

**EFFECT OF CUSTOMS ELECTRONIC SYSTEMS ON TRADE
FACILITATION AT KEY ENTRY POINTS (JKIA, ICD AND MOMBASA
PORT) IN KENYA**

BY

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**A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF BUSINESS
AND ECONOMICS IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF DEGREE OF MASTERS IN TAX AND
CUSTOMS ADMINISTRATION**

MOI UNIVERSITY

2021

DECLARATION

Declaration by Candidate

I, the undersigned, declare that this is my original work and has not been submitted for a degree to any other college, institution or university other than Moi University.

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Declaration by the Supervisors

This research project has been submitted with our approval as the University supervisors.

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DEDICATION

ACKNOWLEDGEMENTS

I would first acknowledge the Almighty God for the good health during the entire period of this work. I would also like to acknowledge the assistance of my research Supervisors Dr. Doris Gitonga and Dr. Ronald Bonuke for their guidance and constructive criticism in the writing of this research project. Without their input, this work would remain incomplete.

ABSTRACT

Despite reforms, trade procedures in Kenya remain lengthy, cumbersome, and costly. This has negatively impacted the competitiveness of Kenyan goods in the region. This study investigated the effect of customs electronic systems on trade facilitation at key entry points in Kenya. Specifically, the study sought to determine the effect of the Integrated Customs Management System on trade facilitation at key entry points in Kenya; establish the effect of the Electronic Cargo Tracking System on trade facilitation at key entry points in Kenya, and assess the effect of scanning technology on trade facilitation at key entry points in Kenya. The study was supported by diffusion of innovation theory, technological determinism theory, and resource-based view theory. The explanatory research survey design was employed. The target population of the study was 147 Customs officials at JKIA, ICD, and Mombasa Port. Out of the 147 questionnaires distributed, 143 were filled and returned resulting in the response rate of 97.27%. Data collected was analyzed using descriptive and inferential statistics. Descriptive findings were presented in form of averages, standard deviations, counts, and percentages. Inferential statistics relied on the use of correlation and regression analyses. The study findings indicated that the Integrated Customs Management System had a positive and significant effect on Trade Facilitation at key entry points in Kenya ($\beta_1=0.230$, $p=0.02<0.05$). Electronic Cargo Tracking System had a positive and significant effect on Trade Facilitation at key entry points in Kenya ($\beta_2=0.153$, $p=0.028<0.05$). Likewise Scanning technology had a positive and significant effect on Trade Facilitation at key entry points in Kenya ($\beta_3=0.506$, $p=0.000<0.05$). The study concluded that Customs Electronic Systems play a fundamental role in explaining changes in trade facilitation in Kenya. The study recommended that management of key entry points should continue encouraging the use of customs electronic systems in daily operations. The management should organize regular training workshops aimed at equipping employees with the necessary skills to handle customs electronic systems. The government of Kenya should allocate enough financial resources to boost the development and maintenance of the customs electronic systems. Future researchers could introduce intervening or moderating variables in the model and establish their role in determining the relationship between customs electronic systems and trade facilitation. Some of these factors could include government regulations, organization culture, and technological capabilities.

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ABBREVIATIONS AND ACRONYMS

CASE:	Customs Automated Services
CRV:	Consignment Release Verification
DPC:	Document Processing Center
ECTS:	Electronic Cargo Tracking System
EMCS:	Excise Movement Control System
ESA:	East and Southern Africa
FDI:	Foreign Direct Investment
ICD:	Inland Container Depot
ICT:	Information and Communication Technology
JKIA:	Jomo Kenyatta International Airport
CAA:	Kenya Airports Authority
KPA:	Kenya Ports Authority
KRA:	Kenya Revenue Authority
NACOSTI:	National Commission for Science, Technology and Innovation
NASP:	National Airport System Plan
NES:	National Export System
NTB:	Non-Tariff Barriers
PEOU:	Perceived Ease of Use
RBV:	Resource-Based View Theory
SD:	Summary Declaration
SPSS:	Statistical Package for Social Sciences
TD:	Technological Determinism
VIF:	Variance Inflation Factor
WCO:	World Customs Organization

WF: Webb Fontaine
WTO: World Trade Organization

OPERATIONAL DEFINITION OF TERMS

Electronic Cargo Tracking System: is a technology solution that enables real-time tracking of cargo from point of loading to point of discharge or off-loading (Raghu Das & Peter Harrop, 2013)

Integrated Customs Management System: is a modern, robust, and efficient system that runs on the most recent technological platforms and seamlessly connects with KRA's internal systems as well as the systems of external stakeholders to achieve faster cargo clearance (KRA, 2018).

Scanning Technology: is a risk management process that aims to eliminate human interaction in shipment screening (Beaulieu & Dutilleul, 2019).

Trade facilitation: examines how procedures and rules regulating the flow of commodities across national borders might be enhanced in order to reduce related economic burdens and maximize efficiency while protecting valid regulatory objectives (Gnangnon, 2017).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Trade facilitation is seen as an important factor in determining a country's export competitiveness. It addresses a variety of issues critical to the smooth and efficient flow of trade (Swaleh, 2020). Most economies, however, are extremely vulnerable to high trading costs. Lowering trade costs will encourage developing countries to participate more in international trade, increase trade flows, and help to their economic development. There is broad agreement in the literature that future cost reductions in trade will be achieved by removing non-tariff trade barriers (NTBs), including promoting digital trade, such as the B. electronic customs system. According to Alipour (2017), one method for facilitating commerce is to equip businesses participating in commercial processes with current technology. In the form of an electronic customs system, ICT applications play a critical role in the transmission of electronic data. Many countries have begun to use electronic customs management and have seen the benefits and positive consequences of the operation.

Trade facilitation is defined by the World Trade Organization (WTO) as the simplification and harmonization of international trade procedures for the collection, presentation, transmission, and processing of data required for the movement of goods in international trade, resulting in greater trade (WTO, 2015). Trade facilitation, according to Sakyi and Afesorgbor (2019), is the acceleration of the movement, release, and clearing of products, including goods in transit. Trade facilitation can also mean an attempt to trade lawfully with minimal delay, while exercising the necessary controls is considered essential to facilitate trade (Swaleh, 2020).

Trade facilitation refers to all agreements that aim to improve border and transportation efficiency while also lowering transaction costs associated with trade flows. The regulations cover issues of transportation and transit, professionalism of customs authorities, transparency, banking and insurance, business practices, telecommunications and compliance with international (regional) standards (Narayanan, Sharma & Razzaque, 2016). Trade facilitation also tries to improve international trade by removing administrative barriers, streamlining trading procedures, boosting transparency and security, and incorporating technology into the trade process.

The electronic customs system collects all customs data entered, calculates tariffs and other taxes, and validates entries. Connect to the Customs Automated Services (CASE) website and initiate file transfers to submit entries electronically. Receive submission confirmation or rejection, along with a full mistake analysis; Print the necessary forms and reports. In 1997, the electronic customs system was implemented. By 1998, nearly all cargo handling segments had been fully automated, and the system was operational in all major ports around the world (Mwende, 2020).

An important strategy is the widespread use of information and communication technology, particularly to improve customs operations prior to cargo arrival, automate processes, and minimize human participation. Systems and procedures will be redesigned as follows: processes will be automated to reduce disruption to up to 80 percent of transactions, controls will be placed where they are most effective without disrupting business, remote facilities for filing declarations will be provided, Paper and cashless processing will be introduced, certain processes are privatized and

eventually the authorities involved in the system are connected electronically (Customs & Protection, 2016).

National Import System (NIS), National Export System (NES), Excise Movement Control System (EMCS), scanning technology, summary declaration (SD), manifest, Online Payment System, Consignment Release Verification (CRV), and electronic cargo tracking system are examples of customs electronic systems. This study focused on integrated customs management system, scanning technology and electronic cargo tracking system. The choice of the three customs electronic systems was because they have been used in previous studies (Njoku et al., 2012; Kabiru, 2016; Mugambi, 2017; Makunike, 2017; and Omosa, 2020).

The Integrated Customs Management System (ICMS) is a contemporary, resilient, and efficient system that operates on cutting-edge technological platforms and effectively integrates with KRA's internal and external actor systems to enable speedier cargo handling. The Revenue Authority of Kenya manages ICMS, which increases commercial efficiencies by speeding up the cargo handling process and lowering the complexity associated with numerous manual process automation systems and process redesign (KRA, 2018). An electronic products tracking system is a technology solution that allows for real-time tracking of commodities from loading to unloading. This system was introduced to help customs authorities and private freight forwarders around the world monitor the movement of goods remotely and prevent goods in transit being stolen and goods in transit being unloaded through an area.

The electronic customs system, according to Sachasia (2017), is the use of current information and communication technology (ICT) for procedures linked to the

transportation of products across borders. It encompasses, in particular, measures that allow for the electronic (and non-paper) transmission of data and documents between public and private players involved in international trade, as well as cross-border paperless trade. These paperless trade procedures are becoming increasingly vital not just for maintaining trade competitiveness, but also for overcoming trade control and logistical issues associated with increasing tiny shipments and cross-border e-commerce. As a result, facilitating digital commerce through the introduction of cross-border paperless trading measures promises to cut trading expenses while increasing trade (Duval, Utoktham & Kravchenko, 2018).

Customs administration is a critical component of the international commerce cycle in Iran, without which export, import, and transit processes and formalities cannot be performed. Furthermore, completing the business cycle necessitates the interchange of vast amounts of commercial papers and information, and it is common to see different businesses involved in business operations attempting to access the same information in different ways. This increases the time and cost of handling business procedures by 4 to 7 percent of the delivery's value. Because of the vast volume of commercial cargo transferred between different countries each year, this percentage is exceptional, showing the need to convert to trade facilitation (Alipour, 2017).

Senegal has also adopted the custom electronic system in trade management. The system was developed in 1990. Professionals are currently employed to maintain, upgrade, and run the system, at an annual cost of roughly € 600 000. Senegal has adopted a number of bespoke electronic systems, including the single window system (Orbus) and system drawings (Yasui & Engman, 2019). In Canada, the standard goods release time in 2000 was 45 minutes, but most goods were released in seconds

in 2009. This is a result of the introduction of digital trading facilities in 2008. In Australia, more than 98% of imports are shipped electronically. processed within 15 minutes in 2000 (Australian Customs, 2015). Moroccan automated systems helped cut the average release time from 132 hours in 1997 to less than an hour in 2002 in 2016 (Sakyi & Afesorgbor, 2019).

Nigerian Consumer Services started implementing ASYCUDA 2.7 through the ECOWAS Community Computer Center in 1999 to automate the process. FGN after evaluating the benefits of ASYCUDA 2.7. With the aim of increasing sales and speeding up the handling of goods, a contract was signed with UNCTAD in 2005 to implement ASYCUDA++ / Dunia for a period of three years to further improve customs clearance. In 2006 UNCTAD succeeded in converting customs clearance to use ASYCUDA++, supported by a further contract with Webb Fontaine (WF) in 2005 to provide the telecommunications backbone and software and other systems required for ASYCUDA++/World. In 2011, more than 4,200 NCC employees were trained in customs procedures, risk management, trade facilitation, image analysis, and systematic audits. This eliminates the commercial process of providing the same data to several different government agencies for traders or shippers (Adeniji, 2018).

In Kenya, trade facilitation is provided by a number of institutions whose roles include collecting revenue, providing transport services, and ensuring goods meet applicable health standards and regulations, and efficiency. However, in terms of the time it takes to complete a trade transaction process and the numerous procedures that must be followed, Kenyan enterprises confront several trade barriers that facilitate trading both domestically and beyond borders. Concerns about trade facilitation are mostly focused on border formalities both at home and abroad. The primary goal of

enabling cross-border trade is to boost the efficiency of port operations through the use of information technology. As a result, Kenya has launched an initiative to reform and modernize customs services (CRM). The project's goal is to turn customs into a contemporary customs administration by 2008/09, in compliance with internationally recognized conventional standards and best practices of the WTO agreement and the amended WMO Kyoto agreement on customs procedural simplification and harmonization (Tavengerwei, 2018).

Kenya's transportation infrastructure consists of an airport, road, rail, and pipeline network; commercial ports in Kilindini and Mombasa, as well as tiny local ports in Lamu, Malindi, Kilifi, and Shimoni; and internal container depots in Nairobi, Eldoret, and Kisumu. This study focuses on the main import entry points in Kenya, including airports, domestic container depots in Nairobi, Eldoret and Kisumu, and commercial ports in Mombasa (Appling, 2017).

A complicated transit facility for aircraft, people, cargo, and ground vehicles is an airport. Each of these users is served by a distinct airport component. Kenya Airports (KAA) manages a coordinated network of airport facilities around the country, with each airport serving a distinct purpose. KAA has a National Airport System Plan (NASP) in place for this purpose, which was first developed in 1993 and is updated on a regular basis to reflect changes in growth and traffic trends. In the foreground, international airports include Jomo Kenyatta International Airport (JKIA), Moi International Airport, Mombasa International Airport, and Eldoret International Airport, while significant domestic airports include Wilson, Malindi, Ukunda, and Lamu (Abdullah, 2014).

ICD Inland Container Depot is a container handling and storage facility located far from the port. ICD helps importers and exporters handle their shipments close to their location (Gathogo, 2019). Kenya has three major international container depots in Nairobi, Eldoret and Kisumu. Mombasa port, on the other hand, is the most important port in Kenya and one of the most modern ports in Africa. It services all types of ships and freight, as well as interior areas of Uganda, Rwanda, Burundi, the Democratic Republic of the Congo, Ethiopia, South Sudan, Northeast Tanzania, and Somalia.

1.2 Statement of the Problem

Despite the reforms, trade procedures in Kenya are long, complicated and expensive. This has a negative impact on the competitiveness of Kenyan goods in the region (Kabui & Mwaura, 2019). In 2019, 79% of people who imported goods experienced delays in document processing. There are also many complaints about the compatibility of the computer system used by the port. Between October 2016-August 2017, the number of containers that had overstayed at Mombasa ports were 4923 (KPA, 2018).

The ineffectiveness in trade facilitation in the import entry points has majorly been associated with slow adoption of technology by the agents and brokers. Customs brokers are a particularly difficult group because changes in their interactions with customs reduce their competitive advantage over each other. They are also afraid of new technology because it is the first time they use transactional internet services a lot. Others who are extremely familiar with the technology, on the other hand, do not use it for their own internal activities and are thus inexperienced. Overtime will be eliminated through the electronic system. Personalized computerized systems further

prevent corruption by limiting direct contact between customs officials and merchants, as well as greatly reducing the potential negative impact of physical controls (Duval, 2016).

Past studies have been done on customs electronic systems and trade facilitation but little is known on effect of customs electronic systems on trade facilitation at key entry points in Kenya. Shirsavar and Shirinpour (2016) conducted research on the impact of e-customs administration on the export activities of Gilan, Iran-based export enterprises. This study was conducted in Iran, revealing a contextual gap. Swaleh (2020) also conducted a study on the effect of one-stop border crossings on trade facilitation during the Lunga Lunga-Horo Horo 2015-2020 period, which uses a cross-sectional study design and so constitutes an omission technique. This study will adopt an explanatory research design. Duval, Utoktham and Kravchenko (2018) conducted a study on the effect of introducing digital trade facilitation on trading costs. The study used trade facilitation as the independent variable thus presenting a conceptual gap. In light of this, the purpose of this study was to fill a knowledge gap by estimating the impact of customs electronic systems on trade facilitation at important entry points in Kenya.

1.3 Study Objectives

This study contained both general and specific objective.

1.3.1 General Objective

The general objective of the study was to investigate the effect of customs electronic systems on trade facilitation at key entry points in Kenya.

1.3.2 Specific Objectives

1. To determine the effect of Integrated Customs Management System on trade facilitation at key entry points in Kenya
2. To establish the effect of Electronic Cargo Tracking System on trade facilitation at key entry points in Kenya
3. To assess the effect of Scanning Technology on trade facilitation at key entry points in Kenya

1.4 Research Hypotheses

H₀₁: Integrated Customs Management System does not have a significant effect on trade facilitation at key entry points in Kenya

H₀₂: Electronic Cargo Tracking System does not have a significant effect on trade facilitation at key entry points in Kenya

H₀₃: Scanning Technology does not have a significant effect on trade facilitation at key entry points in Kenya

1.5 Significance of the Study

This study may be beneficial to several groups including government, key entry points management and academicians. The government through the Ministry of Trade may be able to formulate policies relating to custom electronic systems to facilitate trade. The study findings might be of vital importance to the ministry of trade as it will get a true reflection of the customs electronic systems and their effect on trade facilitation.

This study may also be of importance to the management of key entry points in Kenya including JKIA, ICD, and Mombasa Port. This is because it provides valuable

information to the management on how to improve trade facilitation by the use of customs electronic systems.

Further, given the limited knowledge in the same field, the results of this study can be used as a reference for other researchers. Similarly, this research could be of great importance to academics wishing to expand their knowledge of the impact of the electronic customs system on trade facilitation at key entry points in Kenya.

1.6 Scope of the Study

The study sought to determine the effect of customs electronic systems on trade facilitation at key entry points in Kenya. The study focused on three customs electronic systems: Integrated Customs Management System, Electronic Cargo Tracking System and scanning technology. The study used primary data. Primary data was collected through administration of questionnaires. The study focused on key entry points in Kenya including JKIA, ICD, and Mombasa Port. The target population was customs officials stationed at the key entry points.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presented a review of the literature. It covered the concepts of the study, the theoretical framework, empirical review, critiques the literature to present the research gap and the conceptual framework.

2.2 Concepts of the Study

2.2.1 Trade Facilitation

Trade facilitation is becoming an increasingly global concern because of the need for free movement of goods and services due to the increase in trade volume which is directly caused by the liberalization of world trade (Moïsé & Sorescu, 2013). The origins of trade facilitation and issues raised during WTO negotiations were discussed at the Singapore Ministerial Level in 1996 and in Doha, where the Doha Development Agenda was adopted by ministers as a framework agreement. It is important to point out early on that promoting trade, lifting restrictions, and providing means of transportation will not make trade as we know it much easier. Trade facilitation tends to minimize the business costs associated with implementing regulations and guidelines (Feenstra & Ma, 2014).

Trade facilitation investigates how to improve procedures and controls for cross-border movement of products in order to reduce associated costs and maximize efficiency while ensuring acceptable regulatory objectives (Gnangnon, 2017). Business expenses can be incurred directly as a result of information collection and declaration, or indirectly as a result of border restrictions in the form of delays and associated time penalties, missed business opportunities, and decreased

competitiveness. Trade facilitation is defined by Sakyi et al. (2017) as the streamlining and harmonization of international trade procedures. These procedures cover the activities, practices, and formalities related with the collection, distribution, delivery, and processing of data required for international commerce goods movement. According to Seck (2016), trade facilitation also includes customs officials' transparency and professionalism, the harmonization of diverse standards, and conformity with international or regional legislation. The mobility of goods in cross-border trade is addressed by trade facilitation.

Trade facilitation is the simplification and harmonization of international trade procedures (Grainger, 2008). This definition includes the various activities, practices and formalities associated with the collection, delivery, transmission and processing of data necessary for the movement of goods in international trade. These include improving transportation infrastructure, modernizing customs administration, removing other non-tariff barriers to trade and promoting exports. Trade Facilitation is a concept that aims to reduce the complexity and cost of processing trade transactions and ensure that all these activities are carried out in an efficient, transparent and predictable manner. It covers a wide range of areas and activities, such as government regulation and control, business efficiency, transportation, information and communication technology, and payment systems.

Effective trade facilitation requires broad and deep commitment from government agencies, collective and professional business support, and integrated and coordinated technical assistance. Therefore, it is important to increase the capacity of customs administration and border control authorities to facilitate trade. These include capacities related to trade procedures (development, dissemination and application of

rules and regulations) and capacities related to trade infrastructure (particularly in the field of information and communication technology (ICT), particularly single windows) (Hoekman & Shepherd, 2015).

2.2.2 Electronic Cargo Tracking System

An electronic cargo tracking system (ECT) is a system that has been established to electronically monitor and regulate products in transit along corridor routes to their destinations. The monitoring of items occurs in real time and is accomplished through the use of radio frequency identification (RFID) and GPS/GPRS technology (Raghu Das & Peter Harrop, 2013). In Kenya, all trucks/vehicles, tanks and containers carrying transit goods must be equipped with location devices for electronic monitoring and tracking of goods. In addition, Musyoka (2016) claims the vehicle is equipped with an electronic seal that recognizes the location of the truck and reports all violations in real time.

Electronic tracking has several benefits for shippers, including greater efficiency and productivity, resulting in cost savings. This system also helps improve reliability and service quality, which is widely seen as a tool to retain good customers and increase market share and revenue, and ultimately improve the integrity of transport and containers due to important safety concerns (Huanye, 2010). Similarly, in this case, the system offers KRA benefits to the public sector. Implementation of the system increases the efficiency and effectiveness of operating results. This is a double-edged sword with the hope that reducing illicit trade through diversion will lead to increased import revenues.

2.2.3 Scanning Technology

Scanning is a risk management process that aims to avoid human intervention when checking shipments (Beaulieu & Dutilleul, 2019). The procedure entails using high-resolution x-ray scanners on imported items delivered by containers and vehicles. The goal of this procedure is to collect high-resolution photos of concealed and non-hidden objects so that they may be digitally assessed on a regular basis using advanced image analysis software.

X-ray technology is central to the scanner's function. Safety and performance assessments are usually carried out prior to using these high emission devices on site and, if satisfactory, issuing a certificate, the type of license that allows the owner to operate according to licensing principles. The procedure entails using high-resolution x-ray scanners on imported items delivered by containers and vehicles. The goal of this procedure is to collect high-resolution photos of concealed and non-hidden objects so that they may be digitally assessed on a regular basis using advanced image analysis software.

2.2.4 Integrated Customs Management System

The Integrated Customs Management System (ICMS) is a contemporary, sustainable, and efficient system that operates on cutting-edge technical platforms and connects seamlessly with KRA internal systems as well as external stakeholder systems to facilitate speedier clearance of goods. iCMS, which is managed by KRA, improves trade efficiency by speeding up the cargo handling process and reducing the complications associated with multiple systems for automation of manual processes and process reengineering (KRA, 2018). The system intends to make doing business in Kenya easier by streamlining processes that permit pre-arrival processing and

creating processes that allow AEOs to receive preferential treatment that they previously did not receive due to limits that the prior System could not afford. The ICMS system is expected to address security risks by offering a solid risk management system that assures a secure retail chain, facilitates regional integration by integrating with regional revenue administrations, and maintains cargo transparency by eliminating human involvement (KRA, 2018).

2.3 Theoretical Framework

This section provides review of theories that underpin the study. The theories include diffusion of innovation theory, technological determinism theory and resource-based view theory.

2.3.1 Technological Determinism Theory

This theory was developed by Thorstein Veblen (1857-1929). The philosophy of technological determinism is a reductionist philosophy which holds that the main cause of change in society is technological change. This means that the technology of a society influences the growth of its cultural and social structure. Technological determinism has been used to hinge several analyzes of shifts in socio-economic structures that are the transition from feudalism to capitalism, shifting work and skills structure of 20th century labor force and globalization. For some, technological progress is an expression of the hope of incremental freedom from the pressures of needless illness and labor. For others, this same direction represents a loss of our very identity, snatching us into ever more complex, alienating and dangerous systems of technology (Adler & Borys 1989). Technological determinism attempts to understand the effect of technology on human action and thinking. Nevertheless, there are some disadvantages to the concept.

According to Gillies (1990), people vary in technology adoption. For example, in his assessment of the power of the Internet in culture, Andrew Feenberg (2000) takes a near-evangelist stance: "The true revolution took place when the Internet became a platform for personal communication.". Nevertheless, Feenberg also understands the often-dystopian nature of technology, so particularly his appreciation for Internet technology is something to be noted. Essentially, he argues that internet communications are democratized and points out that people on the internet are not only users of data (or entertainment), but also creators. Chandler (2000) further contends that determinism automatically equates technology with a position of total control over society, and that this belief can lead to people feeling powerless to change the apparent direction in which technology is heading society.

The principle is applicable in this study as it promotes the adoption of technology. It is instrumental in allowing the customs department to appreciate the shaping of the technological processes such as the use of customs electronic system in improving their operations for the country's trade competitiveness and trade effectiveness. The theory therefore, supported the customs electronic systems including Integrated Customs Management Systems, Electronic Cargo Tracking System and Scanning technology.

2.3.2 Diffusion of Innovation Theory

The theory of diffusion of innovation was developed by Rodgers (1962) and states that there are five innovation attributes that can determine the acceptance of an innovation. Relative advantage, compatibility, complexity, testability, and observability are the five qualities of perceived innovation (Rodgers, 1962). Relative advantage is defined as "the extent to which an innovation is judged to be superior to

the idea it replaces." The degree to which development is considered as "predictable with past values, past experiences, and demands of anticipated consumers" is defined as compatibility. The complexity of an innovation lies in whether it is considered "generally difficult to use and understand". Probability testing indicates whether an innovation can be "tried to some extent". Finally, observability is whether "the effects of an innovation are visible to others".

Because it clarifies the concept of innovation, the diffusion of innovation theory is useful to this research. The study focuses on customs electronic system, which is a form of innovation. This is a technology or innovation that KRA has adopted in order to enhance customs operations. The theory thus provided a link between customs electronic systems and trade facilitation.

2.3.3 Resource-Based View Theory (RBV)

The RBV theory was first proposed by Wernerfelt in 1984 and later expanded by Helfat in 2003 and puts emphasis on the organization's resources as critical determinants of performance. To achieve high productivity, according to the theory, an organization must find its resources, develop them and use them sustainably. This theory makes two assumptions when analyzing sources of competitive advantage (Barney, 1991). First of all, it is assumed that firms in an industry can be heterogeneous in terms of the pool of resources they control. Second, it is assumed that the heterogeneity of resources can be sustainable over time because the resources used to implement the firm's strategy do not show perfect mobility between firms. Heterogeneity (or uniqueness) of resources is seen as a necessary condition for the resource package to contribute to competitive advantage (Bridoux, 2004).

This theory is important in this study because it supports to the concept of trade facilitation as resource. Trade facilitation investigates how to improve procedures and controls for cross-border movement of products in order to reduce associated costs and maximize efficiency while ensuring acceptable regulatory objectives (Gnangnon, 2017). A country that utilizes trade facilitation as a resource is expected to enhance its trade efficiency in terms of increase in trade volume, cost reduction and faster release of goods. RBV theory thus supported the trade facilitation variable in this study.

2.4 Empirical Review

This section provides a review of past literature related to the study objectives. A critique of the literature is captured as well as the research gaps.

2.4.1 Integrated Customs Management Systems and trade facilitation

Ngigi and Collins (2015) investigated the impact of an integrated tax management system on tax compliance among Nairobi District's small and medium-sized businesses. A descriptive study approach and an interested population of 1737 SMEs were used to meet the research aims. For this study, a sample of 173 SMEs was chosen using a simple procedure for a random stratified sample based on the demographic classification supplied on the City of Nairobi website. Many linear regressions have been used to investigate the relationship between fines and penalties, as well as the relationship between tax compliance and tax compliance expenses. This study found that the amount of fines and fines paid as well as tax consulting/processing fees were positively and significantly associated with tax compliance. However, this study finds a conceptual gap as it focuses on tax compliance rather than trade facilitation as a dependent concept.

Grainger (2016) investigated the administration of customs in multinational corporations. A review of pertinent customs rules, procedures, and literature provides the backdrop required. The findings revealed that senior customs officers were active in three interconnected areas of activity: logistics support, supply chain management, and regulatory compliance. The identified customs management practices provide relevant company employees with the ability to identify and review opportunities for improvement and make more appropriate compromises in terms of timing and division of labor. A greater understanding of customs administration methods is also beneficial for trade and customs policymakers tasked with minimizing transaction costs between businesses and border authorities – especially in the context of trade facilitation. However, this study shows context gaps as it does not focus on the Kenyan context.

Omosa (2020) identified factors that affect the revenue representation of the Ministry of Customs and Excise and Border Control in Kenya in terms of actual revenue collection, trade facilitation, and public protection. It focuses on determining the impact of Integrated Customs Management (ICMS) on the revenue presentation of the Department of Customs and Border Control in Kenya. This study adopted an explanatory research design. The results show that the presentation of customs revenues in Kenya has increased significantly since the introduction of the ICMS. Nonetheless, the study presented a contextual gap since it did not target key entry points in Kenya.

Chimilila, Soapani and Benjamin (2014) handled trade facilitation in the Customs Union of the East African Community (EAC CU), track performance and performance, and use Tanzania as an opportunity. This study employed a descriptive

research design, with the majority of the research data coming from secondary sources; unstructured interviews with important stakeholders supplemented the data for this study. The study finds that trade facilitation, trade performance, foreign direct investment inflows and business tax collection have significantly improved in all EAC countries as a result of the implementation of trade facilitation initiatives. Tanzania outperforms the other EAC countries in terms of FDI inflows and exports' contribution to GDP (GDP). According to the findings of this study, there is a considerable positive association between trade facilitation and export performance. It was discovered that the relief had no meaningful relationship with FDI flows. Non-tariff barriers, transportation infrastructure, insufficient staff capacity, and low levels of automation are the key trade facilitation impediments. Addressing these issues will boost the EAC countries' trading advantages. However, this study shows no relationship between an integrated customs administration system and trade facilitation, therefore this study should be conducted.

Komarov (2016) analyzed the basic principles and requirements of international standards for customs risk management. The stages of establishing customs risk management in Ukraine and the prospects for its development are established. Particular attention is paid to implementing international law enforcement information systems to ensure legal compliance throughout the supply chain. The role of risk management maturity level for the introduction of integrated risk management in customs authorities is emphasized. On the basis of quality management, change management and knowledge management, ways of implementing integrated customs risk management were proposed and innovative models for integrated risk management in the activities of the Ukrainian customs authorities were developed. The use of different types of benchmarking in the application of the proposed model

is seen as a powerful tool to improve the efficiency of all operations and management of the customs system. However, the research was conducted in Ukraine, whose operations differ from that of Kenya, which represents a conceptual gap.

Boiwo, Onono, and Makori (2015) investigated the impact of the East African Community Customs Union on Kenyan trade and economic growth. For the analysis, data from the time series 2000 to 2013 were employed, and the EAC manikin coefficient to quantify the influence of customs unions was statistically significant and positive. This conclusion indicates that after the founding of the customs union, Kenya's trade volume increased by 0.9083 percent. The coefficient of the fictitious EAC was likewise found to be positive and statistically significant for the influence of customs unions on commerce in Kenya in the EAC. This means that Kenya's GDP has increased by 0.6214 percent since the establishment of the customs union. According to the study, the founding of the Customs Union EAC had a favorable influence on Kenyan trade and economic growth. The statistics also reveal that commerce to Kenya has increased since the founding of the Customs Union. As a result, the establishment of the EAC customs union is a critical step in the process of developing regional integration among member states. Nonetheless, this study focuses on assessing the impact of the East African Community Customs Union on trade and economic growth in Kenya, while this study focuses on the impact of an integrated customs administration system and trade facilitation.

Ancharaz and Authority (2018) empirically examines some of the most important milestones that have been achieved by MRA Customs on its journey to digitization. The main stages have been considered by considering the plans of the World Customs Organization on digital customs, namely the revision of the Kyoto Agreement (RKC)

and the World Trade Organization Agreement (WTO TFA), the Mercator program, the IMF and others. with other people. This study found that the MRA customs department managed to overcome several important challenges in its digitalization goals, such as paperless customs services, trade facilitation, optimal collection of duties and taxes, and others. Similarly, this research paper also identifies several shortcomings that MRA customs authorities need to address in order to be more efficient, and include the challenge of finding the right balance between trade facilitation and border protection, staff training and training. as well as stakeholders. Research carried out in the context of this document also unequivocally confirms that the MRA customs department has made great progress in terms of digitization and is considered a role model in the ESA region. The study revealed a conceptual gap in which the relationship between an integrated customs administration system and trade facilitation was not clearly visible, which is why the current investigation should be undertaken.

Uzzaman and Yusuf (2011) investigate the role of customs officials and other trade facilitation agencies in Bangladesh. This study employs a mix of primary and secondary data sources to discover that traders in Bangladesh endure delays as a result of excessive paperwork, inefficiency, and arbitrary judgment in carrying out their operations. These issues mostly affect customs and port administration. Other factors, including inaccurate Clean Report Certificate (CRF) issued by the Pre-Shipment Inspection Agency (PSI), a lack of testing facilities, cases filed by traders, and false statements from the trading community, are thought to be responsible for delays and inefficiencies in the design of import and export. However, this study focuses on customs and other authorities, while the current study examines systems of integrated

customs administration and trade facilitation and thus demonstrates contextual differences.

Elmane-Helmane and Ketners (2012) investigated customs and other government agencies' roles in facilitating commerce in Bangladesh. This study employs a mix of primary and secondary data sources to discover that traders in Bangladesh endure delays as a result of excessive paperwork, inefficiency, and arbitrary judgment in carrying out their operations. These issues mostly affect customs and port administration. Other factors, such as inaccurate Clean Report Certificate (CRF) issued by the Pre-Shipment Inspection Agency (PSI), a lack of testing facilities, cases filed by traders, and false statements from the trading community, are thought to be responsible for delays and such inefficiencies in the design of import and export. However, this study focuses on the Customs Service and other government trade facilitation organizations in Bangladesh, whose economic and regulatory environments may differ from those of the Customs Service in Kenya, making this study necessary.

Ayuma (2018) investigates the influence of scanning technology, cargo tracking systems, and integrated customs management (ICMS) on Kenya's Ministry of Customs and Border Control's revenue presentation. An explanatory research design was used in this study. The Taro Yamane sampling method was used to choose 902 clearing and shipping organizations and customs officers from a sample of 227 respondents. This study collects primary data through structured questionnaires and secondary data from relevant academic research materials from 2017 to 2019. The Cronbach Alpha Score was used as a reliability test to examine the data for validity and reliability. Scanner technology ($r = 0.451$, $p = 0.00$), Cargo Tracking System

technology ($2 = 0.303$, $p = 0.00$), and ICMS technology ($3 = 0.204$, $p = 0.00$) were found to have a significant impact on the representation income customs clearance in Kenya, with a P value less than 0.05 for all factors. The results show that the presentation of personal income in Kenya has increased significantly since the introduction of the system. This has strengthened regional trade activities and achieved better border control. This study, on the other hand, focuses on the effects of scanning technology, cargo tracking systems, and integrated customs management (ICMS) on the revenue presentation of Kenya's Ministry of Customs and Border Control, whereas the current study investigates integrated customs management systems and trade facilitation for future research.

2.4.2 Electronic Cargo Tracking System and Trade Facilitation

Mugambi (2017) examined the impact of a commodities monitoring system on cross-border trade between Kenya and Uganda. The particular goals were to establish the amount of automation at the Kenya-Uganda border and the impact of a cargo tracking system on trade between Kenya and Uganda. This study is a research design with a focus on the structure of the study to draw conclusions from the causal relationship of the data. The target people were border guards at the border between Kenya and Uganda as well as at bases. The results showed that the electronic cargo tracking system introduced by the Kenyan tax authorities succeeded in reducing the diversion of cargo to the local market, as well as the time required to clear cargo at border crossings and collect import duties. The fines have been reduced due to the introduction of the system. The study concludes that electronic tracking systems increase border efficiency, reduce transit times and reduce costs for private businesses. This study, however, focuses on cross-border commerce between Kenya and Uganda, whereas the current research focuses on trade facilitation in Kenya.

Kabiru (2016) attempted to determine the impact of electronic goods tracking systems and operating results at KRA and on transport companies between Kenya and other East African countries. This study adopted a research design and included vans, headquarters, charging points, and border points; Harbor and patrol officers. Based on qualitative data collected through questionnaires, it was found that the tracking system is useful in improving overall operational efficiency for both the Kenyan tax authorities and operators who have implemented the system, especially using it for outbound shipments. According to the findings, the majority of users tend to be neutral, particularly on crucial concerns such as system infrastructure and capabilities. The study indicates that it is critical for the effective adoption of an electronic cargo monitoring system for revenue collectors to clearly describe the system's expectations and advantages so that providers may create dependable systems that will help achieve goals. The study adopted qualitative data analysis method, whereas the current study employed quantitative data analysis method.

Kilonzi and Kanai (2020) developed an electronic delivery tracking system and its impact on revenue generation in East African member states. The goal of this study was to see how operating outcomes, costs on revenue, and tax losses in collecting revenue affected revenue recognition. An explanatory research design is used in this study. The primary data collection tool is the questionnaire. Data was evaluated with descriptive statistics as well as supplementary statistics such as correlation and regression analysis. The findings revealed a positive correlation between operating income and sales. There is a positive correlation between the presentation of costs and revenues. This study concludes that the electronic cargo tracking system has not completely reduced cargo handling time. At border crossings in East African member states, staff costs have remained a challenge since the introduction of electronic

tracking systems. However, this study focuses on the East African Member States, whereas the current research focuses on Kenya.

Nyongesa (2018) assessed the impact of tracking regional electronic goods shipments on the management of goods in transit at the Kenya Revenue Authority. This study aims to determine the effect of seamless monitoring, transit time, transparency and accountability on the management of goods in transit. This study is a descriptive study in which the target population was taken from KRA customs officers from the transit control unit, customs agents, truck drivers and truck owners. Stratified random sampling was used to generate sample and respondent sizes. The results show that smooth supervision, transit time, transparency between stakeholders and accountability have a positive effect on the management of goods in transit. However, this study finds a conceptual gap as it focuses on managing goods in transit rather than trade facilitation.

Polycap (2017) studied the impact of a computerized system on the functioning of the Kenyan tax authorities' customs and border control departments. The descriptive research design was adopted in this study. The intended population is 120 people. Employees from various tax collection agencies were chosen for the sample. The sample size was 120 respondents drawn at random from a stratified random sample. The questionnaire is the most significant tool for gathering primary data. Descriptive and inferential statistics were mostly used in data analysis. According to the findings of this study, the computerized system aided the customs department's operations. Cargo security and tax accounting time are independent variables that have a considerable favorable effect on performance. Revenue collection and tax administration have a small impact, thus there are many elements affecting revenue

collection that are not related to computer systems. However, this study represents a conceptual sector interested in revenue collection, whereas the current study focuses on trade facilitation.

Odago (2021) established the effect of the introduction of an electronic goods tracking system (ECTS) on the collection of excise receipts in Kenya - using the example of Kenya's Jomo International Airport (JKIA) as entry and exit points. This study adopted an explanatory research design. The target group consists of 300 customs and technical officers from the Kenyan tax authorities, based in the JKIA customs department. A stratified random sample was used to identify the population who were customs and technical officers assigned to ECTS. This study used primary data collection with a closed structured questionnaire with a five-point Likert scale. Multiple regression analysis reveals that cargo control has a positive and substantial influence on excise revenue collection ($\beta = 0.221, p = 0.003$); Cargo security has a positive and substantial influence on excise receipt collection ($\beta = 0.334, p = 0.000$); information sharing has a positive and significant effect on excise revenue collection ($\beta = 0.357, p = 0.000$). However, this study focuses on revenue collection, while this study focuses on how the Electronic Cargo Tracking System (ECTS) improves trade in Kenya.

2.4.3 Scanning technology and trade facilitation

Kwalia (2012) investigated the extent to which clearing and freight forwarders in Nairobi had used electronic customs procedures. The specific goal is to ascertain the extent to which clearing and freight forwarders have implemented electronic customs procedures; identify problems in implementing e-customs procedures; and assess how implementing e-customs procedures has facilitated commerce. The descriptive survey

method is used in this study to determine how electronic submission of customs paperwork influences trade facilitation. According to the survey, electronic customs procedures have a significant impact on enterprises. You are need to have an IT system with internet access. It has been demonstrated that electronic customs procedures have significantly lowered typical filing times, clearing times, and filing expenses. Additionally, customer service has improved. There is a conceptual gap in the research because it does not specifically focus on scanning technology.

Njoku et al. (2012) examined the use of information and communication technology (ICT) to facilitate trade in Botswana. The goal is to raise awareness of the role that ICTs may play in promoting commerce by facilitating better trade. Trade facilitation is understood to be the streamlining and harmonization of international trade procedures. The main finding of this study is that Botswana is still in the early stages of implementing ICT in commerce. This is attributed to a number of causes, including poor internet and very low broadband penetration, high computer prices, high service fees, and a lack of IT expertise in the country. According to survey respondents, the use of ICT for commerce and border administration in Botswana is still in its infancy. However, the research was conducted in Botswana, not Kenya.

Makunike (2017) assesses the use of ICT in Zimbabwe's tax authorities, which makes various positive contributions to trade facilitation. Some of the key benefits of trade facilitation are mentioned in the document, such as lowering the burdens and expenses involved with international trade transactions. Other advantages of a conducive environment for trade facilitation include increased potential for attracting foreign direct investment (FDI). There are numerous more positive connections between effective and efficient border cleaning and trade facilitation systems and the

economy, which can help to economic progress and boost regional and worldwide trade. The goal is to replace paper documents with electronic data and to connect the various computer systems of governments and businesses to form a robust international supply chain. The document also demonstrates how ICT plays an important and critical role in many border clearance activities such as the central point of border crossings, the timing of goods release or clearance, the concept of a single window, and coordinated border administration in East and South Africa (ESA). However, the research was conducted in Zimbabwe, not Kenya.

Al-Haraizah and Al-Hawary (2017) investigate environmental scanning and communication technology as a path to long-term competitive advantage for sanitary equipment (bathtubs) in Jeddah. It determines the most appropriate understanding of environmental scanning as well as the role of communication technology as an agent for long-term competitive advantage, as well as its impact on the selection of a plumbing business. The findings revealed that environmental scanning and communication technologies (independent variables) had a favorable effect on tub pipe suppliers' sustainable competitive advantage (dependent variable) in the city of Jeddah. This study, on the other hand, identifies a conceptual gap by examining environmental scanning and communication as a gateway to a sustainable competitive advantage of sanitary (bathtub) equipment in the city of Jeddah, whereas the current study aims to connect scanning technology and trade facilitation.

Rudahigwa and Kuncia (2021) investigated the impact of East African Community cargo handling practices on Rwandan trade facilitation. According to the study results, the majority of respondents rate cargo handling operations favorably. The findings also suggest that some situations of delayed release are mostly attributable to

the description of the origin criteria. This is due to the difficulty in determining the quantity of imported ingredients in a mixture of manufactured products for some products. The findings revealed that, before to the foundation of the EAC, each nation used distinct release documents with different types of release of commodities and descriptions of items, but that, since the establishment of the EAC, all countries have utilized the same documents and descriptions of goods. This simplifies the goods approval procedure because each merchant is aware of what is required. To facilitate intra-Community commerce, partner countries agree to simplify their trade documentation and procedures. According to the survey results, the majority of those polled believe that the bureaucratic effort involved in developing things is little. This study, however, focuses on the impact of the East African Community's cargo handling policies on trade facilitation in Rwanda, whose operating environment and rules may differ from those in Kenya, necessitating this study.

Kamau (2014) recognized technology adoption as a strategic measure for improving tax compliance in Kenya. A descriptive research design is used in this study. It is primarily based on primary data sources. The stratified and random sample techniques were utilized in this study. The population comprises primarily of Kenya Revenue Authority taxpayers. The Kenya Revenue Authority circulated a questionnaire to 62 large taxpayers in order to obtain primary data. The responders utilized a spot Likert scale on the structured questionnaire (from strongly agree to strongly disagree). The findings indicate that major taxpayers' use of technology has an impact on their tax compliance. The adoption of technology and the level of tax compliance have a good link. The Kenyan tax authorities' use of technology as a strategic tool has resulted in enhanced regulatory compliance by significant taxpayers. According to the report, the Kenyan tax authority has successfully executed its internet and communication

technology plan, and the majority of significant taxpayers are pleased with the results. He also stated that major taxpayers believe that technology has made it easier for them to comply with tax regulations, such as submitting declarations and making payments on time, hence enhancing tax compliance. Furthermore, significant taxpayers agree that the Kenya Revenue Service's use of technology to promote tax compliance is sustainable and that they will continue to utilize it indefinitely. The inquiry, on the other hand, sought to assess the influence of technology adoption as a strategic instrument for improving tax compliance in Kenya, but failed to demonstrate how technology adoption could promote commerce.

Omido and Kasibo (2021) investigated the impact of scanning technology, cargo tracking systems, and integrated customs management (ICMS) on the revenue presentation of Kenyan customs and border control departments. This study collects primary data through structured questionnaires and secondary data from relevant academic research materials from 2017 to 2019. The data was analyzed descriptively and inferentially with SPSS (20) and presented in tables, pie charts, and tabulations. The Cronbach Alpha Score was used as a reliability test to examine the data for validity and reliability. Scanner technology (1 = 0.451, $p = 0.00$), Cargo Tracking System technology (2 = 0.303, $p = 0.00$), and ICMS technology (3 = 0.204, $p = 0.00$) were found to have a significant impact on the representation income customs clearance in Kenya, with a P value less than 0.05 for all factors. The results also demonstrate that the integrated scanning technology, goods tracking system, and customs administration system generate variances in the sales presentation of 64.7 percent or ($R^2 = 0.652$ and adjusted for $R^2 = 0.647$). The findings suggest that the presentation of personal income in Kenya has improved dramatically following the system's implementation. This has improved border control and increased regional

commercial operations. Kenya's tax authorities must implement tighter enforcement techniques, as well as equipment such as scanners, cargo tracking systems, and ICMS. However, this study concentrates on the revenue of Kenya's Ministry of Customs and Border Control without demonstrating how this increases commerce.

Odago (2021) investigated the impact of implementing an electronic goods monitoring system on excise revenue collection in Kenya. The descriptive survey method is used in this survey to determine how electronic submission of customs paperwork affects trade facilitation. The study's target audience comprised of 350 Nairobi-based clearing and freight companies out of a total of 962 licensed enterprises in Kenya. In preparing samples for research, this study employs an appropriate stratified sampling strategy. This is due to the heterogeneity of the population investigated. Because each clearing and forwarding company is unique and has its own features, the layered random sample method is used. To acquire data, researchers employed both primary and secondary sources. Secondary data were acquired from corporate profiles and customs department records. According to the main sources, a semi-structured questionnaire comprised of open and closed questions and completed by targeted respondents in the clearing and forwarding sector of the economy should be used. The information gathered in the field is both qualitative and quantitative. After that, the data was reviewed for consistency, completeness, and usability. This comprises fieldwork, data validation, and central processing. Descriptive statistics were used to analyze quantitative data. According to the survey, electronic customs procedures have a significant impact on enterprises. However, this study examines the impact of the introduction of an electronic delivery tracking system on the collection of excise tax receipts in Kenya. This study examines the effects of scanning technology on trade facilitation and thus reveals conceptual gaps.

Salihu, Mohammed and Abubakar (2019) determine the extent to which importers are satisfied with the introduction of unobtrusive inspection technology by Nigerian customs services to facilitate trade. The survey investigative method was adopted for the investigation. The study population consisted of 295,783 importers and 293 Nigerian customs officers at NIISS Unobtrusive Inspection Sites. The researcher used a systematic sampling technique to select thirty (30) importers at each of the six (6) scanner locations selected from one hundred and eighty (180). 157 Customs Officers were selected using a simple sampling process at six (6) scanner locations. The survey results show that importers are satisfied with the implementation of NIIT by the Trade Facilitation Authority in Nigeria. There are challenges in particular in the area of scanner maintenance in the area being inspected. Importers are satisfied with the use of unobtrusive inspection technology in customs services to facilitate trade in Nigeria. It was concluded that unobtrusive inspection technology is important to facilitate trade and security in Nigerian customs services. However, this study focuses on the extent to which importers are satisfied with the introduction of low-profile inspection technology by the Nigerian Customs Facility for trade, whereas this study, which aims to determine the impact of scanning technology on trade facilitation, thus reveals a conceptual gap.

2.4.4 Trade facilitation

Trade facilitation eases the movement of goods across borders by lowering costs and streamlining trade procedures (OECD, 2005). It is founded on four pillars: transparency, simplification, harmonization, and standardization. Transparency encourages openness and accountability by disclosing provisions that are simple to comprehend so that stakeholders can provide comments before they are enforced. By focusing on core features of trading and critical operations, simplification eliminates

extraneous elements and duplication. National procedures, methods, and documentation are coordinated amongst trading partners as a result of harmonization. Furthermore, standardization seeks to develop international best practices (UNECE, 2012).

Many elements influence a company's competitiveness in international markets. These considerations include manufacturing costs such as machinery, investment, labor, and finance. They also include trade and transit expenditures including customs, shipping, and logistics service provider fees. Trade facilitation is commonly defined as improving the transparency and efficiency of international trade procedures in order to lower the time and cost of international trade transactions. This is a wide concept that refers to "the complete supply chain." Logistics efficiency, on the other hand, can be just as vital to a company's competitiveness as production efficiency. Retail logistics, on the other hand, can only be as efficient as its "weakest link." It simply takes inefficient border regulators or logistics service providers to cause a shipment's arrival or clearance to be delayed. Trade facilitation should be viewed holistically, beginning with the manufacturer's premises and ending with the retailer's shelf. In recent years, trade and transportation costs have been more hot topics in trade policy circles. While trade facilitation was once seen to be a highly technical field better left to border customs officials, it is today recognized as an important component of trade and development strategy. The fundamental reason for this shift in view is an acknowledgement that the costs connected with goods transportation - border procedures, paperwork requirements, delays, and logistics costs – have a considerable influence on trade. As the costs of other sorts of trade regulations, particularly tariffs, continue to fall, the hidden costs of trading have become the most significant burden for traders (Czapnik & Saeed, 2016).

2.5 Summary of Research Gaps

The review of past literature on the relationship between Integrated Customs Management Systems, Electronic Cargo Tracking System, scanning technology and trade facilitation indicated several study gaps. These gaps are summarized as shown in Table 2.1.

Table 2.1: Summary of Research Gaps

Author &Year	Focus of the study	Findings	Research Gap	Focus on the current study
Ngigi and Collins (2015)	The impact of an integrated tax management system on tax compliance among Nairobi County's small and medium-sized businesses	The study discovered that the amount of fines and penalties paid, as well as the cost of tax consulting/filing, have a positive and significant link with tax compliance.	The study presents a conceptual gap since it focused on tax compliance and not trade facilitation as the dependent concept	The current study focused on trade facilitation
Grainger (2016)	explored customs management in multinational companies	Senior customs officers work in three interconnected areas: logistics support, supply chain management, and regulatory compliance.	The study indicates a conetextual gap because it did not focus on the Kenyan context.	The current study was conducted in Kenya.
Omosa (2020)	Factors influencing the revenue performance of Kenya's customs and border control department in terms of real revenue collection, trade facilitation, and societal protection	According to the study's findings, Kenya's custom revenue performance improved dramatically after the introduction of the ICMS.	Because it did not target significant entrance sites in Kenya, the study has a contextual gap.	The current study targeted 3 key entry points in Kenya including JKIA, ICD, and Mombasa Port
Mugambi (2017)	The impact of a cargo tracking system on Kenya-Uganda cross-border trade	The use of an electronic cargo tracking system enhances border efficiency, reduces transit time, and lowers the cost of private enterprise.	The research focused on cross-border trade between Kenya and Uganda.	Current study focused on trade facilitation in Kenya.
Kabiru (2016)	The impact of an electronic cargo tracking system on KRA operational effectiveness and transporters between Kenya and other East African countries	Tracking system has been beneficial in improving the overall operational performance	Study adopted qualitative data analysis method	Current study employed quantitative data analysis method

Kilonzi and Kanai (2020)	The impact of an electronic freight tracking system on revenue realization in East African member countries	The electronic freight tracking technology has not completely decreased cargo clearance time.	Study focused on East Africa Member Countries.	Current study focused on Kenya.
Nyongesa (2018)	The influence of regional electronic cargo tracking on transit goods management in the Kenya Revenue Authority	The findings show that seamless monitoring, transit time, transparency among stakeholders, and accountability all have a positive impact on transit goods management.	Study presented a conceptual gap since it focused on management of transit goods and not trade facilitation.	The current study focused on trade facilitation
Kwalia (2012)	The extent to which Nairobi Customs Clearing and Forwarding agents have implemented Customs Electronic Procedures	Customs computerized procedures have a significant impact on businesses.	The study has a conceptual gap because it does not primarily focus on scanning technologies.	The current study focused on scanning technology
Njoku et al. (2012)	the application of information and communication technologies (ICTs) to trade facilitation in Botswana	Botswana is still in the early stages in the use of ICTs in trade	The survey was done in Botswana.	The current study was conducted in Kenya
Makunike (2017)	The Zimbabwe Revenue Authority's usage of ICT has resulted in a variety of good contributions to trade facilitation.	ICT plays an important and crucial role in a variety of border clearance operations.	The study was carried out in Zimbabwe	The current study was conducted in Kenya

2.6 Conceptual Framework

A conceptual framework is defined as a set of general ideas and principles taken from a relevant research area and used to structure subsequent presentations. In this study, the conceptual framework comprised of independent variables (Integrated Customs Management Systems, Electronic Cargo Tracking System and Scanning technology) and dependent variable (trade facilitation). Figure 2.1 shows the study conceptual framework.

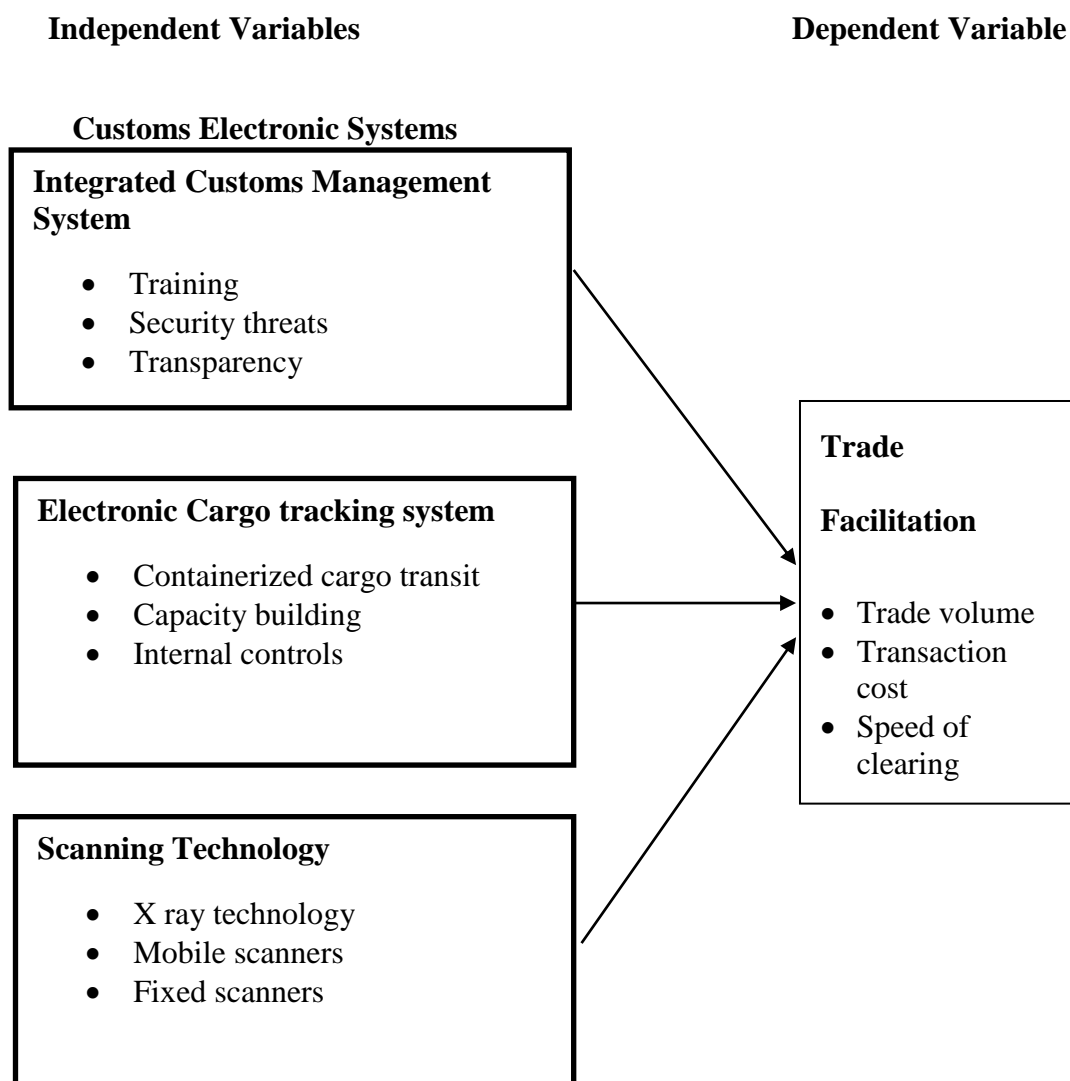


Figure 2.1: Conceptual Framework

Source: Empirical Literature

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research approach that was used in this study. Research design, target population, sample size and methodology, data collection instruments and methodologies, pilot studies, data analysis and presentation, and ethical issues are all examples of specific methods.

3.2 Research Design

Research design is a plan and mechanism used to collect, measure, and analyze data (Schwart & Yanow, 2013). According to Ethics and Bala (2017), research design is a road map for carrying out research. This study used an explanatory research design. The design provides a foundation for establishing causal relationship between the independent and dependent variables (Rahi, 2017). The design was considered appropriate in this study since the aim was to determine the causal relationship between customs electronic systems and trade facilitation.

3.3 Target Population

Target population refers to the population constituting of individuals sharing similar characteristics (Sekaran & Bougie, 2010). The target population in this study included customs officials at JKIA, ICD, and Mombasa Port. The total number was 147. The choice of customs officials was justified because they were involved in operations relating to customs electronic systems and trade facilitation. Given the small size of the target population in this study, there was no need for sampling. Therefore, all the 147 customs officials participated in the study. The individuals targeted shared similar characteristics since they were all customs officials.

Table 3.1: Target Population

Category	Customs officials
JKIA	35
ICD	52
Mombasa Port	60
Total	147

Source, (KRA, 2020)

3.4 Research Instrument

The process of gathering information from intended participants is referred to as data collection (Sutton & Austin, 2015). A structured questionnaire was used to obtain primary data for this investigation. The questionnaire asks about the respondents' basic information as well as survey variables. The following Likert scale was used: strongly disagree (1), strongly disagree (2), neutral (3), agree (4) and strongly agree (5). It is believed that questionnaires are cheaper to use, less time consuming, and less administrative to use. The questionnaire also makes it easy to collect data after the survey.

3.5 Data Collection Procedure

In the processing of data and the creation of useful data for study, the data collection method is an integral element (Groves, 2009). The research instrument was issued using the drop and pick later technique. This was done in July 2021 and the exercise took two weeks. A register was maintained to ensure that all questionnaires issued to the respondents are accounted for. The researcher sought necessary approvals for relevant institutions before starting the process of data collection.

3.6 Pilot Testing

Before the questionnaire can be used to collect data, it must first be tested (Dikko, 2016). The goal is to improve the questionnaire so that responders have no trouble

answering the questions. Furthermore, prior examination of the questionnaire aids in determining the validity and reliability of the data. During this survey, 14 questionnaires were handed at random to customs officers at the KRA headquarters. This is equivalent to 10% of the study population. Pilot studies of 5 to 10% of the target group, according to Mugenda & Mugenda (2003), are appropriate. The pilot study's findings were not incorporated into the main study.

3.6.1 Validity of Research Instrument

The extent to which an instrument measures what it is designed to measure is referred to as its validity (Remenyi, 2015). The content and validity of the instrument design were investigated in this study. The study director reviewed the questionnaire and provided recommendations to ensure its content validity. Furthermore, the questionnaire has been divided into design validity sections to guarantee that each area examines the information for a distinct purpose while also linking it to the conceptual framework for study. Validity test was also conducted using communality scores in factor analysis. Criterion was that scores above 0.49 indicate that the items measuring the variables are valid. The pilot data was used to conduct validity test using communality scores in factor analysis. Results are shown in Table 3.2.

Table 3.2: Validity Test

Constructs	Initial	Extraction
Integrated Customs Management Systems	1	0.691
Electronic Cargo Tracking System	1	0.504
Scanning Technology	1	0.649
Trade Facilitation at Key Entry Points in Kenya	1	0.503

Extraction Method: Principal Component Analysis.

Source: Research data (2021)

Validity test was conducted using communality scores in factor analysis. Criterion was that scores above 0.49 indicate that the items measuring the variables are valid.

Based on the results in Table 3.2, all variables had scores above 0.49 implying that the questionnaire was valid.

3.6.2 Reliability of Research Instrument

The degree to which the tests in this study are internally consistent and yield consistent findings across tests and retests is referred to as reliability (Orodho, 2009). Cronbach's alpha coefficient was used in this study to analyze the internal coherence between the research instrument's elements, which was used to test the instrument's reliability (Cronbach, 1951). The limit value is 0.7 for Cronbach's alpha coefficient. The pilot data was used to conduct reliability test and the results are presented in Tables 3.3.

Table 3.3: Reliability Test

Variables	Items	Cronbach Alpha	Decision
Integrated Customs Management Systems	5	0.811	Reliable
Electronic Cargo Tracking System	5	0.846	Reliable
Scanning Technology	4	0.780	Reliable
Trade Facilitation at Key Entry Points in Kenya	5	0.806	Reliable

Source: Research data (2021)

The results in Table 3.3 indicate that ECMS had a Cronbach value of 0.811, ECTS had 0.846, scanning technology had 0.780 and trade facilitation had 0.806. All the variables had coefficients greater than 0.7. Therefore, the items in the questionnaire were regarded as reliable.

3.7 Measurement of Variables

The dependent variable in this study was trade facilitation. The variable was measured using trade volume, transaction cost and speed of clearing. These indicators were suggested by Mugambi (2017).

The independent variable was customs electronic systems. These was categorized into three components: Integrated Customs Management System, Electronic cargo tracking system and Scanning technology. Integrated Customs Management System was measured in terms of training, security threats and transparency. Similar indicators were used by Omosa (2020).

Electronic cargo tracking system was measured using containerized cargo transit, capacity building and internal controls as used by Kabiru (2016). Scanning technology was measured in terms of X ray technology, Mobile scanners and Fixed scanners. These indicators were borrowed from Makunike (2017) work. Table 3.4 summarizes the study variables and their measurements.

Table 3.4: Measurement of Variables

Variable	Type of Variable	Indicators	Source	Measurement scale
Trade Facilitation	Dependent	-Trade volume -Transaction cost -Speed of clearing	Mugambi (2017)	Ordinal
Integrated Customs Management System	Independent	-Training -Security threats -Transparency	Omosa (2020)	Ordinal
Electronic cargo tracking system	Independent	- Containerized cargo transit -Capacity building - Internal controls	Kabiru (2016)	Ordinal
Scanning technology	Independent	-X ray technology -Mobile scanners -Fixed scanners	Makunike (2017)	Ordinal

Source; (Author, 2021)

3.8 Data Analysis and Presentation

The method of structuring and adding order and meaning to the bulk of collected data is data analysis (Connaway & Powell, 2010). Quantitative data was analyzed using

descriptive and inferential statistics. This analysis was aided by the use SPSS program (v.22.0). Descriptive findings were presented in form of averages, standard deviations, counts and percentages. Inferential statistics helped in measuring the relationship between the variables and included correlation and regression analyses. Tables and graphs captured the findings.

3.8.1 Empirical Model

The following multiple regression model was estimated:

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

Where;

Y = Trade Facilitation at Key Entry Points in Kenya

β_0 = constant

$\beta_1, \beta_2, \beta_3$ = Bet coefficients

X_1 = Integrated Customs Management Systems

X_2 = Electronic Cargo Tracking System

X_3 = Scanning Technology

e = Error term

3.8.2 Hypotheses testing

Hypotheses testing criteria used in this study is summarized in Table 3.5.

Table 3.5: Hypotheses testing

Hypothesis	Test	Criteria	Decision
H₀₁ : Integrated Customs Management System does not have a significant effect on trade facilitation at key entry points in Kenya	P value	P<0.05	Reject
		P>0.05	Fail to reject
H₀₂ : Electronic Cargo Tracking System does not have a significant effect on trade facilitation at key entry points in Kenya	P value	P<0.05	Reject
		P>0.05	Fail to reject
H₀₃ : Scanning technology does not have a significant effect on trade facilitation at key entry points in Kenya	P value	P<0.05	Reject
		P>0.05	Fail to reject

3.8.3 Regression Assumptions

Several linear regression assumptions were made for the variable data prior to the regression analysis. This was done to ensure that the results of the analysis are correct and unbiased (Field, 2009). Tests included: multicollinearity, normality and linearity, heteroscedasticity.

a) Normality Test

By guaranteeing that the data is regularly distributed, the normality test enhances the regression model. The Shapiro-Wilk test was used to determine the data's normality. A probability value larger than 0.05 is used as the requirement to ensure that the data is regularly distributed (Thornhill, Saunders & Lewis, 2009).

b) Multicollinearity Test

When there is a high correlation between the independent variables, it impacts the significance of each variable. To test for multicollinearity, the rate of variance

inflation (VIF) is used (Thompson, Kim, Aloe & Becker, 2017). A VIF number greater than 10 indicates a multicollinearity issue, whereas a VIF value less than 10 indicates a multicollinearity issue. Furthermore, a tolerance value of more than 0.2 implies that the independent variables are not significantly associated.

c) Linearity Test

A scatter plot was used to determine whether there is a linear relationship between two continuous data. The linearity test assesses the strength or degree of linearity of correlated variables represented by straight lines (Jain, Agarwal, Thinakaran & Parekhji, 2017). The relationship between the independent variable and the dependent variable is expected to be linear, as indicated by a straight line with most of the data points concentrated.

d) Heteroscedasticity Test

There is heteroscedasticity in the data if the error variance is not constant. Applying the regression model without taking heteroscedasticity into account will result in biased parameter estimation. The Levene's change reasonableness test is used to assess fluctuation homogeneity (Parra-Frutos, 2013). The null hypothesis states that the error element's variance is constant. A probability value larger than 0.05 resulted in the assumption of a null hypothesis, which meant that the error term had a constant variance.

3.9 Ethical Considerations

Ethics are norms or standards that bring out the difference between right and wrongs. The researcher upheld strong ethical standards by keeping the information gathered from respondents as anonymous as possible. The researcher also asked for respondents' consent and included only those who wished to participate. In addition,

the researcher informed the respondents about the purpose of the study and guaranteed their anonymity. In addition, researchers apply for a research permit to the university and a research permit application from NACOSTI.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion based on the research objectives. Research results are interpreted and discussed in relation to the literature reviewed in Chapter 2. Response rates and reliability results are given first. This is followed by a description of the demographic information of the respondents. Descriptive analysis findings are then provided followed by regression assumptions, correlation and regression analysis.

4.2 Response Rate

The response rate of the administered questionnaires is presented in Table 4.1.

Table 4.1: Response Rate

	Number	Percent
Response	143	97.27%
Non-response	4	2.73%
Total	147	100

Source: Research data (2021)

According to the results in Table 4.1, 147 questionnaires were issued to Customs officials. Out of the 147 questionnaires distributed, 143 were completed and returned, yielding a response rate of 97.27 percent. A response rate of more than 50% is considered appropriate for analysis.

4.3 Demographic Characteristics

The respondents' demographic characteristics results are presented in Table 4.2.

Table 4.2: Respondents' demographic characteristics

Category	Levels	Frequency	Percent
Gender	Male	98	68.5
	Female	45	31.5
	Total	143	100.0
Age	Below 25years	25	17.5
	26 to 35 years	28	19.6
	36 to 45 years	60	42.0
	46 to 55 years	30	21.0
	Total	143	100.0
Education	Diploma	30	21.0
	Bachelor degree	70	49.0
	Master's degree	43	30.1
	Total	143	100.0
Duration	Below 2 years	26	18.2
	2 to 5 years	37	25.9
	6 to 10 years	63	44.1
	Above 10years	17	11.9
	Total	143	100.0

Source: Research data (2021)

The findings in Table 4.2 indicate that 98 (68.5%) of the respondents were male, while 45 (31.5%) were female. This shows that most of the customs officers working at key entry points in Kenya are men. A large number 60 (42%) of the respondents were aged 36 to 45 years, suggesting that a sizeable number of the customs officials were middle aged. Further, results indicate that 70 (49%) of the respondents had bachelor degree, 43 (30.1%) had master degree and 30 (21%) had diploma. This means that all the participants were literate enough to understand customs electronic systems and trade facilitation. Finally, majority of the respondents numbering 63(44.1%) had worked in their institutions for 6 to 10 years. This means that the respondents had sufficient experience with customs electronic systems and trade facilitation to produce trustworthy responses.

4.4 Descriptive Analysis

Descriptive analysis was done to capture the nature of the study variables in terms of frequencies, percentage, mean and standard deviation. On a five-point Likert scale, where 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Neutral (N), 4 = Agree (A), and 5 = Strongly Agree (SA), mean scores of 0 to 2.5 represented statements disagreed upon by a majority of respondents, while mean scores of 2.6 to 5.0 represented statements agreed upon by a majority of respondents.

4.4.1 Integrated Customs Management System

The research sought to find out the participants' opinion in regard to Integrated Customs Management System.

Table 4.3: Descriptive statistics on Integrated Customs Management System

		SA	D	N	A	SA	Mean	Std. Dev
ICMS Training is available to all stakeholders.	f	8	22	9	46	58	3.87	1.257
	%	5.6	15.4	6.3	32.2	40.6		
Using estimates during customs valuation is more favourable.	f	4	26	15	42	56	3.84	1.208
	%	2.8	18.2	10.5	29.4	39.2		
Self-declaration of goods and import data sharing has affected compliance	f	12	20	11	27	73	3.90	1.381
	%	8.4	14.0	7.7	18.9	51.0		
ICMS is able to counter security threats through a robust risk management system	f	4	8	6	62	63	4.20	.961
	%	2.8	5.6	4.2	43.4	44.1		
ICMS provides for transparency of the cargo as the system eliminates human intervention	f	10	16	10	49	58	3.90	1.246
	%	7.0	11.2	7.0	34.3	40.6		
Aggregate score							3.942	1.2106

Source: Research data (2021)

The results presented in Table 4.3 reveal that majority of the participants agreed with the claim that ICMS training is available to all stakeholder (M=3.87); using estimates

during customs valuation is more favourable (M=3.84); self-declaration of goods and import data sharing has affected compliance (M=3.90); ICMS is able to counter security threats through a robust risk management system (M=4.20); and ICMS provides for transparency of the cargo as the system eliminates human intervention (M=3.90). The aggregate mean of 3.942 and a standard deviation of 1.2106 implied that the respondents were agreeing with most of the claims on ICMS.

4.4.2 Electronic Cargo Tracking System

The research sought to determine participants' opinion in regard to Electronic Cargo Tracking System.

Table 4.4: Descriptive statistics on Electronic Cargo Tracking System

		SA	D	N	A	SA	Mean	Std. Dev
There has been capacity building on cargo tracking systems	f	10	18	10	58	47	3.80	1.225
	%	7.0	12.6	7.0	40.6	32.9		
Containerized cargo theft has reduced since incorporation of cargo tracking system.	f	10	18	24	34	57	3.77	1.287
	%	7.0	12.6	16.8	23.8	39.9		
Use of physical escorts during transit is more preferable.	f	32	36	11	26	38	3.01	1.552
	%	22.4	25.2	7.7	18.2	26.6		
Cargo Tracking systems are costly to implement	f	12	20	13	30	68	3.85	1.368
	%	8.4	14.0	9.1	21.0	47.6		
Electronic cargo tracking system ensures internal control systems are enhanced.	f	4	26	19	49	45	3.73	1.169
	%	2.8	18.2	13.3	34.3	31.5		
Aggregate score							3.632	1.3202

Source: Research data (2021)

The results presented in Table 4.4 reveal that most of the participants agreed with the assertion that there has been capacity building on cargo tracking systems (M=3.80),

containerized cargo theft has reduced since incorporation of cargo tracking system (M=3.77), physical escorts are preferable during transit (M=3.01), cargo tracking systems are expensive to deploy (M=3.85), and electronic cargo tracking systems ensure that internal control systems are upgraded (M=3.75). The aggregate mean of 3.632 and standard deviation of 1.3202 indicated that the majority of the ECTS assertions were agreed upon by the respondents.

4.4.3 Scanning Technology

The research sought to determine the participants' opinion in regard to scanning technology. The results are shown in Table 4.5.

Table 4.5: Descriptive statistics on Scanning Technology

		SA	D	N	A	SA	Mean	Std. Dev
X ray technology has enhanced the inspection of products at the entry points.	f	4	20	10	46	63	4.01	1.154
	%	2.8	14.0	7.0	32.2	44.1		
Mobile scanning is useful in inspection of products at the entry points.	f	6	18	18	39	62	3.93	1.202
	%	4.2	12.6	12.6	27.3	43.4		
Fixed scanners are used in the inspection of products at the entry points.	f	8	8	12	45	70	4.13	1.137
	%	5.6	5.6	8.4	31.5	49.0		
Scanning technology affect accountability and efficiency of customs officers and cargo owners.	f	8	14	15	27	79	4.08	1.248
	%	5.6	9.8	10.5	18.9	55.2		
Aggregate score							4.0375	1.18525

Source: Research data (2021)

The outcome presented in Table 4.5 indicate that most of the participants agreed with the assertion that X ray technology has enhanced the inspection of products at the

entry points (M=4.01), mobile scanning is useful in inspection of products at the entry points (M=3.93), fixed scanners are used in the inspection of products at the entry points (M=4.13), and scanning technology affect accountability and efficiency of customs officers and cargo owners (M=4.08). The aggregate mean of 4.0375 and standard deviation of 1.1852 indicated that most of the aspects utilized to gauge scanning technology were agreed upon by the respondents.

4.4.4 Trade Facilitation at Key Entry Points in Kenya

The research sought to determine participants' opinion in regard to Trade Facilitation at Key Entry Points in Kenya. The results are shown in Table 4.6.

Table 4.6: Descriptive statistics on Trade Facilitation at Key Entry Points in Kenya

		SA	D	N	A	SA	Mean	Std. Dev
The clearing speed has increased due to automation of customs processes.	f	6	10	8	49	70	4.17	1.088
	%	4.2	7.0	5.6	34.3	49.0		
The time taken to clear goods has improved due to automation of customs processes.	f	6	18	17	35	67	3.97	1.216
	%	4.2	12.6	11.9	24.5	46.9		
There is increase in publication of trade information through channels such as internet.	f	10	16	8	44	65	3.97	1.264
	%	7.0	11.2	5.6	30.8	45.5		
There is increase in volume of trade following the automation of customs processes	f	4	9	4	56	70	4.25	.982
	%	2.8	6.3	2.8	39.2	49.0		
The transaction cost has reduced following the automation of customs processes.	f	4	18	5	63	53	4.00	1.081
	%	2.8	12.6	3.5	44.1	37.1		
Aggregate score							4.072	1.1262

Source: Research data (2021)

The results presented in Table 4.6 indicate that most of the participants agreed with the assertion that the clearing speed has increased due to automation of customs processes (M=4.17), the time taken to clear goods has improved due to automation of customs processes (M=3.97), there is increase in publication of trade information through channels such as internet (M=3.97), there is increase in volume of trade following the automation of customs processes (M=4.25), and the transaction cost has reduced following the automation of customs processes (M=4.00). The aggregate mean of 4.072 and standard deviation of 1.1262 indicated that most of the aspects used to quantify trade facilitation were agreed upon by the respondents.

4.5 Regression Assumptions

Multiple Regression assumptions were tested to ensure accuracy of the findings. They include multicollinearity, normality, linearity and heteroscedasticity tests.

4.5.1 Multicollinearity test

According to Field (2009), a VIF value above 10 indicates a multicollinearity problem, while a VIF value below 10 indicates a lack of multicollinearity. In addition, a tolerance value greater than 0.2 indicates that the independent variables are not strongly correlated. The results are shown in Table 4.7.

Table 4.7: Multicollinearity Test

	Tolerance	VIF
ICMS	.552	1.811
ECTS	.589	1.698
Scanning Technology	.509	1.966

Source: Research data (2021)

The results in Table 4.7 show that the VIF ranged from 1.698 to 1.966 for all variables. These values were less than ten, indicating that the independent variables

were not multicollinear. Therefore, the assumption of multicollinearity was observed in relation to the independent variables.

4.5.2 Tests of Normality

Results on normality test are displayed in Table 4.8.

Table 4.8: Shapiro-Wilk test of normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.088	143	.052	.980	143	.069
Standardized Residual	.088	143	.052	.980	143	.069

Source: Research data (2021)

The outcome in Table 4.8 reveals that all the both standardized and unstandardized residuals had Significance (Sig) p-values greater than 0.05 for Shapiro-Wilk ($p=143$, $p=0.069 > 0.05$) and Kolmogorov-Smirnov tests ($p=143$, $p=0.052 > 0.05$). Therefore, the null hypothesis of normal distribution was accepted. This implied that the data was normally distributed. Therefore, the assumption of normality was factored in relation to the study data distribution.

4.5.3 Linearity tests

Linearity test measures the strength or degree of linear association between correlated variables represented by a straight line (Jain, Agarwal, Thinakaran & Parekhji, 2017). The expected linear relationship between the independent variables and the dependent variable was demonstrated by a straight line of fit, where the majority of the data points were located. The test of linearity between the study variables was conducted using Normal P-P Plot of the regression standardized residual.

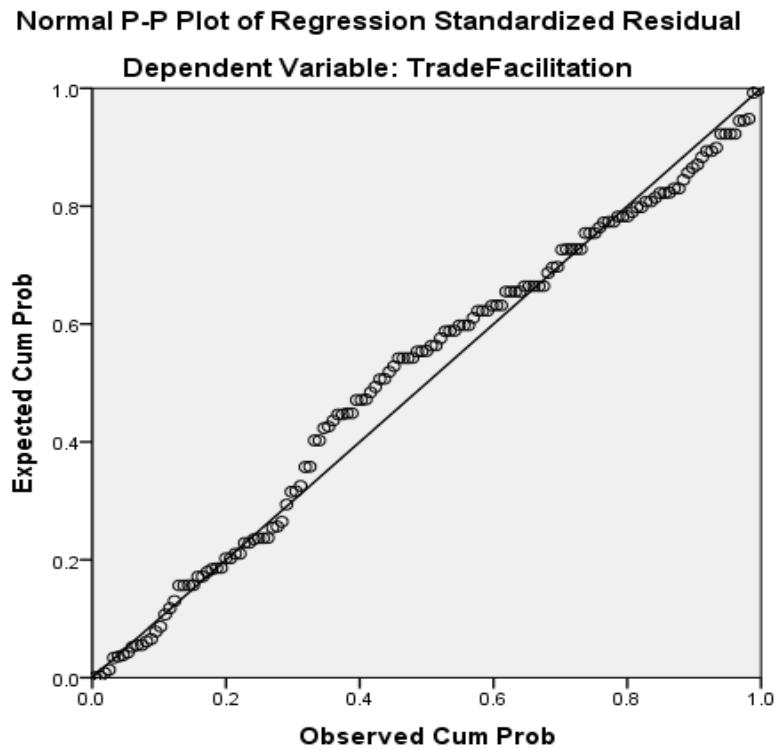


Figure 4.1: Linearity Test

The findings in Figure 4.1 indicate that there is a linear direct relationship between ECMS and trade facilitation. This is supported by a straight line of fit, where most of the data points were concentrated. Therefore, the assumption of linearity was taken into consideration in relation to the study data.

4.5.4 Heteroscedasticity Test

The Levene's change fairness test is used to test the homogeneity of fluctuations. The null hypothesis is that the variance of the error element is constant. A probability value greater than 0.05 will lead to the assumption of a null hypothesis, which implies a constant variance of the error term. The findings are shown of Table 4.9.

Table 4.9: Levene's Test

F	df1	df2	Sig.
4.172	35	25	0.071

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Source: Research data (2021)

Table 4.9 revealed a significant (Sig.) p-value of 0.071, which was more than 0.05. This meant that the null hypothesis of error terms with constant variance was accepted. Therefore, the assumption of heteroscedasticity was not violated implying the data was homoscedastic.

4.6 Inferential Analysis

Inferential statistics were employed in the study to determine the link between the outcome and the study's predictor factors. Correlation and multiple regression analysis were used in inferential statistics.

4.6.1 Pearson Correlation Analysis

Pearson Correlation analysis was conducted to determine the relationship between the independent variables and the dependent variable. The correlation coefficients usually ranges from -1 for a perfect negative relationship to +1 for perfect positive relationship with zero revealing no relationship.

Table 4.10: Correlation results

		Trade Facilitation at Key Entry Points in Kenya	Integrated Customs Management Systems	Electronic Cargo Tracking System	Scanning Technology
Trade Facilitation at Key Entry Points in Kenya	Pearson Correlation Sig. (2- tailed) N	1 143			
Integrated Customs Management Systems	Pearson Correlation Sig. (2- tailed) N	.635** .000 143	1 143		
Electronic Cargo Tracking System	Pearson Correlation Sig. (2- tailed) N	.584** .000 143	.553** .000 143	1 143	
Scanning Technology	Pearson Correlation Sig. (2- tailed) N	.743** .000 143	.633** .000 143	.601** .000 143	1 143

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

Source: Research data (2021)

Table 4.10 shows that at the 1% level of significance, there was a positive and significant association between Integrated Customs Management Systems and Trade Facilitation at Key Entry Points in Kenya ($r=0.635$, $p=0.000.01$). This suggested that when Integrated Customs Management Systems changes, trade facilitation also happens to change in the same direction.

The findings also reveal that there was a positive and significant relationship between Electronic Cargo Tracking System and Trade Facilitation at Key Entry Points in

Kenya at 1% level of significance ($r=0.584$, $p=0.000<.01$). This suggested that when Electronic Cargo Tracking System changes, trade facilitation also happens to change in the same direction.

The findings further reveal that there was a positive and significant relationship between scanning technology and Trade Facilitation at Key Entry Points in Kenya at 1% level of significance ($r=0.743$, $p=0.000<.01$). This suggested that when scanning technology changes, trade facilitation also happens to change in the same direction.

4.6.2 Multiple Regression Analysis

The multiple regression analysis was done to determine the combined effect of customs electronic systems on trade facilitation. In order to understand the nature of the relationship between the predictor variables and the Outcome variable, coefficient of correlation denoted R and coefficient of determination denoted R² (R Square) were calculated. The findings of the model summary are presented in table 4.11.

Table 4.11: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782 ^a	.611	.603	.20066

a. Predictors: (Constant), Scanning Technology, Electronic Cargo Tracking System, Integrated Customs Management Systems

Source: Research data (2021)

The model summary results in Table 4.11 revealed a correlation coefficient (R) of 0.782. This was interpreted to mean that there was a strong association between the independent predictor variables and the dependent variable Trade Facilitation at Key Entry Points in Kenya. The model summary also showed R square of 0.611 that was adjusted to 0.603. This was interpreted to mean that 60.3% of all changes in Trade

Facilitation at Key Entry Points in Kenya was explained by the three independent variables namely Scanning Technology, Electronic Cargo Tracking System and Integrated Customs Management Systems. Therefore, 39.7% of all changes in Trade Facilitation at Key Entry Points in Kenya was accounted by other factors not included in the study.

Table 4.12: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.790	3	2.930	72.767	.000 ^b
	Residual	5.597	139	.040		
	Total	14.387	142			

a. Dependent Variable: Trade Facilitation at Key Entry Points in Kenya

b. Predictors: (Constant), Scanning Technology, Electronic Cargo Tracking System, Integrated Customs Management Systems

Source: Research data (2021)

The ANOVA results in Table 4.12 indicate that the overall model was statistically significant as confirmed by the F statistic of 72.767 which was greater critical value ($p=0.000<.05$). This was interpreted to mean that the study model was a good fit.

Table 4.13: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.187	.183		6.491	.000		
	Integrated Customs Management Systems	.177	.055	.230	3.225	.002	.552	1.811
	Electronic Cargo Tracking System	.088	.040	.153	2.220	.028	.589	1.698
	Scanning Technology	.352	.052	.506	6.817	.000	.509	1.966

a. Dependent Variable: Trade Facilitation at Key Entry Points in Kenya

Source: Research data (2021)

The regression model was as follows:

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

After substituting the Beta values, the optimal regression model was follows:

$$Y = 1.187 + 0.230X_1 + 0.153X_2 + 0.506X_3 + e$$

Where;

Y = Trade Facilitation at Key Entry Points in Kenya

X₁ = Integrated Customs Management Systems

X₂ = Electronic Cargo Tracking System

X₃ = Scanning Technology

e = Error term

Regression coefficients findings in Table 4.13 revealed that the use Integrated Customs Management Systems had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_1=0.230$, $p=0.02<0.05$). This was interpreted to mean that for every use of Integrated Customs Management Systems would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.230 units other factors held constant.

The findings also revealed that the use of Electronic Cargo Tracking System had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_2=0.153$, $p=0.028<0.05$). This was interpreted to mean that for every use of Electronic Cargo Tracking System would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.153 units other factors held constant.

The results further reveal revealed that the use of Scanning Technology had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_3=0.506$, $p=0.000<0.05$). This was interpreted to mean that for every use of Scanning Technology would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.506 units other factors held constant.

4.7 Testing of Hypothesis

Hypothesis testing was premised on the p value (Table 4.13). The decision to reject or not reject the null hypothesis was based on the p value; if the $p<0.05$, H_0 would be rejected, and if $p>0.05$, H_0 would be accepted. Table 4.14 show a summary of hypothesis testing results.

Table 4.14: Hypotheses testing

Hypothesis	p-value	Criteria	Decision
H₀₁ : Integrated Customs Management System does not have a significant effect on trade facilitation at key entry points in Kenya	0.002	$P<0.05$	Rejected
H₀₂ : Electronic Cargo Tracking System does not have a significant effect on trade facilitation at key entry points in Kenya	0.028	$P<0.05$	Rejected
H₀₃ : Scanning technology does not have a significant effect on trade facilitation at key entry points in Kenya	0.000	$P<0.05$	Rejected

Source: Research data (2021)

The first objective (H_0) predicted that Integrated Customs Management System does not have a significant effect on trade facilitation at key entry points in Kenya. The p value of 0.002 was less than 0.05, therefore, the null hypothesis was rejected. This implied that Integrated Customs Management System had a significant effect on trade facilitation at key entry points in Kenya.

The second objective (H₀₂) predicted that Electronic Cargo Tracking System does not have a significant effect on trade facilitation at key entry points in Kenya. The p value of 0.028 was less than 0.05, therefore, the null hypothesis was rejected. This implied that Electronic Cargo Tracking System had a significant effect on trade facilitation at key entry points in Kenya.

The third objective (H₀₃) predicted that Scanning technology does not have a significant effect on trade facilitation at key entry points in Kenya. The p value of 0.000 was less than 0.05, therefore, the null hypothesis was rejected. This implied that scanning technology had a significant effect on trade facilitation at key entry points in Kenya.

4.8 Discussion of the Findings

4.8.1 Integrated Customs Management System and Trade Facilitation

The study first objective aimed to determine the effect of Integrated Customs Management System on trade facilitation at key entry points in Kenya. The correlation results revealed that there was a positive and substantial relationship between Integrated Customs Management Systems and Trade Facilitation at Key Entry Points in Kenya at 1% level of significance ($r=0.635$, $p=0.000<.01$). The findings suggested that increase in the use of Integrated Customs Management System would positively enhance trade facilitation at key entry points in Kenya.

The results of multiple regression analysis revealed that the use Integrated Customs Management Systems had a positive and substantial influence on Trade Facilitation at Key Entry Points in Kenya ($\beta_1=0.230$, $p=0.02<0.05$). This was interpreted to mean that for every use of Integrated Customs Management Systems would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.230 units other factors held

constant. These findings are congruent with the findings of Omosa (2020), who found that customs revenue performance in Kenya improved dramatically after the deployment of the ICMS.

4.8.2 Electronic Cargo Tracking System and Trade Facilitation

The study second objective aimed to determine the effect of Electronic Cargo Tracking System on trade facilitation at key entry points in Kenya. At the 1% level of significance, the correlation results demonstrated a positive and significant association between Electronic Cargo Tracking System and Trade Facilitation at Key Entry Points in Kenya ($r=0.584$, $p=0.000.01$). The findings suggested that increase if the use of Electronic Cargo Tracking System would positively enhance Trade Facilitation at Key Entry Points in Kenya.

The results of multiple regression analysis revealed that the use of Electronic Cargo Tracking System had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_2=0.153$, $p=0.028<0.05$). This was interpreted to mean that for every use of Electronic Cargo Tracking System would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.153 units other factors held constant. These findings support Mugambi (2017) and Kabiru (2016)'s claims that electronic cargo tracking systems improve border efficiency, reduce transit time, and lower private sector costs. However, the study findings contradict Kilonzi and Kanai's (2020) conclusion that electronic cargo tracking systems have not cut cargo clearance time completely.

4.8.3 Scanning Technology and Trade Facilitation

The study third objective aimed to assess the effect of scanning technology on trade facilitation at key entry points in Kenya. At the 1% level of significance, the

correlation results demonstrated a positive and significant association between scanning technology and Trade Facilitation at Key Entry Points in Kenya ($r=0.743$, $p=0.000<.01$).

The results of multiple regression analysis revealed that the use of Scanning Technology had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_3=0.506$, $p=0.000<0.05$). This was interpreted to mean that for every use of Scanning Technology would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.506 units other factors held constant. These findings are consistent with those of Kwalia (2012) and Makunike (2017), who reported that customs electronic procedures significantly reduced average lodgment time, clearance time, and lodgment cost.

CHAPTER FIVE
SUMMARY OF KEY FINDINGS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings. It further provides the conclusions and recommendation of the study. The chapter also highlights the areas of further research.

5.2 Summary of Key Findings

5.2.1 Integrated Customs Management System

The study first objective aimed to determine the effect of Integrated Customs Management System on trade facilitation at key entry points in Kenya. At the 1% level of significance, the correlation results demonstrated a positive and significant association between Integrated Customs Management Systems and Trade Facilitation at Key Entry Points in Kenya ($r=0.635$, $p=0.000<.01$). The results of multiple regression analysis revealed that the use Integrated Customs Management Systems had a positive and substantial influence on Trade Facilitation at Key Entry Points in Kenya ($\beta_1=0.230$, $p=0.02<0.05$). This was interpreted to mean that for every use of Integrated Customs Management Systems would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.230 units other factors held constant. Based on the findings, the null hypothesis that Integrated Customs Management System does not have a significant effect on trade facilitation at key entry points in Kenya was rejected in favour of the alternative.

5.2.2 Electronic Cargo Tracking System

The study second objective aimed to determine the influence of Electronic Cargo Tracking System on trade facilitation at key entry points in Kenya. At the 1% level of significance, the correlation results demonstrated a positive and significant association between Electronic Cargo Tracking System and Trade Facilitation at Key Entry Points in Kenya ($r=0.584$, $p=0.000<.01$). The findings suggested that increase if the use of Electronic Cargo Tracking System would positively enhance Trade Facilitation at Key Entry Points in Kenya. The results of multiple regression analysis revealed that the use of Electronic Cargo Tracking System had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_2=0.153$, $p=0.028<0.05$). This was interpreted to mean that for every use of Electronic Cargo Tracking System would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.153 units other factors held constant. Based on the data, the null hypothesis that the Electronic Cargo Tracking System has no effect on trade facilitation at key entry points in Kenya was rejected in favor of the alternative hypothesis.

5.2.3 Scanning Technology

The study third objective aimed to assess the effect of scanning technology on trade facilitation at key entry points in Kenya. At the 1% level of significance, the correlation results demonstrated a positive and significant association between scanning technology and Trade Facilitation at Key Entry Points in Kenya ($r=0.743$, $p=0.000<.01$).

The results of multiple regression analysis revealed that the use of Scanning Technology had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya ($\beta_3=0.506$, $p=0.000<0.05$). This was interpreted to mean that for

every use of Scanning Technology would lead to increase in Trade Facilitation at Key Entry Points in Kenya by 0.506 units other factors held constant. Based on the data, the null hypothesis that scanning technology has no influence on trade facilitation at key entry points in Kenya was rejected, and the alternative hypothesis was supported.

5.3 Conclusions

The study findings established that Customs electronic systems explain over sixty percent of changes in Trade Facilitation at Key Entry Points in Kenya. This study therefore concludes that the electronic customs system plays a key role in explaining changes in trade facilitation in Kenya. The study also finds that the use of an integrated customs management system has a positive and significant effect in facilitating trade at key entry points in Kenya. The study concludes that the use of an integrated customs management system has made a positive contribution to facilitating trade in Kenya. The findings further revealed that the use of Electronic Cargo Tracking System had a positive and significant effect on Trade Facilitation at Key Entry Points in Kenya. The study concludes that Electronic Cargo Tracking System had a positive contribution to trade facilitation in Kenya. Finally, the study concluded that the use of scanning technology had a positive contribution to trade facilitation in Kenya.

5.4 Recommendations

5.4.1 Practice

The research recommended that the management of key entry points including JKIA, ICD, and Mombasa Port should continue encouraging the use of Integrated Customs Management System in daily operations. The management should organize regular

training workshops aimed at equipping employees with the necessary skills to handle ECMS.

The study also recommended that the management of key entry points including JKIA, ICD, and Mombasa Port should continue encouraging the use of Electronic Cargo Tracking System and Scanners in daily operations. The management should organize regular training workshops aimed at equipping employees with the necessary skills to handle Electronic Cargo Tracking System and Scanners. The government of Kenya should allocate enough financial resources to boost the adoption of the Electronic Cargo Tracking System and Scanning technology at all other entry points.

5.4.2 Policy

The study recommended that the government of Kenya through the ministry of trade should streamline policies relating to customs electronic systems. In particular, policies on Integrated Customs Management System, Electronic Cargo Tracking System and Scanning technology should be strengthened to boost operations at key entry points. There should be policy adjustment to ensure that there is enough allocation of financial resources to boost development and maintenance of the customs electronic systems at the key entry points.

5.5 Suggestions for Further Research

The study was confined to investigating the effect of customs electronic systems on trade facilitation at key entry points in Kenya. The study focused on three Customs electronic systems that jointly accounted for 60.3% of variations in Trade Facilitation at Key Entry Points in Kenya. Future studies could focus on other factors that can explain the remaining 39.7%. Researchers could also introduce intervening or moderating variables in the model and establish their role in determining the

relationship between customs electronic systems and trade facilitation. Some of these factors could include government regulations, organization culture, and technological capabilities.

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APPENDICES

Appendix I: Introduction Letter

Dear (Respondent)

RE: PARTICIPATION IN DATA COLLECTION

I am a student pursuing a Masters' degree in tax and customs at Moi University and currently undertaking a research project on **“EFFECT OF CUSTOMS ELECTRONIC SYSTEMS ON TRADE FACILITATION AT KEY ENTRY POINTS IN KENYA”**

Kindly respond to the questions in the attached questionnaire. The information provided will exclusively and solely be used for academic purposes and will be treated with utmost confidentiality. Upon request, you will be furnished with a copy of the final report.

Your cooperation will be highly appreciated.

Yours Faithfully,

ABDIHAKIM DERE

Appendix II: Questionnaire

The questionnaire seeks information on the effect of customs electronic systems on trade facilitation at key entry points in Kenya.

Instructions: Tick and fill were appropriate

Section A: Background Information

1. Gender

Male Female

2. Age

Below 25years 26 to 35 years 36 to 45 years

46 to 55 years above 55 years

3. Highest level of education

Diploma Bachelor degree Master's degree Doctorate

4. How long have you worked as a customs officer?

Below 2 years 2 to 5 years 6 to 10 years

Above 10years

Section B: Integrated Customs Management System

Kindly indicate your level of agreement or otherwise with the following statements relating to Integrated Customs Management System.

Use a scale of 1-5 where; 1 = strongly disagree, 2= disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Statements	1	2	3	4	5
ICMS Training is available to all stakeholders.					
Using estimates during customs valuation is more favourable.					
Self-declaration of goods and import data sharing has affected compliance					
ICMS is able to counter security threats through a robust risk management system					
ICMS provides for transparency of the cargo as the system eliminates human intervention					

Section C: Electronic Cargo Tracking System

Kindly indicate your level of agreement or otherwise with the following statements relating to Electronic Cargo Tracking System.

Use a scale of 1-5 where; 1 = strongly disagree, 2= disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Statements	1	2	3	4	5
There has been capacity building on cargo tracking systems					
Containerized cargo theft has reduced since incorporation of cargo tracking system.					

Use of physical escorts during transit is more preferable.					
Cargo Tracking systems are costly to implement					
Electronic cargo tracking system ensures internal control systems are enhanced.					

Section D: Scanning Technology

Kindly indicate your level of agreement or otherwise with the following statements relating to scanning technology.

Use a scale of 1-5 where; 1 = strongly disagree, 2= disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Statement	1	2	3	4	5
X ray technology has enhanced the inspection of products at the entry points.					
Mobile scanning is useful in inspection of products at the entry points.					
Fixed scanners are used in the inspection of products at the entry points.					
Scanning technology affect accountability and efficiency of customs officers and cargo owners.					

Section E: Trade Facilitation

Kindly indicate your level of agreement or otherwise with the following statements relating to trade facilitation.

Use a scale of 1-5 where; 1 = strongly disagree, 2= disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Statement	1	2	3	4	5
The clearing speed has increased due to automation of customs processes.					
The time taken to clear goods has improved due to automation of customs processes.					
There is increase in publication of trade information through channels such as internet.					
There is increase in volume of trade following the automation of customs processes					
The transaction cost has reduced following the automation of customs processes.					

THANKS FOR YOUR COOPERATION

Appendix III: Authorization letter from KESRA



REF: KESRA/NBI/036

15th September 2021

TO: WHOM IT MAY CONCERN

RE: REQUEST FOR RESEARCH PERMIT

ABDIIKIM ABDULLAHI DERE- REG. NO.: KESRA/105/0107/2019

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

The named student is undertaking Research on TOPIC: "EFFECT OF CUSTOMS ELECTRONIC SYSTEMS ON TRADE FACILITATION AT KEY ENTRY POINTS IN KENYA."

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

Your support to KESRA in this regard will be highly appreciated.

Thank you.

**Dr. Marion Nekesa, PHD,
Head Academic Research
KESRA**



Appendix V: Turnitin Results

EFFECT OF CUSTOMS ELECTRONIC SYSTEMS ON TRADE FACILITATION AT KEY ENTRY POINTS (JKIA, ICD AND MOMBASA PORT) IN KENYA

ORIGINALITY REPORT

19%

SIMILARITY INDEX

17%

INTERNET SOURCES

5%

PUBLICATIONS

8%

STUDENT PAPERS

PRIMARY SOURCES

1

Submitted to Kenyatta University

Student Paper

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2

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