is reviewed. Significant discussion entails the theories supporting the study, forms of electronic cargo tracking system and the effect of Regional Electronic Cargo Tracking system on monitoring transit cargo.

2.2 Theoretical Review.

This refers to theories formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists. This study is based on two theories which comprise of GPS tracking system work theory and Indoor tracking theory

2.2.1 Indoor Tracking Theory.

D. Madigan et al., 2009 in their paper titled “Bayesian indoor positioning systems”, define indoor tracking as an indoor positioning system used to locate objects or people inside a building using lights, radio waves, magnetic fields, acoustic signals, or other sensory information. In the last decade, the research and the technology for outdoor tracking have seen an explosion of advances. It is expected that in the near future, we will witness similar trends for indoor scenarios where people spend more than 70% of their lives (P. Closas

, C. Fernández-Prades, and J. A. Fernandez-Rubio, Oct 2009).

The rationale for this is that there is a need for reliable and high definition real-time tracking systems that have the ability to operate in indoor environments thus complementing those based on satellite technologies such as GPS. The indoor environments are very challenging and as a result, a large variety of technologies have been proposed for coping with them but no legacy solution emerged. Indoor real-time locating systems (RTLs) have been gaining relevance due to the widespread advances of devices and technologies and the necessity for seamless solutions in location based services. An important component of RTLs is indoor tracking where objects, vehicles or people referred to as mobile nodes are tracked within a building or any enclosed structure. P. Harrop and R. Das, “Mobile Phone Indoor Positioning Systems (IPS) And Real Time Locating Systems (RTLS) 2014-2024: Forecasts, players, Opportunities,” ID TechEx, Cambridge, U.K., 2014. Examples include tracking operation of indoor unmanned vehicles, first responder navigation, tracking of products through manufacturing lines or people movers.

There are some solutions for indoor tracking and they are based on large variety of technologies from the early RTLs that exploit ultrasounds such as the active bat system to more recent impulse radio ultra wide band (UWB). Current trend in addressing indoor tracking is to use standard low-cost and already deployed technologies. One driver of this activity is the enabling of smart phone centred indoor positioning systems (IPS). In general, it is expected that the market opportunities for RTLs and IPSs will be on the order of USD10 billion yearly in 2024. The technologies used in these systems are highly heterogeneous, encompassing Wi-Fi, radio frequency identification, Bluetooth and near field communication.

However, the latest challenge in indoor tracking as well as localization is not only to design specialized sensors for these tasks but to advise and implement data fusion methods that can exploit the already existing technologies. The theory in this paper is relevant in that e-monitoring is a form of technology used in the tracking and monitoring of transit cargo for that reason KRA has a centralized monitoring centre where real-time electronic monitoring of transit cargo on twenty-four hours a day and 7 days a week basis. This has facilitated seamless flow of transit cargo and have a single view of cargo tracking along the corridor increasing cargo security by providing real time detection of transit violations such as theft and diversions as well as coordinated response to alerts by rapid response units.

2.2.2 The GPS Tracking System work theory.

The Global Positioning System (GPS), originally Navistar GPS, is a satellite-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

In work system theory, Alter (2013) work is defined as the application of resources, human and otherwise in the production or provision of a good or service. A work system is where humans and/or machines perform processes and activities using information, technology and other resources to produce products/services to customers. A work system is a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific products/services for specific internal and/or external customers.

The theory in this paper is relevant in that E-monitoring is a form of technology used in the tracking and monitoring of transit cargo along the northern corridor with minimal customs

physical disarming and rearming at the border. Global positioning system (GPS) is a worldwide radio navigation system formed from the constellation of 24 satellites and their ground stations. The GPS is mainly funded and controlled by the U.S department of defence(D.O.D).The system was initially designed for the operation of U.S military but today there are also many civil users of GPS across the whole world. The civil users are allowed to use the standard positioning service without any kind of charge or restrictions.

Technology adoption to improve efficiency of cross-border trade has been discussed in various international trade studies. Naidoo (2012) suggests that for effective border trade, there is need for the cross-border management system to be anchored on the adoption of technology compared to existing systems. GPS tracking is a method of working out exactly where something is. A GPS tracking system for example may be placed in a vehicle on a cell phone or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person for example a GPS tracking system can be used by a company to monitor the route and progress of a delivery truck and to monitor high valued assets in transit.

The transmitter built into the device sends a signal to the satellite orbiting the earth. This signal allows the satellite to determine your position. The GPS unit is programmed with maps of specific areas and roads. These utilize a GPS receiver which receive signals from the current GPS satellite constellation and the internal processor computes your position. This position is then actively transmitted via any number of RF means to receiving unit.

The use of technology will facilitate harmonious integration of the road user's and stakeholder's needs that are not accessible to customs authorities in which GPS tracking information reflecting truck movements, as well as weigh bridge information generated by roads agencies is used. In addition, new systems facilitate identification of trucks upon arrival

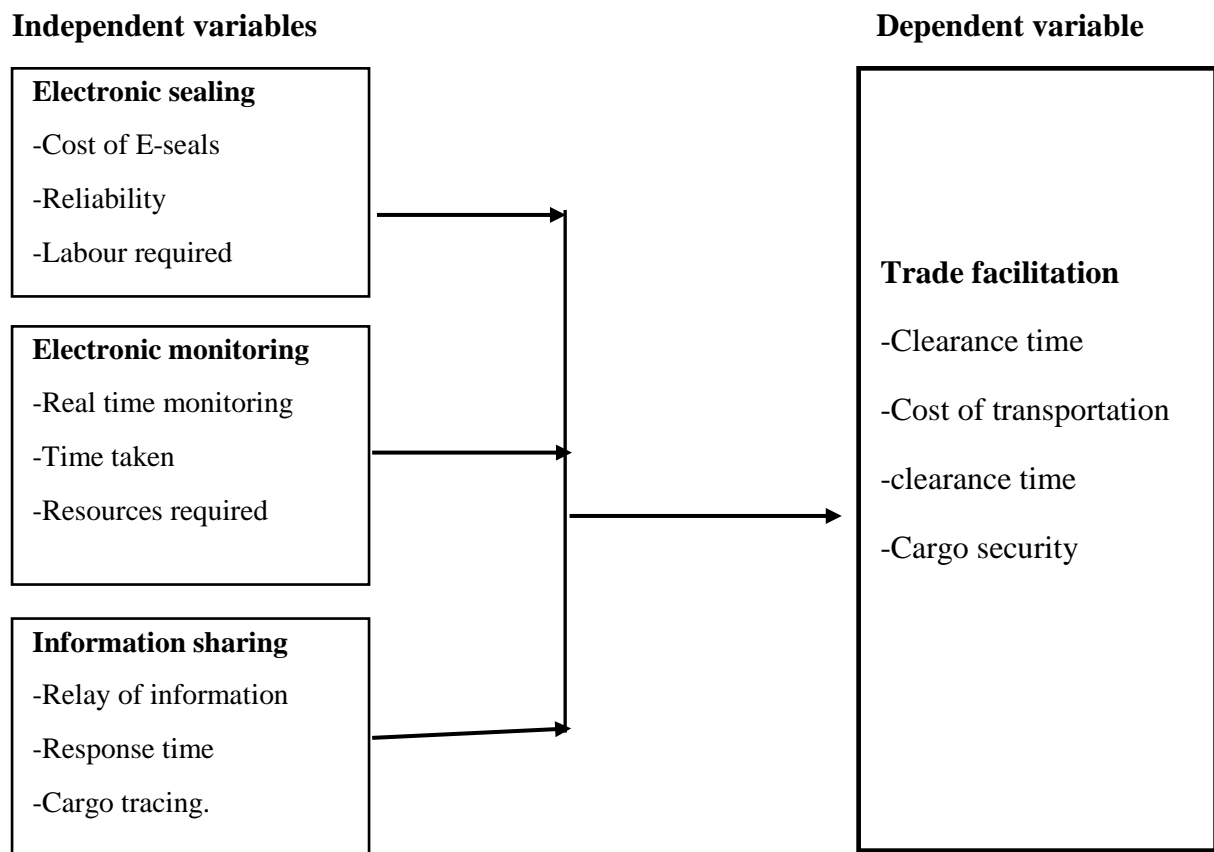
at the border and at the customs gate, document scanning submitted on behalf of cargo owners and at the same time capturing of the actions taken by customs officials during inspections (Hoffman, 2014).

The GPS tracking system is a requirement for all freight vehicles and is used to support vehicle recovery and also fleet management and is a mandatory requirement to qualify for insurance, for example in Kenya (Kabiru, 2016). The GPS tracking system can be used as a subset of tracking data by customs authorities to determine compliance by the fleet trucks. By linking the tracking information to the pre-declarations submitted to customs it will be possible for customs authorities to build up a behavioural profile for each consignment by the time it reaches a border. The use of electronic seals and active RFID is of additional value to both cargo owners and customs authorities due to its ability to relay real time security status of cargo in transit (Siror, 2010). The RFID integrates electronic identifiers into the container sealing devices being ferried on trailer and shipping vessel or alternatively on cargo items. The popular tracking method is to have a RFID link between the seal and the tracking unit on the truck and this is implemented by integrating an active RFID transporter with tamper detection capability into the seal, as well as linking an active RFID reader to the GPS tracking device of the truck.

The use of the radio frequency identification (RFID) system used in monitoring of cargo in transit, in particular has created enormous value by improving transit management in long global supply chains, helping reduce inventory costs by up to 70 percent while improving the service offered (Raghu & Harrop, 2013).

2.3 Conceptual Framework

Conceptual Framework is an analytical tool that serves as a roadmap in research with several variations and context to organize and measure ideas and elements in a research.



2.3.1 Electronic sealing.

The use of technologies, for example, Radio-frequency identification (RFID), to track physical flow of physical goods is one prominent system that is envisaged to improve the

cross-border business activities between countries (Raghu Das & Peter Harrop, 2013). RFID technology uses wireless communications to track objects and collect information about their location and activity. Globally, the use of RFID to track goods has grown at an average rate of 20 percent per annum between 2005 and 2015, significantly higher than the 7 percent growth in flow of goods (Calabrese & Eberhard-Ruiz, 2016). RFID has made it possible for the Kenya Revenue Authority to ensure that all cargo destined to Uganda, Rwanda and Tanzania, whether direct exports or transit goods are electronically monitored along gazetted and geo-mapped routes. In effect, this has led to increased accountability for the goods being exported from Kenya and transiting through Kenya effectively combating illicit and fraudulent trade.

Cargo monitoring reduces transit cargo theft, time and cost of doing business given that there is seamless flow of goods across borders without the need to stop for seal replacements at border points until the last destination in the region. Regional electronic cargo tracking has real time data capture and conveyance of information through the electronic seal armed on the container with time limit of 2 days from point of dispatch to destination point. This has put truck Drivers on check since any delay e-monitoring system sends an overtime alert to Rapid response team for action. Initially, such measures were not there thus resulting in transit cargo theft and attack of transporters.

2.3.2 Electronic Monitoring.

GPS tracking is a method of identifying exactly where something is. A GPS tracking system for example may be placed in a vehicle on a cell phone or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person for example a GPS tracking system can be

used by a company to monitor the route and progress of a delivery truck and to monitor high valued assets in transit Lund and Manyika (2016).

The GPS tracking system is a requirement for all freight vehicles and is used to support vehicle recovery and also fleet management and is a mandatory requirement to qualify for insurance, for example in Kenya (Kabiru, 2016). The GPS tracking system can be used as a subset of tracking data by customs authorities to determine compliance by the fleet trucks. By linking the tracking information to the pre-declarations submitted to customs it will be possible for customs authorities to build up a behavioural profile for each consignment by the time it reaches a border. The use of electronic seals and active RFID is of additional value to both cargo owners and customs authorities due to its ability to relay real time security status of cargo in transit (Siror, 2010).

Kenya is a major transit route for East Africa cross-border trade thus transit trade and trade facilitation are important factors contributing to the economic development of EAC partner states and safeguarding of the Kenya's supply chain. 30% of cargo from port of Mombasa comprises of transit cargo. Of this, 20% is destined to EAC single customs territory that comprise of Kenya, Uganda, Rwanda, Tanzania and Burundi whereas the remaining 10% is destined to DRC Congo and South Sudan.

2.3.4 Information Sharing.

Regional electronic cargo tracking system focus more on securing transit cargo and this has been achieved since the system conveys information on real time basis through seals armed on the containers sending alerts as incidences occur for rapid intervention by rapid response unit. Easy notification on custom offences makes it efficient to collect revenue through fines

as compared to manual process that lacked the real time data conveyance causing delay in taking action on custom offences leading to loss of revenue through cargo diversion.

Technology adoption to improve efficiency of cross-border trade has been discussed in various international trade studies. Naidoo (2012) suggests that for effective border trade, there is need for the cross-border management system to be anchored on the adoption of technology compared to existing systems. GPS tracking is a method of working out exactly where something is. A GPS tracking system for example may be placed in a vehicle on a cell phone or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person for example a GPS tracking system can be used by a company to monitor the route and progress of a delivery truck and to monitor high valued assets in transit.

The transmitter built into the device sends a signal to the satellite orbiting the earth. This signal allows the satellite to determine your position. The GPS unit is programmed with maps of specific areas and roads. These utilize a GPS receiver which receive signals from the current GPS satellite constellation and the internal processor computes your position. This position is then actively transmitted via any number of RF means to receiving unit.

2.4 Empirical Review.

Several studies have been undertaken to establish the effect of tracking systems on various aspects trade both in Kenya and the Africa region. Lund and Mandinka (2016) researched on ways to determine the effect of digital trade on global trade and investment system in the developing countries. The research identified three ways by which the digital transformation is taking place. These include cross-border flows of purely digital goods; use of digital wrappers and the creation of online platforms for production, exchange, and consumption.

The research determined that digital developments affect both large and small business entities in both developed and emerging economies world over. Further, the researcher points out that this digital transformation raises concerns of data security, control and governance both for governments and policymakers.

Mugambi (2017) sought to identify the link between tracking systems and cross-border trade between Kenya and Uganda. Specific objectives was to determine the extent of automation at the Kenya –Uganda border post as well as establish the effect of the cargo tracking system on the level of trade between Kenya and other EAC partner states. The findings were that the electronic cargo tracking system adopted by Kenya government has been able to reduce the level of diversion of cargo to the local market as well as reducing the time taken to clear the cargo at the border points. The study concludes that electronic cargo tracking system improves the border efficiency, reduction of transit time and cost of private business.

Bhero et al. (2015) investigated the impact of a radio-frequency identification (RFID) system and information interchange on clearance processes for cargo at South Africa's border. Through interviews, the finding was that the average transit time for all cargo types decreased from over 17 hours to less than of 13 hours at 80% of pre-declared cargo in the cargo clearing system. Although several researchers have attempted to highlight the various effects of tracking on trade within the region, there has not been focus on the effect of electronic cargo monitoring on trade facilitation in Kenya.

2.4.1 Electronic sealing and Trade Facilitation.

Technology adoption to improve efficiency of cross-border trade has been discussed in various international trade studies. Naidoo (2012) suggests that for effective border trade, there is need for the cross-border management system to be anchored on the adoption of

technology compared to existing systems. The use of technology will facilitate harmonious integration of the road user's and stakeholder's needs that are not accessible to customs authorities in which GPS tracking information reflecting truck movements, as well as weigh bridge information generated by roads agencies is used. In addition, new systems facilitate identification of trucks upon arrival at the border and at the customs gate, document scanning submitted on behalf of cargo owners and at the same time capturing of the actions taken by customs officials during inspections (Hoffman, 2014).

The GPS tracking system is a requirement for all freight vehicles and is used to support vehicle recovery and also fleet management and is a mandatory requirement to qualify for insurance, for example in Kenya (Kabiru, 2016). The GPS tracking system can be used as a subset of tracking data by customs authorities to determine compliance by the fleet trucks. By linking the tracking information to the pre-declarations submitted to customs it will be possible for customs authorities to build up a behavioural profile for each consignment by the time it reaches a border. The use of electronic seals and active RFID is of additional value to both cargo owners and customs authorities due to its ability to relay real time security status of cargo in transit (Siror, 2010). The RFID integrates electronic identifiers into the container sealing devices being ferried on trailer and shipping vessel or alternatively on cargo items.

The popular tracking method is to have a RF link between the seal and the tracking unit on the truck and this is implemented by integrating an active RFID transporter with tamper detection capability into the seal, as well as linking an active RFID reader to the GPS tracking device of the truck. This will have the benefit of permanent installation of the active RFID reader in the truck rather than the need to install and remove the tracking device for each trip (Meltzer, 2013).

Hoffman (2014) suggest that the passive RFID is widely used in automated vehicle identification applications, and holds several benefits over alternative auto-ID technologies such that it can be read at longer ranges compared to barcodes and at higher speeds allowing detection of vehicles in normal traffic situations. In addition, the RFID technology has a shorter read range compared to active RFID to ensure accurate identification of specific vehicles moving through specific lanes that they are taking. The ability to store additional information on tags makes it possible to provide information about the status of the vehicles without requiring online checks, and can also support a higher level of authenticity by storing encrypted codes (Siror, 2010).

2.4.2 Effect of Regional Electronic cargo monitoring on Trade in Kenya

The capacity of an operation to match excellence of its system to customer requirements lies at the heart of any operations based strategy. Kidd and Cranel (2012) suggest that efficiency is concerned with doing things right and in the case of KRA, being able to facilitate trade and enhance compliance. E-monitoring will enable the Kenya Revenue Authority clear more cargo per day at a shorter time at the border posts. This move will help decongest the border points by ensuring that cargo moving across the border arrives at its intended destination faster (Cohen & Leventhal, 2000).

The adoption of RFID system will enable data captured on the system to be shared on a real time basis resulting in reduced dumping, reduced tax evasion and cargo theft within the Kenyan territory. All cargo transported by road will be closely monitored on an electronic platform as it is received into the country and transported to its destination. The users of the system will capture the details of the driver, the cargo, the vehicles, the routes; the origin and destination of the cargo. Successful implementation of the system requires that data is standardized. Consistent data definitions are fundamental to IT process of integration and

supporting technologies. To realize greater efficiency, there is need to consider data reconciliation and integration into a single data dictionary that will serve as the standard for the organization (Funkhouser & Vanderslice, 2013).

Electronic monitoring offers a platform whereby data can be analysed accurately and therefore KRA will be able to generate useful insights into its operational performance and will be done on a real time basis. Similarly, an electronic system eliminates the paperwork involved in the old ways of doing business. Electronic monitoring also has been associated with increased quality of service and cost control (Siror, 2010). This means that customers will be willing to comply with the revenue authority's guidelines and this leads to more trade and revenue collection because goods arriving at the border points are cleared promptly. Technology allows for faster processing of data, easier retrieval of information, and in some cases automation leads to the reduction of human errors. When technology is used in repetitive operational tasks, there is a reduction in errors or complete elimination, and the time it takes to complete a task is greatly reduced.

The other benefit of E-monitoring is to minimise cases of diversion of transit goods into the local market as well as control counterfeit products such as medicine and consumer goods. According to KRA, up to 25% of transit cargo was diverted into the local market in 2013. This means, such diverted goods ended up in the local market without proper inspection for quality and control. The goal of E-monitoring is to ensure diversion cases are minimised as much as possible to ensure goods which do not conform to local standards are not permitted for consumption in Kenya.

2.4.3 Rapid Response and Trade facilitation.

The Regional Electronic Cargo Tracking System (RECTS) integrates transit cargo tracking platforms for three Northern Corridor Countries namely Kenya, Uganda and Rwanda with plans to roll out the same to include South Sudan, Tanzania and ultimately to destinations outside the EAC bloc. RECTS, which is funded by Trade Mark East Africa (TMEA) through a grant from the UK's Department for International Development (DfID), will add to on-going efforts to reduce the cost of doing business in the region.

Transport delays and cargo theft are among the key concerns to importers and exporters who are forced to pay high insurance cover for goods on transit. Despite previous efforts to promote fair trade, illegal cargo continues to enter the region through physical smuggling and technical violation of customs/transit procedures where tax evaders offload into the market goods not declared to Customs. This cross-border tracking system will deal with this problem through real time monitoring and use of CCTV cameras at customs offices to minimise possible connivance between customs officers and traders.

The cameras capture number plates of trucks as they enter or exit as well as seals fixed on trucks to deter offloading of goods destined for another country. Any tampering with the electronic seal or deviation from the defined route automatically sends alerts to the Command monitoring centre and the revenue authorities' Rapid Response Unit is notified by the CMC to take action. Using a navigation system on a tablet, officers can trace a problem to the exact spot and both audio and video images re-rayed to the CMC from the scene. The e- seal is checked and in case of any transit violations action is taken raising an F147 which is customs payment slip for fines on offences committed this is a source of revenue for the Kenya revenue authority. Rapid response team offices in Kenya are strategically located along the

Northern Corridor Transit route From Port of Discharge to the exit station at the border post for quick action. This include mazaras, Voi, Sameer Business Park, Naivasha and Kericho.

2.5 Critique of Existing Literature.

Several studies have been undertaken to establish the link between employment of a tracking system of exports and the volume of trade between EAC member states. Kabiru (2016) sought to determine the effect of electronic cargo tracking system and operational performance at Kenya Revenue Authority and on transporters between Kenya and other East African Countries. The finding was that the tracking system has been beneficial in improving the overall operational performance for both Kenya Revenue Authority and the transporters. Mugambi (2017) determined that the electronic cargo tracking system adopted by Kenya government has been able to reduce the level of diversion of cargo to the local market.

Based on the findings most of the researchers appear to be neutral especially on critical matters such as the system infrastructure and its capabilities. The studies conclude that in order to implement the Regional electronic cargo tracking system successfully it will be important for the revenue collector to accurately define the system expectations and its benefits so that the vendors can be able to build a reliable system that will assist in achieving the set goals. The experience of Kenya highlights the importance of political will, consistency, and comprehensiveness of the system addressing tax evasion, because piecemeal measures have only short-term effects. In addition, the study recommends that the tracking and tracing system needs to be monitored and reviewed continuously for performance to ensure robustness and stability of the system and to deal with possible mutation of tax evasion schemes. Although researchers have attempted to highlight the various effects of tracking on various aspects of trade within the region, there has not been focus on the effect of tracking systems on transit cargo time in Kenya.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction.

This chapter contains a description of the methods and procedures that were used to carry out the study. It gives summary information regarding the methodologies adopted and applied in this study. It describes the research design, target population, data collection procedures and methods, data analysis and data presentation.

3.2 Research Design.

The study adopted an exploratory research design. (Rajendra, 2008) argues that an exploratory research design focuses on the structure of an enquiry which lead to the minimization of a chance of drawing the wrong inferences from a causal relationship of the data. Exploratory research is defined by Burns and Groove (2001) as research conducted to gain new insights, discover new ideas, and for increasing knowledge of the phenomenon. This will help the researcher monitor the behaviour of the variables and hence present an opportunity to challenge theoretical assumptions. The design of the study involved

interviewing Customs staff and truck drivers and review of transit cargo monitoring reports over a period of 4 years

3.3 Target population

A study population is the complete group of individuals or companies that the researcher wishes to investigate (Sekaran & Bougie, 2010). It is defined in terms of availability of elements, time frame, geographical boundaries and topic of interest. The population of this study was 50 Customs officials at the Kenya and Uganda border Busia one stop border post, 20 officers at the Transit monitoring unit, 15 staff in Rapid response unit and 10 transporters.

Category	Number
Customs Staff (TMU)	20
Customs Staff (Rapid Response Unit)	15
Transporters (Busia)	10
Custom officers at Busia OSBP	50
Total	95

3.4 Sampling Frame and size

The researcher adopted purposive and convenience sampling whereby respondents that are considered knowledgeable in the research were sampled. Sampling decisions were made for the explicit purpose of obtaining the richest possible source of information to answer the research questions. Purposive sampling decisions influence not only the selection of

participants but also settings, incidents, events, and activities for data collection (Ploeg, 1999).

Given the small population, a census approach was adopted. The researcher thereby worked with 95 respondents.

3.5 Data Collection Instrument

The study used primary data which was collected using semi-structured questionnaire. The open-ended questions intended to allow the respondents to answer questions without any restriction while the closed ended questions were intended to restrict respondent's answers to specific range of answers that will help the respondents to respond quickly. The questionnaire consists of five sections. Section A, covered respondents' demographic information while section B sought to establish the effect of electronic sealing on trade facilitation. Section C attempt to determine the extent to which electronic cargo monitoring affect trade in Kenya. Section D attempt to determine how information sharing affect trade facilitation in Kenya and finally section D focus on trade facilitation. The questionnaires were administered through the "drop and pick" later strategy and target the employees of Kenya Revenue Authority at the headquarters and the border points. Mugenda (2003) notes that the use of questionnaire ensures that confidentiality is upheld, saves on time and is easy to administer. The respondents will give their responses in a five point Likert scale.

Secondary data was obtained from the Transit Monitoring unit office of the Kenya Revenue Authority Customs & Border Control department. Transit time, customs offences and fines are the variables that were collected to attain the second and third object

3.6 Pilot Study

The researcher carried out a pilot study in order to pre-test the validity and reliability of data to be collected using the questionnaire. Validity is defined as the degree to which a test measures what it is supposed to measure (Key, 1997). The tendency towards consistency found in repeated measurements is referred to as reliability (Bryman & Bell, 2003).

The researcher selected ten respondents from the target population for pilot testing in order to test the validity of the research instrument. The clarity of the instrument items to the respondents is necessary to enhance the instrument's validity and reliability. Furthermore, the aim is to correct inconsistencies arising from the instruments, which are to ensure that they measure the intended result.

3.6.1 Reliability of Research Instruments

Validity is the degree to which an instrument measures what it's supposed to measure. According to Wasserstein (2008), comprehensive literature reviews on measurement approaches are critical in guiding the selection of measures and measurement instruments. Reliability is increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. In order to test the reliability of the instruments, internal consistency techniques will be applied using Cronbach's Alpha.

The alpha value ranges between 0 and 1 with reliability increasing with the increase in value. According to (Mugenda, 2008), a coefficient of 0.6-0.7 is a commonly accepted rule of thumb that indicates acceptable reliability and 0.8 or higher indicated good reliability

3.6.2 Validity of Research Instruments

Reliability refers to a measure of the degree to which research instruments yield consistent results after repeated trials. In this study, reliability will be achieved by selecting a sample and testing it for accuracy from the database. A test-retest will be carried out and reliability

coefficient computed. The results obtained will assist in revising the measurement instrument to ensure it covers the objectives of the study.

Though the records are reliable, there are often inconsistencies and inaccuracies, therefore there is a need also to examine the method by which the data were collected and try to ascertain the precision needed by the original (primary) user (Saunders et al., 2009). To assess the validity of the documents, the research will make a quick assessment of the source of the data and assessing the authority or reputation of the source. If the records reflect the original information as gathered from the primary sources, the data collection instruments can therefore be considered have validity due to their nature.

3.7 Data Analysis and Presentation

The data was analysed by use of descriptive statistics to summarize and relate variables which were attained from the administered questionnaires. The data was classified, tabulated and summarized using descriptive measures, percentages and frequency distribution tables while tables and graphs were used for presentation of findings. However, before final analysis is performed, the data was cleaned to eliminate discrepancies and thereafter, classified on the basis of similarity and then tabulated. In accomplishing all analysis details with efficiency and effectiveness, the researcher intends to use the Statistical Package for Social Sciences (SPSS) software. The data was analysed using inferential statistics to determine the effect of Regional electronic cargo tracking system on transit cargo monitoring in Kenya.

The model will take the following form: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$

Whereby the variables were as follows:

Y = Trade facilitation

$\beta_1, \beta_2, \beta_3,$ and β_4 represent the coefficients of

X1 = Electronic sealing

X2 = Electronic monitoring

X3 = Information sharing.

α = Constant term indicating the level of efficiency.

ϵ = Error term: representing, other factors other than the above

The F- test was used to determine the significance of the regression while the coefficient of determination, R^2 , was used to determine how much variation in Y is explained by X. This was done at 95% confidence level. The Statistical Package for Social Sciences (SPSS) was used to analyse the data.

CHAPTER FOUR: RESEARCH FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the research findings and a discussion of the same in line with the objectives of the study as guided by the techniques mentioned in chapter three.

4.2 Response rate

Table 4.1 Response rate

Respondents	Questionnaire Administered	Questionnaire Filled and returned	Percentage
Total	95	82	86%

Out of the respondents, 65% were male and 35 % were female. Mugenda and Mugenda (2003) observed that a 50% response rate is adequate, 60% good, while 70% rated very well. This collaborates with Bailey (2000) assertion that a response rate of 50% is adequate, while a response rate greater than 70% is very good. This implies that based on this assertion, the response rate in this case of 86% is therefore good.

4.3 Descriptive statistics

4.3.1 Electronic sealing and Trade Facilitation.

This section covers descriptive statistics concerning Electronic sealing and Trade Facilitation. Table 4.2 presents statistics on various aspects of Electronic sealing.

Table 4.2 Electronic sealing and Trade Facilitation.

Statements on Electronic sealing and Trade Facilitation.	Mean	Standard Deviation
Diversion of cargo to local market has been reduced due to the use of E-seal in tracking transit cargo.	3.84	1.405
The collection of duties and fines has been made easier due to the use of electronic seals.	3.58	1.456
Cargo theft has reduced drastically since the introduction of Electronic seal.	3.67	1.400

According to table 4.2, the respondents agreed that Diversion of cargo to local market has been reduced due to the use of E-seal in tracking transit cargo.as shown by a mean score of 3.84 and a standard deviation of 1.405. Further, the respondents agreed that the collection of duties and fines has been made easier due to the use of electronic seals.as shown by a mean of 3.58 and a deviation of 1.456. Additionally, the taxpayers further established that Cargo theft has reduced drastically since the introduction of Electronic seal as indicated in table above by a means score of 3.67 and a standard deviation of 1.400.

4.3.2 Electronic cargo monitoring and Trade Facilitation.

This section covers statistics on the Electronic cargo monitoring.

Table 4.3 Electronic cargo monitoring

Statements on Electronic cargo monitoring	Mean	Standard Deviation
Electronic cargo monitoring has improved service delivery to transporters.	3.51	1.532
Electronic cargo monitoring has improved compliance thus enhanced revenue collection by KRA.	3.90	1.381
Adoption of electronic cargo monitoring has reduced transit cargo diversion cases.	3.78	1.362

From the findings in table 4.3, the respondents agreed that Electronic cargo monitoring has improved service delivery to transporters as shown by a mean of 3.51 and a deviation of 1.532. Further, the respondents agreed that Electronic cargo monitoring has improved compliance thus enhanced revenue collection by KRA as shown by the mean score of 3.78 and a deviation of 1.362. As well, the recipients agreed that Adoption of electronic cargo monitoring has reduced transit cargo diversion cases.as shown by a mean of 3.90 and a deviation of 1.381.

4.3.3 Information sharing and Trade Facilitation

This section covers statistics on Information sharing and Trade Facilitation.

Table 4.4 Information sharing and Trade Facilitation

Statements on Information sharing and Trade Facilitation	Mean	Standard Deviation
The use of RFID technology in electronic cargo monitoring has enabled information sharing on a real-time basis.	4.19	1.170
Adoption of GPS technology in electronic cargo monitoring has reduced tax evasion.	3.90	1.343
The adoption of RFID and GPS technology has enhanced transit cargo security.	3.75	1.359

From the findings in table 4.4 the respondents agreed that The use of RFID technology in electronic cargo monitoring has enabled information sharing on a real-time basis as shown by a mean score of 4.19 and a standard deviation of 1.170. Additionally, the respondents agreed that Adoption of GPS technology in electronic cargo monitoring has reduced tax evasion as shown by a mean score of 3.90 and a standard deviation of 1.343. Moreover, the respondents agreed that The adoption of RFID and GPS technology has enhanced transit cargo security as shown in table above by a mean score of 3.75 and a standard deviation of 1.359.

4.4 Inferential Statistics

4.4.1 Diagnostic Tests

Normality and Multicollinearity tests were conducted in order to ascertain the validity of the data used.

4.4.1.1 Normality Test

To test for normality, the Shapiro-Wilk test was used. The null hypothesis for the test expressed that the residuals are ordinarily disseminated while the alternate hypothesis expressed that the residuals are not ordinarily dispersed. The outcome of the Shapiro-Wilk test is as shown below.

Table 4.7: Test for Normality

	Shapiro-Wilk Test		
	Statistic	df	Sig.
Trade Facilitation	.395	81	.076

(Researcher, 2020)

The probability estimation of the Shapiro-wilk test for trade facilitation remained at 0.076. Since the value is more than 0.05, it was assumed that the data set followed a normal distribution. According to Razali and Wah (2011) , it was held that information set did not fundamentally go astray from a normal distribution.

4.4.1.2 Multicollinearity

Multi-collinearity multi-collinearity alludes to the nearness of relationships between the indicator factors. (William, 2013). To test for Multi-collinearity, the study used Variance Inflation Factor (VIF) which was calculated using SPSS. If the VIF is less than 5 (≤ 5) this

indicates that no Multi-collinearity exist. If the VIF of greater than 10 ($VIF \geq 10$), This indicates that there exists a Multi-collinearity issue. The findings are as shown below.

Table 4.8 Multicollinearity Test using Variance of Inflation Factor

Variables	Tolerance	VIF
Electronic sealing	0.622	1.608
Electronic monitoring	0.547	1.829
Information sharing.	0.394	2.538
Mean	0.521	1.992

Source: (Research Data, 2020)

The findings revealed that no multi-collinearity existed between the dependent variable and the independent variables. This is because the Variance Inflation Factors for all the variables was less than 5 ($VIF \leq 5$) as indicated above.

4.4.2 Pearson Correlation analysis

Having done the descriptive analysis, the study conducted a correlation analysis to determine the strength and significance of the relationship between the study variables. The table below presents the Pearson Correlation Output as derived from SPSS.

Table 4.10: Correlation Matrix

		Trade facilitation	Electronic sealing	Electronic monitoring	Information sharing.
Trade facilitation	Pearson Correlation	1			
	Sig (2- Tailed)				
Electronic sealing	Pearson Correlation	0.506**	1		
	Sig (2- Tailed)	.000			
Electronic monitoring	Pearson Correlation	.599**	0.583**	1	
	Sig (2- Tailed)	.000	.000		
Information sharing.	Pearson Correlation	.688**	0.488**	0.568**	1
	Sig (2- Tailed)	.000	.000	.000	

**Correlation is significant at the 0.01 level (2-tailed)

Source: Researcher (2020)

The results revealed that Electronic Cargo monitoring and trade facilitation have a statistically significant relationship ($p < .001$). The direction of the relationship is positive. This implies that Electronic Cargo monitoring and trade facilitation are positively correlated hence these variables tend to increase together.

4.4.3 Regression Analysis

Table 4 .11 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.762	.581	.569	.68651

(Researcher, 2020)

From the findings above, the value of R stood at 0.762, adjusted R^2 was 0.569 while the value of R^2 was 0.581. This means that 58.1% of variations in trade facilitation were explained by the independent variables of the study. However, their other factors that influence trade facilitation that were not involved in the model. This accounted for 41.9%.

Table 4.12 Analysis of Variance and F-Test Results

Model		Sum of squares	df	Mean Square	F	Sig
	Regression	92.165	2	23.041	48.889	.000 ^b
1	Residual	66.453	80	.471		
	Total	158.618	82			

(Researcher, 2020)

The findings in the above table indicate that the calculated value of F as 48.889 while the F critical value is 41.465. This means that since the calculated value of F is greater than the critical F value, then the regression model was significant and hence a dependable indicator of the study findings. As far as the p values were concerned, the study showed a probability of 0.000. This value is less than 0.05 and thus was statistically significant. This suggests that the information set is suitable for evaluating the connection concerning Electronic Cargo monitoring and trade facilitation. The independent variables electronic sealing, electronic cargo monitoring, and information sharing influence trade facilitation in Kenya

As far as p esteems, the examination demonstrated 0.000 which is under 0.05 and in this way measurably huge. This infers the informational collection is suitable for examining the relationship.

Table 4.13 Regression Results

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error	Beta		
(Constant)	.193	.285		.678	.499
Electronic sealing	.124	.078	.110	1.592	.004
Electronic cargo monitoring	.251	.084	.222	3.006	.003
Information sharing	.330	.095	.302	3.482	.001

(Researcher, 2020)

a. Dependent variable: Trade facilitation in Kenya.

b. Predictors: (Constant), Electronic sealing , Electronic cargo monitoring and Information sharing

As shown in table 4.13 the multiple regression model equation is expressed as:

$$Y = 0.193 + 0.124X_1 + 0.251X_2 + 0.3330X_3$$

Where: Y= Trade facilitation

X1= Electronic sealing

X2= Electronic cargo monitoring

X3= Information sharing

In terms of the significance, Electronic sealing had p value 0.004 which is less than 0.05. It's beta coefficient (0.124) is positive. Therefore, it can be inferred that Electronic sealing has a positive significant effect on Trade facilitation. The results indicate that a 1% increase in Electronic sealing will result in a 12.4% increase in the level of Trade facilitation.

Electronic cargo monitoring had p value ($p=0.003$) which is less than 0.05. The beta coefficient (0.251) is positive. This can be interpreted that Electronic cargo monitoring has a positive and significant effect on Trade facilitation. The findings suggest that a 1% increase in Electronic cargo monitoring will result in a 25.1% increase in the level of Trade facilitation.

Information sharing ($p=0.001$) with beta coefficient (0.330). The beta coefficient is positive and the p value is less than 0.05. Hence, it can be inferred that Information sharing has a positive and significant effect on Trade facilitation. This indicates that a 1% increase in Imposition of quotas will result in a 33.0% increase in the level of Trade facilitation.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings of the research, conclusions and the recommendations. The study also gives suggestions for further research.

5.2 Summary of Findings

The purpose of the study was determine the effect of Electronic Cargo monitoring on trade facilitation in Kenya. The type of research design adopted is descriptive design. 50 Customs officials at the Kenya and Uganda border Busia one stop border post, 20 officers at the Transit monitoring unit, 15 staff in Rapid response unit and 10 transporters. Given the small population, a census approach was adopted. The researcher thereby worked with the 95 respondents. Questionnaires were used as data collection instruments for this study which were both open ended or closed. Data was analyzed using Statistical Package for Social Sciences (SPSS version 24.0). Descriptive statistics was used to summarize the data and the findings were presented in form of frequency distribution tables, pie charts and bar charts.

5.2.1 Effect of electronic sealing of transit cargo has affected trade facilitation in Kenya.

The study sought to establish how electronic sealing of transit cargo has affected trade facilitation in Kenya. The study found that majority of the respondents indicated that Diversion of cargo to local market has been reduced due to the use of E-seal in tracking

transit cargo. Further, the respondents agreed that the collection of duties and fines has been made easier due to the use of electronic seals. Additionally, the respondents further agreed that Cargo theft has reduced drastically since the introduction of Electronic seal.

5.2.2 Effect of effect of electronic cargo monitoring on trade facilitation in Kenya

The study sought to find out the effect of electronic cargo monitoring on trade facilitation in Kenya. The study established that majority of the respondents agreed that Electronic cargo monitoring has improved service delivery to transporters. Further, the respondents agreed that Electronic cargo monitoring has improved compliance thus enhanced revenue collection by KRA. As well, the recipients agreed that Adoption of electronic cargo monitoring has reduced transit cargo diversion cases.

5.2.3 Effect of Electronic cargo monitoring information sharing on trade facilitation in Kenya

The study sought to determine the effect of Electronic cargo monitoring information sharing on trade facilitation in Kenya. From the findings, the respondents agreed that The use of RFID technology in electronic cargo monitoring has enabled information sharing on a real-time basis. Additionally, the respondents agreed that Adoption of GPS technology in electronic cargo monitoring has reduced tax evasion. Moreover, the respondents agreed that The adoption of RFID and GPS technology has enhanced transit cargo security.

5.3 Conclusion

The study established that the electronic cargo tracking system implemented by the Kenya Revenue Authority has become a dominant way to track goods that are destined for neighbouring countries. The common identified factors that affect implementation of the system were the level of technological preparedness of the organisation, training of both the staff and stakeholder's usage of the system. The study revealed that diversion of cargo to the

local market has been reduced due to tracking system. The study finding indicated that due to the implementation of the system, clearance of cargo at the border point has been hastened and the collection of duties and fines made easier.

The findings show that implementation of the ECTS has improved border efficiency, reduced transit time and time taken to clear goods at the border. Reduced transit and border clearance times has led to lower cost of business. Moreover, it improves customs coordination with other agencies at the border. The study also revealed that the quality of service to the traders had improved due to the increased speed of service delivery by the adoption of the ECTS. RFID system enables data captured on the system to be shared on areal time basis resulting to reduced dumping, reduced tax evasion and cargo theft in the country. More so, ECTS has deterred commissioning of violations which more often lead to loss of government revenue.

Based on the study findings , the study concludes that electronic cargo tracking system has a positive impact on cross-border trade.It was found thatdiversion of cargo to the local market ,the clearance of cargo at the border point as well as easy collection of duties and fines being experienced by the revenue authorities have been made possible by the adoption of the cargo tracking system.The study concluded that ECTS implementation improves the border efficiency, reduction of transit time and cost of private business. The study also concluded that ECTS improves the coordination with other border agencies at the borders and led to efficient manpower deployment and improved accountability of goods along the transit goods supply chain.

In addition, the quality of service to the traders has improved due to increased speed of service delivery from the adoption of ECTS. Therefore, the adoption RFID system enables data captured on the system to be shared on real time basis resulting to reduced dumping, reduced tax evasion and cargo theft in the country.

5.4 Recommendations for the Study

The study found out that effect of electronic cargo tracking system on trade facilitation has deterred diversion of transit cargo to the local market due to real time monitoring of the cargo electronically, increased coordination and information sharing has improved the clearance efficiency of cargo at the border points. It is recommended that countries should adopt electronic cargo tracking system to improve the border efficiency, reduction of transit time and cost of private business. The study also recommends that electronic cargo tracking should be enhanced to improve the transactions at the borders which leads to improved revenue collection at the borders while reducing transit goods violations .

5.5 Limitations of the Study

In pursuit of this study, several limitations were experienced. First is the ‘confidential’ nature of the organization that is very reluctant to give out any information. Secondly, the study relied on qualitative data collected through structured questionnaire of which collection, analysis and interpretation is not free from human errors.

Finally, financial constraints that will require purchase of research material and costs of logistics due to the researcher’s limited resources. Hence, it may affect the research in terms of the quality of recorded information and the organization of the data collected.

5.6 Suggestions for Further Research

This study focused on investigating the effects of electronic cargo tracking on trade facilitation in Kenya. The study recommends that similar studies be carried out in

neighbouring countries like Uganda and Rwanda so as to have a better understanding of the trade barriers that exporters from the EAC region face, and this will help policy makers formulate better recommendations.

The study recommends that a further study should be carried out to establish the challenges facing cargo tracking system on cross-border trade between Kenya and other neighbouring countries.

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APPENDICES

APPENDIX I:

LETTER OF INTRODUCTION.

Date.....

To.....

.....

Dear Sir/Madam,

RE: COLLECTION OF RESEARCH DATA – EFFECT OF REGIONAL ELECTRONIC CARGO TRACKING SYSTEM ON REGIONAL TRADE.

I, Margaret Kamala Wandera, a post graduate student at the Kenya school of Revenue administration at the Jomo Kenyatta University of agriculture and technology.

I am in the process of gathering relevant data for this study. You have been identified as one of the collaborators and respondents in this study based on your job knowledge and experience in this field. I kindly request for your assistance towards making this study a success.

In view of this, I kindly request you to take some time to respond to the attached questionnaire on the above subject matter. I wish to assure you that your responses will be treated with utmost confidentiality and will be used solely for the purpose of this study.

I thank you in advance for your time and responses. It will be appreciated if you can fill the questionnaire within the next 5 days to enable data analysis and finalization of the study.

Yours Sincerely

Margaret Khamala Wandera

Student Reg No. HDB-C016-2425

APPENDIX II: QUESTIONNAIRE.

SECTION A: GENERAL INFORMATION AND BIO DATA.

1. Name of the respondent?

2. Nationality a) Kenyan () b) Ugandan ()

3. What is your highest academic qualification?
 - a) Diploma () b) Degree () c) Post Graduate Diploma () d) Masters ()
 - e) Doctorate ()

4. Gender: Male () Female ()

SECTION B: E-SEALING AND TRADE FACILITATION.

1. To what extent, do you think Electronic sealing supports trade facilitation?

	Not at all	Very small extent	Small Extent	Moderate extent	Large extent	Great extent
Please tick \surd						

2. Below are statements in relation to electronic sealing and trade facilitation. Please indicate the extent to which you agree with the statements, where:

1= Strongly Disagree 2= Disagree, 3= Indifferent, 4= Agree, 5= strongly agree

	Statement	5	4	3	2	1
a)	The E-seal relays information details of outbound cargo and trucks.					

b)	Due to use of E-seal, clearance of cargo at the border point has been hastened					
c)	The cargo tracking cost has been reduced with the adoption of RFID tracking technology					
d)	Diversion of cargo to local market has been reduced due to the use of E-seal in tracking transit cargo.					
e)	The collection of duties and fines has been made easier due to the use of electronic seals.					
f)	Cargo theft has reduced drastically since the introduction of Electronic seal.					

SECTION C: EFFECT OF ELECTRONIC CARGO MONITORING ON TRADE FACILITATION IN KENYA

1. With regard to the adoption of the electronic cargo monitoring, please indicate the extent to which E-monitoring has facilitated trade in Kenya

	Not at all	Very small extent	Small Extent	Moderate extent	Large extent	Great extent
Please tick \surd						

1. Below are statements in relation to cargo monitoring and trade facilitation. Please indicate the extent to which you agree with the statements, where:

1= Strongly Disagree 2= Disagree, 3= Indifferent, 4= Agree, 5= strongly agree

	Statement	5	4	3	2	1
a)	Electronic Cargo Monitoring has expedited border clearance.					
b)	E-monitoring has reduced truck congestion at the border points.					
c)	Electronic cargo monitoring ensures that cargo arrives at its destination at the expected time.					
d)	Adoption of Electronic monitoring of cargo has reduced paper work involved in border clearance.					
e)	Electronic cargo monitoring has improved service delivery to transporters.					
f)	Electronic cargo monitoring has improved compliance thus enhanced revenue collection by KRA.					
g)	Adoption of electronic cargo monitoring has reduced transit cargo diversion cases.					

SECTION D: INFORMATION SHARING AND TRADE FACILITATION.

1. To what extent do you think E-monitoring information sharing has influenced trade facilitation in Kenya?

	Not at all	Very small extent	Small Extent	Moderate extent	Large extent	Great extent
Please tick \surd						

2. Below are statements related to information sharing and trade facilitation in Kenya

please indicate the extent which you agree with the statements where:

1= Strongly Disagree 2= Disagree, 3= Indifferent, 4= Agree, 5= strongly agree

	Statement	5	4	3	2	1
a)	The use of RFID technology in electronic cargo monitoring has enabled information sharing on a real-time basis.					
b)	Adoption of GPS technology in electronic cargo monitoring has reduced tax evasion.					
c)	Data capture and analysis of Electronic cargo monitoring system has enhanced operational performance.					
d)	The adoption of RFID and GPS technology has enhanced transit cargo security.					
e)	Adoption of electronic monitoring has increased accountability for transit goods thus combating illicit trade.					
f)	Transit cargo transportation time has improved drastically since the introduction of Electronic monitoring system.					

g)	There is a reduction of transit cargo stop over points resulting in transit cargo arrival to its destination in expected time.					
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SECTION E: TRADE FACILITATION

1. To what extent has Electronic cargo monitoring affected trade facilitation in Kenya in Kenya with respect to indicators shown below where:

1= Very small extent, 2=Small extent, 3=, 4= moderate extent, 5= Large extent

	Factors	1	2	3	4	5
a)	Cargo clearance time					
b)	Cost of Transport					
c)	Turnaround time					
d)	Cargo security					