

**EFFECT OF ELECTRONIC CARGO TRACKING SYSTEMS (ECTS)
IMPLEMENTATION ON PERFORMANCE OF CUSTOMS AND BORDER
CONTROL DEPARTMENT IN KENYA**

BY

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Partial Fulfillment of the Requirements for the Award of the Degree of
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DECLARATION

Declaration by Candidate

This research project is my original work and has not been presented for any degree award at any other University. No part of the project should be reproduced without the prior permission of the author and/or Moi University.

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DEDICATION

This research project is dedicated to my friends and family for their unwavering support.

ACKNOWLEDGEMENT

I acknowledge the efforts of my supervisor for the professional guidance and dedication towards shaping my research project. I also recognize my family and friends who offer immense support during this research process. I thank the Almighty God for giving me the strength to undertake the project.

ABSTRACT

The Custom and Border Control department in Kenya has continued to experience numerous challenges relating to transportation of Cargo in transit including theft, delays, regulation and compliance with regulations which contributed to significant loss of revenue to the government. This necessitated the implementation of an electronic tracking system providers whose core mandate is capturing real-time locations of Cargo in transit. Though applying the system has presented an opportunity for ensuring cargo security and information sharing, the effect this system has on performance is yet to be fully established. The purpose of the study was to determine the effects of ECTs implementation on the performance of C&BC department in Kenya. The specific objectives were to: find out the effect of ECT system infrastructure, ECT's users and ECT compatibility on the performance of C&BC department in Kenya. An explanatory research approach guided the study. The population for this research comprised of 440 respondents encompassing the Top KRA management, employees working at the Customs and Border Control Department and Transit Monitoring Unit (TMU). Slovin's formula (1960) was used in getting a sample size of 80 respondents who were selected using stratified random sampling. Data for the study was collected using primary means using structured questionnaires. The collected data were analyzed using descriptive and inferential statistics and presented in tables and figures. The study found out that the three aspects of ECT investigated including System Infrastructure ($r=0.50$, $p=0.686$), User Ability ($r=0.554$, $p=0.00$) and System Compatibility ($r=0.398$, $p=0.001$) had a positive effect on C&BC department performance. The study thus concludes that the sustainability, viability and profitability of C&BC department will be based on the efficiency in coordination of these aspects. The study recommends that the functionality of ECT should be enhanced to improve the transactions at the borders which leads to improved revenue collection at the borders while reducing transit goods violations. Kenya Revenue Authority is also recommended to recheck the need to enhance ECT reforms and enhance systems validations and integrity so as to enhance C&BC performance.

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ABBREVIATIONS

C&BC	Customs and Border Control
ECTS	Electronic Cargo Tracking Systems
GPRS	General Packet Radio Services
GPS	Global Positioning System
ICT	Information Communication Technology
IDF	Import Declaration Fee
IDF	Inverse Document Frequency
KAA	Kenya Airports Authority
KHz	Kilohertz
KRA	Kenya Revenue Authority
ICMS	Integrated Customs Management Systems
RRU	Rapid Response Unit
LAN	Local Access Network
RECTS	Regional Electronic Cargo Tracking Systems
RFID	Radio Frequency Identification
UHF	Ultra High Frequency
VAT	Value Added Tax

OPERATIONAL DEFINITION OF TERMS

Compatibility: Capacity for two systems to work together without having to be altered to do so (Odunayo, 2014).

Electronic cargo Tracking System: This is a technology solution that enables real-time tracking of cargo from point of loading to point of discharge or offloading (Thomas, 2019).

Hardware compatibility: This is compatibility of the hardware components with the operating system, CPU, bus and motherboard.

Management of transit goods: This refers to the customs release, monitoring, handling of transit goods as they are moved from customs entry station to the customs exit station (Kabiru, 2016).

Performance: Extent to which an organization accomplishes both its financial and non-financial objectives (Hoffman, 2014).

Seamless monitoring: the term can be used to refer to two aspects, there being no gap between releasing point and the exit point where the response time of rapid response team and the attention to alerts takes very little time so as not to allow for gaps that can be exploited to steal the goods (Musyoka, 2016).

Software compatibility: This are software characteristics in term of components and systems that can operate satisfactory together.

System infrastructure: Foundation or framework that supports a system or organization (Kabiru, 2016).

Transit goods: goods entering a country, being ferried by a transport vessel to an exit point then being cleared to go to a foreign country (Patel, 2014).

Transit time: The time taken for goods to exit a country after they are released from the customs entry point (Kilonzi, & Kanai, 2020).

User ability: This entail how well a specific user in a specific context can use a product/design to achieve a defined goal effectively, efficiently and satisfactorily (Muia, 2017).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Border agents mandated to manage the country's borders lack the capacity to carry out their mandates effectively. However, Mpata, (2014) point out the burdensome paperwork being the reason for holdups in customs. In their literature review, Sawhney and Sumukadas (2015) state that some of the factors that cause the delays, especially in customs of developing countries, might be the inadequate and inefficient regulations, the infrastructure that connects to railways and roads are usually not automated and communication as well as the use of technology is often rather inadequate.

A study conducted by KenTex Cargo (2014) further noted that clearing a consignment can be a daunting experience, confusing, costly and sometimes, seemingly impossible to most. All goods imported or exported into and outside Kenya undergo various tasks through Kenyan customs and Kenya Port Authority (KRA). The procedures include manifest submission and approval, goods declaration, pre-shipment declarations, clearance process which entails sometime verification of goods through scanning or physical verification. These procedures are often marred with issues such as delays, corruption and loss of goods. Customs procedures in Kenya still suffer numerous challenges which impede their efficiency such as slow gate out process, poor yard planning and poor working corporate culture leading to diminished performance (Ruto, & Datche, 2015).

Cases of dumping have also for long time posed a challenge to Kenya Revenue Authority (KRA) Customs and Border Control Department, which has reported billions in estimated loss of revenue (KRA, 2021). Report by the Global Financial Integrity

(GFI), 2020 showed that revenue lost due to the mis-invoicing of imports was \$767 million. Uncollected VAT tax accounted for \$324 million, customs duties \$229 million and corporate income tax \$214 million. The need effective border posts and capacity to track transit goods is therefore imperative in improving the performance of the C&BC department (Calabrese & Eberhard-Ruiz, 2016).

Efficient cross-border operations are an important component as all countries need to transact with other business units outside its National boundaries. For the cargo owners, cargo transporters and freight forwarders, not only do they require enhanced efficiency in the cargo clearance but assured security. The use of technologies, for example, Electronic Cargo Tracking System (ECTs), to track physical flow of physical goods is one prominent system that is envisaged to improve the cross-border business activities between countries (Mputa, 2014).

Electronic Cargo Tracking System is an information technology system developed to assist in the electronic tracking of transit goods for revenue authorities. The goods are physically armed with electronic seals then remotely monitored from the Centralized Monitoring Centre (CMC). The cargo monitoring process is on real time basis and this is achieved using the Radio Frequency Identification (RFID) and GPS/GPRS technology (Raghu Das & Peter Harrop, 2013). In addition to this the system uses a series of features such as a virtual fence known as the Geo-fence that is set-up along gazetted routes used by transporters carrying transit or export cargo. At the beginning of every journey the seal is armed and at the end of the journey when the cargo arrives to its destination the seal is disarmed (Nyongesa, 2018).

Electronic cargo tracking in developing countries has been associated with several benefits to the transporters that include increased efficiency and productivity which

results in a cost reduction benefits (Lusanga, & Bhero, 2016). The system also aides in improved reliability and service quality, usually thought of as tools to retain good customers and grow market share and revenue and lastly there is improved shipment and container integrity, built around a core of security issues (Kilonzi, & Kanai, 2020). The system helps in improved reliability and service quality hence maintains recommended consumers and expands market share and revenue. Also, the firms encounter enhanced shipment and container integrity as it is formed on essential security issues.

In Kenya, the ECT guidelines stipulate that all outbound trucks or vehicles, tankers, and containers loaded with transit goods have tracking devices set to electronically monitor and control the objects. Also, the truck or vehicle is equipped with an electronic seal which discloses the vehicle location and investigates on violations committed on real time basis (Musyoka, 2016). The electronic seal contains a dual mode ability which employs UHF 433.92 MHz for long range communication and LF 125 KHz for short range communication. The ECTs initiative aims at handling cargo that has traversed Kenya's boundaries to ensure that duty is paid and also encourage authorized trade. According to Huanye (2010), the ECT system is critical to the public sector, in this case the KRA, in the customs and border control department.

ECTs at the C&BC has led to improved reliability and service quality as well as improved shipment and container integrity, built around a core of security issues (Kilonzi, & Kanai, 2020). However, there are still cases of revenue leakages at the border posts even after the introduction of electronic cargo tracking system. According to KRA, in 2020 revenue losses from leakages at the border post was estimated to exceed 5% of the Gross Domestic Product with only a growth of 25.4% recorder by the

customs and border department. There are still loopholes for importers at the border posts which enable tax evasion. In addition, electronic cargo tracking system has made little improvement monitoring transit cargo at the border posts and data is not fully shared on a real time basis which has not fully reduced dumping of goods.

Therefore, the ECT framework helps in lessening of illegal trade caused by digression ignites more revenue collection from imports (Kabiru, 2016). The notable achievements involve the electronic cargo tracking that have been accredited to advancement in the use of technology by the department. In Kenya, ECT encompasses of online clearance agents, RECTS, ACMS, COSIS, SIMBA system and MMS. Though the framework was expected to yield substantial gains in the custom department, this is yet to be realized. This study therefore sought to shed more light into this system whilst investigating the effects on the performance of the C&BC department.

1.1.1 Custom and Border Department in Kenya

The customs and border control department (C&BC) is a section in KRA liable for administration of customs tax, enforcement and regulation of cross border trade and management of transportation of goods and services in and out of the country. It is the largest as compared to the other four revenue collecting departments in operations such as human resource, collecting of revenue, and operational network nationwide. The section was formed in 1978 through an Act of parliament. Initially, the department was recognized as Customs and Excise Department. Border control activities mainly take place at strategic entry and exit points. Kenyan coast lies strategically on the entry point to east and central Africa. It is also a resting point for goods destined for West and Southern Africa. This makes gives the Customs and Border Control Department of KRA and advantage over its east Africans rivals.

The C&BC department in Kenya has the mandate for societal protection against illicit entry and exit of objects that are interdicted and cross border facilitation. The section has the commissioner of custom services as its head and has six deputies that manages their specific areas. The section notes four areas such as the ICT region, Human Resource region, Innovation Strategy, and Revenue Collection area that modifies the imminent of most Kenyan companies (KRA, 2020). ECTs lies in the ICT region in C&BC and the section has recently established some guidelines that relates to the goals to enhance performance.

The Customs Services Department, as the agency of government is also entrusted with the responsibility to monitor and control imports and exports, is responsible for the implementation of the trade and customs clauses of regional trade agreements. This also applies to trade preferences that may not be reciprocal – such as the preferences extended to Kenya under the African Growth and Opportunity Act (AGOA) of the U.S. and the Africa, Caribbean and Pacific/European Union Cotonou Partnership Agreement signed in June 2000. The Kenya Revenue Authority Customs Services Department is a member of the World Customs Organization (WCO).

Performance at the Customs and Border Control (C&BC) department can ideally be established based on key factors such as Changes in revenue collection, reduction in dumping of counterfeit and substandard products, and efficiency in collection of taxes and enforcement of customs policies. The department has in the recent past instituted a number of stringent measures in line with its strategic objectives all in an attempt to improve performance. Most of the achievements made so far such as electronic cargo tracking have been attributed to advancements in the use of technology by the department (Mwai, 2017). Practice has shown that the old systems of customs

administration resulted in huge tax revenue loss due to corruption and the propensity for the taxpayer to pay less than the due tax. The ICT strategy integrates several systems and processes for easy administration of customs and duties. Moreover, the growth in revenue collected at the C&BC department in Kenya was recorded to have been stagnant from the Financial year 2013/14 to the financial year 2017/18 with an annual growth trend of 9.5% and average collection of Ksh.568million relating to goods in transit. (KRA Annual Revenue Performance Report, 2018/19)

Recently, apart from having truck drivers' menace due to measures set to contain spread of Covid-19, importers are also experiencing problems in tagging cargo due to miscommunication between private tracking companies and KRA. Eight private seal vendors- Automated Logistics, Borderless Tracking Ltd, I Spy Africa, Navisat Telematics, Oak & Gold Ltd, River cross Tracking Ltd, SGS Kenya and Track N Trace Ltd have been complaining of the abrupt suspension of their services leaving hundreds of importers who depend on such vendors to arm their cargo stranded which necessitates an enquiry into the phenomenon (Kitimo, 2021).

1.2 Statement of the Problem

In Kenya, applying the ECTs presents an opportunity for KRA through C&BC to enlarge its revenue through the lessening of tax evasion by the freight companies (Thomas, 2019). However, the C&BC department has continued to experience numerous challenges relating to transportation of Cargo in transit including theft, delays, regulation and compliance with regulations which contributed to significant loss of revenue to the government (Kabiru, 2016). Due to process characteristic and complexity, container trade faces a lot of challenges during day-to-day business. In addition, misplaced containers results in financial and operational risk and any delay in

delivery leading to increased transaction costs, production disruptions, missed sales opportunity and finally higher costs of goods being sold (Miler & Bujak, 2014). This necessitated the implementation of an electronic tracking system providers (ECTS) whose core mandate is capturing real-time locations of Cargo in transit.

Though applying the ECT system has presented an opportunity for ensuring cargo security and information sharing at the C&BC department, the effect this system has on performance is yet to be fully established. Empirically, there are various studies that have been done on the impact of ECTs but the findings have not been conclusive. An analysis conducted by Bhero et al., (2015) illustrated that the simulation model led to an increase of 82% of transit time. Similarly, Nyongesa, (2018) showed that ECTS has also led to improved accountability of all transit goods armed with ECTS seals. This compares with Nkoroi (2015) who noted that the use of ECTs leads to both Ugandan and Kenyan governments increasing immense revenue. However, Lund and Manyika (2016) found out that the rapid transformation of digital trade introduces factors that need to be addressed including lingering barriers to its growth, appropriate ways of measuring it, and questions about governance and data security. Whereas Kabiru (2016) argued that the major challenge in implementing the ECT system is a slight disconnect between what the revenue collector expects and what the system vendors have set-up. This compares with a study conducted by Apondi (2015) on trade documentation and the choice of cross-border trade patterns at Busia border post. On the contrary, Kilonzi, and Kanai, (2020) concluded that electronic cargo tracking system has not fully reduced time in cargo clearance.

This shows that despite the recognized importance of ECTs, the studies conducted have not obtained uniformity on the nature of association between these practices and

performance. The available literature is thus mixed and contradictory on the exact effects of ECTs with there being a major research gap locally. Moreover, the studies done have not given the exact effect in the revenue actualized by the C&BC department after implementation of the Electronic Cargo Tracking system hence creating another gap in the department. It is against this backdrop that this study was conducted which aims at guiding on the way forward to determining the effect of ECTs implementation on the performance of Customs and Border Control department. Understanding is essential for improved security to increased safety for customs officers and quicker turn-around times at the port along with paving the way for increase in revenue and duty collections in the long term in Kenya.

1.3 Study Objectives

1.3.1 General Objective

The main objective of the study was to determine the effects of ECTs implementation on the performance of C&BC department in Kenya.

1.3.2 Specific Objectives

The study was guided by the following specific objectives;

1. To find out the effect of ECT system infrastructure on the performance of C&BC department.
2. To establish the effect of ECT's user ability on the performance of C&BC department.
3. To determine the effect of ECT compatibility with existing systems on the performance of C&BC department.

1.4 Research Hypothesis

H0₁: ECT system infrastructure has no significant effect on the performance of C&BC department.

H0₂: ECT's user ability has no significant effect on the performance of C&BC department.

H0₃: ECT compatibility with existing systems has no significant effect on the performance of C&BC department.

1.5 Significance of the Study

1.5.1 Significance to Practice

This study findings may not only help government agencies enforce cargo handling regulations but also prevent theft of goods in transit and dumping of goods in transit through a given territory. This will provide cargo visibility by providing real-time location and status of the cargo and expedite clearance at loading and off-loading points. In addition, based on the recommendations it will enable quick inspection and clearance of cargo hence providing ready data which helps in decision making.

1.5.2 Significance to Policy

For the government agencies such as Kenya Revenue Authority and the Ministry of trade, the study will shed light on how trade facilitation measures such as the cargo tracking system will increase the level of trade and government revenues. Therefore, it is expected that the outcome of the study will assist policy and decision makers in various government institutions and agencies involved in international trade in understanding the positive impact that cargo tracking system can contribute towards reduction of costs to trade and growth of the economy.

1.5.3 Significance to Theory

To the scholars and academicians, the study finding is expected to increase the stock of the theoretical and empirical knowledge on ECT implementation and related aspects of performance. The study is expected to form a point of reference and will also suggest areas for further research so that future scholars can pick up these areas and study further.

1.6 Scope of the Study

The scope of the study was on ECT implementation at C&BC department at the border posts where ECT has been implemented in Kenya. The independent variables of the study were the features of ECTs including System Infrastructure, User Ability and System Compatibility while the dependent variable was the performance of C&BC. Population of the study entailed the Top KRA management, employees working at the Customs and Border Control Department and Transit Monitoring Unit (TMU) and clearing agents. Data for the study was collected using primary means. The collected data were analyzed using descriptive and inferential statistics and presented in tables and figures.

1.7 Limitations of the Study

The study was limited to its scope whereby it only focused on border posts where ECT has been implemented in Kenya leaving out the inland container depots. The study was limited to only three aspects of ECT including System Infrastructure, User Ability and System Compatibility which is not an exhaustive list of all the available aspects. To counter this limitation and enable generalization of the study findings, comprehensive and systematic data collection was undertaken by the researcher.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents an analysis of empirical research performed in relation to the topic. It explains several theories and creations discussed to define ECTs implementation in the Customs and Border Control Department. The analysis presents an avenue to critique other researchers' findings, research methods as well as the findings of their studies. The chapter depends on data and information gained from the KRA website and other scholarly publications.

2.2 Concept of Performance

Performance relates to the extent to which an organization accomplishes both its financial and non-financial objectives (Hoffman, 2014). It is the conversion of available inputs such as resources to more tangible firm outcomes and the ability of a firm to add value to its operations through maximization of resources (Bennett, James, & Klinkers, 2017). Sustainability in performance hence implies that there is continued productivity and growth in a uniform manner through creation of long term value of the entity to the stakeholders and public (Thomas, 2019).

Performance is measured using both subjective and objective indicators. With regard to objective measures, the main indicators are profitability, solvency, and efficiency ratios (Muia, 2017). Management of performance is essential in enabling an organization to deliver its contributions predictably by sustained creation of value. Performance may be categorized into four main groups including, internal processes, open system interactions, human relations and rationality of goals assessed against changes in these variables. Monitoring of the organizational performance is thus

paramount in ensuring that deliverables are continuously attained. Additionally, the organization should be able to match or surpass the performance of competitors in remaining dominant competitive-wise.

According to Kidd and Crandel (2012), efficiency regards exceptional performance hence with the C&BC department in KRA, gaining more revenue with less expenses is deemed efficient and effective. The ECTs system helps the department clear more cargo and track the vehicles at a much faster rate and cheaper at the border post respectively. Clearing the border at a faster rate helps decongest the border points and through tracking the trucks, it ensures that the cargo from the border arrives to the anticipated destination at the expected time and pace. The pace is evident through ECTs capacity in documentation, duty payment, and inspection which act as the indicators of performance.

2.3 Concept of Electronic Cargo Tracking System

The crucial aspects aligned with ECTs in monitoring therefore involves screening, electronic monitoring, border crossing weigh in motion, automatic equipment identification, and credential supervision. According to Bujak et al. (2017), the nature of ECTs is to ensure security and safety for end supply chain member. Therefore, consolidated management and monitoring begins at fusing and packaging stations, then to the road transport and conveyance to the port which entails storage at the port or container freight stations of yard. Then, it offers separate ship deck examination, pass through the drayage and halts with separation and unloading of the haulier or at the warehouse of the customers. These roles may only be evident by employing state of the art monitoring systems. The analyst identifies that the pattern may not present benefits in low cost and resilience of intermodal supply chain management and security.

ECTs is identified as a critical element worldwide. From various studies, its effect on supply chain and logistics, or various government agencies has been noted as constructive and efficient. According to Patel (2014), the establishment of ECTs and various technologies in freight companies led to a revolution where more companies encounter efficiency and effectiveness in the transport sector. Patel (2014) analysed the impact of technology on supply chain of logistics companies. The study targeted the influence of the introduction of technology to business to consumer and business to business commerce. The outcomes showed the establishment of technology among the freight companies increased efficiency and effectiveness in the transport sector. The introduction of technology in the transport sector has enlarged flexibility, speed, and mobility that tend to be efficient for economic development.

ECTs implementation to enhance the efficiency of C&BC has been evaluated in Naidoo's analysis. Naidoo (2012) proposes that for productive C&BC operations, the department should rely on ECTs than the existing patterns. ECTs help ease harmonious assimilation of the road user's shareholders' demands that are not attainable to C&BC section when the GPS detecting information reflecting truck movements and weigh bridge information formed by road agencies is applied. Also, modern systems such as ECTs facilitate establishment of vehicles upon arrival at the border and at the customs gate. Other activities facilitated include document scanning presented on behalf of cargo owners and broadcasting functions conducted by the customs officials during inspections.

2.3.1 Hardware and Software Components of ECT System

Before the introduction of the ECT system it was virtually impossible to inspect all of the containers. It was not even possible to check even 10% of the containers. This

challenge is addressed as the system is automatic and shares data on a real-time basis showing the location of every truck and its cargo whether it is rerouted, enroute to its destination or stationary (KRA, 2021). Detection of tampering while on transit is done immediately and hence preventing loss before arrival at the unloading port. Monitoring of any change is registered by RFID signals from the truck associated with the opening of the container. Real-time reporting of any exception and incident of container security violation to destination custom and port authorities for remedial action before arrival, (Chung, 2004).

The RFID then links the electronic identifiers into the container sealing devices being transported on trailer and shipping machine or on cargo items as shown by Figure 2.1. The common monitoring approach is to have the RFID connect the seal and tracking unit on the truck. It is executed by connecting an active RFID transponder with tamper detection capacity into the seal, and also linking an active RFID reader to the GPS tracking apparatus of the vehicle. The process is beneficial since permanent installation is encountered in the truck rather than the need to install and remove the tracking machine for each transit.

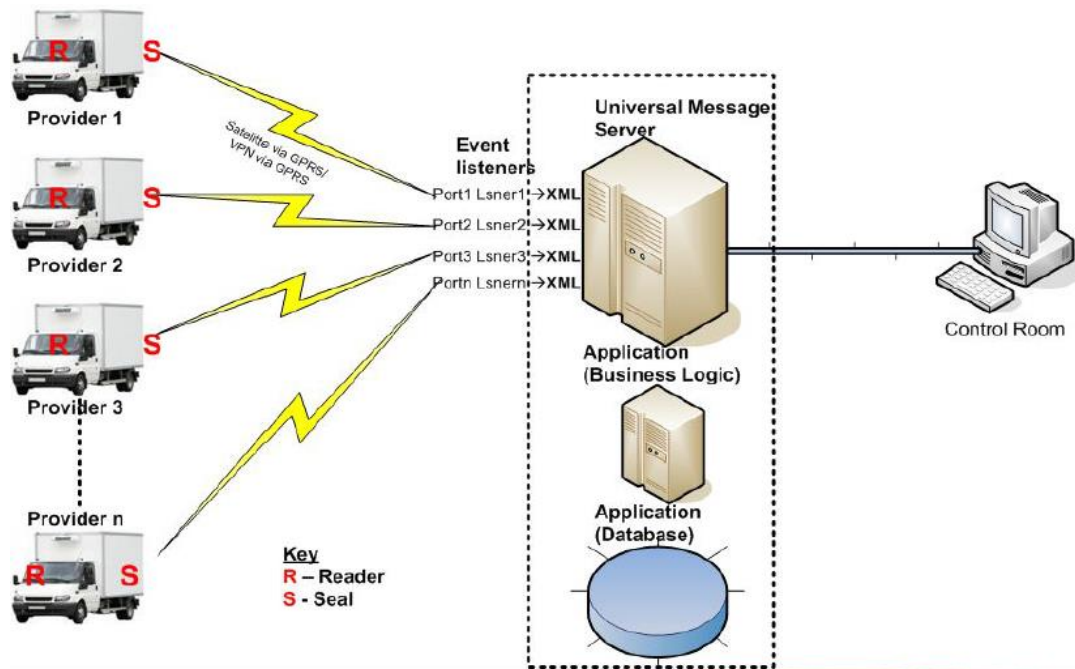


Figure 2.1: ECT System Infrastructure

Source: (KRA, 2021)

Data captured on the system is shared on a real time basis resulting to reduced dumping, reduced tax evasion and cargo theft in the country (KRA, 2021). All cargo transported by road is closely monitor on the electronic system as it is received into the country and transported to its destination. The users of the system capture the details of the driver, the cargo, the vehicles, the routes; the origin and destination of the cargo are recorded on the system. Successful implementation of the system requires that data is standardized. Consistent data definitions are fundamental to IT process integration and supporting technologies.

The system is required to be web- based, ensuring that it is accessible from anywhere in the world. KRA have dedicated resources to this particular project by setting up a department specially for handling cargo monitoring both at the headquarters – Times Towers- and also at the various stations (Mugambi, 2017). 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. The system will thus replace the conventional mechanical seal that is quite cumbersome where the cargo is accompanied by escorts to the borders, which has previously not been effectiveness.

2.3.2 Global Perspective of ECTs implementation and performance

Electronic tracking and monitoring was first used in the World War II. The British air force used radio frequency identification (RFiD) in the war especially for air battles. Customs cargo traceability or electronic tracking of customs goods has been implemented in many countries around the world. Notable implementations have been in Hong Kong and Jordan where it has proved to be a success in monitoring and accounting for transshipment goods (Nyongesa, 2018). Globally over 16 million maritime containers are in transit throughout the logistic processes on any given day regardless time and weather condition at sea, on rail, over the road, or waiting on stuffing, pick-up, delivery and stripping (Mpata, 2014).

Jordan and Alfitiani (2010), observed that numerous states have applied several techniques to handle transit traffic in current times and one of them is electronic transport monitoring and facilitation framework. The monitoring system through the ECTs has led to significant decline on transport of goods expenses through the country as they do not demand travelling in a convoy of vehicles which has been a condition in many nations. The enhanced transit traffic has also led to less smuggling operations and transport time journey has curtailed by at least 60%. Thus, transit time actually declines when ECTs are applied.

Hoffman (2014) notes that the static RFID is commonly applied in automated vehicle identification applications, and presents numerous advantages over separate auto-ID

technologies in a manner that it can be read at longer ranges than to barcodes and at higher speed. This permits disclosure of trucks in normal traffic situations. Besides, the RFID technology contains a shorter read range compared to active RFID that helps individuals in C&BC department ensure precise determination of specific vehicles traversing specific lanes set. The capacity to store more information on tags presents an opportunity to gain information about the status of the vehicles without demanding online checks, and can also support a great degree of validity by storing encrypted codes.

2.3.3 Regional Perspective of ECTs implementation and performance

Electronic cargo tracking has been widely implemented among African countries. Senegal and many other West African countries have implemented electronic cargo tracking. In 2012, Senegal had completed the implementation of the project and reported tremendous improvement in the management of transit goods (World Customs Organization, 2014). In the East African region, Cargo travels for long distance. Unfortunately, however there is an increase of theft, tax evasion, delays in clearance which results to increased cost. Electronic cargo tracking is necessarily a pillar of the East African Single Customs Territory aimed at ensuring goods securely arrive at their final destination while intact.

The ECTs give a channel where data can be reviewed accurately and reduces the paper works involved in the previous methods of conducting business. The framework has also been aligned with enhanced quality service and cost control which implies that consumers are willing to perform business with the department hence more trade and revenue collection. According to Siror (2010), the enhanced quality service and cost of control is apparent since goods arrive at the border points and are quickly cleared to

transit to the next station (Siror, 2010). However, there are still confusion and delays, leading to tax evasion, smuggling of illegal goods, and general disorganization within the supply chain. Also, the government agencies and businesses experience illegal operations involving truck drivers and customs officials.

The researchers then suggested the use of combined GPS/RFID system among all African countries which will help in handling the movement of the vehicles across Africa. Hoffman, Lusanga, and Bhero (2016) concluded that introduction of ECTs will help expand effectiveness within the cross border operations. In 2013, Hoffman, Lusanga and Bhero (2013) reviewed a combined GPS/RFID system for improved cross-border management of freight consignments. In their analysis, they deducted that the incapability of road freight transport is one of the main factors that derail the economy of Sub-Saharan Africa. In various border points, long delays are evident hence the single biggest contributor towards the slow average movement of freight. Cross-border activities tend to be hampered by the conflicting security objectives of customs authorities and efficiency goals of transport operators.

2.3.4 Local Perspective of ECTs implementation and performance

In Kenya, every cargo on transit is closely controlled on ECTs as it is received into the country and transported to its location. The employees at the department grasp the driver's information, the cargo on transit, the trucks used, the routes, the origin and destination of the goods on the system. C&BC ensures that efficient operation of the system gains standardized data. Sustained data definitions are essential to IT process integration and supporting technologies (Funkhouser & Vanderslice, 2013). For C&BC to recognize immense effectiveness, the users should consider data reconciliation and

assimilation into a single data dictionary that will serve as the grade for the organization.

The system is effective in ensuring that the goods are safe and KRA gains the anticipated from goods and people. The 2016 Kenya tax payers association identifies an unstable operation of ECTs in the customs and border control department. The review identified that operations efficiency was below the recommended level as they experienced low service delivery, illicit goods and services, loss of revenue, and many more. The Kenya Tax payers association questioned the direct impact of ECTs on CB&C section.

Siror et al, (2010) studied the impact of RFID technology on tracking of export goods in Kenya. In their analysis, they mentioned that there are some export products from Kenya that are usually diverted to regional markets. The analysts determined that there were corrupt business people who would forge documents and discard into the local market goods that are linked to export. Most businesses practice these operations to evade paying taxes. The analysts demonstrate how the development of RFID technology has been efficient in detecting vehicles carrying export goods. The findings demonstrate that the RFID based tracking has immense influence on decreasing diversion and tax evasion. Therefore, most business evidence enhanced supply chain management, revenue collection, and increase in the economy.

2.4 Theoretical Framework

The study was anchored on three theories namely Technology Diffusion Theory, Social Presence Theory and Unified Theory of Acceptance and Use of Technology.

2.4.1 Diffusion of Innovation Theory

The theory was developed by Rogers, (1983) and is concerned with how, why and the rate at which new ideas and technological developments spread across cultures, and how they operate at both the individual level and the firm level. The core premise of the theory is that innovations are transmitted through specific channels, over specific timelines and within specific social systems. The degree to which individuals adopt innovations is determined by a host of characteristics and the proportion of a population that adopts an innovation is normally distributed over time.

The theory holds that the rate of how it diffuses and the nature of the diffusion are determined by certain behavioural characteristics. The adoption of technology implies that an individual or a firm has acquired an idea or technology that allows them to do something in a different manner when compared to how they had previously been doing it. At the centre of the theory are concepts of the mechanisms of diffusion (Aluoch, Oondo, & Ndede, 2018). The mechanisms that buttress faster adoption of technology include trial ability, complexity, and observability.

Trial ability relates to the degree to which the innovation is tested and experimented because its inclusion. Complexity refers to the degree to the ease of use of a technology influences its adoption. This implies that if a complex technology requires considerable learning, users persevere in its adoption. On the other hand, observability is concerned with how visible the use and effects of use of the technology is visible to others. These factors determine the extent to which an individual or a firm will examine compatibility with the technology and move towards adopting it to satisfy its needs (Rogers, 1983).

This theory will be the main theory for the study as it helps in explaining the development of ECT technology, the rationale of adoption, how and where the

technology has been adopted, and the potential benefits of adoption to the C&BC department. The interaction between the adoption by C&BC and their customers is an indicator of the degree of success of adoption and by extension the influence on the performance of the sector. In this regard, the theory theorizes ECT as a technology which when well implemented will result in efficiency in customs operations and subsequently improved performance.

2.4.2 Social Presence theory

Social Presence Theory was established to clarify the differences in evident physical proximity essential in using various communications media. The theory formed by Short, Christie, and Williams in 1976 asserted that communication media varies in the degree of social presence as the quality of communication which currently triggered by technology impacts the way individuals interact. The key concepts noted in the theory includes intimacy, non-verbal communication, immediacy, and efficiency (Short et al., 1976). Intimacy in this assumption includes the capacity to describe non-verbal clues whether it is in person or online while immediacy entails the urgency we detect when communicating with others that creates intimacy and significance to the relationship (Baozhou et al., 2015). Non-verbal communication involves the ambiguous essence of computer-mediated interactions such as emotions, the urgency of response, and personal subjects within the conversation.

The theory was formed by analysing the classification of media to understand technology implementation. The classifications include face-to-face interactions and computer mediated interactions. These categories explain how the level of social presence is linked to the awareness degree of the other person in a communication interaction. The face to face interactions relies on verbal communication while

computer-mediated interactions defines a more relational view of social presence (Dixson, 2016). The technology designers regard computer-mediate interactions as a major design principle to gain insight into user behaviour when creating web-based applications and social computing technologies (Baozhou et al., 2015). This study recognizes the classification of media and its key concepts to study whether they impact the effects of ECTs implementation on Customs and Border Control Department.

2.4.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTUAT's aim includes identifying the user's objective to use technology and subsequent use. The hypothesis assumes that the recommended duration of the four essential constructs such as performance expectancy, effort expectancy, social influence, and facilitating conditions. According to Venkatesh et al, (2013), performance expectancy, effort expectancy, and social influence are determinants of usage intention and behaviour while facilitating conditions is a direct determinant of user behaviour. Factors such as age, gender, experience, and voluntariness weaken the influence of four key constructs on usage intention and behaviour.

The assumption relies on the designs of eight models that describes information systems usage behaviour. These models include theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, and social cognitive theory. Also, the models entail diffusion of innovations theory, model of personal computer use, and a combined theory of planned behaviour or technology acceptance model. UTUAT involves variables such as trust and confidentiality, convenience and cost, and user satisfaction and culture (Verhoeven et al., 2010). This study applies user satisfaction and culture as well as trust and confidentiality to study the effects of ECTs implementation on Customs and Border Control department.

Social Determinism theory was established to explain how human race shapes technology and not the other way round. The objective depends on the aspect that technologies are constantly classified by consumers and given a new, often unpredicted trajectories. The theory asserts that social connections and constructs alone identify individual behaviour rather than the depicted biological and objective aspects. The assertion is evident in how the internet was first applied as a communication and information engine, yet, presently it is used as e-business, marketing media, and social interactive media.

2.5 Empirical Literature

2.5.1 ECT system infrastructure and performance

When ICT controls of the ECTs system are not completely solved, the challenges of financial loss increases which destroys the opinion of the customs organization by its clients and partners. According to Vatuiu and Tarca (2010), in Romania, the e-customs new electronic framework permits permitted present monitoring of product improvement within the state. The ECTs has enhanced monitoring capacity of the C&BC to handle and trade in excise cargo in duty deferments. It has led to the expansion in revenue for excise department, decrease in fraud incidents, and attainment of Romania conditions as a member state of European Union while aligning to the application of e-customs monitoring systems. The study was however only limited to Romania hence cannot be adequately compared locally.

According to Odunayo (2014), to maintain effective cyber security of C&BC technological apparatus, the ECTs should be checked regularly through logging operations along with auditing and analysis. The analyst demonstrated that the process may show information on the application of websites and other ICT systems to impede

unauthorized access and cyber-attacks on the system. The employees that apply ECTs may employ these devices even when the authorities are not involved. The C&BC may lessen the outsource activities for one or other companies hence reducing the cyber security issue through its data and systems. However, while outsourcing, the companies will have the right to customs logging information, monitoring and information processed through customs website and other ICT framework. According to Odunayo (2014), the technique was employed in New Zealand where utilization of ICT systems and websites of customs have adopted the constant monitoring. However, the impact on performance was not fully investigated by this study.

Mugambi, (2017) investigated the effect of cargo tracking system on cross-border trade between Kenya and Uganda. The research adopted an exploratory research design and focused on the structure of an enquiry with an aim of drawing inferences from a causal relationship of the data. The targeted respondents were border officials at the Kenya – Uganda border and also at the head office, Cargo tracking department with purposive sampling design being employed to identify the respondents. Primary data was collected using a semi-structured questionnaire. The study concludes that electronic cargo tracking system improves the border efficiency, reduction of transit time and cost of private business. The study recommends synchronization of electronic cargo tracking system and the and RFID system being employed by both Kenya and Uganda to create a seamless operation and management of cargo between the two countries. The study however only investigated the effects of ECT cross border trade leaving out the influence on performance of C&BC department.

Serete (2015) examined the factors that affect clearance of containerized cargo at KPA. The study found out that there is a strong positive relationship between documentation

process and clearance of container cargo at KPA. It was noted that the Single Window system curbs congestion at KPA. However, this study did not focus on the effect of system automation on customs performance measured by total costs for importation and exportation transactions, transparency, simplification of the process of clearing cargo and identification and interdiction of cargo of high risk.

Alcedo and Cajala (2015) examined the present computerization program of the bureau of customs (BOC) in Philippines, focusing on import and export transactions. It was noted that there was unanimous agreement among respondents that the perceived benefits of the BOC computerization program were attained. However, corruption was fairly eliminated. It was noted that respondents unanimously agreed that the computerization of the BOC was effective. The study also found out that import/export documentation was fairly effective. However, this study did not focus on the effect of automation of customs release process on customs performance.

Gidisu (2012), in his case study of Ghanaian Customs department explains that the management of customs has implemented an electronic tracking and monitoring system in its transit operations to reduce delays and prevent revenue leakages associated with Transit operations; this initiative undertaken in collaboration with the private sector stakeholders. In Uganda, the Regional E-cargo tracking system project was initiated in 2013 through to 2016 at the value of \$US 3,600,000. It was introduced to curb major delays arising from physical escorts, which are considered a major non-tariff barrier in the region. The current will aim at providing local empirical evidence and findings compared.

2.5.2 ECT's user ability and performance

According to Belissent (2009), it is essential that the employees at C&BC department are trained on how to apply the framework thus a present cost factor (Belissent, 2009). Numerous shareholders connected to the C&BC department such as the transporters, businessmen, truck drivers, and many more will be able to experience the fusion of the processing and clearance of goods. Other values of the ECT system involves reducing the dumping of goods in the regional market and manage fake items such as medicines in the country.

Nyongesa, (2018) undertook a study on the influence of seamless monitoring, transit time, transparency and accountability on management of transit goods. The study was limited to Kenya. Stratified and simple random sampling techniques were used to generate the sample size and the respondents. As sample size of 60 respondents was used to carry out this research. The research findings pointed out that seamless monitoring, transit time, transparency among stake holders and accountability positively influence the management of transit goods. The seamless monitoring has ensured quick dissemination of alerts to responsible units, quick response to alerts by RRUs, reduced dwell time at Malaba and Busia borders and has drastically reduced the dumping of transit goods in Kenya. RECTS has also led to the reduction of cargo transit time along the northern corridor, led to improvement of transparency among stakeholders in the business and has improved accountability of all transit goods armed with RECTS seals.

In case study of Nigeria, Durban, the Suez Canal and Mombasa, Gidado (2015) studied the implications congestion in ports as a phenomena associated with delays, queuing and extra time of voyage and dwell of ships and cargo at the port, which always occur

with unpleasant consequences on logistics and supply chain. This creates extra costs, loss of trade and disruption of trade and transport agreements. This study was however narrowly limited to Nigeria.

Teera, (2017) examined the tax system and tax structure of Uganda to investigate the factors affecting revenue collection in the country. He used the time series data of the period 1970 to 2000 and estimated a model. His results showed that agriculture ratio, population density and tax evasion affect all type of taxes. GDP per capita showed the surprising negative sign. Tax evasion and openness (as measured by import ratio) showed the significant negative impact. Aid variable showed positive sign since aid in Uganda always supported imports especially raw material so not surprisingly

Kilonzi, and Kanai, (2020) examined electronic cargo tracking system and its effect on revenue realization in East Africa Member Countries. The data was analysed using descriptive and further inferential statistics including correlation and regression analysis. The study concluded that electronic cargo tracking system has not fully reduced time in cargo clearance. Staffing cost was still a challenge at the border posts of East African Member states since the introduction of electronic cargo tracking system. There were some cases of revenue leakages at the border posts even after the introduction of electronic cargo tracking system. The study recommended that East Africa member states should come up with a common policy on ICT integration on cargo clearance.

2.5.3 ECT compatibility and performance

Kavanagh (2010) deducted that the victory is simply examined by assessing the pre and post implementation performance metrics. They then observe the metrics over a period of time to depict constant advancement which called up on the essence of baseline value

of the Key Performance Indicators (KPIs) that relies on users' need assessment. The monitoring system through the ECTs mainly battle economic fraud with real time basis information and inspects on cargo being transported under duty suspension. It controls the transit of excised goods on which duty has been compensated to be secure with before dispatch evaluations on businesspersons and simplifies the process for traders (European Union, 2017). The monitoring system through ECTs expedites the release of warrants when cargo arrive their point of destination and establish a paperless management.

According to Miller (2015), the department should regard real time remote tracking and monitoring of containers on transit to help in curtailing the losses linked with container goods. The ECTs in monitoring apparatus presents real time data that helps in retrieving goods hence lessening the damage. Besides, there is devaluation in insurance claim costs and insurance premiums since the monitoring system causes low damage and theft. The analyst proposed that constructive container transport management and security system need to assimilate sub-systems of container detecting and intrusion monitoring in real time.

Based on a study conducted by Kabiru (2016), the GPS tracking system is a need for all freight vehicles and is applied to support vehicle recovery and fleet management. In Kenya, most insurance companies have set it as mandatory requirement to qualify for insurance. The GPS tracking system can be employed as a subset of monitoring data by customs authorities for identifying conformity by the fleet trucks. When the GPS connects the tracking information to the pre-declarations presented to customs, the custom and border department then creates a behavioural profile for every consignment when it arrives at the border. Employing electronic seals and active RFID gives

additional value to cargo owners and C&BC because of its capacity to broadcast real time security status of cargo consigned.

Omosa, (2020) studied the effects of systems automation on customs revenue performance in Kenya. The study had three independent variables which were Scanner technology, Cargo Tracking System and Integrated Custom Management (ICMS). This study was grounded by three theories: Technological Determinism Theory, General Systems theory and International Trade theory. The study adopted the explanatory research design A population of 902 clearing and forwarding companies and customs officers were used out of which a sample of 227 respondents was selected, through Taro Yamane sampling method. Findings of the study established that custom revenue performance in Kenya increased significantly after implementation of systems. As a result, regional trade activities were intensified and greater border control achieved.

Mumia, (2021) studied the Effect of automation of customs release process on customs performance at the port of Mombasa in Kenya. This study was founded on the unified theory of rational expectations theory of technology adoption. The study's target population constituted of 1500 Clearing Agents. The sample size of 306 was determined using Yamane formula. Simple random sampling was adopted to select respondents from the population. The main data collection instrument adopted for this study was the questionnaire which was self-administered to the respondents. The study found out that that enhancing automation of customs verification leads to enhancement of customs performance ($\beta_2 = 0.313$; $p < 0.05$). It was also concluded that improving system automation will lead to improved customs performance at the port of Mombasa in Kenya.

2.6 Conceptual Framework

This conceptual framework demonstrates the relationship between dependent variables and independent variables. The independent variable includes the features of ECTs including System Infrastructure, User Ability and System Compatibility while the dependent variable was the performance of C&BC.

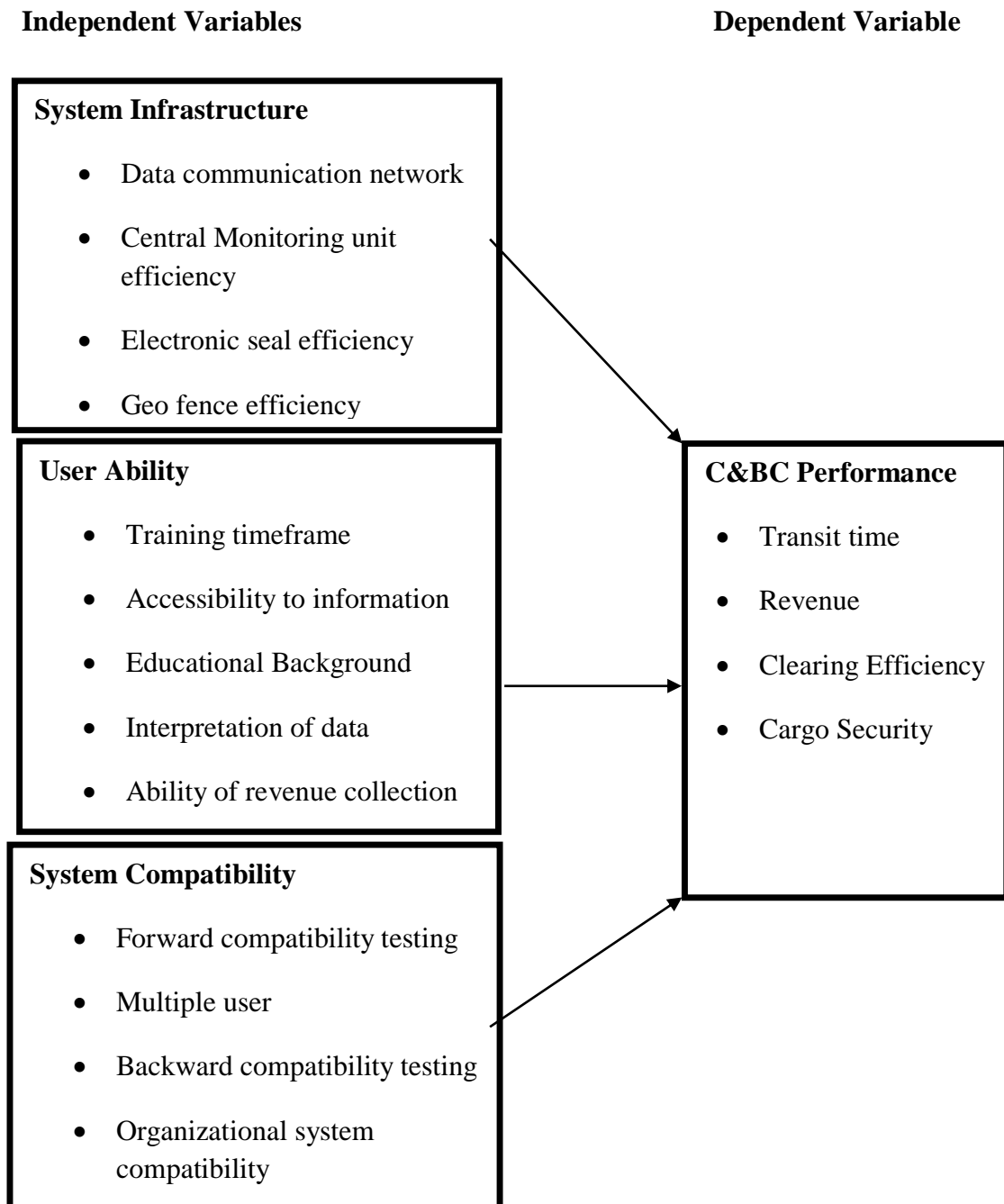


Figure 2.2: Conceptual Framework

Source: Researcher, (2021)

2.7 Summary of Reviewed Literature and Research Gap

In the recent years, most states have recognized the significance of trade and Information Communication Technology to attain reliable economic growth. Through trade, these states have lowered tariffs, developed measures to enhance foreign investment, and embraced opportunities for immense regional integration. Some of these opportunities include ICT systems such as ECTs that have contributed to expansion of economies through improving trade facilitation and enhanced revenue administration and collection processes (Oguta et al., 2014). Though the reviewed theoretical framework tries to put a framework for explaining the concept of ECTs implementation, the studies conducted have not been fully conclusive as shown by Table 2.1. Very few studies have also been conducted locally as most have been concentrated in the developing countries. Additionally, the exact nature of relationship and magnitude of the influence of ECTs on C&BC performance is not well established by the existing literature. This study therefore was conducted with a view of addressing these research gaps by providing local empirical evidence.

Table 2.1 Research Gaps

Author, year	Topic	Findings	Research Gap
Mugambi, (2017)	Effect of cargo tracking system on cross-border trade between Kenya and Uganda.	Electronic cargo tracking system improves the border efficiency, reduction of transit time and cost of private business.	The scope of the study was only limited to the Kenya Uganda border leaving other borders of the country.
Nyongesa, (2018)	Influence of seamless monitoring, transit time, transparency and accountability on management of transit goods.	The research findings pointed out that seamless monitoring, transit time, transparency among stake holders and accountability positively influence the management of transit goods.	The study failed to investigate the effects on the performance.
Kilonzi, and Kanai, (2020)	Electronic cargo tracking system and its effect on revenue realization in East Africa Member Countries.	Electronic cargo tracking system has not fully reduced time in cargo clearance.	The study generalized all the East African countries without singling out one country.
Serete (2015)	Factors that affect clearance of containerized cargo at KPA	The study found out that there is a strong positive relationship between documentation process and clearance of container cargo at KPA.	This study did not focus on the effect of on customs performance.
Alcedo and Cajala (2015)	Present computerization program of the bureau of customs (BOC) in Philippines.	It was noted that there was unanimous agreement among respondents that that the perceived benefits of the BOC computerization program were attained.	This study did not focus on the effect of ECTcess on customs performance.
Gidisu (2012)	Case study of Ghanaian Customs department	Management of customs has implemented an electronic tracking and monitoring system in its transit operations to reduce delays and prevent revenue leakage.	The scope of the study was limited to an international setting in Ghana hence cannot be equally compared locally.
Omosa, (2020)	Effects of systems automation on customs revenue performance in Kenya.	Findings of the study established that custom revenue performance in Kenya increased significantly after implementation of systems.	The study was not able to narrow down to ECT aspect of automation.
Mumia, (2021)	Effect of automation of customs release process on customs performance at the port of Mombasa in Kenya	The study found out that that enhancing automation of customs verification leads to enhancement of customs performance.	The study was only limited to automation of custom release without investigation of the automation of other processes.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

Research methodology describes the procedure or approach which was undertaken in accomplishment of the study objectives. Specifically, the chapter encompasses the research design, population of study, sampling design and size and data collection instruments. The chapter also discusses pretesting, data analysis and presentation, diagnostic tests and the ethical considerations.

3.2 Research Design

Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2014). This facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible, yielding maximal information with minimal expenditure of effort, time and money. The study used an explanatory research design. This is a research design which is conducted in order to assess impacts of specific changes on existing norms, and processes. The research design plays an instrumental role in terms of identifying reasons behind a wide range of processes hence the most appropriate in investigating the impact of ECT practices on C&BC departments (Seeram, 2019).

3.3 Target Population

The population for this research comprised of the Top KRA management and employees working at the Customs and Border Control Department and Transit Monitoring Unit (TMU). As of 31st January 2021 there were 40 top management officials, 250 C&BC employees and 150 Transit Monitoring Unit (TMU) employees

and this constitute the study targeted population as presented Table 3.1. The C&BC staff and TMU staff were targeted due to the fact that they are they are the ones directly involved on custom administration as well as the ECT procedures. Further the top management are the ones in charge in formulation, implementation and monitoring the ECT practices hence their appropriateness for the study.

Table 3.1 Target Population

Category	Namanga Border Post	Busia Border Post	KRA Headquarters	Total
KRA Top Management	5	5	30	40
C&BC Staff	120	110	20	250
TMU Staff	80	60	10	150
Total	205	175	60	440

Source: KRA HR, (2021)

3.4 Sample Size

To identify the study population, Slovin's formula (1960) was used.

Slovin's formula is:

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

Where n = number of samples, N = total population and e = error margin / margin of error at 10%

Therefore;

$$80 = \frac{440}{1 + 440(0.1^2)}$$

By applying the formula, a sample size of 80 respondents were studied using at 10% margin of error.

3.5 Sampling Design

The study applied stratified random sampling in selecting the respondents for the study. The different population categories will form the strata for the study. The weight of the stratum was identified by relating the number of respondents under the strata in relation to the entire population as shown by Table 3.2. Simple random sampling techniques was then used to select respondents in each of the four strata to form the sample size. Random sampling is whereby every subject meeting the inclusion criteria is randomly selected until the desired sample is achieved. This sampling procedure was preferred as it not only equal representation of all the respondents but also proportion representation of the respondents' categories. This is more appropriate where the population is small and the variability within the population is high.

Table 3.2 Sample Population

Category	Target Population	Sample	Percentage
KRA Top Management	40	7	9%
C&BC Staff	250	45	57%
TMU Staff	150	28	34%
Total	440	80	100%

3.6 Data Collection Instruments

Data for the study was collected using primary means. The primary data was collected using semi structured questionnaires. Development of the questionnaire was guided by the available literature review and further direction given by the supervisor. To enable

comprehensiveness of the data collection, closed ended questionnaires were used. Additionally, a Likert Scale was used in rating the responses of the respondents on various statements of the questionnaire. The questionnaire was structured into sections whereby each section addressed a specific objective.

3.7 Pretesting

Cooper and Schindler (2016) indicated that pretesting is done through a pilot test which is conducted to detect weaknesses in design and instrumentation and to provide proxy data for selection of a probability sample. In line with this, the researcher pre-tested the questionnaire with an equivalent of 10% of the target population as a way of checking the instrument's reliability and validity. This was done at the KRA headquarters based at Times Tower, Nairobi. These respondents selected for the pilot study were the KRA top management and they will not take part in the actual study. Once feedback was received from these respondents, the questionnaire was revised in line with the recommendations that was received in readiness for administration.

The pre-test study is thus important as it will provide a chance for estimating response rates and estimating interview or questionnaire completion times. Cronbach's alpha was then used to assess internal consistency and reliability of the questionnaire based on the feedback of the pilot test. The piloted sample were encouraged to make comments and suggestions concerning instructions, clarity of questions and relevance hence improve the validity of the questionnaires. Finally, the pilot survey drew responses on the design and content of the instrument and suggestions for more efficient and practical way of administering it. In this study however the pilot study results were not included in the final study.

3.7.1 Reliability of the Data Collection Instruments

Reliability refers to as the consistency or constancy of a measuring instrument (LoBiondo-Wood & Haber, 2014). The data from the pilot test was tested using Cronbach alpha. Cronbach's alpha was used to determine the internal consistency or average correlation of items in the survey instrument to gauge its reliability to assess and improve upon the reliability of variables derived from summated scales. Cronbach's alpha coefficient ranges between 0 and 1. The Cronbach alpha values obtained for all the variables were ensured they are higher than 0.7. This was achieved through rephrasing the questions with low alpha after pilot study or dropping them.

3.7.2 Validity of the Data Collection Instruments

Validity on the other hand refers to the degree to which the data collection instrument is able to capture what it was intended (Cooper, Schindler & Sun, 2016). The instrument was evaluated for construct and face validity. Construct validity was achieved by conducting factor analysis. Face validity further ensured validity of questionnaire based on respondent's attitude and opinions and multiple choice questions with adequate opinions were used.

3.8 Data Analysis

The data collected was first cleaned so as to avoid any discrepancies before being analysed. The data was then coded and keyed into the computer. The data was then categorised and thereafter summarised using descriptive measures such as frequencies, percentages, means and inferential statistics. Tables and graphs were used for presentation of findings. Regression model and correlation analysis were used to determine the relationship between the variables. To achieve this, data was coded and analysed by Statistical Package for Social Science (SPSS Version 20.0) program.

3.8.1 Analytical Model

A multiple regression model was used to determine the relationship between ECT practices and performance of C&BC. The multiple regression model was in the form:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (\text{Equation 3.1})$$

Where:

Y = Dependent Variable (Performance of C&BC)

β_0 = Constant

β_1, \dots, β_z = Coefficient of the independent variable

X_1 = System Infrastructure

X_2 = User Ability

X_3 = System Compatibility

ε = error term

3.9 Hypothesis Testing

To test the hypotheses, it was necessary to compute composite scores for variables that have several measures. In this regard, composite scores were calculated to represent the responses of the research variables which were used as input to the evaluation. The test of hypothesis is shown in Table 3.3.

Table 3. 3 Hypothesis Testing

Hypothesis	Test
H0₁: ECT system infrastructure has no significant effect on the performance of C&BC department.	Inferential analysis
H0₂: ECT's user ability has no significant effect on the performance of C&BC department.	Inferential analysis
H0₃: ECT compatibility has no significant effect on the performance of C&BC department.	Inferential analysis

3.10 Measurement of Variables

3.10.1 C&BC Performance

This refers to the extent to which the C&BC department achieves both its financial and non-financial objectives (Gravertter, & Forzano, 2011; Hoffman, 2014). Assessment of performance is essential in determining not only the efficiency, but also accountability and long-term viability of the department. In this study, performance was measured in terms of revenue collected.

3.10.2 ECT System Infrastructure

System infrastructure describes the foundation or framework that supports a system or organization. It is composed of physical and virtual resources that support the flow, storage, processing and analysis of data in terms of compatibility (Kabiru, 2016). Compatibility of hardware and software means the components those can be replaced because they have the same properties and mostly the same or similar design. Hardware compatibility entails the compatibility of the hardware components with the operating system, CPU, bus and motherboard. This is important because hardware designed to operate in one system cannot work in another or using other drivers. Software

compatibility on the other hand entail the software characteristics in term of components and systems that can operate satisfactory together. In this study, a Likert Scale was used in measuring the various constructs of system infrastructure including software relevancy, easy information sharing, storage of information for long and relevant and reliable reports. The data was then analysed using descriptive analysis and inferential analysis.

3.10.3 ECT User Ability

User ability is a measure of how well a specific user in a specific context can use a product/design to achieve a defined goal effectively, efficiently and satisfactorily (Muia, 2017). It measures the ease in which the users are able to utilize the program in accomplish the required tasks. In this study, a Likert Scale was used in measuring the various constructs of user ability including reporting violation, easiness in tracking, easiness in data capturing, increased ability of revenue collection and time saving in location of inventory. The data was then analysed using descriptive analysis and inferential analysis.

3.10.4 ECT compatibility

Compatibility relates to the ease of two systems to work together without having to be altered to do so (Odunayo, 2014). In this study, this entailed the ability of ECT to be integrated into other custom procedures and practices. In this study, a Likert Scale was used in measuring the various constructs of ECT compatibility including multiple users, compatible with organizational features, pairs with android systems and ease compliance. The data was then analyzed using descriptive analysis and inferential analysis. The measurement and operationalization is as shown in Table 3.4.

Table 3.4 Operationalization and Measurement of Study Variables

Variable	Type	Measurement	Scale
C&BC Performance	Dependent	<ul style="list-style-type: none"> • Revenue collected 	<ul style="list-style-type: none"> • Likert Scale
System Infrastructure	Independent	<ul style="list-style-type: none"> • Software relevancy • Easy information sharing • Storage of information for long • Relevant and reliable reports 	<ul style="list-style-type: none"> • Likert Scale
User Ability	Independent	<ul style="list-style-type: none"> • Reporting violation • Easiness in tracking • Easiness in data capturing • Increased ability of revenue collection • Time saving in location of inventory. 	<ul style="list-style-type: none"> • Likert Scale
System Compatibility	Independent	<ul style="list-style-type: none"> • Multiple users • Compatible with organizational features • Pairs with android systems • Ease compliance 	<ul style="list-style-type: none"> • Likert Scale

3.11 Ethical Considerations

There are various ethical considerations that were catered for in this research. This included voluntary participation, informed consent, confidentiality and communication of results. The researcher ensured that no respondent was coerced to participate in the study through misrepresentation or promise of rewards. The study also adhered to the ethical guidelines set up by the university in regard to academic research. The study was only undertaken after consent and approval from the university and NACOSTI.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

The study sought to establish the effects of ECTs implementation on the performance of C&BC department in Kenya. This chapter presents the research findings by focusing on; background information of the respondents and data analysis based on the specific objectives of the study.

4.2 Response Rate

The study's target population was Top KRA management and employees working at the Customs and Border Control Department and Transit Monitoring Unit (TMU). As such, a total of 80 questionnaires were issued out of 68 which were duly filled and returned. This translated to a response rate of 85%.

Table 4.1 Response Rate

Response	Frequency	Percent
Responded	68	85%
Not Responded	12	15%
Total	80	100%

4.3 Background Information

4.3.1 Position of the Respondents

This section sought to determine the ranking of the positions held by the respondents.

The findings obtained are presented by Table 4.2.

Table 4.2 Position of the Respondents

Ranking	Frequency	Percent
KRA Top Management	6	9%
C&BC Staff	41	60%
TMU Staff	21	31%
Total	68	100%

The results obtained indicated that 9% were KRA Top managers, 60% were C&BC Staff and 31% were TMU Staff. This implies that all the respondents held different positions at KRA hence conversant with how the organizations operate. The respondents were therefore knowledgeable on the study topic.

4.3.2 Education level of the Respondents

On the education level of the respondents, majority of the respondents 59% had diplomas, 19% had undergraduate degrees, 18% had certificates while 4% had postgraduate degrees as per Figure 4.1. The respondents therefore were well qualified for their respective positions in the organization and were capable of applying their expertise in ECTs.

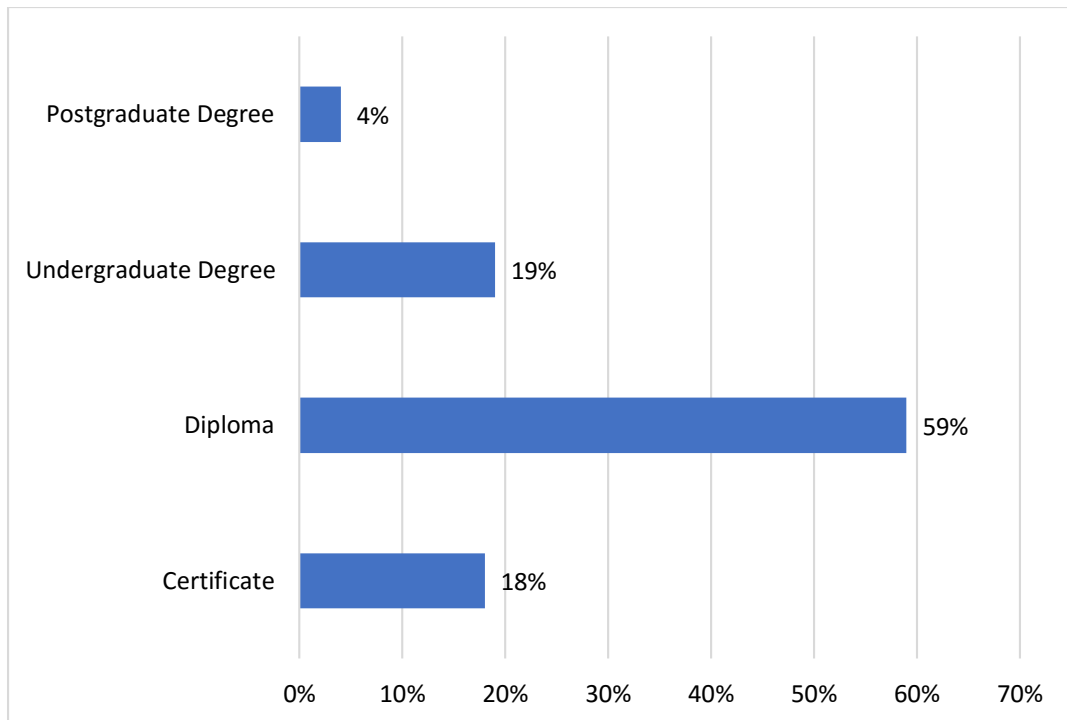


Figure 4. 1 Education level of the Respondents

4.3.3 Respondents Working Duration at the C&BC

This section further sought to establish the respondents' working duration at the C&BC. As shown by Figure 4.2, 31% had worked for less than 3 years, 31% for 3 to 7 years, 24% for 8 to 12 years and 15% for over 12 years. As per the findings, majority of the respondents (over 65%) had worked at their respective positions for a duration of more than 3 years. The respondents were therefore experienced with the custom practices including ECTs.

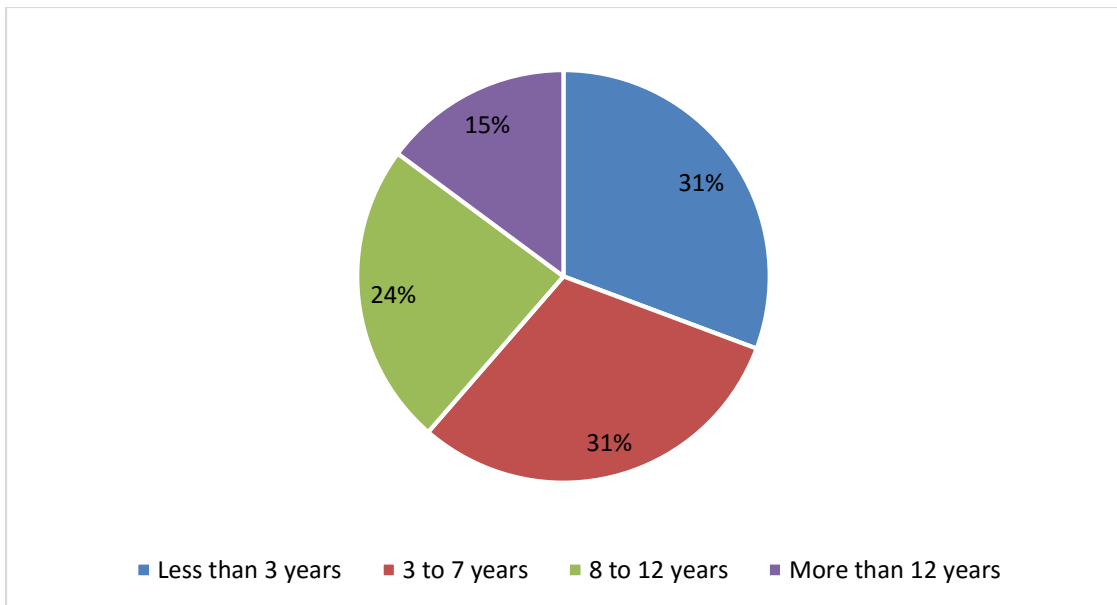


Figure 4.2 Respondents Working Duration at the C&BC

4.4 ECTS Implementation at Customs and Border Control Department in Kenya

4.4.1 System Infrastructure

The study sought to determine extent to which the infrastructure of the Electronic Cargo Tracking Systems (ECTs) features have been implemented in Kenya. The respondents were required to rate their agreements on the statements using a Likert scale of 1-5, whereby 5 is Strongly Agree, 4 is Agree, 3 is Neutral, 2 is Disagree and 1 is Strongly Disagree. The findings obtained are presented by Table 4.3.

Table 4.3 System Infrastructure

Statement	Mean	Std. Dev
Electronic cargo tracking system data communication networks provides real time information on the goods in transit enhancing faster clearance of cargo.	3.94	1.2800
The systems' central monitoring unit is efficient in information storage for over 12 months and sharing	3.51	1.2155
The use of Electronic seals and geo fence has helped reduce theft on goods in transit	3.35	1.2310
The ECTs Centralized Monitoring Centre (CMC) is able to provide information even when the system is offline	3.24	1.3835
The system hardware i.e. the geo fence is properly located along the routes and captures correct data avoiding delays	3.68	1.2748
Average Mean score	3.54	1.277

As shown by Table 4.3, a large extent was stated by the respondents on Electronic cargo tracking system data communication networks provides real time information on the good in transit enhancing faster clearance of cargo, the systems' central monitoring unit is efficient in information storage for over 12 months and sharing and the system hardware i.e. the geo fence is properly located along the routes and captures correct data avoiding delays .of 3.94, 3.51 and 3.68 respectively. However, the use of Electronic seals and geo fence has helped reduce theft on goods in transit and the ECTs Centralized Monitoring Centre (CMC) is able to provide information even when the system is offline with means of 3.35 and 3.24 respectively. From the descriptive statistics results, it was deduced that many respondents agreed with the statements that suggest the influence of ECT system infrastructure with existing systems infrastructure on the performance of C&BC department as indicated by an overall mean of (\bar{x} =3.54). Similarly, Kwalia (2012) who researched on the Impact of adoption of customs electronic procedure in Kenya found out that there is a strong positive relationship

between documentation process and clearance of container cargo . The adoption of Customs electronic procedures system has had a great impact on clearing and forwarding firms

4.4.2 User ability

The study sought to investigate the ability of the cargo tracking system to be applied by different types of users to access services offered by the Kenya Revenue Authority. The respondents were required to rate their agreements on the statements using a Likert scale of 1-5, whereby 5 is Strongly Agree, 4 is Agree, 3 is Neutral, 2 is Disagree and 1 is Strongly Disagree. The findings obtained are presented by Table 4.4.

Table 4.4: User ability

Statement	Mean	Std. Dev
The users requires minimum training to understand and use of the Electronic Tracking Systems controls and hardware	4.10	1.2355
The Electronic Cargo Tracking system captured information is easily accessible to the end user	3.54	1.4806
The users educational background makes it easier to understand and use the Electronic Cargo Tracking systems	3.46	1.3320
The Electronic Cargo Tracking systems is efficient and useful to the user in improving their performance in the C&BC department	3.96	0.9687
The information captured by the Electronic Cargo Tracking system is easily interpreted and analyzed by the end user	4.15	1.1878
Average Mean score	3.84	1.2409

The findings obtained showed that to a very large extent, the users requires minimum training to understand and information captured by the Electronic Cargo Tracking system is easily interpreted and analyzed by the end user having means of 4.10 and 4.15 respectively. A large extent was also indicated on he Electronic Cargo Tracking system

captured information is easily accessible to the end user and the Electronic Cargo Tracking systems is efficient and useful to the user in improving their performance in the C&BC department of 3.54 and 3.96 respectively. However, a moderate extent was noted on the users' educational background makes it easier to understand and use the Electronic Cargo Tracking systems having a mean of 3.46. From the descriptive statistics results, it was deduced that many respondents agreed to a large extent on the effect of user ability and performance as indicated by an overall mean of ($\bar{x}=3.84$). This compares to studies conducted by Sichone, (2019) who researched on Information System Success in Tanzania Customs Operations and concluded that the ease of use of the systems, accessibility and proper interpretation of data by the users highly affected the performance at their customs department.

4.4.3 System Compatibility

The study sought to examine the compatibility of the Electronic Cargo Tracking Systems (ECTs) Implementation in Kenya. The respondents were required to rate their agreements on the statements using a Likert scale of 1-5, whereby 5 is Strongly Agree, 4 is Agree, 3 is Neutral, 2 is Disagree and 1 is Strongly Disagree. The findings obtained are presented by Table 4.5.

Table 4.5 System Compatibility

Statement	Mean	Std. Dev
The ECT system is able to pair and works well with the other the latest versions of systems like ICMS system (forward testing).	4.10	1.1862
The system allows multiple users to be online and work at the same time.	4.16	1.1668
The system is able to pair and work easily with old versions of other systems e.g android systems (backward testing).	3.57	1.1758
The system is compatible with the other set-up organizational systems like the GPS ,Geo fence and Electronic seals	3.85	1.4379
The systems is compatible with other systems in neighboring counties	3.60	1.2476
Average Mean score	3.86	1.2429

As shown, a very large extent was stated by the respondents on the ECT system is able to pair and works well with the other the latest versions of systems like ICMS system and the system allows multiple users to be online and work at the same time with means of 4.10 and 4.16 respectively. A large extent was also noted on The system is able to pair and work easily with old versions of other systems e.g. SIMBA systems (backward testing)., the system is compatible with the other set-up organizational systems like the GPS, Geo fence and Electronic seals and The systems is compatible with other systems in neighboring counties with means of 3.57, 3.85 and 3.60 respectively. From the descriptive statistics results, it was deduced that many respondents agreed with the statements that suggest the influence of ECT compatibility with existing systems on the performance of C&BC department as indicated by an overall mean of (\bar{x} =3.86). This coincides with Omosa, (2020) who studied the effects of systems automation on customs revenue performance in Kenya and established that custom revenue

performance in Kenya increased significantly after implementation of systems. As a result, regional trade activities were intensified and greater border control achieved.

4.5 C&BC Department Performance

The study also sought at determination of the C&BC department performance. The respondents were required to rate the measures of performance using a Likert scale of 1-5, whereby 5 is Very Large Extent, 4 is Large Extent, 3 is Moderate Extent, 2 is Small Extent and 1 is Very Small Extent. The findings obtained are presented by Table 4.6.

Table 4.6 C&BC department performance

Performance Measure	Mean	Std Dev
Electronic Cargo tracking system implementation has reduced Transit time	3.68	1.4189
Electronic Cargo tracking system implementation has increased the amount of revenue collected	3.90	0.9946
Electronic Cargo tracking system implementation has improved Clearing Efficiency	4.03	1.0070
Electronic Cargo tracking system implementation has improved Cargo Security	4.21	1.0729
Electronic Cargo tracking system implementation has improved Quality service offered at the C&BC department	4.19	1.1623
Electronic Cargo tracking systems has facilitated cost control in the C&BC department.	3.49	1.4506
Average Mean score	3.92	1.184

As shown, a very large extent was indicated on clearing efficiency, cargo security and quality service with means of 4.03, 4.21 and 4.19 respectively. A large extent was also indicated on transit time and amount of revenue collected with means of 3.68 and 3.90 respectively. However, a moderate extent was indicated on cost of control with a mean

of 3.49. From these descriptive statistics results, it was can be deduced that the performance of the C&BC department was performing to a large extent with an overall mean of ($\bar{x}=3.92$).

4.6 Assumptions of Regression

Diagnostic tests on the assumptions of regression analysis was done to ensure that the quality of quantitative assessment are valid.

4.6.1 Test for Multi collinearity

Multi collinearity tests was conducted on the regression model so that incorrect conclusions about the relationship between dependent variable and predictor variables to be avoided. Variance Inflation Factor (VIF) and tolerance degree was used to indicate presence of multi collinearity test. The findings obtained are presented by Table 4.7.

Table 4.7 Test for Multi collinearity

Variable	Tolerance	VIF
System Infrastructure	0.9958	1.0041
User Ability	0.7702	1.2982
System Compatibility	0.7679	1.3021

The findings obtained show System Infrastructure had a tolerance value of 0.9958 and VIF value of 1.0041, User Ability had a tolerance value of 0.7702 and VIF value of 1.2982 and System Compatibility had a tolerance value of 0.7679 and VIF value of 1.3021. All variables had tolerance of greater than 0.1 and VIF less than 10 and there was no multi collinearity problem.

4.6.2 Test for Normality

Normality test was undertaken to ensure that the study variables are normally distributed. Skewness which is the extent to which a distribution of values deviates from symmetry around the mean was used to test normality of the data. While Kurtosis which is a measure of the "peakedness" or "flatness" of a distribution was used in testing the normality of the study variables. The normality test results are presented by Table 4.8.

Table 4.8 Normality Test

Variable	Skewness	Kurtosis
C&BC Performance	-.304	-1.028
System Infrastructure	-.458	-.830
User Ability	.287	-1.317
System Compatibility	-1.002	-.239

The results obtained show that C&BC Performance had a Skewness value of -.304 and Kurtosis value of -1.028, System Infrastructure had a Skewness value of -.458 and Kurtosis value of --.830, User Ability had a Skewness value of .287 and Kurtosis value of -1.317, while System Compatibility had a Skewness value of -1.002 and Kurtosis value of -.239. Hence, for all the variables, skewness and kurtosis statistics were within +/-2 and hence the data was normality distributed. Therefore an indication that the normality assumption of linear regression analysis was in place.

4.7 Correlation Analysis

Correlation Analysis results obtained as shown by Table 4.9 indicate the r coefficients of the variables to include System Infrastructure ($r=0.50$, $p =0.686$), User Ability ($r=0.554$, $p =0.00$) and System Compatibility ($r=0.398$, $p =0.001$). The positive coefficient indicated that all the ECT features had a positive effect on the C&BC

department performance. Therefore, unit increase in these system infrastructure, user ability and system compatibility will result in increase in performance in factors of 0.50, 0.554 and 0.398 respectively. The p -value > 0.05 of all the variables except system infrastructure indicated that the positive effect of these variables was significant at 95% confidence level.

Table 4.9 Correlation Analysis Results

		C&BC Performance	System Infrastructure	User Ability	System Compatibility
System Infrastructure	Pearson Correlation	.050	1		
	Sig. (2- tailed)	.686			
User Ability	Pearson Correlation	.554**	-0.0338	1	
	Sig. (2- tailed)	.000	0.7845		
System Compatibility	Pearson Correlation	.398**	-0.0644	.479**	1
	Sig. (2- tailed)	.001	0.602	.000	

4.8 Regression Analysis

Regression analysis was adopted in establishing the relationship that existed between the research variables. The results are as shown by Table 4.10.

Table 4.10 Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.579 ^a	.336	.3045	0.804

a. Predictors: (Constant), System Compatibility, System Infrastructure, User Ability

The results of the regression analysis statistics obtained as shown by Table 4.10 indicate that the coefficient of correlation was 0.579 indicating that the ECT has a positive effect on the C&BC department performance. The regression analysis further showed that the ECT constructs account for 33.6% of the total variation of the C&BC department performance ($R^2=0.336$). This means that the remaining 66.4% of the changes in the C&BC department performance is accounted for by other factors not presented in the model. Therefore, showing that the ECT features had a positive but minimal effect on the C&BC department performance.

Table 4.11 Analysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.904	3	6.968	10.78	.000a
Residual	41.375	64	0.646		
Total	62.279	67			

Predictors: (Constant), System Compatibility, System Infrastructure, User Ability
Dependent Variable: C&BC Performance

ANOVA as shown by Table 4.11 indicate a significance of 0.000 which implies that the model was sufficient in describing the relationship that exists between the research variables ($P<0.05$). The estimated value was higher than the critical value, showing that the overall model was important ($10.78 > 6.968$).

Table 4.12 Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	2.073	0.5567		3.723	0.000
System Infrastructure	0.080	0.1058	0.077	0.756	0.452
User Ability	0.320	0.0786	0.472	4.069	0.000
System Compatibility	0.136	0.0900	0.176	1.516	0.135

Predictors: (Constant), System Compatibility, System Infrastructure, User Ability
Dependent Variable: C&BC Performance

The model coefficients further showed that all the independent variables had a positive effect on the C&BC department performance including System Compatibility ($\beta_1=0.080$), System Infrastructure ($\beta_2=0.320$) and User Ability ($\beta_3=0.136$). However, all the variables except User Ability had p values more than 5% ($P > 0.05$) meaning that they are not able to effectively explain changes in the C&BC performance on their own. The positive relationship was obtained by other empirical studies (Nyongesa, 2018; Kilonzi, & Kanai, 2020; Kabiru, 2016). Lusanga, and Bhero, (2016) also concluded that electronic cargo tracking in developing countries has been associated with several benefits to the transporters that include increased efficiency and productivity which results in a cost reduction benefits.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings and discussion. The chapter also contains the conclusions and recommendations of the study.

5.2 Summary of the Findings

The purpose of the study was to determine the effects of ECTs implementation on the performance of C&BC department in Kenya. A descriptive research approach guided the study. The population for this research comprised of the Top KRA management, employees working at the Customs and Border Control Department and Transit Monitoring Unit (TMU). Data for the study was collected using both primary means using semi structured questionnaires. The collected data were analyzed using descriptive and inferential statistics and presented in tables and figures. Summary of key findings is presented below as per the specific research objectives.

5.2.1 Effect of ECT system infrastructure on the performance of C&BC department

The first objective of the study was to determine the effect of ECT system infrastructure on the performance of C&BC department. From the outcomes of the descriptive statistics, it was deduced that many respondents agreed with the statements that suggest a moderate extent of effect of ECT system infrastructure with an overall mean of ($\bar{x}=3.54$). From the Pearson Correlation analysis results, it is clear there was a moderately strong positive and but not significant correlation between ECT system infrastructure and C&BC department performance ($r=0.050$, $p=0.686>0.05$). This means that keeping all other independent variables constant, a unit change in ECT

system infrastructure leads to unit increase in C&BC department performance. This compares with Mugambi, (2017) who conducted a study effect of cargo tracking system on cross-border trade between Kenya and Uganda and concluded that electronic cargo tracking system infrastructure improves the border efficiency, reduction of transit time and cost of private business.

5.2.2 Effect of effect of ECT's user ability on the performance of C&BC department

The second objective of the study was to establish the effect of ECT's user ability on the performance of C&BC department. From the outcomes of the descriptive statistics, it was deduced that many respondents agreed with the statements that suggest the influence of ECT's user ability on the performance of C&BC department as indicated by an overall mean of ($\bar{x}=3.84$). From the Pearson Correlation Analysis results, it is clear there was a moderately strong positive and significant correlation between ECT's user ability and the performance of C&BC department ($r=0.554$, $p=0.000<0.05$). This means that keeping all other independent variables constant, change in ECT's user ability leads increase in C&BC department performance. This compares to studies conducted by Kilonzi, and Kanai, (2020) who established the same in their respective studies.

5.2.3 Effect of ECT compatibility with existing systems on the performance of C&BC department.

The third objective of the study was to determine the effect of ECT compatibility with existing systems on the performance of C&BC department. From the descriptive statistics results, it was deduced that many respondents agreed with the statements that suggest the influence of ECT compatibility with existing systems on the performance of C&BC department as indicated by an overall mean of ($\bar{x}=3.86$). The results of the Pearson Correlation Analysis reveal a moderately strong positive and significant

correlation between ECT compatibility and performance of C&BC department ($r=0.398$, $p=0.001<0.05$). As a result, keeping all other independent variables constant, a unit change in ECT compatibility will result in increase in the performance of C&BC department. In a similar manner, Mumia, (2021) concluded that improving system automation will lead to improved customs performance at the port of Mombasa in Kenya.

5.3 Conclusion

The study found out that the three aspects of ECT investigated including System Infrastructure, User Ability and System Compatibility had a positive effect on C&BC department performance. The study thus concludes that the sustainability, viability and profitability of C&BC department will be based on the efficiency in coordination of these aspects. From the inferential analysis, the study concludes that ECT had a significant positive relationship with C&BC department performance. This is attributed to the fact that ECT implementation improves the border efficiency, reduction of transit time and cost of private business. The ECT also enables automatic remote tracking and monitoring, data collection and protection of cargo as it is transported from one location (start point) to its destination as well as continuous monitoring of the transported cargo.

The study also concludes that the C&BC department has experienced improved productivity, effectiveness, improved personnel skills, improved governance and reduced related operating costs since adoption of ECT. This is largely because it enables data captured on the system to be shared on a real time basis resulting to reduced dumping, reduced tax evasion and cargo theft in the country. Further, the study concludes that increased coordination and information sharing of cargo has improved the efficacy of C&BC department. There are however some aspects that need to be

improved to realize the full potential and benefit of RECTS to customs service department of KRA.

5.4 Recommendations for Practice

The study recommends that the functionality of ECT should be enhanced to improve the transactions at the borders which leads to improved revenue collection at the borders while reducing transit goods violations. This will also lead to the adoption of RFID system which shares real time information on the movement thereby leading to reduced dumping, reduced tax evasion and cargo theft while goods are in transit. Therefore, more adoption of the ECT system and RFID system is recommended to improve the business transactions at the borders.

Kenya Revenue Authority is recommended to recheck the need to enhance ECT reforms and enhance systems validations and integrity so as to enhance C&BC performance. Systems enhancement based on risks management will be a key game changer in this era of digitization. This is because some reforms do not affect entirely the performance of C&BC department. Some systems can be manipulated to bring out less than optimal performance based on ethics of individuals. The system should also use a combination of both passive and active RFID to capture audit trails of freight consignments, in the process improving both the efficiency and security of cross-border operations.

The study also recommends that the C&BC need to deploy more manpower to the TMU unit to ensure that the targeted number of 12 RRU units is realized. This would reduce geographical area coverage per a single RRU therefore reducing delays in response to alerts. There is also need for more financial injection so as to raise the number of

electronic seals currently under operation to the projected figure of 17000. This would ensure more cargo is tracked with ECTS and no delays at the port due to lack of seals.

5.5 Recommendations for Policy

The study recommends that emphasis should be put on the incorporation of the principles and policies of operational performance to aide in the successful implementation of the cargo tracking system by the concerned sectors. The role of the vendors offering the service, the role of the leaders both at KRA and in the transportation organizations, the participation of the employees and the spirit of empowering them, feedback, training and communication are critical to be able to succeed.

The ministry of finance as the parent ministry under which KRA draws its funding is recommended to increase the 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. 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 ECT against any form of litigation or court actions.

5.6 Recommendations for Further Research

The study was limited to only three aspects of ECT including System Infrastructure, User Ability and System Compatibility. The study thus suggests that to enable holistic determination of the effects of ECT, further studies should be undertaken encompassing other aspects of the ECT including tracking modules, seal management, reader

management and notification modules. The study also suggests that a comparative study should be carried using with systems implemented by our neighboring countries as this will assist in establishing any similarities and differences that may exist as far as the electronic cargo monitoring system is concerned. The study also established that ECT was yet to be completely adopted which necessitates further enquiry into the challenges facing cargo tracking system implementation and execution. The study also recommends a further study on the cost benefit of implementation and operation of ECTS by the Revenue Authority to enable determination its effects on the financial aspects of C&BC. Additionally, further studies are suggested at different time frames so as determine whether the ECT practices would have changed or improved.

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APPENDICES

Appendix I: Introduction Letter

Dear Respondent,

This study is aimed at collecting data on *the effects of ECTs implementation on the performance of C&BC department*. This is to kindly request for your participation in this study.

Please note that participation in the research is optional and you could decide whether or not you would like to proceed with the study. You may decline to answer any or all questions and you may terminate your involvement at any time if you choose.

Your responses to this research questions will be anonymous and your participation in this study is voluntary. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason.

If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher or the University. I provide assurance that the information obtained from this study will be maintained as confidential and only utilized for academic purposes.

Your accurate and frank responses are required to make this survey reliable and valid.

Thank you.

Mutinda Judy Mwelu

Appendix II: Questionnaire

This questionnaire consists of two sections. Please see the instructions at the beginning of each section.

Kindly respond to the spaces provided.

SECTION A: Background Information

Kindly fill in the blank spaces and tick where appropriate.

1. What position do you hold in the organization?.....
2. Indicate your educational level
 - Diploma { }
 - Degree { }
 - Masters Degree { }
3. How long have you worked at the C&BC department in Kenya?
 - Less than 3 Years { }
 - Between 3 – 7 Years { }
 - Between 7 – 12 Years { }
 - Over 12 Years { }

SECTION B: ELECTRONIC CARGO TRACKING SYSTEMS (ECTS) IMPLEMENTATION AT CUSTOMS AND BORDER CONTROL DEPARTMENT IN KENYA

Kindly rate the extent to which you agree with the following statements by ticking where appropriate.

1. System Infrastructure

Kindly rate the extent to which you agree with the following statements on the infrastructure of the Electronic Cargo Tracking Systems (ECTs) Implementation in Kenya.

Key – 5- Strongly Agree, 4- Agree, 3 – Neutral, 2- Disagree, 1- Strongly Disagree

	Statement	5	4	3	2	1
1	Electronic cargo tracking system data communication networks provides real time information on the goods in transit enhancing faster clearance of cargo.					

2	The systems' central monitoring unit is efficient in information storage for over 12 months and sharing					
3	The use of Electronic seals and geo fence has helped reduce theft on goods in transit					
4	The ECTs Centralized Monitoring Centre (CMC) is able to provide information even when the system is offline					
5	The system hardware i.e. the geo fence is properly located along the routes and captures correct data avoiding delays					

2. User Ability

Kindly rate the extent to which you agree with the following statements on the ability of the cargo tracking system to be applied by different types of users to access services offered by the Kenya Revenue Authority.

Key – 5- Strongly Agree, 4- Agree, 3 – Neutral, 2- Disagree, 1- Strongly Disagree

	Statement	5	4	3	2	1
1	The users requires minimum training to understand and use of the Electronic Tracking Systems controls and hardware					
2	The Electronic Cargo Tracking system captured information is easily accessible to the end user					
3	The users educational background makes it easier to understand and use the Electronic Cargo Tracking systems.					
4	The Electronic Cargo Tracking systems is efficient and useful to the user in improving their performance in the C&BC department					

5	The information captured by the Electronic Cargo Tracking system is easily interpreted by the end user					
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3. System Compatibility

Kindly rate the extent to which you agree with the following statements on the compatibility of the Electronic Cargo Tracking Systems (ECTs) Implementation in Kenya.

Key – 5- Strongly Agree, 4- Agree, 3 – Neutral, 2- Disagree, 1- Strongly Disagree

	Statement	5	4	3	2	1
1	The ECT system is able to pair and works well with the latest versions of systems like ICMS system (forward testing).					
2	The system allows multiple users to be online and work at the same time.					
3	The system is able to pair and work easily with old versions of other systems e.g. SIMBA systems (backward testing).					
4	The system is compatible with the other set-up organizational systems like the GPS ,Geo fence and Electronic seals					
5	The systems is compatible with other systems in neighboring counties					

PART C: C&BC DEPARTMENT PERFORMANCE

This section aim at determination of the C&BC department performance from 2015 to 2021. The implementation of the Electronic Cargo Tracking systems has improved the performance at the C&BC department Kindly rate the following measures of performance by ticking where appropriate.

Key – 5- Very Large Extent, 4- Large Extent, 3- Moderate Extent, 2-Small Extent, 1-Very Small Extent

	Statement	5	4	3	2	1
1	Electronic Cargo tracking system implementation has reduced Transit time					
2	Electronic Cargo tracking system implementation has increased the amount of revenue collected					
3	Electronic Cargo tracking system implementation has improved Clearing Efficiency					
4	Electronic Cargo tracking system implementation has improved Cargo Security					
6	Electronic Cargo tracking system implementation has improved Quality service offered at the C&BC department					
7	Electronic Cargo tracking systems has facilitated cost control in the C&BC department.					

Appendix IV: Research Budget

	Activity	Kenya shillings (Ksh)
A	Project Preparation	
	USB Flash disk	1,500
	Photocopy papers @ 500	2,500
	Writing of project	4,000
	Data collection instruments	5, 000
	Sub total	13,000
B	Thesis Preparation	
	Bureau services	
	Thesis photocopy and printing (5 copies)	2,500
	Binding (5 copies)	2,500
	Research Assistant's fee	10,000
	Publication of complete thesis	20000
	Sub total	35,000
	Total	48,000
	Contingencies (10Per Cent of the total)	4, 800
	Grand Total	52, 800

Source of Funding: Self

