EFFECT OF ADOPTION OF ELECTRONIC CARGO TRACKING SYSTEM ON EXCISE REVENUE COLLECTION IN KENYA: A CASE OF JOMO KENYATTA INTERNATIONAL AIRPORT

BY

ZEDEKIAH OCHIENG ODAGO

A RESERCH PROJECT SUBMITTED TO THE SCHOOL OF BUSINESS AND ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF TAX AND CUSTOMS ADMINISTRATION

MOI UNIVERSITY

2021

DECLARATION

Declaration by Candidate

This research project is my original work and I confirm it has not been presented for a degree in any other University. No part of this thesis may be reproduced without the prior written permission of the author and/or Moi University.

Signature………..………………… Date: ………………………….

Zedekiah Ochieng Odago

KESRA/105/0006/2018

Declaration by the Supervisors

This research project has been submitted for examination with our approval as University Supervisors.

Signature………..………………… Date: ………………………….

Dr. Ronald Bonuke

Moi University, Eldoret.

Signature………..………………… Date: ………………………….

Dr. Marion Nekesa

Kenya School of Revenue Administration, Nairobi.

DEDICATION

I dedicate my research project to my family, more so my beloved wife Evelyn who continuously encouraged me never to give up on my studies, and for the moral and financial support extended to me throughout the period of my study. I also thank the Almighty God for the sufficient grace & wisdom that He has given me throughout my entire period of study.

ACKNOWLEDGEMENT

I express my gratitude to my supervisors Dr. Ronald Bonuke and Dr. Marion Nekesa for their tireless efforts and support to ensure that I complete my research project. I also thank the research assistants and the data analyst who supported me in data collection and analysis to make this process a success.

ABSTRACT

Over the years, Kenya Revenue Authority has implemented reforms and modernization programs geared towards positioning it as an efficient modern tax administrator. Despite the positive developments, KRA has continued to miss revenue targets partly attributed to taxpayer's noncompliance and inefficiencies in revenue management systems. To mitigate lack of adequate revenues, Ministry of Finance has continuously revised up its fiscal deficit on a number of occasions. Electronic Cargo Tracking System is a modern computer-based assessment system that was introduced by the Kenya Revenue Authority Customs department, to monitor cargo and improve revenue collection. The study aimed to determine the effect of adoption of electronic cargo tracking system (ECTS) on excise revenue collection in Kenya - a case of Jomo Kenyatta International Airport (JKIA) as an entry and exit point. The study was guided by the following specific objectives; to determine how cargo monitoring affects excise revenue collection at JKIA in Kenya; to investigate whether Information Sharing affects excise revenue collection at JKIA in Kenya; to establish if cargo Security has effectively contributed to excise revenue collection at JKIA in Kenya. The study adopted explanatory research design. The target population comprised of 300 Customs and technical staff of Kenya Revenue Authority stationed at JKIA Customs department. Stratified random sampling was used to identify the population which was Customs and technical officers assigned to ECTS. Modern portfolio theory, Diffusion of innovation theory, Technological determinism theory, Infusion theory of technology and Technological acceptance model are the theoretical frameworks that guided the study. The study employed primary data collection by closed ended structured questionnaire using five-point Likert scale. The findings of the Multiple regression analysis revealed that Cargo Monitoring positively and significantly influenced Excise Revenue Collection (β_1=0.221, p=0.003): Cargo Security positively and significantly influenced Excise Revenue Collection (β_2=0.334, p=0.000); Information Sharing positively and significantly influenced Excise Revenue Collection (β_2=0.357, p=0.000). Therefore, the study concluded that adoption of Electronic Cargo Tracking System (ECTS) has had significant effect on Excise Revenue Collection in Kenya, as shown by the increase in excise revenue from Sh. 80 billion in 2010 to 165 billion in 2018. From the results, the study recommends that Kenya Revenue Authority should fully strengthen Cargo Monitoring, Cargo Security and Information Sharing in order to realize additional Excise Revenue Collection at JKIA. The study suggests that future research can evaluate other factors that affect Excise Revenue Collection at JKIA.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

OPERATIONAL DEFINITION OF TERMS

Cargo Monitoring   Benjamin et al. (2016) define cargo monitoring as the process of keeping track of cargo that is on transit. It is powered by a system of sensors that upload information to receiver stations.

Cargo Security   According to Shpak et al. (2018), cargo security is defined as the protection or securing goods on transit from pilferage or theft.

Electronic Cargo Tracking System: According to Dongo, Rono & Nuwagaba (2020), the ECTS is defined as a technological solution that allows for authorities to track cargo on a real-time basis between the loading and discharge points to prevent cargo dumping.

Excise Revenue   Montagnat-Rentier (2019) defines excise tax as duty paid on manufactured goods at the manufacturing station, as opposed to the point of sale.

Information sharing   Information sharing is the electronic transmission of transit data between different points of call during the transit of goods (Almetova, Shepelev & Shepelev, 2016).

ABBREVIATIONS AND ACRONYMS

ASYCUDA	Automated System for Customs Data
EACMA	East African Customs Management Act
ECTS	Electronic Cargo Tracking System
EGMS	Excise Goods Management System
ESARO	East and Southern Africa Region Office
ETR	Electronic Tax Register
FCB	For Capacity Building
GPRS	General Packet Radio Service
GPS	Global Positioning System
GRA	Ghana Revenue Authority
ICMS	Integrated Customs Management System
KRA	Kenya Revenue Authority
NACOSTI	National Commission for Science, Technology, and Innovation
OECD	Organization for Economic Co-operation and Development
RFiD	Radio Frequency iDentity
TMP	Tax Modernization Programme
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
VAT	Value Added Tax
WCO	World Customs Organization
WTO	World Trade Organization

CHAPTER ONE

INTRODUCTION

1.0 Overview

The chapter highlights the background of this study, statement of the problem, objectives, study questions, significance, and scope of this study.

1.1 Background of the Study

Revenue collection is an important part of fiscal policy and public administration in all economies as it impacts the operations of each government. Most of the state governments use taxation as their primary source of income for development of the economy. Taxation is used by many governments around the world as a basic mechanism to collect state revenues. Besides the collection of state revenues, the other objective of taxation is to achieve of efficiency and equity within the economy through allocation, stabilization and distribution function (Onyancha, 2010). Taxation is also a vital aspect of sustainable economic development because it seeks to offer financial independence to all the nations (OECD, 2016). All governments are thus compelled by such requirements to raise adequate finances which will fund their projects of development and ensure all the responsibilities are discharged in the expected way. Since the governments are not entrepreneurial entities, they have to obtain financial resources for all their projects from different tax revenues (Simiyu, 2013).

The practice of tax collection globally has to be in line with all best practices and the basic ability to pay, the principles of equity, certainty, convenience and economy. With economic growth governments undergo numerous challenges of evasion of taxes

and dumping of all goods that are not costumed, hence, it ends up being deprived of resources that generate income.

1.1.1 Global perspective of Electronic Cargo Tracking Systems.

Presently, the world has evolved because of technological innovations which provide the society with public services. Hence, there is a higher dependence on the levels and rates of communication and information deployment. Sani (2009) writes that systems of automation help in improvement of revenue collection. Applications such as toll revenue collection, automatic fare collection, bus revenue systems and parking systems are based on an electronic payment system for example. Also, through automation of revenue collection, providers of services are at a better position of trailing audits since all transactions that are captured are in details according to time, where and whoever owns the information. It thus prevents the loss of revenue via abuses because there is an electronically recording of moves. Automation offers opportunity to turn around huge transactions to be handled in a highly effective manner. One of the vital areas of application that relate to IT use in public services is taxation. Applications of electronic tax management began in America, later they spread to the other developed and developing nations worldwide. This reduce costs while increasing sharing of information capabilities hence, the electronic tax management applications are everywhere in the world (de Wulf & Sokol, 2012).

Automated system-based methods have become an important means of efficiency in tax administration regionally (UNCTAD, 2014), leading to effectiveness of tax administration. The efficiency of tax administration is defined as the expense, time of tax clearance, and efficiency of the collection of revenue. Results suggest that such developments in technology are constantly creating incentives for tax administrators

to create new guidance, taking into account both the wide range of new utilities available to them and the need to use them on a case-by-case basis, with some regard to consistency across tax jurisdictions. This growing pace of technological change is likely to have a major impact, positive and negative, direct and indirect, on tax compliance (Mutua, 2012). Digital technology, which includes telecommunications and computerized systems, is expected to greatly increase tax output, saving time and resources while providing consumers with improved service at the same time. The human factor, on the other hand, is also affected by technological developments in different ways because it makes work much easier for some while at the same time posing a threat to others. Both tax information systems including databases and resources are also available at the click of a button to resolve tax non-compliance, to facilitate tax compliance and to satisfy operational, administrative and internal control information criteria in order to effectively manage the current tax administration (de Wulf & Sokol, 2012).

The tax technology strategy reflects the plans of an organization to incorporate and use technology in an attempt to allow tax operations boost tax administration performance and increase government tax revenue. It is therefore important to incorporate technology as a strategic tool for enhancing tax compliance, combining it with a roadmap while taking into account short, medium and long-term horizons. Technology can be viewed as a technique for the operations and department organization used by tax features and tax business objectives and related dependencies. Tax authorities would need to understand the need for a prioritized plan to help their tax role achieve its goals and growth. Some analysts have argued that the proposal that better technology and incorporation will increase their tax efficiency is supported by nearly 85 percent of studies on existing tax authorities.

The tax technology strategy will allow tax professionals to better focus their efforts while analyzing data and improving revenue generation and cost reduction systems, according to Chaloupka, Yurekli & Fong (2012), rather than wasting precious data collection time. Therefore, the tax technology strategy allows the tax feature to be very effective in evaluating current tax processes, recognizing areas for reform, and at the right time using the most helpful technologies. Furthermore, a strategy would allow an organization to spread all the costs associated with investments in licensing and implementing technology. When resources are deployed efficiently, a technology strategy is likely to drive greater and more efficient support for the tax position. Finally, any good tax technology has the basic objective of improving tax regulation, which has three dimensions: filing, tracking, and payment compliance.

Technology continues to affect the flow of work, processes, and even the interactions of various people. It also affects how taxation systems, especially in developing countries like Kenya, are structured and administered. The use of technology to improve the effectiveness of tax administrations, expand taxpayer services and enhance tax compliance is attracting increasing attention in both developed and developing countries (Ross, 2017). Increasingly, world governments have requested that digital technology platforms be used more efficiently to improve services to people.

Without intimidation and default, having residents and corporate agencies to pay their taxes is the dream of every government. However, until the advent of modern information technology, the challenge was daunting. The world witnessed an unparalleled rate of development in information technology in the early 80s. These technical advances continually have profound effect on the operation of financial

systems and how the way taxation is handled (Zhou & Madhekeni, 2013). Tax compliance is achieved mainly if the majority of taxpayers voluntarily files their tax returns and as provided for in the tax laws, pays the resulting tax obligations without the intervention of the tax authorities by regulation. However, it goes without saying that regulatory methods such as auditing and compulsory compilation are used if there is no voluntary compliance. This technique was introduced in Kenya in 2003, when KRA embarked on serious automation and taxpayer empowerment for the adoption of online tax services through planning, sensitization and tax clinics.

A technological milestone witnessed in the domain of Custom administration around the world to curb any thefts and dumping of goods that are in transit within a particular territory is the Electronic Cargo Tracking System (ECTS). Electronic Cargo Tracking System, a concept that was from the developed world through World Customs Organization (WCO); technology adoption being one of the pillars envisaged to improve provision of Customs services. Electronic Cargo Tracking System (ECTS) is a technology solution that enables cargo to be monitored in real time from the point of loading to that of discharge. The system has been adopted by most Customs administrations around the world to track the movement of goods remotely and on Gazetted transit routes. ECTS is a superior system to other tracking systems as it uses the Global Positioning System (GPS) to locate cargo by use of coordinates (KRA,2020). The system also includes the General Packet Radio Service (GPRS) and GSM data transmission system for data transmission to the server, as well as the Radio Frequency iDentity (RFiD) system for cargo protection (KRA, 2020).

The significance of monitoring goods that are in transit is prevention of diversion of imported goods into the local market "duty free". Such goods if not monitored cause undue competition to those who dully pay their taxes and may end up rendering genuine taxpayers out of business, loss of business results into loss of employment and government revenue.

1.1.2 Regional perspective of Electronic Cargo Tracking Systems.

In Africa, much of the compliance levels are attributed directly to a higher adoption of technological by tax administrations. Siror et al. (2017) argues that when used well, technology is considered an effective tool. In tax administration, fair technology needs to be incorporated only if it truly meets certain basic principles. These principles include reducing tax life, reducing errors and improving procedural efficiency, increasing the multi-task rate of tax officers and encouraging taxpayer compliance through tax regulations (Lee, Hsieh, & Hsu, 2011). Proper technology must ensure that the tax becomes accountable for the time between the date of the property or service. The 'lifetime of the tax' include feature of reducing the payment of the tax or rate at which it is reduced to the minimum amount. This category includes all technological developments used in the processing of automation, mass data processing and the reduction of administrative challenges.

The use of technology has benefited majority of African tax administrations by reducing tax leakages and enhancing sustainable revenue collection. According to Gidisu (2012), the Ghana Revenue Authority (GRA) has adopted the Automated Framework for Customs Data and Management (ASYCUDA) developed by UNCTAD, which is fully integrated and covers the full tax clearance processes. The system manages, inter alia, the generation of trade data which can be used for

statistical and economic analysis, Customs declarations, accounting procedures and transit procedures (United Nations Economic Commission for Europe, 2011). ASYCUDA has also been adopted by other African countries including Zimbabwe which migrated from ASYCUDA ++ to ASYCUDA World which is a web-based system (WCO, 2015).

1.1.3 Kenyan perspective of Electronic Cargo Tracking Systems.

As part of its strategy to modernize Kenya's tax administration, KRA implemented Revenue Administration Reform and Modernization Program (RARMP) (Asala, 2012). The reforms have steered KRA to initiate a number of systems to meet the needs of various departments within the organization. In the context of Customs, Integrated Customs Management System (ICMS), Scanner Technology and Regional Electronic Cargo Monitoring System (RECTS) have been adopted. In addition, the Customs Oil Stock Information System (COSIS) has been implemented to manage the inventory of all refined oil. The Cargo Management Information System (CAMIS) was introduced to increase service delivery and minimize compliance costs. Other systems that have been rolled out by KRA include the Integrated Tax Management System (iTax) that is incorporated within the Domestic Tax Department (KRA,2020). According to KRA, ECTS was introduced to provide visibility for cargo through the provision of real-time position and status of the cargo. It is also expected to speed up clearance at loading and unloading points and to provide ready decision-making data, thereby securing Customs revenue. As such, ECTS was implemented by Customs to ensure minimization of all tax leakages while improving on excise revenue collection. The Roll out of ECTS was done in Kenya in the year 2011, taking approximately a period of 4years to achieve full implementation in the year 2015. Moreover, in order to minimize lose as the transit cargo as movement happen through the domestic

market, the Electronic Cargo Tracking System (ECTS) was implemented to monitor and control transit cargo from ports to borders.

In line with the collection of excise revenue, Russel (2010) established that long-term reform efforts need to be made to enhance tax enforcement. These effects begin with the enhancement of the income agency's structure and management and the implementation of robust collection systems, despite capacity building in the core functions of tax administration (registration, filing and payment enforcement, debt collection, audit, taxpayer services, and processing of appeals). Gordon (2010) further suggests that the tax authorities' technological problem is distinct from that of their taxpayers. The general acceptance appears to be that in tax administration, technology is likely to play an important role. As such, most authorities have made major investments in recruiting or enhancing their audit capabilities through adoption of technology.

1.1.4 Excise Tax Collection in Kenya

Taxation of excise goods started in the 17th century on tenancies on royally owned land under puritan regime Gordon (2010). At that time, excise tax was aimed at serving political purposes. The rationale of excise duty revolved around the safety of the public, health morals, protection of the environment and national defense. The major objective of the taxes was redressing particular costs originating from consumption of the products. As a result, they used activities like campaigns against drug use, healthcare such as heart, lung, and cancer screenings among others. in other instances, excise tax was meant to be a punitive tax seeking to ensure all the users feel the pain of taxation. Over the years, the excise tax has become a revenue stream for the government and is used to fund its operations.

Like any other tax head relied on by tax administrations, excise taxes are vital heads that most of the tax administrators around the globe rely on to finance government expenditure. The excise tax may be defined as a levy that is selectively applied to particular goods and services. The tax may be levied either on manufacturing or sales, on domestic production or on imported goods. The tax is levied directly on manufacturers, but the tax burden is passed on to consumers by raising prices (Karingi et al., 2005). Kenya's excise duty is levied on a schedule of products and services and, depending on the type of the goods, is paid on a basic or ad valorem basis (value-based) (Mutua, 2012). In the late 1980s, Kenya launched a Tax Modernization Program (TMP) to revise the tax system that affects excise tax policies. In this respect, there was a change between particular rate and ad valorem regimes to ensure that revenue maximization was maintained. For example, although Kenya retained a specific tariff structure during the introduction of the TMP, there was a shift from specific to ad valorem in 1991/2, where arbitrary annual adjustments were made to the excise duty for beer and tobacco in order to keep up with inflation. In addition, in order to simplify the collection and curb misrepresentation of manufactured tobacco, different excise rates for cigarettes were rationalized to a single rate in 1997/98. In 2003/04, the government returned from ad valorem to the unique tax regime; and more recently, the excise tax policy is currently affected by the integration and harmonization policies of the East African Community, of which Kenya is a member (Mutua, 2012). In some instances, excise tax (often referred to as sin tax) is meant to be a punitive tax aimed at ensuring that the users feel the pain of taxation.

In Kenya, soft drinks, alcoholic beverages, cigarettes, gasoline and motor vehicles are the principal excisable commodities. Plastic sacks and imported second-hand machines are other excisable commodities. Excisable services predominantly include

gambling and cell phone services. Excise taxes on alcohol, tobacco and petroleum, rather than for motor vehicles, are usually paid at a specific rate, i.e. by amount or quantity. Excise revenue accounts for approximately 15% of revenue base hence securing it is key in bridging any gaps which may be experienced during given financial periods.

With respect to Kenya, Excise taxes are also part of Customs revenue in addition to import duties and value added taxes (VAT) (EAC CMA, 2004). The other forms of Customs revenues include penalties and fines.

1.2 Statement of the Problem

Despite the various changes that have been launched, KRA has consistently missed its revenue expectations over the last three years. Compared to Sh 1,435 trillion collected in the 2017/18 financial year the government collected Sh 1,58 trillion in revenue for the financial year ending June 2019; this reflects a shortfall of Sh 25 billion as the National Treasury had expected a collection of 1,605 trillion (KRA, 2019). Consistent failure in achieving the revenue targets have resulted in an increase in internal and external borrowing due to missed revenue targets. According to KRA (2020), in recent years all the major heads of taxation, PAYE, VAT, Excise Duty, Income Tax and Import Duties, have reported growth, but KRA has continuously missed the revenue targets. This situation raises concerns about the integrity and efficiency within the agency of the current revenue management system. The Ministry of Finance of Kenya recently presented its Sh 2.7 trillion budget for the year beginning on 1 July 2020, detailing the projected budget deficit of 7.5% of GDP for the 2020/21 financial year (KNBS, 2020). The success was related to some of KRA's initiatives during the year, including KRA's seventh Corporate Strategy, which aims to increase

the revenue to GDP ratio from 18.3 percent as recorded in the financial year 2017/18 to 19.2 percent by the financial year 2020/21. This fiscal gap is responsible for the increased public debt because the Kenyan government is forced to borrow to fill the deficit. The ballooning of public debt has, in turn, affected development expenditures as the financial resources that would otherwise be channeled to development are directed to settle the public debt.

Kenya Revenue Authority has initiated numerous reforms in its systems as part of its plans to increase efficiency in the revenue collection system, hence reverse the trend of missing its annual revenue targets. The agency suggested merging IFMIS and iTax systems to ensure that all suppliers to national and county governments are compliant in order to achieve this dream. As part of this strategy, the introduction of the Revenue Administration Reform and Modernization Program (RARMP), intended to turn KRA Customs into a modern agency meeting its revenue goal, was also introduced (Asala, 2012). As part of its strategy to curb theft and dumping of goods in transit and secure Customs revenues, Kenya Revenue Authority's Customs department adopted Electronic Cargo Tracking System (ECTS) among other initiatives within the modernization program. KRA's introduction of ECTS was intended to encourage the growth of excise revenue by addressing transit diversion and expansion of the tax base, with an emphasis on the informal sector. The implementation process came at a high cost to KRA and stakeholders both financially and changed management across the Supply chain. The ECTS was also introduced as part of the efforts to streamline revenue collection by the agency. This system promotes efficiency at the loading and off-loading points of the logistics value chain. It is expected that the system will provide readily available data for decision making, thus securing Customs revenue. Consequently, ECTS systems were commissioned at

some Customs stations to combat tax leakages and improve on excise revenue collection amongst other levies. Whereas few studies conducted in the country have explored the effect of ICT on Customs revenue, none has examined the impact of the adoption of Electronic Cargo Tracking System on excise revenue collection in Kenya. For instance, Gitaru (2017) looked at the effect of system automation on revenue collection in Kenya Revenue Authority, while Wanyama (2017) examined causes of delay in the clearance of goods at Mombasa port. This study therefore attempts to establish the specific impacts of commissioning the ECTS at customs stations within JKIA. It evaluates all critical elements of the ECTS, including cargo security, cargo monitoring and information sharing with a view to establish their impact on excise revenue collection.

1.3 Objectives of the Study

1.3.1 General Objective

The purpose of this research was to evaluate the connection between excise revenue collection and the adoption of the ECTS system at JKIA. The impact of ECTS on system efficiency and revenue collection was evaluated using three aspects, namely ECTS cargo monitoring, ECTS information sharing, and ECTS cargo security.

1.3.2 Specific Objectives

The specific objectives of the study were;

   i.   To determine the impact of ECTS Cargo Monitoring on excise revenue collection at JKIA in Kenya.

  ii.   To evaluate the effect of ECTS Cargo Security to excise revenue collection at JKIA in Kenya.

  iii. To establish the impact of ECTS Information Sharing on excise revenue collection at JKIA in Kenya

1.4 Research Hypothesis

The research hypothesis was as follows:

H_{o1}: ECTS Cargo Monitoring system has no significant effect on excise revenue collection at JKIA in Kenya.

H_{o2}: ECTS Cargo Security system has no significant effect on excise revenue collection at JKIA in Kenya.

H_{o3}: ECTS Information Sharing system has no significant effect on excise revenue collection at JKIA in Kenya.

1.5 Significance of the Study

The study is relevant to the following stakeholders:

The government sets budgets for the following period each year, predicting what it hopes to earn and what it tends to spend. Most revenues, which are taxable acts as a source of government revenue. These revenues are used in Kenya to enhance social security for the citizenry and to build infrastructure. The study therefore will inform the Policy framework which is key to achieve desired tax administration by the government.

This study would help tax administration in this case KRA which is responsible for raising revenue at different ports of entry and exit, including excise taxes on the viability of implantation of the right technology to achieve desired revenue output. The study will also help researchers and academicians by adding to their body of

knowledge the influence of the Electronic Cargo Tracking System (ECTS) on excise revenue collection in Kenya. This study will benefit researchers and students in the field of Customs and Tax, acting, among other things, as a reference point for future researchers.

1.6 Scope of the Study

The research assessed the impact of adoption of Electronic Cargo Tracking System (ECTS) on excise revenue collection at Jomo Kenyatta International Airport in Kenya. The study targeted KRA Customs officers and technical staff who handle Electronic Cargo Tracking System on a daily basis located at JKIA in Kenya. Whereas there are other variables that affect Excise revenue collection, the study focused on the three independent variables namely ECTS Cargo Monitoring, ECTS Cargo Security and ECTS Information Sharing since they represent the adoption of electronic tracking component of ICT that has been implemented by Customs to enhance excise revenue collection.The study was conducted during the period of June to October 2020.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter outlines the literature relevant to the study. The chapter covers the theoretical framework, empirical and conceptual framework of the study. The chapter further looked at what other researchers have done and examined other related studies.

2.1 Review of Concepts

2.1.1 Electronic Cargo Tracking System (ECTS)

Digital Customs refer to the use of digital systems to collect and safeguard Customs duties, to monitor the movement of goods, people, transportation and money, and to safeguard cross-border trade in crime, including international terrorism, which continues to take over the world (*Revised Kyoto Convention Guidelines on Application of Information and Communication Technology*). In order to prevent smuggling and dumping of goods in transit within a given jurisdiction, the Electronic Cargo Monitoring System (ECTS) is a technical milestone adopted by Customs administrations around the world. Electronic Cargo Tracking System is a concept that has been fronted by World Customs Organization (WCO) to be adopted by Customs administrations globally. The significance of monitoring goods in transit is to prevent any diversion of imported goods into a local market without imposing relevant import duties. Such goods if not monitored cause undue competition to those who dully pay their taxes and may end up rendering genuine taxpayers out of business. when there is a loss in business there is loss of employment and government revenue.

ECTS is a technical solution, which enables real-time monitoring of cargo from the point of loading to the point of discharge or discharge (KRA, 2020). As the latter uses GPS and GPRS technology, ECTS is a superior device to the vehicle tracking system, while ECTS uses the Global Positioning System (GPS) that provides coordinates on the map to give the location of cargo. The system also includes the General Packet Radio Service (GPRS) and the GSM data system for data transmission to the server, as well as the Radio Frequency identification (RFiD) system for cargo protection (KRA, 2020). ECTS was introduced in order to ensure that the cargo is clear by presenting the location and status of the cargo in real time at any given time. It is also expected to speed up clearance at loading and unloading points and to provide readily accessible decision-making and secure Customs revenue information. It is against this background that ECTS was implemented by Customs administrations to ensure all tax leakages are addressed to improve on excise revenue collection.

2.1.2 Excise Revenue

In its mandates, customs play a critical role in raising government revenue, promoting the country's competitiveness, protecting society, encouraging trade, gathering trade data for policy making and protecting the international supply chain in an efficient and effective manner around the world. An excise tax, or excise tax, is a manufactured goods duty which is imposed at the time of production and not of sale. Excise is related to customs duties imposed on pre-existing goods in transit at a specified border. The taxes on gasoline and other fuels and taxes on cigarettes and alcohol are common examples of excise duties, often it is referred to as a levy on sin.

In Kenya, Customs revenue includes import duties, export duties, excise taxes and value added taxes (VAT). These are import or export tariffs and other charges

imposed on goods with an equal effect due to the factors affecting their importation or export (EAC CMA, 2004); other forms of Customs revenues are penalties and fines. Like other tax heads, Excise taxes form part of revenue collected for government expenses. Collections of excise taxes began in the 17th century on royally owned land and tenancies; at the time, Excise tax was seeking to serve political purposes. The rationale for excise duty or taxes later revolved around safety of the public and health, national defense, public morals and environmental protection. The objective of these taxes was redressing the specific costs resulting from consumptions of the products, hence used in activities such as anti-drug usage campaigns, health care such as cancer and heart and lung diseases. In some instances, excise tax is meant to be a punitive tax aimed at ensuring that the users feel the pain of taxes as they consume the affected products. Excise tax has over time turned into a source of revenue for governments to fund their activities. Governments and public bodies in general, particularly in the provision of essential public services, have to act on behalf of society at large.

2.2 Theoretical Framework

A theory is a collection of systematically interrelated principles, definitions and propositions that are advanced to describe and forecast phenomena or reality (Cooper & Schindler, 2013). In this context, we have several hypotheses and constantly use them to describe or predict what is going on around us. Theories can be used to forecast possible evidence that should be known. Modern portfolio theory, Diffusion of Innovation Theory, Technological Determinism Theory, Infusion Theory of Technology and Technological Acceptance Model are the theoretical framework that was used to guide the research.

2.2.1 Diffusion of Innovation Theory

Innovation Theory Diffusion notes that there are five characteristics of an innovation that can decide the acceptance of an innovation (Rogers, 1995); (Chong and Ooi, 2008). Relative advantage, compatibility, sophistication, trialability and observability are the five considered characteristics of innovation (Rogers, 1995). The relative gain is the degree to which an invention is considered to be superior to the concept it replaces. Compatibility is characterized as the degree to which a development with past values, past experience, and the needs of potential adopters is seen as predictable. The difficulty of an invention is when the innovation is viewed as difficult to use and understand in general. Trialability alludes to whether an invention can be evaluated on a restricted basis. Lastly, observability is whether the results of an invention are obvious to others.

Therefore, this analysis was guided by a mix of four hypotheses that together affirm the psychological, behavioral and imaginative structures that decide the use of computerized systems. In this report, this principle was important as it sought to emphasize the use of technology (ECTS) to achieve the organizational target of raising excise revenue. The system's relative benefit, compatibility, sophistication, trialability and observability (Rogers, 1995) decreases the applicability across both the study's independent and dependent variables.

2.2.2 Technological Determinism Theory

The theory of technological determinism, advanced by Karl Marx, indicates that technology has essential effects on our lives; technology is a vital aspect of the human condition. Technologies nourish, clothe, and provide shelter for us; transport, entertain, and heal us; provide wealth and recreation; pollute and kill us. They are inextricably woven into the fabric of our lives, from birth to death, at home, at school,

in a paid job, for good or ill. Rich or poor, working or not, woman or male,' black' or 'white,' north or south, all our lives are related to technology, from simple tools to vast systems of technology.

MacKenzie and Wajcman (1999) state that, either because of technological progress or following a rationale of their own, technologies change; they then impact society. Computer technology growth, for instance, tends to follow trajectories, most notably the law of Moore. It explains how the number of components doubles in a set, predictable time on a state-of-the-art microchip (initially a year; now 18 months). This 'new world's defining law' (Malone, 1995) sparks a revolution in information and communication technology that many experts believe, is transforming and will change the way we live.

Technology matters in addition to the material state of our lives and to our biological and physical environment. Wood (2004) shows that computer is one technology as an example that has facilitated social expectations of immediacy and the ability to multitask by engaging in several tasks at the same time or in simultaneous and collaborative ways.

In different ways, opponents of technological determinism claim that technology itself is socially determined. In a non-deterministic, emergent method, this proposal implies that technology and social systems co-evolve. The results of any given technology are primarily based on how it is applied, which is socially decided in turn. Technologies are not neutral but are encouraged by organizations to sustain or change social ties (Hard, 1993). The Technological Determinism debate is constantly revived in view of the emergence of new technology in modern capitalism. For this research, this principle was important as it sought to emphasize the use of technology (ECTS) in

achieving the organizational target. Wood (2004) defines the machine as an invention that has encouraged society's aspirations of immediacy and the capacity to multitask by participating in multiple activities simultaneously or in overlapping and interactive ways; therefore the theory bases the independent variables precisely in terms of raising the collection of excise revenue.

This principle is applicable to the research since the use of technology can enhance service delivery and the realization of organizational targets at KRA. In this case, the technological element that will be used in the ECTS system, which will be applied to improve excise revenue collection and Customs points within JKIA. As posited in the theory, technology is a critical component of operations for individuals and corporate entities. This reality means that KRA needs to embrace technology as an avenue for improving their operations at all times. Based on the proposals of this theory, KRA should experience improved revenue collection at all Customs points after implementing the ECTS system.

2.2.3 Infusion Theory of Technology

Rogers developed the Infusion Theory of Technology (2003). He described adoption as a decision to make full use of innovation as the best available course of action, and rejection as a decision not to adopt a specific innovation. The theory describes infusion as the mechanism through which an innovation is transmitted among the participants of a social structure through certain networks over time. The technology theory of infusion claims that potential users decide, based on their beliefs about innovation, to adopt or reject an innovation ((Lee, Hsieh, & Hsu, 2011). Innovation features, communication networks, time and the social system are the four main components of the propagation of innovations, as expressed in this definition (Sahin, 2006). Infusion is the process of embedding IT applications deeply and extensively

within the system of work of an individual or of an organization (Cooper & Zmud, 1990; Kwon, 1987; Sullivan, 1985). Infusion is therefore the extent of integration of a particular innovation to which the full potential within an organization's operational or managerial work systems and the profundity of that integration (Kishore & McLean, 1998).

IT infusion leads to improved individual performance and this has resulted to organizations investing large amount of money in information technologies (IT). Cooper and Zmud (1990) argued that the use alone is insufficient to significantly and directly improve individual performance.

Tyre and Orlikowski (1996) argued that when more users have experience with emerging technologies, they encounter new challenges and opportunities, hence, need to adjust to technologies that are suitable to their procedures and assumptions. These instances take the form of activities of adaptation and integration of IT in the work system that is peculiar to the users. The principle was applicable to this research since it emphasized the use of technology (ECTS) in achieving organizational objective.

2.2.4 Technological Acceptance Model

TAM is a specialized form of Theory of Action towards technological implementation. It describes the relationship between users' beliefs viz a vis their behavioral intentions; combining attitude to determined intention. This theory was formulated by Davis et al in the 1989 and used to model user acceptance of technology. It explains that users are likely to use technology when they perceive it as an improvement in job performance and depending on how easy it can be used.

In 1989, Fred Davis introduced TAM as a theory of data systems that revolves around the adoption and use of technology by users. According to Davis et al. (2003),

Maisiba and Atambo (2016), TAM theorizes that the purpose of a person to use a system is jointly determined by their perception of usefulness, the subjective probability of the user that using a particular application system will boost his or her job performance and perceived ease of use (PEOU), which is the degree to which the user expects the target TAM is a TRA (Taiwan Relations Act) adaptation and is explicitly dependent on the adoption of information systems by users (Amin 2007a; Ramayah & Jantan 2004; Sun & Zhang 2006). The theory is able to describe consumer behavior through a wide variety of end-user applications and user demographics, in addition to explaining the determinants of technology adoption, while at the same time being flourishing and technically justified (Alrafi 2006; Amin 2007a; Amin, Baba & Muhammad 2007; Chung 2008). The model indicates that two behaviors influence the feelings of consumers about the use of any technology; perceived utility and perceived ease of use.

The TAM states that the acceptance of technological advancement is influenced by the perceived utility and perceived ease of use of the technology (Davis, 1989). There are 2 fronts to the model. One is the degree to which a person believes that, within an organizational context, a specific system will increase job efficiency. Secondly, the degree to which a person believes that it will be free of strain to use a particular system (Amin, Baba, & Muhammad, 2007; Chung 2008). The model therefore indicates that the use of innovation is indirectly influenced by both perceived utility and perceived ease of use which form the primary relevance of innovation adoption behaviors (Lee, Hsieh & Hsu, 2011).

The principle was applicable to this research as it emphasized how use of technology (ECTS) is expected to offer process efficiencies by lowering cost while improving

revenues. This theory which was created by Davis et al in the 1989 and was used to model user acceptance of technology explains that users are highly likely to use technology when they perceive it will improve job performance and is easy to use grounds the dependent variable of the study.

2.3 Empirical Review

2.3.1 ECTS Cargo Monitoring and excise revenue collection

Belissent (2009) established that the key information technology management drivers are quality of service and cost control. The best approaches to preserving quality services at border points are currently considered to be better predictive approaches to service efficiency issues. This is particularly so when goods are secured at the border points and are cleared quickly for onward delivery or exit through the next station. The Electronic Cargo Tracking System (ECTs) helps the revenue authority to get more and more shipments cleared at a faster pace every day, leading to more revenue collection. The change seeks to decongest all border points such as airports by ensuring that cargo moving across the border arrives at its destination in time and at the planned date, i.e. the complex nature of the capabilities that ultimately rely on organizational performance and the role of organizational learning (Cohen & Levinthal, 1990).

For the period 2001-2008, Wang'ombe (2009) conducted a research on revenue efficiency and some administrative factors in the Kenyan tax system. The outcome of his analysis was that the overall tax system's buoyancy figures were 1.26, while elasticity was 1.27. The study thus concluded that in general, the tax system was both elastic and buoyant, suggesting that efficiency was greatly enhanced by tax reforms. There was a very limited impact of discretionary tax reforms on tax productivity,

suggesting improved efficiency. Computerization allows to reliably, efficiently and effectively execute complex processes (Hollingum, 2006, 2007). The effective application of automation to tax administration is emphasized by Shivakumar (2007) as well as Gutierrez (2008). Automation of tax administration, according to Vasudevan (2007), requires the development of driven computer programs to carry out tax assessments and computations and to decide tax duties at higher levels of speed and accuracy (Guido, 2007).

Katsuya-Takii (2003) noted that automation is a catalyst and stimulus for modernizing Customs. Usually, Customs automation is part of an overall restructuring of the tax administration (Rao, 2000) and modernization programs (Greenwood et al., 2008; Guido, 2007; Gutierrez, 2006). The provision of Customs records through computer-assisted processing of electronically transmitted information is the automation of Customs administration. Booze et al. (2007) postulates that the main functions of automated Customs administration should include: controlling the cross-border movement of goods, ensuring compliance with the rules and regulations of the government, collecting duties and taxes due under the national Customs and tax code, and preventing illegal goods and materials from being imported by a country.

Gitau and Nzuki (2014) examined how the use of ICT has modernized the expense of tax administration procedures and improved revenue collection in the Tanzania Revenue Authority's Large Taxpayer Department. In 2001, the department's ease of Maintenance and Timely Access to Records and Quick Return Processing introduced ICT to reduce postal delays; reduce operating costs; curb theft and loss of revenue from plugging (TRA, 2010). The determinants of tax revenue success in the Southern African Development Community (SADC) were analyzed by Ade, Rossouw, &

Gwatidzo, (2018). In general, the findings highlighted the robust role of taxation, i.e. tax rates and tax policy harmonization variables, providing empirical support for existing anecdotal evidence, in raising tax revenue in the region.

Sagas (2015) carried out an assessment by the Kenya Revenue Authority Western Region, Kenya of the effect of the electronic tax register on revenue collection. Findings from their study showed that 75% of the respondents were of the opinion that ETR machines helped to curb tax evasion cases, 86% of the respondents believed that because of their efficient existence, ETRs helped improve revenue collection.

The impact on revenue collection of system revenue modernization at the Kenya Revenue Authority was examined by Muthama (2003). One of the main objectives for her research was the relationship between system automation and revenue collection at the Kenya Revenue Authority with respect to the Simba system. Majoring on a number of completed transactions, the study clearly compared on the performance of revenue collection before the introduction of the Simba System and after the automation. From the results, Jacobs (2007) concludes that the amount of revenue collected is closely linked to the operations of adoption of new systems in Customs. The study concluded that transactions increased after the introduction of the Simba system while comparing the amount of transactions conducted before and after the implementation of the Simba system. There was also a direct comparison on the number of transactions completed and the revenue raised. The higher the number of the transactions, the more the revenue collected.

2.3.2 ECTS Cargo Security and excise revenue collection

Computerization of tax collection is a modern tax control system which comes with specific security controls and that does not require tax authorities to collect and

monitor tax payments physically; it is done by information and communication technology. It is a groundbreaking electronic administration technology and a new concept of public service. The system consists of turn-in-tax declaration forms detailing taxes retained by the authorities in electronic format and due levies paid by interactive bank accounts or ATM bank machines through the Internet-based electronic environment (Siror et al., 2017). Via electronic declaration and payment methods, electronic system is intended to collect taxes in electronic settings. In Turkey, the majority of taxpayers records their taxes payable in an electronic environment. Taxes reported online will undoubtedly be charged by moving applicable taxes electronically to tax consultants. At the Kenya Revenue Authority, Kariuki (2012) researched the effect of automation as a strategy of systemic change. Automation of revenue administration makes extensive use of computer systems consisting of comprehensive and integrated software packages defined by Greenwood et al. (2008) as cargo control, to track all import, transit and export movements, and to ensure that all goods are properly cleared before release; and processing of declarations, collecting and processing duty and revenue collection data Swindley (2007) adds payment and accounting, the registration and accounting of payments by importers and exporters, and risk control, the collection of consignments with higher risks, the concealment of Customs duties and non-compliance with taxes, the illicit importation of narcotics or suspected terrorist related products.

2.3.3 ECTS Information Sharing system and excise revenue collection

Vasudevan (2007) noted that automation of customs administration leads to increased collection of duties and taxes because of the effective implementation of laws and regulations. Graham and Wendy (2003) gathers data for the dissemination of foreign trade information in addition to statistics and documentation, and generates Customs

management reports for effective communication between offices, merchants and other relevant government agencies. The system increases transparency in the determination of export and import duties and other taxes, reduces clearance time significantly and improves predictability. The net benefit is that administration expenses are directly and indirectly decreased, and Customs revenue collection efficiency is increased (Katsuya-Takii, 2003).

Data reconciliation and incorporation into a single data dictionary, which served as the organization's standard, were important to realize greater productivity (Funkhouser & Vanderslice, 2013). The ECTS framework provides a forum where data can be correctly analyzed. The Kenya Revenue Authority was able to generate valuable insights into its operational efficiencies, and this was achieved on a real-time basis and was thus timely and applicable to the information obtained and shared.

In real time, ICT made it possible to understand the state of the system and thus to control and adjust online routes, vehicle movements, orders and deliveries (Agbesi, 2013). The new advanced real-time Electronic Cargo Monitoring System (ECTS) helps government agencies improve enforcement of regulations on cargo handling, retaining the region as the preferred trade route for cargo and thereby improving tax collection by curbing dumping incidents (Patel, 2004). The data obtained in the system is shared on a real-time basis, resulting in a decrease in the country's dumping, tax evasion and cargo theft.

With regard to the particular effect of ICT on the transport industry, Crowley (1998) pointed out that ICT has had an impact on transport in at least three different ways, the increased information content of many items has changed the quality of the goods

being transported, the use of ICT has enhanced the integration of the supply chain and has redefined the role of freight and transport business.

In Kenya, the government's requirement that the Electronic Cargo Tracking System (ECTS) be installed by all truckers was initially met with resistance (Wilson, 2015). However, the ECTS which replaced the physical armed police and Customs officials escort, was slowly adopted by truckers, as was the practice to track cargo in transit and provide information on the location, protection and condition of cargo and assets. KRA's expectations on the ECTS are among others, ability to secure cargo under KRA's control, raise an alert in an event of violation. Ability to monitor cargo along supply chain, gives cargo status, give geographical location and any pertinent cargo information, record cargo events from source to destination. In this study, the interest was to link the technology of acceptance model, where factors such as politics have had an effect on the adoption of ICT security systems.

2.4 Literature Overview and Gaps

In the reviewed literature, the influence of information communication technology on tax administration efficiency is well known, so many policymakers were unanimous in making improvements to their tax structures in their countries to adopt ICT.

However, these studies have concentrated on information communication technology in general and have not focused on specific systems such as Electronic Cargo Tracking System (ECTS). Most of these studies have also been conducted in foreign countries that have a different macro environment from Kenya and the region.

A thorough study on the subject was appropriate in recognition of the role of ECTS in improving Customs revenue and in particular, the collection of excise revenue. This is supported by Vasudevan (2007), who noted that the automation of Customs

administration contributes to higher collection of duties and other associated levies. This research thus sought to look at the effect of adoption of Electronic Cargo Tracking System (ECTS) on excise revenue collection in Kenya with a focus on Jomo Kenyatta International Airport (JKIA)

2.5 Conceptual Framework

The purpose of a conceptual framework is to identify and define concepts important to the analysis and to map the relationships between them. The explanatory variables are ECTS Cargo Monitoring, ECTS Cargo Security and ECTS Information Sharing. The dependent variable is the Excise revenue collection at JKIA in Kenya. The conceptual framework for this study is figuratively depicted below under figure 2.1

Independent Variable   **Dependent Variable**

```
+---------------------------+
| ECTS Cargo                |
| Monitoring                |
|   • Cargo tracking.       |
|   • Cargo clearance       |
|     times at loading and  |
|     offloading points.    |
|   • Real time response    |
+---------------------------+

+---------------------------+
| ECTS Cargo Security       |
|   • Transit tamper        |
|     detection             |
|   • Number of reported    |
|     cases                 |
|   • Compliance            |
|     Enforcement           |
+---------------------------+

+---------------------------+
| ECTS Information          |
| Sharing                   |
|   • Transit data sharing  |
|   • Interstate data       |
|     sharing               |
|   • Decision making       |
+---------------------------+
```

```
+---------------------------+
| Excise Revenue            |
| Collection at JKIA        |
|                           |
|   • Tax collection.       |
|   • Tax base              |
|   • Tax leakages          |
+---------------------------+
```

Figure 2.1: Conceptual Framework

Source: *KRA, 2020 and Avante.*

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter discussed choice of the research design employed in the study, the target population of the study, sampling criteria, sample size, data collection methods, data analysis and presentation of the results.

3.1 Research Design

Research design can be considered as the structure of a research. Deutch & Cook (1965), defines research design as the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy and procedure. Explanatory research design was approved in this study. An explanatory research explains the subject of the research and thereby answers what, why, and how one variable influence or is responsible for changes in another variable. For this analysis, the relationship between the collection of excise revenue and the implementation of the ECTS was assessed. Explanatory study designs go beyond explanation and seek to describe the reasons for the phenomenon. Explanatory research design was appropriate for this as the study sought to establish the effect of Cargo Monitoring on excise revenue collection at JKIA in Kenya; effect of Cargo Security on excise revenue collection at JKIA in Kenya and effect Information Sharing on revenue collection at JKIA in Kenya. The quantitative research design was necessary for finite information that can be quantified; revenue collected in this case.

3.2 Target Population

The study target population which is the unit of analysis comprised of KRA Customs personnel stationed at JKIA Customs office and the technical staff. A population can be defined as a collection of persons, events, or documents that contain the desired information and can address the question of measurement (Cooper & Schindler, 2008). The study unit of analysis was the Customs and technical staff involved in ECTS operations. The staff were chosen as the unit of analysis because they are the personnel involved in the day-to-day execution of the system.

Table 3.1 below shows the distribution of the target population.

Table 3.1: Target Population at JKIA

Respondents	Target Population
Senior Customs Managers (KRA)	50
Customs Verification Staff (KRA)	129
Customs Documentation Staff (KRA)	121
Total	**300**

Source: KRA 7th Corporate Plan

3.3 Sampling Procedure and Sample Size

A sampling frame was obtained from Kenya Revenue Authority (KRA) Customs staff who use ECTS on a regular basis. Stratified random sampling was employed to stratify the sample of participants based on departmental roles. Stratified random sampling is a method of sampling that involves the division of a population into smaller sub-groups known as strata. In stratified random sampling, or stratification, the strata are formed based on members' shared attributes or characteristics such as income or educational attainment. A stratified random sampling was also employed

because of the heterogeneity of the population and to give the respondents an equal opportunity of participation. As such the study participants were stratified into strata based on departmental roles. Proportionate random sampling was thereafter applied to select the final participants of the study to capture the proportionate distribution of the study to allow the researcher to gather information about the ECTS system and its impact on the collection of excise duty at JKIA terminal. This information could only be sourced from KRA Customs and technical staff in the Customs department who worked on the system on regular basis. Having this knowledge made it easy for the researcher to select the appropriate group of respondents from the greater populations of employees of KRA at JKIA terminal.

Then sample size was calculated by the formula advanced by Yamane (1967)

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

Where:

n= sample size

N = Target population

e= level of significance (5%) implying that the Confidence level is (95%)

Therefore;

$$n = \frac{300}{1+300(0.05)^2}$$

` $$n = \frac{300}{1.75}$$

$$n = 171$$

A sample of 171 respondents was therefore drawn from the population. The calculated sample size was proportionately distributed as indicated in Table 3.2 below.

Table 3.2: Sample Size

Item	Target Population	Proportion of sample size	Sample size
Senior Customs Managers (KRA)	50	0.166	29
Customs Verification Staff (KRA)	129	0.43	74
Customs Documentation Staff (KRA)	121	0.4	68
Total	**300**		**171**

Source: Author (2020)

3.4 Data Collection

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes. According to Mugenda & Mugenda (2003), questionnaires, interview schedules, observation and assessments are basic study techniques used in social science to collect data. To examine the relationship between the dependent and the independent variables of the study, the study used a closed ended structured questionnaire administered on a five-point Likert ranging from strongly disagree to strongly agree to gather primary data. The primary data collected was qualitative in nature.

3.4.1 Pilot Test

Pilot testing is normally conducted to allow a researcher to test the research approach with a small number of test participants before the main study is conducted. According to Mugenda (2003), a sample of at least 10% of the population is usually acceptable in a pilot study. In the context of this study, the pilot test was conducted on

thirty-four (20%) of the actual sample size of one hundred and seventy-one (171) participants. The participants selected for the pilot exercise did not form part of the population under study. Data was then collected from the participants and then subjected to correlation and multiple regression analysis to establish the approach of the research in relation to the study variables. Please refer to Appendix II for the results of the Pilot Test.

3.4.2 Reliability of the Data Collection Instrument

Reliability measures the consistency of the items in a questionnaire to produce the same results under the same conditions. The study used Cronbach, (1951) formula to measure the internal consistency of the items in the questionnaire. Cronbach's alpha has the most utility for multi-item scales, needs only a single administration, and offers a special, quantitative approximation of a scale's internal consistency. Cronbach alpha (α) was computed using the following formula.

- Cronbach's basic equation for alpha

$$\alpha = \frac{n}{n-1}\left(1 - \frac{\Sigma Vi}{Vtest}\right)$$

- n = number of questions
- Vi = variance of scores on each question
- Vtest = total variance of overall scores on the entire test

The computation of Cronbach reliability alpha based on the above formula was simplified by use of SPSS. The questionnaire responses were entered into the SPSS and the alpha coefficient of Cronbach was determined for reliability. The alpha value of A Cronbach of 0.7 and above showed that the analysis method used was accurate. This study adopted a coefficient of 0.7 as the benchmark for reliability.

The results of the test-pre-test method are indicated in Table 3.3.

Table 3.3: Reliability statistics

Cronbach's Alpha	N of Items
.863	34

Source: Research Data (2020)

Form the analysis Cronbach's Alpha was greater than 0.7 ($\alpha > .7$) for all the variables, an indication that the research instrument was reliable.

3.4.3 Validity of Data Collection Instrument

Validity informs the researcher how accurately a method measures the variables of a study. McMillan and Schumacher (2006) define validity as the degree of congruence between the phenomenon's interpretations and the world's realities. There are four main types of validity namely; Construct validity which determines whether the test measure the concept that it's intended to measure; Content validity which determines whether the test is fully representative of what it aims to measure; Face validity which determines whether the content of the test appear to be suitable to its aims and Criterion validity which determines whether the results correspond to a different test of the same thing. Both construct validity and content validity were used in this study. The questionnaire was split into several sections for construct validity in order to ensure that each section evaluated information for a particular purpose and also ensured that the conceptual structure for this study was closely linked to the same. To ensure content validity, two independent technical personnel were randomly engaged from the Kenya Revenue Authority Customs department to assess the questionnaire. In addition to the two distinguished research supervisors, the technical personnel were requested to determine the validity of the statements in the questionnaire and whether

the content was aligned to the research objectives. The questionnaire was adopted from reviewed literature based on WCO Model on ECTS. The instrument was properly calibrated on the basis of the assessment before it was subjected to the final data collection exercise**.**

3.5 Data Collection Procedure

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to test hypotheses and evaluate outcomes. Data collection is defined as the reliable, systematic collection of research-related information using techniques such as interviews, participant observations, focus group discussion, narratives and case histories (Cooper & Schindler, 2011). The questionnaires were self-administered, with the assistance of two research assistants. Voluntary involvement of the respondents was encouraged.

3.6 Data Analysis and Presentation

The research adopted both descriptive and inferential statistical analysis techniques to examine the relationship between the variables of the study. After collecting qualitative data through questionnaires, values from the scale of the Likert were cleaned, coded and keyed into SPSS for purposes of data analysis.

The data was coded into segments to represent the variables of the study. Descriptive statistics in the form of means and standard deviations as well as Correlation and multiple regression analysis were used to explore the interaction between the independent variables and the dependent variable. The intensity of the linear relationship between the variables was defined by correlation analysis. According to Hosmer & Lemeshow (2015), Linear multiple regression is a useful way to view decision effects, makes relatively few statistical assumptions, and is robust to the

statistical assumptions made. The results of the descriptive statistics were summarised in the form of means, standard deviations, frequencies, and percentages.

Ouma and Muriu (2014) suggested that researchers may use a variety of diagnostic tests, each of which is designed to detect a specific type of model inadequacy, to be able to verify the adequacy of a selected model. In order to prevent incorrect regression outcomes, diagnostic tests namely Linearity, Normality, Homoscedasticity, Autocorrelation and Multicollinearity were conducted.

Most statistical tests rely upon certain assumptions about the variables used in the analysis. When these assumptions are not met the results may not be trustworthy, resulting in over or underestimation of the significance or effect size. As Pedhazur (1997) notes, knowledge and understanding of the situations when violations of assumptions lead to serious biases, and when they are of little consequence, are essential to meaningful data analysis.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where **Y** is the Dependent Variable (Excise Revenue Collection at JKIA),

X_1 is the ECTS Cargo Monitoring,

X_2 is the ECTS Cargo Security,

X_3 is the ECTS Information Sharing

β_0 is the regression coefficient, β_1, β_2, β_3, are the slopes of the regression equation,

ε = error term

3.7 Operationalization of Study Variables

Table 3.3 below gives an outline of the dependent and independent variables and how they were measured and reviewed.

Table 3.4: Measurement of variables

Variable	Variable Type	Indicators	Analytical tool used
Excise Revenue Collection at JKIA	Dependent	• Actual tax collection. • Increase in tax base • Reduction of leakages of tax.	Descriptive statistics, multiple regression,
ECTS Cargo Monitoring	Independent	• Cargo tracking • Cargo clearance times at loading and offloading points • Real time response	Multiple regression, correlation,
ECTS Cargo Security	Independent	• Transit tamper detection • Number of reported cases • Enforcement	Multiple regression, correlation,
ECTS Information Sharing	Independent	• Transit data • interstate data • Decision making	Multiple regression, correlation,

Source: researcher (2020)

3.8 Ethical Considerations

Ethical considerations refer to the moral principles that the researcher must take into account at all levels of the study design and all research methods (Polit et al., 2001). Strict adherence to study processes was given due consideration. The ethical concerns that have been encountered in the research process include voluntary engagement,

privacy and confidentiality and fairness of respondents. The researcher ensured that the collected data was handled with the utmost confidentiality and was only used for research purposes.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.0 Introduction

This chapter presents the findings of the results of the study that sought to determine the adoption of electronic cargo tracking system on excise revenue collection in Kenya. The findings are presented, analyzed, and interpreted based on research objectives.

4.1 Response Rate

The respondents were given one hundred and seventy-one (171) questionnaires, 165 of which were filled in and returned. This gave a 96.5 percent response rate. A response rate of 50 percent is appropriate to evaluate and publish, 60 percent is good, 70 percent is very good, and above 80 percent is an outstanding response rate, according to Kothari (2007). The response rate is presented in Table 4.1.

Table 4.1: Response rate

Response	Frequency	Percentage
Returned	165	96.5%
Unreturned	6	3.5%
Total	**171**	**100%**

Source: Research, 2020

4.2 Demographic Information

This section presents the Demographic information of the respondents.

4.2.1 Gender

The researcher sought to establish the gender of the respondents. The results were recorded in the table below.

Table 4.2: Gender of the Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	90	54.5	54.5	54.5
Female	75	45.5	45.5	100.0
Total	165	100.0	100.0	

Source: Research, 2020

The study shows that 55% of the respondents were male while 45% were female with majority being male. The results indicate that both genders were well represented

4.2.2 Work Experience

The researcher sought to establish the work experience of the respondents. The results were recorded in the table below.

Table 4.3: Years of Work Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 years	16	9.7	9.7	9.7
	10-20 years	44	26.7	26.7	36.4
	20-30 years	47	28.5	28.5	64.8
	30 years and above	58	35.2	35.2	100.0
	Total	165	100.0	100.0	

The findings reveal that most of the participants representing 35% had 30 and above years of work experience, 28% between 20 to 30 years of work experience, 27% between 10 to 20 years of work experience while 10% less than 10 years of work experience. The findings on years of work experience indicate that most of the respondents had acquired enough experience in the use of KRA systems and were well informed.

4.3 Descriptive Statistics

In this section, the descriptive statistics are presented. The findings were captured in a Likert scale of 1 to 5 ranging from 1(strongly disagree) to 5(strongly agree). Based on

the Likert Scale, 1 to 2.5 responses represented respondents who dissented with the statements whereas 2.6 to 5 responses represented respondents who agreed with the statements. The mean of each response was obtained, and interpretations made based on these means rounded up to the nearest whole number.

4.3.1 Cargo Monitoring System

The first objective of the study was to determine how ECTS Cargo Monitoring affects excise revenue collection at JKIA in Kenya. The findings of the descriptive statistics are illustrated below.

Table 4.4: Descriptive statistics on ECTS Cargo Monitoring System

	N	Mean	Std. Deviation
The introduction of the Electronic Cargo Tracking System (ECTS) has enhanced the traceability of cargo enroute to the destination reducing incidents of revenue leakages	165	4.59	.584
ECTS has reduced diversion of Transit goods therefore safeguarding Customs revenue.	165	4.34	.852
ECTS has provided control on cargo clearance time of transit vehicles which then secures Customs revenue	165	3.79	.866
Shared information through ECTS supports real time response when required while the cargo is in transit	165	4.39	.548
Electronic Seals has reduced tax evasion that was previously experienced during changeover of seals from cargo departure to exit through the border points	165	4.50	.801
Mean = 4.322	**Standard Deviation=0.7302**		

Source: Research findings, 2020.

The study findings in table 4.4 revealed that majority of the respondents were in agreement that ECTS Cargo Monitoring affects excise revenue collection at JKIA in Kenya indicated by the mean score of 4.322 and a standard deviation of 0.7302. Specifically, majority of the participants noted that the introduction of the Electronic Cargo Tracking System (ECTS) has enhanced the traceability of cargo enroute to the destination reducing incidents of revenue leakages ($\overline{x}$=4.59); majority of the respondents agreed that ECTS has reduced diversion of Transit goods therefore safeguarding Customs revenue. ($\overline{x}$=4.34); majority of the respondents agreed that ECTS has provided control on cargo clearance time of transit vehicles which then secures Customs revenue($\overline{x}$=3.79); majority of the respondents agreed that Shared information through ECTS supports real time response when required while the cargo is in transit($\overline{x}$=4.39); Electronic Seals has reduced tax evasion that was previously experienced during changeover of seals from cargo departure to exit through the border points($\overline{x}$=4.50).

4.3.2 Cargo Security System

The second objective of the study was to establish if ECTS Cargo Security system has effectively contributed to excise revenue collection at JKIA in Kenya. The findings are presented in table 4.5.

Table 4.5: Descriptive statistics on ECTS Cargo Security system

	N	Mean	Std. Deviation
ECTS has reduced the reported attempts of pilferage and outright theft of cargo therefore safeguarding Customs revenue	165	4.47	.590
The introduction of the Electronic Cargo Tracking System (ECTS) has enhanced enforcement by Customs monitoring team while cargo is in transit thus securing Customs revenue	165	3.84	.857
Implementation of ECTS on Transit goods has eliminated revenue leakages	165	4.26	1.023
Electronic Seal has improved cargo security previously compromised during changeover of seals at border points thus securing Customs revenue	165	4.59	.584
Movement of Transit Containerized cargo from Port of entry to Port of exit is more secure with the implementation of ECTS than when physical escort was in place thus safeguarding Customs revenue	165	4.24	1.017
Mean = 4.28		**Standard Deviation=0.8142**	

Source: Research findings,2020

The study findings in table 4.5 revealed that majority of the respondents were in agreement that ECTS Cargo Security system affects excise revenue collection at JKIA in Kenya indicated by the mean score of 4.28 and a standard deviation of 0.8142. Specifically, majority of the respondents agreed that ECTS has reduced the reported attempts of pilferage and outright theft of cargo therefore safeguarding Customs

revenue($\overline{x}$=4.47); majority of the respondents agreed that The introduction of the Electronic Cargo Tracking System (ECTS) has enhanced the real time location of cargo by the monitoring team while in transit thus securing Customs revenue($\overline{x}$=3.84); majority of the respondents agreed that implementation of ECTS on Transit goods has eliminated revenue leakages($\overline{x}$=4.26); majority of the respondents agreed that Electronic Seal has improved cargo security previously compromised during changeover of seals at border points thus securing Customs revenue($\overline{x}$=4.59); majority of the respondents agreed that ECTS has enhanced monitoring of the movement of Transit Containerized cargo thus safeguarding Customs revenue($\overline{x}$=4.24).

4.3.3 ECTS Information Sharing system

The third objective of the study was to investigate whether ECTS Information Sharing system affects excise revenue collection at JKIA in Kenya. The findings are as shown in Table 4.6.

Table 4.6: Descriptive statistics on ECTS Information Sharing system

	N	Mean	Std. Deviation
ECTS has strengthened Management of Transit data which secures excise tax	165	3.87	.960
ECTS has provided a secure platform for real time data gathering and sharing therefore safeguarding excise tax	165	4.64	.483
Integration of ECTS with other KRA Systems has facilitated seamless interstate data sharing which safeguards Customs revenue at JKIA	165	4.24	1.017
ECTS has reduced reaction time in case of reported noncompliance therefore securing Customs revenue	165	4.60	.582
The information received through the ECTS platform has sufficiently supported decisions that has reduced excise tax evasion	165	3.31	1.442
Mean = 4.132	**Standard Deviation=0.8968**		

Source: Research findings, 2020.

The study findings in table 4.6 revealed that majority of the respondents were in agreement that ECTS Information Sharing system affects excise revenue collection at JKIA in Kenya indicated by the mean score of 4.132 and a standard deviation of 0.8968. Specifically, majority of the respondents agreed that ECTS has strengthened Management of Transit data which secures excise tax($\overline{x}$=3.87); majority of the respondents agreed that ECTS has provided a secure platform for real time data gathering and sharing therefore safeguarding excise tax($\overline{x}$=4.64); majority of the respondents agreed that Integration of ECTS with other KRA Systems has facilitated

seamless interstate data sharing which safeguards Customs revenue($\overline{x}$=4.24); majority of the respondents agreed that ECTS has reduced reaction time in case of reported noncompliance therefore securing Customs revenue($\overline{x}$=4.60); most of the participants noted that the information received through the ECTS platform has sufficiently supported decisions that has reduced excise tax evasion($\overline{x}$=3.31).

4.3.4 Excise Revenue Collection at JKIA

The Excise Revenue Collection formed the dependent variable of the study. The findings are as shown in Table 4.7.

Table 4.7: Descriptive statistics on Excise Revenue Collection at JKIA

	N	Mean	Std. Deviation
There has been an increase in the collection of excise revenue as a result of the introduction of ECTS at JKIA	165	4.61	.580
There has been a reduction of tax leakages of excise revenue as a result of the introduction of ECTS at JKIA	165	4.60	.582
There has been an increase in the tax base of excise revenue taxpayers as a result of the introduction of ECTS at JKIA	165	4.24	1.017
The cost incurred in acquiring ECTS is reflective of the overall benefit of excise revenue collected at JKIA	165	4.60	.582
Excise Revenue has led to an overall increase in total tax revenue at JKIA	165	2.88	.896
Mean = 4.186		**Standard Deviation=0.7314**	

Source: Research findings, 2020

Based on table 4.7, the research findings revealed that most of the participants were in agreement that there has been an increase in Excise Revenue Collection at JKIA in Kenya as indicated by the mean score of 4.186; majority of the respondents were in agreement that there has been an increase in the collection of excise revenue as a

result of the introduction of ECTS. The cost incurred in acquiring ECTS is reflective of the overall benefit of excise revenue collected ($\overline{x}$=4.60); excise revenue as a result of the introduction of ECTS ($\overline{x}$=4.61); There has been a reduction of tax leakages of excise revenue as a result of the introduction of ECTS ($\overline{x}$=4.60); There has been an increase in the tax base of excise revenue taxpayers as a result of the introduction of ECTS ($\overline{x}$=4.24); Excise Revenue has led to an overall increase in total tax revenue ($\overline{x}$=2.88).

4.4 Assumptions of Multiple Regression Analysis

Before inferential statistics was conducted, assumptions of the multiple regression analysis were tested to ensure the suitability of the data for multiple regression analysis. The test includes Linearity, Normality, Multicollinearity and Heteroscedasticity. If these assumptions are violated, the end results lead to serious biasness. As such these tests are essential for meaningful data analysis.

4.4.1 Linearity Test

The relation between the dependent and the independent variables needs to be linear in a linear regression. Using the Usual P-P Plot of Regression Standardized residuals, the linearity assumption was checked. If a linear pattern (not a curvilinear pattern) fits the Usual P-P map, it indicates that the assumption of linearity is met.
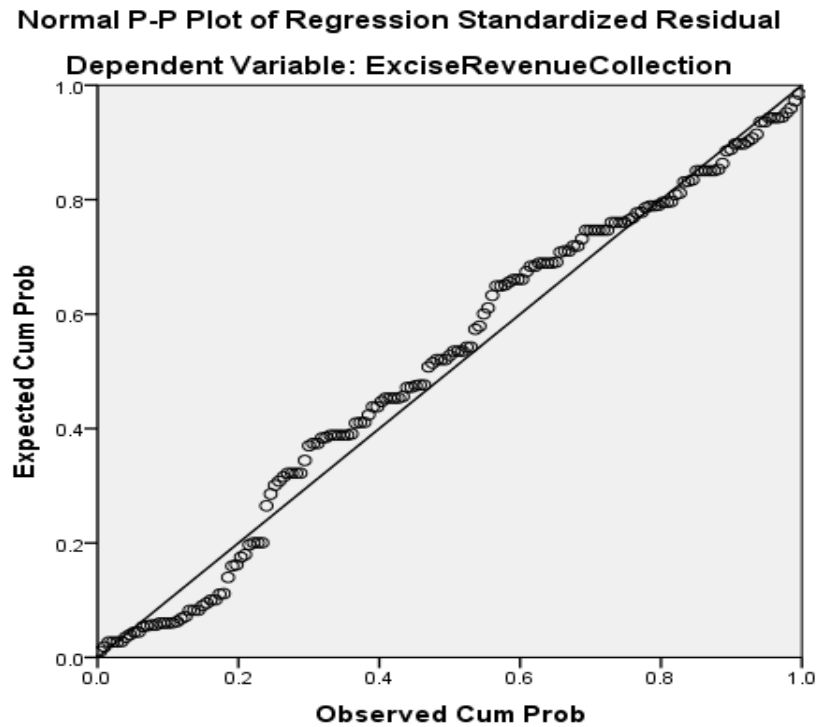
Figure 4.1: Normal P-P Plot of Regression Standardized Residuals

From a visual inspection of the Normal P-P plot of the Regression Standardised Residual, a linear relationship is observed indicating that the assumption of linearity was not violated.

4.4.2 Normality Test

The test for normality was performed using the Kolmogorov-Smirnov test. If the probability value is greater than 0.05, it is typically distributed to the results. Table 4.8 displays the results of the Kolmogorov-Smirnov test.

Table 4.8: Kolmogorov-Smirnov test

	Kolmogorov-Smirnov[a]		
	Statistic	**df**	**Sig.**
Unstandardized Residual	.087	165	.067
Standardized Residual	.087	165	.067

Source: Research findings,2020

From the findings on table 4.8, the probability value was greater than 0.05 indicating that the assumption of Normality was not violated.

4.4.3 Multicollinearity Test

When the independent variables are strongly correlated, multicollinearity exists. It is important to test for multicollinearity among independent variables, according to Amata (2017), because the existence of collinearity results in multiple errors that make the study results biased. The Variance Inflation Factor and Tolerance values were used to determine multicollinearity.

Table 4.9: Multicollinearity Test

Variable	Tolerance (1/VIF)	VIF
Cargo Monitoring	.499	2.002
Cargo Security	.618	1.617
Information Sharing	.644	1.554
Mean VIF		**1.724333**

Source: Research findings, 2020

4.4.4 Homoscedasticity Test

Heteroscedasticity is a violation of the assumption of Multiple Regression Analysis. As such the error term in the regression model should have a constant variance meaning it should be Homoscedastic. Heteroscedasticity was tested using scatter plot. Figure 4.2 shows the results of the scatter plot.
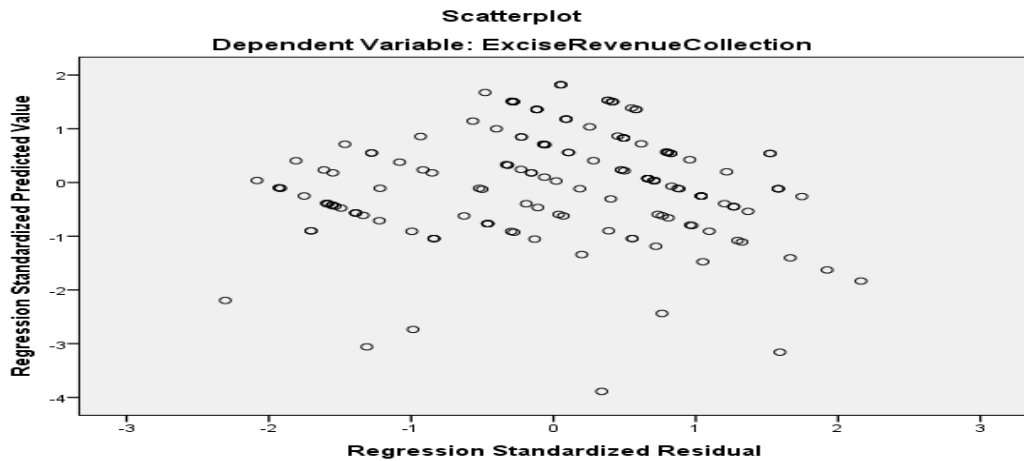
Figure 4.2: Heteroscedasticity Test

From the findings on Figure 4.2, the dispersion around the regression line was constant implying that Homoscedasticity was not violated.

4.5 Inferential Statistics

The study employed Correlation and Multiple Regression Analysis to establish the effect of independent variables ECTS Cargo Monitoring, ECTS Cargo Security and ECTS Information sharing and the dependent variable which is Excise Revenue Collection.

4.5.1 Pearson Correlation Analysis

In order to calculate the degree of association between variables under consideration, Pearson Correlation analysis was used. The thesis aimed to determine the relationship between the variables under analysis. There was a relationship between the independent variable representing the variables and the dependent variable. The correlation coefficient is usually between + 1 and -1. The Correlation Analysis findings have been presented in Table 4.10.

Table 4.10: Correlation Analysis

		Excise Revenue Collection at JKIA	Cargo Monitoring	Cargo Security	Information Sharing
Excise Revenue Collection at JKIA	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	165			
Cargo Monitoring	Pearson Correlation	.634*	1		
	Sig. (2-tailed)	.000			
	N	165	165		
Cargo Security	Pearson Correlation	.624**	.610**	1	
	Sig. (2-tailed)	.000	.000		
	N	165	165	165	
Information Sharing	Pearson Correlation	.632***	.589***	.437**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	165	165	165	165

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

Source: Research findings, 2020

From the results of Pearson Correlation Analysis, it is clear there was a moderately strong positive and significant correlation between ECTS Cargo Monitoring and Excise Revenue Collection at JKIA based on the respective correlation coefficient ($r=0.634$, $p=0.000<0.01$).

The Correlation result also indicate a moderately strong positive and significant correlation between ECTS Cargo Security and Excise Revenue Collection at JKIA based on the respective correlation coefficient ($r=0.624$, $p=0.000<0.01$).

The results of the Pearson Correlation Analysis also show a moderately strong positive and significant correlation between ECTS Information Sharing and Excise Revenue Collection at JKIA based on the respective correlation coefficient ($r=0.632$, $p=0.000<0.01$).

From the Correlation analysis, it can also be deduced that the correlation among the independent variables was also relatively low based on the strength of their correlation Coefficients. Therefore, the results of the Correlation Analysis were interpreted to mean that ECTS Cargo Monitoring system, ECTS Cargo Security system and ECTS Information Sharing system affect the Collection of Excise Revenue at JKIA.

4.5.2 Regression Analysis

Regression analysis was conducted to establish the effect of ECTS Information Sharing, ECTS Cargo Security, ECTS Cargo Monitoring on excise revenue collection at JKIA.

Table 4.11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.758	.574	.566	.28681

a. Predictors: (Constant), ECTS Information Sharing, ECTS Cargo Security, ECTS Cargo Monitoring
b. Dependent Variable: Excise Revenue Collection at JKIA.

Source: Research findings, 2020

The results in Table 4.11 indicated that ECTS Information Sharing, ECTS Cargo Security, ECTS Cargo Monitoring had a positive and significant correlation with Excise Revenue Collection at JKIA as indicated by the Correlation Coefficient (R= 0.758). The coefficient of determination represented by (R^2=0.574 adjusted to R^2 =0.566) reveal that ECTS Information Sharing, ECTS Cargo Security and ECTS Cargo Monitoring explains or accounts for 56.6% of all changes in Excise Revenue Collection at JKIA. This implies that the remaining 43.4 % of the changes in Excise Revenue Collection at JKIA was caused by other factors not included in the study.

Table 4.12: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.841	3	5.947	72.295	.000
	Residual	13.244	161	.082		
	Total	31.085	164			

a. Dependent Variable: Excise Revenue Collection at JKIA
b. Predictors: (Constant), ECTS Information Sharing, ECTS Cargo Security, ECTS Cargo Monitoring

Source: Research findings, 2020

From the Analysis of Variance (ANOVA) statistics in table 4.12, the, F-Calculated value was found to be greater than F-Critical value (F-value=72.295, P=0.000<0.05). This denotes that the regression model was statistically significant and a good fit.

Table 4.13: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.851	.245		3.476	.001
	Cargo Monitoring	.238	.078	.221	3.034	.003
	Cargo Security	.267	.052	.334	5.099	.000
	Information Sharing	.282	.051	.357	5.562	.000

a. Dependent Variable: Excise Revenue Collection at JKIA

Source: Research findings, 2020

The Constant (β_0 = .851, p=0.001<0.05) was found to be statistically significant. This was interpreted to mean that Excise Revenue Collection at JKIA is at 0.851 currency units when other independent variables are not factored in the study.

The coefficients table 4.13 results indicate that ECTS Cargo Monitoring positively and significantly influenced Excise Revenue Collection (β_1=0.221, p=0.003 < 0.05). This was denoted to imply that holding all other predictor variables of the study constant, a

unit change in ECTS Cargo Monitoring will lead to a 0.221 currency unit increase in Excise Revenue Collection at JKIA.

The results also show that ECTS Cargo Security positively and significantly influenced Excise Revenue Collection (β_2=0.334, p=0.000 < 0.05). This was denoted to imply that holding all other predictor variables of the study constant, a unit change in ECTS Cargo Security will lead to a 0.334 currency unit increase in Excise Revenue Collection at JKIA.

Last but not least, the results also indicate that ECTS Information Sharing positively and significantly influenced Excise Revenue Collection (β_2=0.357, p=0.000 < 0.05). This was denoted to imply that holding all other predictor variables of the study constant, a unit change in ECTS Information Sharing will lead to a 0.357 currency unit increase in Excise Revenue Collection at JKIA.

Thus, the multiple regression was as follows:

$Y= \beta_0+ \beta_1X_1+\beta_2X_2+ \beta_3X_3+ \varepsilon$

$Y = 0.851 + 0.221X_1 + 0.334X_2 + 0.357X_3 + \varepsilon$

Where:

Y is the Dependent Variable (Excise Revenue Collection at JKIA),

X_1 is the ECTS Cargo Monitoring,

X_2 is the ECTS Cargo Security,

X_3 is the ECTS Information Sharing

β_0 = Constant=0.851,

$\beta_1 = 0.221$

$\beta_2 = 0.334$

$\beta_3 = 0.357$

ϵ = error term

4.6 Hypotheses Test

The first objective of the study was to determine how ECTS Cargo Monitoring affects excise revenue collection at JKIA in Kenya. This informed the first null hypothesis of the study H_{o1}: ECTS Cargo Monitoring has no significant effect on excise revenue collection at JKIA in Kenya.

The results in Table 4.13 reveals that ECTS Cargo Monitoring had a positive and significant effect on Excise Revenue Collection ($\beta_1=0.221$, $p=0.003 < 0.05$, $t=3.034>2.00$). This interpretation was based on the findings that the p-value <0.05 and the t-value >2.000. The null hypothesis was therefore rejected and the alternative hypothesis accepted (H_1) ECTS Cargo Monitoring has a positive and significant effect on Excise Revenue Collection at JKIA in Kenya

The results in Table 4.13 reveals that ECTS Cargo Security had a positive and significant effect on Excise Revenue Collection ($\beta_2=0.334$, $p=0.000 < 0.05$, $t=5.099 >2.00$). This interpretation was based on the findings that the p-value <0.05 and the t-value >2.000. The null hypothesis was therefore rejected and accepted the alternative hypothesis (H_2) ECTS Cargo Security has a positive and significant effect on Excise Revenue Collection at JKIA in Kenya

The results In Table 4.13 reveals that ECTS Information Sharing had a positive and significant effect on Excise Revenue Collection (β_2=0.357, p=0.000 < 0.05, t=5.562>2.00). This interpretation was based on the findings that the p-value <0.05 and the t-value >2.000. The null hypothesis was therefore rejected and the alternative hypothesis (H_3) accepted due to the fact that ECTS Information Sharing has a positive and significant effect on Excise Revenue Collection at JKIA in Kenya.

Table 4.14: Summary of Hypotheses Tests

Hypothesis	t-value	p-value	Verdict
H_{o1}: ECTS Cargo Monitoring has no significant effect on excise revenue collection at JKIA in Kenya.	3.034	0.003	Reject
H_{o2}: ECTS Cargo Security has no significant effect on excise revenue collection at JKIA in Kenya.	5.099	0.000	Reject
H_{o3}: ECTS Information Sharing has no significant effect on excise revenue collection at JKIA in Kenya.	5.562	0.000	Reject

Source: Research Findings, 2020

4.7 Discussion of Key Findings

4.7.1 ECTS Cargo Monitoring system

From the results of Pearson Correlation Analysis, it is clear there was a moderately strong positive and significant correlation between ECTS Cargo Monitoring system and Excise Revenue Collection at JKIA (r=0.634, p=0.000<0.05).

The Multiple Regression analysis results also indicate that ECTS Cargo Monitoring system positively and significantly influenced Excise Revenue Collection (β_1=0.221, p=0.003 < 0.05). This denotes that holding all other explanatory constructs constant, a unit change in ECTS Cargo Monitoring system will lead to a 0.221 unit increase in Excise Revenue Collection at JKIA. Chaloupka, Yurekli and Fong (2012) noted that

the ECTS thus operates in real-time, allowing detection of any transit violations such as seal tampering, off-roading or breaking. When such occur, an alarm is sent to the central monitoring centers held in each state and a rapid response team is sent to the location. The teams have fast-moving cars and computer tablets at their disposal to correctly and reliably locate the sight of the breach. Continued technical advancement means that these systems will soon focus on the facilities installed on Automatic Number Plate Recognition (ANPR); at all points on highways, borders, and port gates. Smart gates determine the truck and cargo to be collected and inform the latter on the pick-up location of the shipment (Siror et al., 2017).

Similarly, the installation of CCTV camera systems at Customs stations increases accountability and improves the battle against corruption. It also allows sensors to monitor petroleum products transported by trucks. As a consequence, information on the volume of the commodity and the integrity of the cargo is collected. However, some of the freight in the shipment is not monitored electronically. The only shipments marked as very high risk and vulnerable by the Customs Authority more so of excise nature are placed under such arrangement. As of December 2018, approximately 21% of the cargo shipments was conveyed under the electric monitoring system (Mateta, 2018). He further argues that the ECTS has reduced the usual state shipment time for electronically tracked cargo correspondingly. Thus, reducing from 1.9 days to 1.6 days in 2014 and 2018, respectively, posting an average transit period of 1.7 days. Gitaru (2017) states that average savings of 2.07 days due to cargo's electronic tracing can translate into projected total investments to reduce demurrage.

In addition, the actual escort is 311 US dollars per consignment together with a cost of 100 dollars a day in demurrage and 50 dollars per physical employee. Kungu (2019) further states that over 32,000 shipping operations costing approximately US $ 370 million in revenue were effective through the ECTS between July and December 2018. After the introduction of the ECTS, many instances of cargo theft have been reported by Customs, with most cases occurring while trucks are mounting steep paths or are parking in the night carpark yard (Ross, 2017). Customs response was rapid enough to deter theft in several accidents.

The study established that most respondents agreed that embracing technology saves on working hours and increases efficiency on revenue collection; Imam & Jacobs (2014) agree with these findings. Using the system has raised significant improvements in the taxman's revenue assortment while improving taxpayers' turnaround time. Revenue enrollment is one of the critical aspects of a nations' economic growth. It ties the poverty reduction, social well-being and economic growth of countries and their people to the national agenda. The Customs Department of KRA is a mandatory component in the conveyance of products across borders. The techniques used to promote the transportation greatly affect the worldwide trade of the national industry and their effect on the state economy.

The automation method, according to Karingi et al. (2005), helps to increase revenue generation. Furthermore, service providers are in a better position by automating all transactions since information collected can be completed and filed by whom, time, and where for ease of retrieval in case of an audit. This action prevents the loss of revenue by manipulation, as all movements are taken electronically into account. Automation also offers a massive turnover of transactions within the shortest possible

period needed to be performed competently. Programming revenue collection is necessary within the return collection agencies, which involves rapid and efficient output as there will always be a trade-off between control and operational needs.

Finally, virtual tax payments have helped KRA increase its base of returns thus helping KRA control the collection process as well. The research study also showed that the overall tax increase and submission was indeed positively related to information communication and technology. The situation indicates that an improvement in overall tax collection and submission is likely to be increased with the introduction of technology. While reflecting on technology, Gitau & Nzuki (2014) believed that technology is an appropriate tool if used correctly; or else it can evolve into an issue that needs to be solved rather than addressed. The technology used in tax administration includes the use of apps for the internet, computers and software. Only when managed by professional staff embedded in the workflow of an organization is technology deemed effective. In tax administration, effective technology should be implemented only if it follows some basic principles. These include improving efficiency, reducing tax life, reducing procedural errors, promoting taxpayers' compliance with tax regulations, and raising the multi-tasking level of tax officers. Proper technology is responsible for minimizing the "lifetime of the tax." by ensuring that the tax is between the date of property or service. Payment of that tax or rate shall be reduced to the minimum level. This class includes both technical advancements in mass data processing, computerization processing, and the reduction of administrative encounters.

The study compliments other studies of taxpayer compliance costs, tax operating costs, and revenue authorities' administrative costs that have diminished in recent

years (Gidisu, 2012). The use of technology is essential for the activities of tax administration, provided that it is required to process a large data collection. Technology, however, ought not to be treated as the target, quite the contrary. Instead in order to achieve productivity and reduce costs, it must be included as part of the tax administration. Consequently, the income tax department and the taxpayers expect effective tax administration. There are several benefits for taxpayers: rationalization, less paperwork, reduction of business tax audits, simplification of ancillary tax responsibilities, improved competitive edge with a decline in tax avoidance, and expedition of tax administration regulated procedures.

Furthermore, Kungu (2019) stresses that at no point do the tax system function better than the tax administration. Similarly, it would certainly be difficult for the best tax administration to transform a faulty tax system into an efficient operating system. Kungu (2019) further warns that because of the ineffective tax administration, many ambitious tax reforms have not succeeded. It is difficult to say that in the absence of a permanent reform of the tax administration and of almost daily improvements in its management strategies, tax reforms will be successfully implemented (KRA, 2020).

4.7.2 ECTS Cargo Security system

The Correlation analysis result indicate a moderately strong positive and significant correlation between ECTS Cargo Security and Excise Revenue Collection (r=0.624, p=0.000<0.05).

The Multiple Regression results also indicate that ECTS Cargo Security system positively and significantly influenced Excise Revenue Collection (β_2=0.334, p=0.000 < 0.05). This denotes that holding all other explanatory constructs constant, a unit

change in ECTS Cargo Security system will lead to a 0.334 unit increase in Excise Revenue Collection at JKIA.

There are three angles to which we will address safety; the safety of upcoming infant industries, the safety of cargo while in transit from the loading port to the exit Port and the safety of consumers on the type of goods brought in for their consumption. In the international trading arena, several occurrences place countries in disadvantaged or injured positions when conducting trade with other countries. Such injuries often result in the closure of small and infant industries due to the inability to compete with the imported products from other countries. Another effect is the loss of employment due to the closure of these same companies, Chaloupka, Yurekli & Fong (2012). Kenya has challenges with dumping. Dumping is an informal definition of selling products in a foreign country often for lower than the price identified and set-up in its domestic market or the cost of producing the commodity. It is essential to note that the topmost leading sectors in the anti-dumping campaign include articles and base metals, resins, chemical and allied industries, plastic and articles; machinery and electrical equipment; and textile and items of textile nature (Ross, 2017). All these are critical sectors in any economy in the world. The fight to ensure transit cargo through the Kenyan market is not dumped has gone higher with the tax collector's initiative to introduce electric cargo tracking solution to monitor goods' movement. This process occurs between the Port of entry or loading and exit border points through which goods have an entry point into the landlocked Great Lakes Region (Makoni, Tsikirayi & Mandizha, 2013). KRA issued a public notice presenting the new electronic system used for monitoring transit shipments, the system uses a radio frequency identification answer. The taxman has been unable to seal gaps as shippers ride on the inadequacy to dump goods intended for neighboring states in Kenya. This change in itself ensures

that the revenue collector efficiently collects taxes and promotes consumer protection. World Health Organization (WHO) has released reports and articles that indicate that 30% of drugs sold in unindustrialized countries are counterfeit (Siror et al., 2017). This statistic shows that the more extensive problem is that high figures of drugs purchased by the country for use in public hospitals are illegitimately obtained and then traded on for profit in the private segment. This outcome is a concern and needs to be curbed with immediate effect and at all costs to ensure no infringement on human rights.

Costs associated with technology

At the early stages of any initiative development, cost-effectiveness remains a challenge for all, and efforts need to be channeled towards ensuring the initiative is cost-effective and viable. This process would soon be geared towards boosting effectiveness in generating value in the long-term and prove that money is well spent if organizations were to continue funding systems to propel growth upwards Chaloupka, Yurekli & Fong (2012). The set-up of ECTs came at a high cost, especially given that the system is still at the introductory stage of being rolled out to cover all types of cargo in Kenya. Both the transporters and the authorities are required to use resources to implement the network across the country. A viable Information Technology system must be implemented to facilitate a smooth and complete rollout and efficient running of the operations. The scheme must have an appropriate standby mechanism given that the data captured daily is quite a lot (McKinnon, 2006). It is paramount that personnel in-charge are appropriately and adequately trained on using the system, which means there is a cost factor. The majority of stakeholders affiliated in this sector, i.e., the transporter and the government, will see the consolidation of infrastructure using virtualization, which

would be a cost first; however, eventually, this shall transition to be a cost reduction. KRA formulated a list of IT specifications that vendors had to adhere to and selected vendors on their panel to provide ECTS cargo monitoring services (Makoni, Tsikirayi & Mandizha, 2013). This development includes both hardware and software expectations. IT support was noted to be critical as the revenue collector required that it gets viewership 24hours, seven days a week, for all the days of the year. The initial cost of setting up the IT platform for most vendors was 2M – 3.5M (Ross, 2017). The system is required to be web-based, ensuring that it is accessible from anywhere accross the world. KRA has dedicated resources to this project by setting up a fully-fledged department, especially for handling cargo monitoring at the headquarters – Times Towers- and various outstations. The KRA Customs, Border stations, Container Freight Stations (CFS), Bonded warehouses, Export Processing Zones (EPZ), Port and KRA approved yards are in a total of 14 regions countrywide.

A World Bank report quoted by Zhou & Madhekeni (2013) stated that infrastructure added to 0.5% to the yearly per capita GDP progress between 2001 and 2011. The report established that if Kenya were to advance the infrastructure, this would increase to 3%; however, due to delays associated with Customs processes, congestion, and upgrades required for networks, the report established that Kenya would need to assign $4bn to infrastructure development yearly until 2011(Kiilu, Githui & Omurwa, 2015). The Kenyan government has to increase its expenditure on improving the road network to facilitate the smooth transition. The roads need to be in good condition to make trucks' movement easy from various Ports of entry to the borders and other Ports of exit. About 93% of all cargo and traveler traffic are by road (Road Policy, 2012). As underlined under Vision 2030's second state medium-term strategy (MTP), which shelters the 2013-17 period, the regime aims to construct and

assimilate approximately 5500 kilometers of road. This initiative increased road cargo transportation, primarily since Kenya acts as a link to its landlocked neighbors.

It is also clear that in the future, the virtual tax system will be feasible as it will improve sustainable tax enforcement. In addition, developments in relevant equipment and technology can in the future, boost the sustainability of virtual tax administration. Similarly, the expense of operating online tax systems, and therefore their viability, would be reduced. Lastly, as a result of access to advanced technologies, taxpayer understanding would grow. The viability of online tax systems would therefore remain, time management has also been improved by online tax payments.

The findings argue that a higher submission rate helps the government to collect the same revenue with either a lower tax authority budget or lower tax rates. A high response resulting from a combination of the two is therefore likely to be obtained. However, it can be inferred that the administration is responding to a higher-than-anticipated pace of submission which increase compliance benefits from a greater chance of identification (Alm et al., 2010). On the other hand, if the reason behind the higher probability of detection is an increase in the audit rate, a reduction in the tax authority's spending will result in the likelihood of detection returning to its original level. In that case, to restore the initial situation, the budget cut comes into play, with the only benefit being decreased operating costs. A higher tax enforcement rate for auditing can be clarified by a shrewder choice of taxpayers (Thurman, 2010). Therefore, improving taxpayers' selection for audit helps in collecting an equal amount with lesser administrative costs.

In addition, enhancing the selection of taxpayers reduces the dispersions that might occur in the effective tax rate, provided that persons deemed most likely to flee become the target of audit efforts. Similarly, the likelihood in decline of large taxpayers contributes to a decrease in the number of taxpayers escaping tax payments. Finally, an increase in non-compliance costs can be explained largely by higher tax-compliance rates. The tax administration will improve enforcement if it is more attentive to the desires of taxpayers (Thurman, 2010).

The study on payments accepted by Hussein et al. (2011) say that the initial introduction of the e-filing system in Malaysia in 2006 was overshadowed by adverse feedback and debates in the mass media. During 2007, there were 0.7 million tax assessment submissions via e-filing. The number rose to 1.18 million submissions in 2008 in the face of concerns about network overcrowding problems. With the upgraded infrastructure, this figure rose to 1.6 million in 2009, with an enhanced average amount of actual tax collection.

Finally, the results comply with Asala (2012). They argue that the real challenge is the use of technology to encourage tax enforcement on an ongoing basis, while at the same time ensuring more effective and transparent tax administration. As for Agbesi (2013), personal and financial data from taxpayers needs to be secured. Tax management must challenge the issue called the big brother syndrome." in this regard. As a result, apart from top management support and internal staff training, user education, a taxpayer-oriented design, and user-friendliness are the serious success factors in an electronic tax governance framework (usability). This accessibility, the position of the electronic tax system, the lower cost of the communication networks (Internet) and the increased involvement of taxpayers would create a socio-economic

climate that will satisfy all taxpayers in the tax administration (Ade, Rossouw & Gwatidzo, 2018).

4.7.3 ECTS Information Sharing system

The results of the Pearson Correlation Analysis reveal a moderately strong positive and significant correlation between ECTS Information Sharing system and Excise Revenue Collection (r=0.632, p=0.000<0.05).

The Multiple Regression results also indicate that ECTS Information Sharing system positively and significantly influenced Excise Revenue Collection (β_2=0.357, p=0.000 < 0.05). This denotes that holding all other explanatory constructs constant, a unit change in Information Sharing system will lead to a 0.357 unit increase in Excise Revenue Collection at JKIA.

The results of the descriptive statistics also revealed that ECTS Cargo Monitoring system, ECTS Cargo Security system and ECTS Information Sharing system have an influence on Excise Revenue Collection at JKIA based on the respective means.

In tandem with the Katsuya-Takii (2003) study, the findings of this study showed that automation is a catalyst and stimulus for Customs modernization. At the same time, the findings of this study are also in tandem with Gitau & Nzuki (2014) on how the use of ICT at the Tanzania Revenue Authority's Wide Taxpayer Department has modernized the cost of tax administration procedures and increased revenue collection. The findings of this study are also in tandem with Vasudevan (2007), who observed that, due to the consistent implementation of laws and regulations, automating Customs administration leads to increased collection of duties and taxes.

Efficiency is defined as doing things right. For instance, whatever is performed, is performed most suitably, given the available resources (Muriithi & Moyi, 2003). A well-known and accepted description of efficiency is rooted in more technical terms, which states that efficiency is a measure of the ratio of output to input Chaloupka, Yurekli & Fong (2012). This definition is acceptable, especially when dealing with a system of well quantifiable input and output measures. On the contrary, it can be noted that efficiency takes on a new perspective and meaning when trying to study it in traditionally measured quantities set up, in a heavy-based system based on; inspirations and human perceptions. This approach gives a distinctive perspective to efficiency. An organization needs to run efficient operations to be able to be successful and profitable. To begin with, the organization must first and foremost learn how to use the implemented system. Ross (2017) states that organizations need to study how to use most of their prevailing resources and competencies to acquire new capabilities. Organizational performance is dependent on the emphasis on the importance of the path and system deployed. The present world of business thrives on making sure we work more hours and experience more tension trying to get more done. The implementation of technology is aimed at simplifying our lives, sapping our attention, and stealing our time. Efficiency considerations, in extremely simplistic terms, is the cost of input for the product produced—in other words, the best use of resources and the least waste of time and effort. Management consultants and management professors have had a long discussion about the relative merits of productivity in the business world. Areas, where efficiency can be optimized are the workforce, which increases individual productivity (Zhou & Madhekeni, 2013).

Related articles such as Makoni, Tsikirayi and Mandizha (2013) have described efficiency as cost-effectiveness; this is an efficient solution with the least cost. The

Electronic Cargo Tracking System (ECTs) works similarly; it permits the revenue authority to get supplementary cargo cleared each day at a faster rate. This move aims to decongest all the boundary points and ensure that cargo being shipped across the borders lands at its destination at the projected time and date (Chaloupka, Yurekli & Fong, 2012). Data netted on the system is shared on an actual basis causing reduced dumping, and cargo theft. On the electronic grid, all shipments transported by road are closely monitored and examined as they transit through the territory and transported to its final destination. The details of the vehicle, driver, routes, shipment, destination, and origin of the cargo are reported on the system by system users. Effective system implementation ensures that information is structured. For IT process integration and supporting technology, consistent data descriptions are fundamental. Data reconciliation and assimilation into a specific dictionary must be considered, which will serve as the group's standard to achieve greater performance (Ross, 2017).

The ECT system offers a platform where data can be analyzed accurately. The Kenya Revenue Authority can generate valuable insights into its working results, which is completed on a real-time basis. The knowledge collected and circulated is therefore suitable and appropriate. Getting an electronic system implies replacing the old business practices that entail a lot of paperwork. IT is an important part of the fabric of businesses. It is a fast reaching utility status in the enterprise that is increasingly assisting to improve service quality and enhancing resource optimization. The key IT management drivers now revolve around service quality and cost control (Makoni, Tsikirayi & Mandizha, 2013). Better reactive and analytical approaches to service efficiency at border points can now be seen as the best quality service methods. Better facilities can ensure that goods arrive at border points and are ready for departure to the next station quickly. Technology allows quicker data processing and smoother

knowledge reclamation. Automation results in the decline of human errors in most instances. There is a reduction or total eradication in errors as technology is used in monotonous operational activities, and the time it takes to complete a mission is significantly decreased.

In addition to this, processes are made quicker, and Information is kept to date (Zhou & Madhekeni, 2013). Elimination of paper cuts down on time taken to search through a room of file cabinets, and it deals with the challenges of guessing how to store the Information. With a few clicks of the mouse, a customer file is opened, Information is updated, and eventually stored on an easily accessible database to all stakeholders. What used to take several minutes to an hour can now be done instantly (Muriithi & Moyi, 2003). Infrastructure and transport network growth is a central component of the state's 2030 financial development plan vision. For landlocked neighboring nations, Kenya represents a vital lifeline. As competition grows, continuing delays between road and port projects and a host of non-tariff barriers pose significant challenges to potential growth. The government has steadily been increasing expenditure on the transport sector comes as a result of the enactment of the Public-Private Partnership (PPP) Act, 2013 which has seen transportation reforms improve dramatically in the medium to long term (The Report Kenya, 2016).

A World Bank report quoted by Zhou & Madhekeni (2013) stated that infrastructure contributed to just 0.5% to the annual per capita GDP growth between 2001 and 2011. According to the trade promotion agency, growth in port traffic has been 8% annually in the last four years. The online world and the realm of operations mechanically and technically often affect the performance of services offered in a tough environment, as many tools are used to monitor shade visibility into the application container (Siror et

al., 2017). Common IT decision-makers consider that the most effective approaches used to avoid the occurrence of problems in development are the prognostic examination of the application assignments that are applicants for virtualization and the prognostic sizing of the physical infrastructure that is loyal to the virtual components. A study by Imam & Jacobs (2014) has revealed that the best steadfastness to production matters and their effect on the business employees, capacity building management procedures, and apparatuses controls both service stages and prices at the IT level. Thus, reduced efficiency and negative monetary impact at the business stage. Kenya's road system requires extensive rehabilitation, now that regional trade is rising. Enlargement of infrastructure and transport networks is a crucial support of the state's Vision 2030 financial development (Makoni, Tsikirayi & Mandizha, 2013). Without this being hastened, we will keep having trucks arriving late, and therefore, the set back of clearance trucks immediately they arrive is not held and dealt with comprehensively. Port crowding has improved. However, increased competition from Tanzania has affected operations at the Mombasa Port. Additionally, oil discoveries in the country are mounting pressure on the government to ensure cargo handling success to benefit the economy.

A larger portion of efficiency is covered by the introduction and transport of the electronic tracking system. Important and encouraging results have been obtained by previous empirical research on the relation between locating systems and the value to the associated organizations. The system's primary focus is to develop overall working performance and advance service delivery (Muriithi & Moyi, 2003). Successful implementation of the framework will enhance how the regulator clears shipments and cargo trucks entering and leaving the Kenyan borders and charges levies accordingly. Security of duties and other levies is guaranteed. The system will

also assist the Kenya Revenue Authority in observing all inbound and outbound properties. A practical execution that needs improved operation performances can generate marked improvements in service excellence, resulting in improved profitability (Muriithi & Moyi, 2003). Employees have been shown to have valuable administrative skills and experience vital to the delivery of dignified service. The same intrinsic assets will increase the morale and happiness of staff (Prajogo & Sohal, 2006).

In 2012, Mombasa handled 21.92M tones while container traffic rose to 903,443 twenty-foot equivalent units. This led to an increase in transit traffic by 18.4% (Siror et al., 2017), this, therefore, means the introduction of the Electronic Cargo Tracking System was well required. The Shippers Council of Eastern Africa remarked that there was a significant improvement on efficiency given that the range of motion at the berth 9 was 24 to 11 per hour, and it is now noted to be closer to 25 per hour. Kenya Ports Authority projected a 50% improvement by 2016 (Siror et al., 2017). Future developments that will bring changes in this system's use include rehabilitating the railway line and the Standard Gauge Railway construction. The Kenya Revenue Authority is currently looking at ways to monitor cargo that will be moving by rail. They have invited vendors of the ECTs to participate in this particular venture and see how best they can implement this system in the railway transport as has been done in developed economies such as Singapore (Ndemanyisho, 2014).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter summarizes the study findings, assumptions, recommendations of the research study, and additional studies.

5.2 Summary of the Findings

5.2.1 ECTS Cargo Monitoring system.

The research study's initial objective was to establish how Cargo Monitoring system affects excise revenue collection at JKIA in Kenya. From the outcomes of the descriptive statistics, it was deduced that many respondents agreed with the statements that suggest the influence of Cargo Monitoring on Excise Revenue Collection at JKIA as indicated by an overall mean of ($\overline{x}$=4.322). From the Pearson Correlation Analysis results, it is clear there was a moderately strong positive and significant correlation between Cargo Monitoring and Excise Revenue Collection (r=0.634, p=0.000<0.05). The Multiple Regression analysis results also indicate that Cargo Monitoring positively and significantly influenced Excise Revenue Collection at JKIA (β1=0.221, p=0.003 < 0.05). This means that keeping all other independent variables constant, a unit change in Cargo Monitoring leads to a 0.221 unit increase in Excise Revenue Collection at JKIA.

5.2.2 ECTS Cargo Security system

The research study's second objective was to determine if Cargo Security system has effectively contributed to excise revenue collection at JKIA in Kenya. From the outcomes of the descriptive statistics, it was deduced that many respondents agreed

with the statements that suggest the influence of Cargo Security on Excise Revenue Collection at JKIA as indicated by an overall mean of ($\overline{x}$=4.28).

The Correlation analysis result designates a moderately strong positive and significant correlation between Cargo Security and Excise Revenue Collection (r=0.624, p=0.000<0.05). Multiple Regression results also indicate that Cargo Security positively and significantly influenced Excise Revenue Collection ($\beta2$=0.334, p=0.000 < 0.05). As a result, keeping all other independent variables constant, a unit change in Cargo Security leads to a 0.334 unit increase in Excise Revenue Collection at JKIA.

5.2.3 ECTS Information Sharing system

The study's third objective was to investigate whether Information Sharing system affects excise revenue collection at JKIA in Kenya. From the descriptive statistics results, it was deduced that many respondents agreed with the statements that suggest the influence of Information Sharing on excise revenue collection at JKIA in Kenya as indicated by an overall mean of ($\overline{x}$=4.132). The results of the Pearson Correlation Analysis reveal a moderately strong positive and significant correlation between Information Sharing and Excise Revenue Collection (r=0.632, p=0.000<0.05). Multiple Regression results also indicate that Information Sharing positively and significantly influenced Excise Revenue Collection ($\beta2$=0.357, p=0.000 < 0.05). As a result, keeping all other independent variables constant, a unit change in Information Sharing will result in a 0.357 unit increase in Excise Revenue Collection at JKIA.

5.3 Conclusion

The study's first objective was to determine how Cargo Monitoring system affects excise revenue collection at JKIA in Kenya. From the findings, Cargo Monitoring

system positively and significantly influenced Excise Revenue Collection at JKIA in Kenya.

The study's second objective was to establish if Cargo Security system has effectively contributed to excise revenue collection at JKIA in Kenya. From the findings, Cargo Security system was positively and significantly influenced Excise Revenue Collection at JKIA in Kenya.

The study's third objective was to investigate whether Information Sharing system affects excise revenue collection at JKIA in Kenya. Information Sharing system positively and significantly influenced Excise Revenue Collection at JKIA in Kenya from the findings.

Therefore, the study concluded that the Customs unit had improved productivity, effectiveness, improved personnel skills, improved governance and reduced related operating costs. Overall, Electronic Cargo Tracking System (ECTS) adoption had a significant effect on the Excise Revenue Collection in Kenya. As is with every new system, the first-time challenges were encountered and change management and introduction of new working methods meant that some adjustments had to be made by both the Customs administration and the staff.

5.4 Recommendations

According to the findings, the study recommends that;

The Kenya Revenue Authority fully strengthen Cargo Monitoring system, Security system, and Information sharing system which can be achieved by ensuring ETCS implementation across all Ports of entry and exit to realize additional Excise Revenue Collection.

The ministry of finance as the parent ministry under which KRA draws its funding must increase budget allocation to enable Customs department achieve modernization under which ECTS can be categorized. This will improve collection of Excise revenue and other taxes to support in narrowing down the deficit experienced by the ministry each year.

Stakeholders such as local manufacturers and importers of excisable goods such as wines and spirits, cigarettes among others should be encouraged to embrace technology, more so the ECTS which apart from safeguarding government revenue will help to reduce cases of outright theft and pilferage which negatively impact their profits in the course of carrying out their businesses.

Policy makers also have an opportunity based on the findings of this study to put in place necessary framework to safeguard any process and decisions which may be arrived at to strengthen and secure revenue collection through implementation of new technology such as ECTS against any form of litigation or court actions.

5.5 Suggestions for Future Studies

The KRA Customs department which includes Border stations, Container Freight Stations (CFS), Bonded warehouses, Export Processing Zones (EPZ), Port and KRA approved yards are in a total of 14 regions countrywide. Based on the study's findings, 43.4% of the Excise Revenue Collection changes were accounted for by other factors not included in the study. Therefore, the research study suggests that future studies can evaluate other factors affecting Excise Revenue Collection at JKIA and all other stations as listed other than the factors considered in this study. The act will inform KRA as an agency and policymakers on specific areas to excise revenue collection.

REFERENCES

Ade, M., Rossouw , J., & Gwatidzo, T. (2018). "Determinants of tax revenue performance in the Southern African Development Community (SADC). *Economic Research Southern Africa*, 762.

Agbesi, K. (2013). the Impact of ICT on the Clearing of Goods At Ghana Ports : a Study of Tema and Takoradi Port. 4(3), 87–95.

Alm, G. H., Mc Clelland & William D., (2012). "Why do people pay taxes?" *Journal of public economics 48, 21-38.*

Almetova, Z., Shepelev, V., & Shepelev, S. (2016). Cargo transit terminal locations according to the existing transport network configuration. *Procedia Engineering*, *150*, 1396-1402.

Asala, J. (2012). Impact Of Reforms And Modernization Programs On The Performance Of Customs Services Department: A Quantitative Study On Kenya Revenue Authority. *Unpublished MBA Thesis at Kenyatta University.*

Benjamin, D., Nygren, B., Parsons, R., & Lafferty, C. (2016). *U.S. Patent Application No. 15/057,899.*

KNBS. (2020, June 11). *Budget 2020/21: The highlights.* https://www.rsm.global/kenya/insights/sector-insights/kenya-budget-highlights-2020-2021#:

Chaloupka, F. J., Yurekli, A., & Fong, G. T. (2012). Tobacco taxes as a tobacco control strategy. *Tobacco control*, *21*(2), 172-180.

Cooper, D., & Schindler, P. (2013). *Business Research Methods.* McGraw-Hill Higher Education.

Dongo, D., Rono, L., & Nuwagaba, D. (2020). Exploring the impact of the Regional Electronic Cargo Tracking System on the key stakeholders in the East Africa Community along the Northern Corridor. *African Tax and Customs Review*, *3*(1), p1-8.

Funkhouser, B., & Vanderslice, P. (2013, April 23). *Elevating the Business of IT*. Retrieved from https://deloitte.wsj.com: https://deloitte.wsj.com/cio/2013/04/23/elevating-the-business-of-it/

Gidisu, T. E. (2012). Automation system procedure of the Ghana revenue authority on the effectiveness of revenue collection. *Kwame Nkrumah University of Science and Technology*.

Gitaru, K. (2017). The Impact Of System Automation OnRevenue Collection in Kenya RevenueAuthority. (A Case Study of SIMBA). *University of Nairobi*.

Gitau, L., & Nzuki, D. (2014). Analysis of Determinants of M-Commerce Adoption by Online Consumers. *International Journal of Business, Humanities and Technology Vol. 4, No. 3*, 88-93.

Gordon K., (2010) *Tiley and Collison's UK Tax Guide 2010-11*

Hussein, R., Mohamed N., Ahlan A., & Mahmud M., (2011) "E-government application: an Integrated model on G2C adoption of online tax", *Transforming Government: People, Process and Policy, Vol. 5 Issue: 3, pp.225 – 248*

Imam, P. A., & Jacobs, D. (2014). Effect of corruption on tax revenues in the Middle East. *Review of Middle East Economics and Finance*, *10*(1), 1-24.

Karingi , S., Wanjala, B., Nyamunga, J., Okello, A., Pambah , E., & Nyakang'o., E. (2005). Tax reform experience in Kenya. KIPPRA Working Paper, No. 13. *Kenya Institute for Public*, P35.

Kemboi, C. K. (2013). *The effect of corporate governance on revenue collection in Kenya Revenue Authority* (Doctoral dissertation, University of Nairobi).

Kiilu, M. J. M., Githui, T. M., & Omurwa, M. J. K. (2015). *Innovative Research and Knowledge.*

KRA. (2020, August 9). https://borderlesstracking.com/our-services/electronic-cargo-tracking-systems/.Retrieved from https://borderlesstracking.com:https://borderlesstracking.com/our-services/electronic-cargo-tracking-systems/

Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2018). *International trade: theory & policy*. Pearson Education Limited.

Kungu, S. N. (2019). *Tax Reforms And Foreign Direct Investments In Kenya* (Doctoral dissertation, University of Nairobi).

Makoni, E., Tsikirayi, C. M., & Mandizha, E. (2013). To charge or not to charge customs excise duty on digitized products: An assessment of the Zimbabwe Revenue Authority (ZIMRA) potential revenue losses through duty exemption on digitized goods.

Mateta, E. (2018). *An Investigation into the adoption of new revenue generation strategies and their impact on organizational performance: a case study of Zimbabwe Revenue Authority* (Doctoral dissertation, BUSE).

McKinnon, A. C. (2006). A review of European truck tolling schemes and assessment of their possible impact on logistics systems. *International Journal of Logistics*, *9*(3), 191-205.

Montagnat-Rentier, G. (2019). *Revenue Administration: Short-Term Measures to Increase Customs Revenue in Low-Income and Fragile Countries* (No. 2019/01). International Monetary Fund.

Muriithi, M. K., & Moyi, E. D. (2003). *Tax reforms and revenue mobilization in Kenya*. AERC.

Mutua, J. (2012). A Citizen's Handbook on Taxation in Kenya. *Institute of Economic Affairs.*, 36.

Ndemanyisho, A. J. (2014). Reflecting on Revenue Collection in Tanzania: What went wrong with Records Management. *International Journal of Education and Research*, *2*(8), 483-502.

Ross, H. (2017). Tracking and tracing tobacco products in Kenya. *Preventive medicine*, *105*, S15-S18.

Sagas, C. C. (2015). An assesssment of the impact of Electronic tax register on revenue collection by KRA western region , Kenya, . 5(4), 4–6.

Shpak, N., Dvulit, Z., Luchnikova, T., & Sroka, W. (2018). Strategic development of cargo transit services: a case study analysis. *Engineering Management in Production and Service*, *10*(4), 76-84.

Siror, J. K., Liang, G., Pang, K., Sheng, H., & Wang, D. (2010). Impact of RFID technology on tracking of export goods in Kenya. *J. Convergence Inf. Technol.*, *5*(9), 190-199.

StandardMedia. (2020, February 18). *KRA falls short of half year revenue target by sh88b*. Retrieved from https://www.standardmedia.co.ke/business/article/2001356803/kra-falls-short-of-hal: https://www.standardmedia.co.ke/business/article/2001356803/kra-falls-short-of-half-year-revenue-target-by-sh88b

Summers, L. H., & Summers, V. P. (1989). When financial markets work too well: A cautious case for a securities transactions tax. *Journal of financial services research*, *3*(2-3), 261-286.

Thurman, Q. C., (2010). "Taxpayer Noncompliance and General Prevention: An Expansion of the Deterrence Model," *Public Finance/Finances Publiques, 46 (2), 289-298.*

Wanyama, T. (2017). Causes of delay in clearance of goods at the port of Mombasa. *International Journal of Supply Chain and Logistics*, 39-41.

WCO, E. (2015). Best Practices in Digital Customs in East and Southern Africa: A Case Study of the Mauritius Revenue Authority(MRA) Customs. *Africa2nd WCO ESA Regional Research ConferenceLarry* (p. 134). Nairobi: World Customs Organization East and Southern Africa.

Wilson, M. N. (2015). Effects of Information Technology on Performance of Logistics Firms in Nairobi County. 5(4).

Zhou, G., & Madhekeni, A. (2013). Systems, processes and challenges of public revenuec ollection in Zimbabwe.

APPENDICES

Appendix I: Introduction Letter

ZEDEKIAH ODAGO

MOI UNIVERSITY

17th August 2020

Dear Respondents,

RE: DATA COLLECTION

My name is Zedekiah Odago, a Masters student from Moi University.

In partial fulfillment of the requirements for the award of the degree of Master of Tax and Customs Administration, I am conducting an academic research on **Effect of Electronic Cargo Tracking System (ECTS) on Excise Revenue Collection in Kenya, a case of Jomo Kenyatta International Airport (JKIA).**

This letter is to humbly request you to respond to the questions in the attached questionnaire to enable me carry out this research. This is an academic exercise and you are assured of anonymity and confidentiality.

Thank you in advance for your willingness to generously contribute to this research.

Yours truly,

Zedekiah Odago.

86

Appendix II: Questionnaire

Kindly answer the following questions as honestly and accurately as possible. The information given will be treated with utmost confidentiality and response in this survey will purely be used for academic purpose only.

SECTION A: DEMOGRAPHIC INFORMATION

1. Gender

    Male [ ]   Female [ ]

  2. Years of work experience

    Less than 10 years [1]   10-20 years [2]   20-30 years [3]

    30 years and above [4]

SECTION B: CARGO MONITORING

Please indicate the extent to which you agree or disagree with the following statements on Electronic Cargo Tracking Systems (ECTS) Cargo Monitoring.

Where: 1= strongly disagree, 2= disagree, 3= Neutral, 4= Agree and 5= Strongly A, Agree

Statement	Level of agreement				
	1	2	3	4	5
The introduction of the Electronic Cargo Tracking System (ECTS) has enhanced the traceability of cargo enroute to the destination reducing incidents of revenue leakages					
ECTS has reduced diversion of Transit goods therefore safeguarding Customs revenue.					
ECTS has provided control on cargo clearance time of transit vehicles which then secures Customs revenue					
Shared information through ECTS supports real time response when required while the cargo is in transit					
Electronic Seals has reduced tax evasion that was previously experienced during changeover of seals					
from cargo departure to exit through the border points					

SECTION C: CARGO SECURITY

Please indicate the extent to which you agree or disagree with the following statements with regards to Electronic Cargo Tracking Systems (ECTS) on Cargo Security.

Where: 1= strongly disagree, 2= disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Statement	Level of agreement				
	1	2	3	4	5
ECTS has reduced the reported attempts of pilferage and outright theft of cargo therefore safeguarding Customs revenue					
The introduction of the Electronic Cargo Tracking System (ECTS) has enhanced enforcement by Customs monitoring team while cargo is in transit thus securing Customs revenue					
Implementation of ECTS on Transit goods has eliminated revenue leakages					
Electronic Seal has improved cargo security previously compromised during changeover of seals at border points thus securing Customs revenue					
Movement of Transit Containerized cargo from Port of entry to Port of exit is more secure with the implementation of ECTS than when physical escort was in place thus safeguarding Customs revenue					

SECTION D: INFORMATION SHARING

Please indicate the extent to which you agree or disagree with the following statements on Electronic Cargo Tracking Systems (ECTS) Information Sharing.

Where: 1= strongly disagree, 2= disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Statement	Level of agreement				
	1	2	3	4	5
ECTS has strengthened Management of Transit data which secures excise tax					
ECTS has provided a secure platform for real time data gathering and sharing therefore safeguarding excise tax Integration of ECTS with other KRA Systems has facilitated seamless interstate data sharing which safeguards Customs revenue					
ECTS has reduced reaction time in case of reported noncompliance therefore securing Customs revenue The information received through the ECTS platform has sufficiently supported decisions that has reduced excise tax evasion					

SECTION E: EXCISE REVENUE COLLECTION

Please indicate the extent to which you agree or disagree with the following statements on Excise Revenue Collection.

Where: 1= strongly disagree, 2= disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Statement	Level of agreement				
	1	2	3	4	5
There has been an increase in the collection of excise revenue as a result of the introduction of ECTS There has been a reduction of tax leakages of excise revenue as a result of the introduction of ECTS					
There has been an increase in the tax base of excise revenue taxpayers as a result of the introduction of ECTS The cost incurred in acquiring ECTS is reflective of the overall benefit of excise revenue collected.					
Excise Revenue has led to an overall increase in total tax revenue					

Thank you for your participation

Appendix III: Pilot Test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819	.671	.638	.30860

a. Predictors: (Constant), ECTS Information Sharing, ECTS Cargo Monitoring, ECTS Cargo Security

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.821	3	1.940	20.372	.000
	Residual	2.857	30	.095		
	Total	8.678	33			

a. Dependent Variable: Excise Revenue Collection

b. Predictors: (Constant), ECTS Information Sharing, ECTS Cargo Monitoring, ECTS Cargo Security

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.763	.820		-.931	.359
	ECTS Cargo Monitoring	.625	.217	.352	2.876	.007
	ECTS Cargo Security	.239	.096	.325	2.495	.018
	ECTS Information Sharing	.290	.114	.333	2.552	.016

a. Dependent Variable: Excise Revenue Collection

Appendix IV: Authorization Letter from KESRA

KENYA SCHOOL OF REVENUE ADMINISTRATION

KENYA REVENUE AUTHORITY
ISO 9001:2015 CERTIFIED

REF: KESRA/NBI/036

14th September, 2020

TO WHOM IT MAY CONCERN

RE: REQUEST FOR RESEARCH PERMIT:

NAME : ZEDEKIAH OCHIENG
REG. NO.; KESRA/105/0006/2018

This is to confirm that the above named is a student at Kenya School of Revenue Administration (KESRA) Nairobi Campus pursuing Masters in Tax & Customs Administration.

The named student is undertaking Research on **"Effect of Electronic Cargo Tracking System on excise Revenue Collection, A case of JKIA."**

The purpose of this letter is to request your good office to assist the above student with the information to enable him work on his project.

Thank you.

Dr. Marion Nekesa PHD,
Head Academic Research
KESRA

1 4 SEP 2020

Tel: +254715877535/9

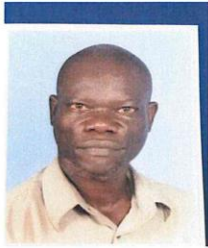**Appendix V: NACOSTI Research License**

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **929533**

Date of Issue: **05/October/2020**

RESEARCH LICENSE

This is to Certify that Mr.. **Zedekiah Ochieng Odago** of Moi University, has been licensed to conduct research in Nairobi on the topic: ADOPTION OF ELECTRONIC CARGO TRACKING SYSTEM AND EXCISE REVENUE COLLECTION IN KENYA. A CASE OF JOMO KENYATTA INTERNATIONAL AIRPORT for the period ending : 05/October/2021.

License No: **NACOSTI/P/20/6990**

929533

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.