THE EFFECT OF CUSTOMS AUTOMATION ON CARGO CLEARANCE EFFICIENCY: THE CASE OF ADDIS ABABA KALITY CUSTOMS, ETHIOPIA

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A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT.

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;

DECLARATION

I hereby declare that this research Titled" ***The Effect of Customs Automation on Cargo Clearance Efficiency: The Case of Addis Ababa Kality Customs, Ethiopia"*** is my original work and has not been submitted by any other person for any other requirement and I acknowledged that all sources of information are used appropriately.

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COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE, GRADUATE STUDIES MASTERS OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT PROGRAM

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LIST OF ABBREVIATIONS

CAS	Customs Automation Systems
ITC	Information and Communication Technologies (ICT)
UNECE	United Nations Economic Commission for Europe
WCO	World Customs Organization
LPI	Logistics Performance Index
OSBPs	One Stop Border Posts
ASYCUDA	Automated Systems for Customs Data
ERCA	Ethiopian revenues and customs authority
ECMS	Electronic Customs Management System
ESW	Electronic Single Window
MOT	Ministry of Transport
EMA	Ethiopian Maritime Authority
BPA	Business Process Automation
WTO	World Trade Organization
TFA	Trade facilitation Agreement
UNCTAD	United Nations Conference on Trade and Development
RKC	Revised Kyoto Convention
DTI	Direct Trade Input
COMESA	Common Market for Eastern and Southern Africa
GPS	Global positioning system

ABSTRACT

The main objective of this research was to investigate the effect of customs automation system on cargo clearance efficiency. Quantitative approach and explanatory study design was used in the study. A sample of 109 customs officers and 51 customs clearing agents were considered. A total of 160 questionnaires with Likert scale were distributed and 148(92.5%) questionnaires were returned. Collected data was processed using SPSS version 27 software. Correlation, multiple regression as well as descriptive statistical methods were applied to analyze the data. The study concluded that the electronic Transit system had a positive effect on cargo clearance efficiency while electronic documents submission and monitoring system had moderate positive correlation with cargo clearance efficiency. Both electronic customs clearance systems and electronic single window systems had significant positive effects on cargo clearance efficiency. The study recommends continuous employee and stakeholders training, GPS-based tracking systems, modern cargo scanning machines, ICT infrastructure, and improved collaboration with regulatory agencies to enhance customs automation features and as a result improve cargo clearance efficiency.

Key Words: Customs clearance, Customs Automation, single window

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

To control the entry and export of products into and out of their borders, nations that take part in international commerce set up customs administrations. The three components of the customs administration's work in international trade are fiscal, economic, and protection and security. All three components are related to international trade in goods. Depending on the nation's geographic, economic, and other characteristics, the roles and functions of customs may vary in terms of their relative relevance and priority, but the three fundamental components are consistently present. (Azcarraga et al., 2022).

As it takes a lot of time to manually handle customs paperwork, which includes classifying, calculating taxes and duties, and gathering the required permits and certifications, this increases the number of committed human personnel, which raises labor expenses and introduces the possibility of human error. The automation of the cargo clearing procedure has been a top concern for international customs administrations. Conventional import and export cargo clearance involves paper-based manual procedures that increase costs by up to 10%, cause delays and time penalties, result in loss of business opportunities, and lower competitiveness. (Chen, 2011).

In order to minimize delays, lower transaction costs, and guarantee a seamless flow of products through international borders, customs administrations of different countries have realized throughout time that they need to modernize and simplify their processes to stay up with the growing volume and complexity of global trade. As a result, many countries adopted different customs technologies such as the Customs automation systems (CAS).

Automation of customs System is the use of ICT technology to achieve the goals of customs agencies (WCO, 2016).

Customs process automation denotes the usage of technology and digital systems to modernize and improve the procedures of customs clearance for global trade. This entails the use of automation to speed up the customs clearance procedure, the implementation of electronic systems

for document and data transfer, and the digitalization of duty and tax computations (i Customs, 2022).

Thus, automation of customs is entirely related to the automation of customs processes. Jane (2024) also explained process automation as the use of software and technology to produce goods or render services.

Thus, it is understandable that the automation of customs is about using Information technology in improving customs clearance efficiency from the old manual based to paperless processes. This idea is supported by the World Economic Forum document. Its states that, in a world that is becoming more technologically advanced, governments are introducing paperless trading to enhance trade administration, customs controls, and trade competitiveness (UNECE, 2017).

Hoping to reap the benefits of customs automation, different countries have been automating their customs clearance processes. Since 1973 that is the First Kyoto Convention, the World Customs Organization (WCO) has pushed the implementation of Customs Automation initiative in each of the nations that are members. As a result, many countries have implemented and are able to successfully improve their logistics performance index (LPI). According to World Customs Organization (2018), of its total members, almost 59% of Customs Organizations practice their own systems of automated customs clearance and Approximately 50% of Customs Administrations use Single Window systems (McGauran and Okazaki,2018).

Paper based processes were replaced by automated customs processes and procedures as part of the modernization and reform of customs. The changes are extensive and include pre-arrival goods processing, electronic tracking of goods, risk-based management, One Stop Border Posts, automated file submission, application of electronic payments, cooperation & coordination including interfacing of government agency systems involved in clearance, and coordinated border management (Gichuki & Msiska,2021).

According to the WCO Report (2022), the implementation of customs automation has increased within the member countries of WCO. Approximately 64.1% of Customs Administrations use their own automated clearance systems.

Countries in Africa like Kenya have automated their customs since 2005. According to Gitaru (2017), Kenya has implemented web-based system called Simba since 2005.It revolutionized the Customs Clearance Process by introducing online manifest lodgment, electronic processing, reports, reconciliations, duties calculation, and internal accounting. It eliminates human intervention and reduces errors.

In Ethiopia, history of customs automation starts in 1998, the time when the first version of the Automated Systems for Customs Data (ASYCUDA) was implemented as a pilot test in Addis Ababa airport. The Ethiopian government fully launched ASYCUDA program in September 2004 in all its branches. Because of ASYCUDA's many advantages in streamlining the Authority's operations, it was implemented in Ethiopian Customs Authority operations. However, despite the advantages, there were issues that arise during its application that reduce customs efficiency, such as frequent breakdowns, a lack of system training, and intentional human intervention (Wondemagegne,2014).

Moreover, ASYCUDA was a semi-automated system that lacked integration with other systems and was not enough to fulfill the demands of customers. As a result, it was replaced by Electronic Customs Management System (ECMS) in 2018.The project for this system was launched in 2016 and started implementation in 2018 in all customs branches. Electronic Customs Management System (eCMS) is a digital platform or software application used by customs authorities to manage and automate various customs processes and procedures. According to Webb Fontaine Group, (n.d.), The key features of the system are: The system automates import and export transit operations, generates T1s from Djibouti Asycuda World system transit declarations, controls transit bonds, and lodges airport electronic manifests using IATA XML and Cargo IMP standards. It also features a comprehensive dynamic risk management system and complex manufacturing raw material processing monitoring.

Apart from this, the government of Ethiopia launched an electronic single window system that is intended to be used by those who are engaging in international trade. The Ethiopian Customs Commission, with World Bank Group support, has developed an electronic single window (eSW) for trade. It enables stakeholders to submit and receive electronic information in association to importing/exporting that is sought to reduce time and cost for traders (World bank,2020).

Although there is broad agreement about the potential advantages of automation, including shorter processing times, more accuracy, and better risk management, there is still a lack of empirical data addressing its actual effects and it is vital to investigate the specific effects of customs automation on cargo clearance efficiency to inform policy decisions and operational strategies. Therefore, this research investigated the effects of customs automation on cargo clearance efficiency, focusing on one of the customs commission branches (Addis Ababa Kality Customs)

1.2 Statement of the Problem

The role of efficient cargo clearance efficiency in the area of global trade is of critical concern. It offers several benefits to various stakeholders involved in worldwide trade. In general, efficient cargo clearance brings about cost savings, operational improvements, and competitive advantages, benefiting importers, exporters, logistics service providers, customs authorities, and ultimately, the global economy as a whole. On the other hand, inefficient cargo clearance results in poor logistics performance of a country. Hoping to modernize its operational activities and facilitate trade, the Ethiopian government has launched customs automation systems like the ASYCUDA program in September 2003 and later replaced by electronic customs management system (ECMS) in 2018.

In addition, a single window system (SWS) that provides a centralized platform for submitting and processing various trade-related documents and data to several government entities that support commerce, such as regulatory bodies, port administrations, and custom was launched in 2020.

The main features of the Electronic Customs Management System (ECMS) that are currently implemented in Addis Ababa Kality customs are electronic documents submission and monitoring system, electronic transit system, and electronic customs clearance system. In addition, the single window system is also in use specially to interlink customs with other regulatory agencies. However, despite all the efforts different studies and researcher's personal observations show that Addis Ababa Kality customs branch is not clearing cargo efficiently. Though the adoption of customs automation systems embraces the promise of streamlining and improving cargo clearance efficiency, its actual effect on cargo clearance efficiency is not well researched.

Studies made by Al-Taani, Jarradat, and Taani (2022) evaluated the effect of adopting automation on customs performance and their study indicated that the performance of Jordanian Customs has

been positively impacted with adopting customs automation. Cajala, and Alcedo (2015) studied bureau of customs computerization project in the Philippines, emphasizing on importation and exportation trades, and showed that computerization programs were effective in eliminating corruption and import/export documentation. Mumia (2021) investigated how automation of the customs clearance procedure affected the efficiency of customs at the Kenyan port of Mombasa. Mumia discovered that the performance of customs and automation are positively correlated. In same country, Kabui, Gakobo, and Mwaura (2019) also studied the Consequence of Single Window System on customs clearing efficiencies in Kenyan port and their study found that the concept of Single Window leads to improved cargo clearance efficiency. Wondemagegne (2014) studied customs reforms, specifically the adoption of ASYCUDA++ in Ethiopia and found out that the application of the system has resulted in customs operation simplifications. Berhe (2017) also examined the effect of automation of customs functions on revenue collection in Ethiopia and found out a favorable connection between the computerization of processes and revenue gathering improvement.

However, most of above studies were not conducted in Ethiopia and can't be generalized to Ethiopia as countries have their own contexts. Thus, there is a contextual gap as there are no ample studies with this specific topic in the selected geographic area. The studies made in Ethiopia by (Wondemagegne,2014; Berhe,2017) in relation to automation were not detailed enough to show customs automation features like electronic submission and monitoring systems, electronic Transit system, electronic Customs Clearance Systems, and electronic one point/place service on consignment clearing performance. Based on observations of researcher as well as interviewing customers and employees of Ethiopian customs commissions there is a gap in showing the clear relationship between custom automation and cargo clearance efficiency. The purpose of the study is to ascertain how customs automation technologies affect the efficiency of cargo clearance, with a particular emphasis on Ethiopia's Addis Ababa Kality Customs Branch.

1.3 Research questions

To achieve the aims of the research topic, the study attempted to seek to answer the following questions.

- What is the effect of electronic submission and monitoring systems on cargo clearance efficiency?
- What is the effect of the electronic Transit system on cargo clearance efficiency?
- What is the effect of electronic Customs Clearance Systems on cargo clearance efficiency?
- What is the effect of a single window system on cargo clearance efficiency?

1.4 Objectives of the Study

The study has both general and specific objectives.

1.4.1 General Objective

The general objective of the study is to investigate the effect of customs automation on cargo clearance efficiency at Addis Ababa kality customs branch in Ethiopia.

1.4.2 Specific objectives

The study is expected to achieve the following specific objectives:

- To investigate the effect of electronic submission and monitoring systems on cargo clearance efficiency
- To investigate the effect of electronic Transit system on cargo clearance efficiency
- To investigate the effect of electronic Customs Clearance Systems on cargo clearance efficiency
- To investigate the effect of single window systems on cargo clearance efficiency

1.5 Definition of Terms

1.5.1 Conceptual definition

Customs: It is a government body in a country assigned for collecting taxes and duties, and for controlling the flow of goods that include animals, transports, personal effects, and hazardous items, into and/or out of a country. (Wikipedia,2024)

C**argo**: means any goods imported or exported by any means of transport other than stores of or means of transport for commercial use and baggage of travelers (Federal Negarit Gazeta,2014).

Automation: It is the adoption of technology to tasks that decrease the need for human intervention. This covers both consumer and company applications, such as home automation and robotics, as well as industrial automation including robots and IT and network automation, automation of business processes, and automating system integration. (IBM,2021)

1.5.2 Operational definition

Declarant: - Any individual who makes a declaration regarding goods or in whose name one is made is referred to as a declarant (Federal Negarit Gazeta,2014).

Customs Clearance: It is a procedure that entails submitting the necessary paperwork to the relevant government agency in charge of customs, followed by monitoring and clearing the cargo while it is in transit. (Goddyn, 2023)

Cargo Clearance: Vital customs procedures carried out prior to the international import or export of goods (Preece & Neher, 2020).

Release of goods: -It is a process in which products within control of customs are released for the stated purpose (Federal Negarit Gazeta,2014).

Single window system: "SWS are essentially trade facilitation tools whose primary purpose is to simplify and harmonize processes associated with cross border movement of goods." (Ndonga,

2015).

1.6 Significance of the Study

The purpose of research was to investigate effects of customs automation on cargo clearance efficiency. The results are expected to have the following significance:

- It is important to evaluate the effectiveness of new adopted systems as each system requires a large budget and expenditure during its implementation as well as preparation. Thus, the results are expected to indicate policy makers especially Ethiopian customs commission if it achieved the objectives given the cost of implementing the system.
- It will assess the customs efficiency from outside the organization by the customers as a result it will help the policy makers to see the problems and indicate the focus areas that should be improved
- It will contribute to filling the gap in empirical literature, especially in the customs automation area.
- It will contribute to the business community, as it recommends areas that need improvement in automating their work procedures.

1.7 Delimitation of the Study

The aim of the study was to investigating the effects of customs automation on cargo clearance efficiency: The case of Addis Ababa kality branch, Ethiopia. It covers staffs of Kality customs and clearing agents located at comet compound. information was collected from 109 employees and 51 customs clearing agents using questionnaires and considers a current cross-sectional view of participants. The number of participants is limited to 160, because the researcher believes they are more related to the operational customs clearance activities in the study area. Even though the concept of automation is wide, this research considers customs automation related only with electronic transit systems, electronic customs clearance systems, electronic document submission & monitoring systems, as well as electronic single window systems, that are currently in use in the study area. The reason why Addis Ababa Kality Customs branch is chosen is that it is the largest customs branch that provides a customs clearance process for both unimodal and multimodal

cargo. Moreover, it is a branch where customs staff and customs clearing agents are located in the same premises, making it the ideal place to conduct the research.

1.8 Organization of the paper

The study is organized in five chapters. The first chapter consists of an introduction and includes background of the study, statement of the problem, research questions, objective of the study, significance of the study, and scope/delimitation of the study. The second chapter deals on the review of related literature. The third chapter is regarding research methodology and design. Chapter four explains about the data analysis, presentation and findings and finally conclusion and recommendations will be presented in chapter five.

CHAPTER TWO

RELATED LITERATURE REVIEW

2. Introduction

The literature reviewed in areas relevant to the research are presented in this chapter. Concepts including customs, trade facilitation, the effect of customs on trade facilitation, and customs automation are covered in the theoretical literature study. By introducing the ASYCUDA, the Electronic Customs Management System (ECMS), and the single window system, it also provides a detailed overview of customs automation in Ethiopia. This chapter also covers the connection between logistical performance and customs clearance efficiency. The empirical literature review, which includes an overview of relevant research findings from other researchers' publications, is also included in this chapter. The gap analysis and research conceptual framework are finally presented in this chapter.

2.1. Theoretical Review

2.1.1.Customs

In import-export operations of a country, there are various government agencies that involve in the process. However, the role of customs is crucial in decreasing transit time of goods, facilitate their movement as well as reducing cost. There are different definitions to customs. According to revised keyoto convention customs refers to governments' Service in responsibility of implementing decrees and directions pertaining to import, export, transport, and storage of goods in addition to managing Customs laws, and duty and tax collection (ERCA, 2017).

In this definition of customs, it is clearly shown that, customs is a service that is given by governments with the main responsibility of administering laws that are related with collection of tax and duties. The flow of commodities across borders is regulated by customs. Because of this, customs authorities are crucial to the upholding of laws governing international trade. The "police at the border" position has been supplemented in recent decades by a heavy emphasis on trade

facilitation, which involves pursuing noncompliant parties and aiding those that strive to be compliant. That is, easy logistics combined with insightful enforcement. (Veenstra, 2023).

The aforementioned illustrates how customs has evolved from its historical function as a gatekeeper to become an essential partner in trade facilitation.

A key factor in economic growth is legitimate international trade. The world trade system is susceptible to terrorist exploitation, which would seriously impair international trade as well as national economies and social cohesion. Customs administrations, which are government agencies tasked with overseeing the flow of products internationally, are uniquely positioned to boost supply chain security globally and promote socio economic growth by facilitating commerce and collecting taxes. (WCO,2021). This implies that Customs administrations, as government entities are responsible for managing international trade, play a crucial role in ensuring global security and contributing to social and economic growth by collecting revenue and facilitating trade.

In general, Customs administrations are responsible for a variety of tasks that differ from nation to nation and are frequently reviewed and modified to maintain their applicability in a world that is changing all the time.

In the Ethiopian context, the Ethiopian customs commission is a government body with authority of implementing proclamations and other legal directives that are related to import-export, transport and warehousing of cargo in Ethiopia. According to the Federal Negarit Gazeta (2014), Ethiopian customs accomplishes its operations based on the following principles:

- It is based on self-assessment principle in which importers and exporters of goods present goods value and make payment of duty & tax
- Should be founded on responsibility, openness, and risks management;
- Encourage, backing manufacturing and economic transformation;
- using globally recognized information technology systems; and
- Preventing illegal practices by promoting self-compliance.

As it can be seen from the principles of the Ethiopian customs commission, using internationally accepted information technology systems that can improve its services is among its priorities.

2.1.2.Trade facilitation

Any activity performed to promote trade or facilitate the worldwide movement of goods would be considered trade facilitation in its broadest definition. It is a concept that is applicable to the whole supply chain. Morini et.al (2017) defines trade facilitation as a collection of steps meant to lower transaction costs related to the administration and enforcement of trade regulations across international borders, with the goal of facilitating trade between nations. This definition of trade facilitation shows that it is a comprehensive strategy aimed at promoting trade between countries by reducing transaction costs associated with the enforcement and management of trade policies.

Clark (2022) described Trade facilitation as trade facilitation in the widest meaning would be any measure adopted to support trade or simplify the movability of goods internationally. As a concept, it can apply to the entirety of the supply chain.

Different negotiations have been done regarding trade facilitations.as a result of these negotiations, the World Trade Organization (WTO) Trade facilitation agreement was signed in 2013 in Bali. The Trade Facilitation Agreement (TFA) of the World Trade Organization (WTO) is the most important framework for trade facilitation in recent times. The WCO Revised Kyoto Convention2, which served as the primary point of reference during the WTO trade facilitation discussions, contains the fundamental ideas and policies that form the foundation of TFA. To reduce border traffic, improve customs transparency, and expedite the delivery of commodities to market, TFA establishes trade facilitation regulations and mandates that its members execute a range of trade facilitation measures (Clark,2022). Clark further explained that the WTO's Trade Facilitation Agreement (TFA) is a significant international agreement aimed at improving trade flow by streamlining, standardizing, and harmonizing customs processes, reducing administrative burdens, and promoting transparent border management under a coordinated approach.

The United Nations Trade Facilitation Implementation Guide identifies four pillars of trade facilitation as transparency, simplification, harmonization, and standardization. (UNECE,2012). These are the important ideas on which effective and long-term facilitation measures are built. And their explanation according to the United Nations is described as follows:

Pillar 1: Transparency

Transparency in trade is crucial for businesses to predict costs, processes, and government requirements. It ensures that rules are accessible and understandable to traders, leading to improved compliance. Guidance documents should be plain, accessible, and available in languages that traders speak, and should be available electronically. Transparency also involves accountability for safeguarding private and public interests, enforcing policy, and involving stakeholders in legislative processes.

Pillar 2: Simplification

For all border control agencies, customs processes need to be simplified. The goal of coordinated strategies should be to minimize the complexity and ease of crossing borders. Procedures are examined to remove duplication, pointless approval phases, discretion, and other extraneous actions. This is frequently achieved by putting the right legislative framework in place, utilizing technology, collaborating with other border authorities, and speaking with merchants.

Pillar 3: Harmonization

International resolutions, norms, and practices must be followed by national procedures. Administrations can collaborate more effectively across borders when there is harmony. Global uniformity in customs operations can be achieved by implementing international standards, exchanging information across borders with other customs agencies, utilizing reciprocal agreements, and engaging in other initiatives that promote closer cooperation with partner agencies.

Pillar 4: Standardization

Customs administrations should establish standard policies, procedures, and documents to ensure uniform treatment of goods at border crossings, promoting cross-border harmonization. This can be achieved through standardized declaration documents, operating procedures, or required documentation. Standardization helps provide consistency for merchants by ensuring that the procedures and paperwork needed for imports will be the same, whereas harmonization focuses more on matching rules to international standards.

Generally, according to the above given explanations, it is understandable that the effective implementations of the trade facilitation pillars need the availability and application of technology.

Trade facilitation leverages automation and information and communication technologies to enhance customs management, effectively managing assignments and eliminating delays.

This reality urges the Ethiopian customs commission to take action to automate its customs clearance procedures based on balancing control and facilitation.

2.1.3. The Role of Customs in trade facilitation

Custom is a government body or authority that controls the movement of goods import and export across national borders of a country. Mainly, in least developed countries, it deals with the gathering of duties charged to imported or export goods. Customs was once thought of as the administrative branch that assessed import and export taxes on top of customs charges. But in recent years, knowledge of customs' functions has grown dramatically, encompassing revenue, security, and trade facilitation. (Kormych,2018)

According to Rbehat and Marafi (2024), trade facilitation was a top priority during the 1996 Singapore Ministerial Conference and has since grown in importance in the present World Trade Organization (WTO) discussions, after the Doha Ministerial Declaration. The fact that many governmental and private sector organizations are involved in international trade operations is one reason why trade facilitation is regarded as a complex and crucial agenda issue for organizations like the World Customs Organization (WCO) and WTO. Other government organizations, in addition to Customs, are involved in managing national boundaries and products movement. In order to lower total transaction expenses, it is crucial to evaluate the functions played by other government agencies, recognize their organizational shortcomings, and take suitable steps to address them.

Because of prospects and challenges that come with globalization, customs' role in trade facilitation has been an important issue in many countries' policy makers. When a cargo crosses the border of a country in international trade, it cannot pass without being touched by customs. Therefore, being efficient or slow in the customs process has a great impact on the release of the goods from customs that definitely has an effect on the profitability of businesses. As a result, countries have progressively begun to give more attention to facilitating lawful commerce using countrywide improvements and worldwide commercial negotiations. At the multilateral level,

WTO’s agreement on trade facilitation entered into force on February 22, 2017, following years of negotiations. Utilizing these international conventions, agreements, guidelines, tools, and instruments is the duty of customs administrations in order to guarantee the unrestrained flow of trade in the supply chains.

Customs clearance procedures consist of both import and export procedures. Import is a process of delivering goods from one country to another country. Before taking into use or being resold, goods must pass through Customs after accomplishing necessary import customs procedures. Export is the process of transporting items that were freely circulated within a country to another country after accomplishing necessary export customs procedures.

Automation of customs procedures involves applying the laws of the Customs Proclamation, which regulate the import-export of goods into and out of Ethiopia and necessitate pass-through customs control, as well as the rights and responsibilities of those involved in customs formalities. Ethiopian traditions manual Ethiopian customs guide (2017)

2.1.4.Customs Automation

According to the World Customs Organization (2016), the Customs Automation System (CAS) is the adoption ICT for achieving the task of Customs. Customs has different operational activities to be performed when applying its responsibilities. Thus, automation of customs is entirely related to the automation of customs processes or procedures. Jane (2024) explained process automation as the use of software and technology to produce goods or render services. It covers the system's conception and execution. It can do these functions automatically based on the given instructions or regulations. Process automation solutions increase output in terms of time, accuracy, efficiency, and productivity. Routine tasks can be automated to free up human resources for more strategic and valuable work. The full or a portion of the complete clearance procedure for the release of customs products is supported by the use of digital technology in the Customs automation systems project. According to UNECE-TFIG (2020), these include the filing and processing of electronic declaration forms, managing cargo approval, transit, or logistics, inspecting and verifying the items, and paying duties and taxes.

2.1.5.Overview of Customs Automation in Ethiopia

2.1.5.1. Automated systems for customs Data (ASYCUDA)

ASYCUDA is a software that is developed by UNCTAD. Most of the global trading procedures are enclosed by the computerized customs administration system known as the Automated System for Customs Data, or ASYCUDA. Along with manifests, it also performs finance, transit, suspense, and customs declarations. It also generates trade data that is beneficial for statistical study in economics. (https://asycuda.org/en/about/).

UNCTAD (2023) states that When ASYCUDA was founded, people in industrialized nations were just beginning to have access to IT technologies. Although using a personal computer is commonplace today, people in poorer nations still face difficulties due to the digital divide. ASYCUDA will keep assisting developing nations in gaining access to and utilizing cutting-edge technology to streamline and automate trade procedures and processes. To assist member nations or territories in their attempts to digitize commerce, ASYCUDA offers a variety of solutions, from its flagship ASYCUDA World customs management software to other integrated, specialized platforms.

This method employs the use of a fully automated Customs administration system that handles every step of the clearing procedure, starting before the items arrive and ending with their ultimate release following paying of any charges. All procedures, including import and export, and all additional Customs regimes, such as transit and storage, are completed by the system.

To improve and modernize customs procedures in Ethiopia Various efforts had been made. Among others was the effort to automate customs. In 1997, the then customs Authority made an agreement with UNCTAD implement for implementing ASYCUDA Version 2. By Establishing Customs Automation Project Office in 1998, Addis Ababa airport customs was the first branch to be automated in the same year. Expanding the experience from Addis airport customs, by 2004, almost 95% of declarations were processed electronically using the ASYCUDA system (ECA,2004).

According to UNCTAD (2011), The primary accomplishments of ASYCUDA at the Ethiopian Revenues and Customs Authority (ERCA) include: using a Direct trader’s input capability;

applying risk management methods; dropping clearance times, which facilitates trade; and to obtain on time and accurate statistical data. ASYCUDA system was used in Ethiopia until it was replaced by the Electronic Customs Management System (eCMS) in 2018.

2.1.5.2. Electronic Customs Management System(eCMS)

In the era of globalization, the movement of goods across countries is huge in volume and demands fast treatment. At the center of the international trade between countries is customs that accomplishes the balance of trade facilitation and trade control. To achieve its objectives customs in different countries have been transformed from manual processes to the use of technology.

According to Erceg (2016) electronic service is vibrantly transforming customs employees' part in global trade and it includes a variety of procedures used in conjunction with computers including modern IT to facilitate the secure exchange between products, services, and data.

In the year 2018, Ethiopian Revenues and Customs Authority (ERCA) has introduced the electronic Customs Management System (eCMS) that was developed by Webb Fontaine to conform with international Customs standards, Streamline Customs processes including Transit controlling, progress clearance time and security. According to Webb Fontaine Group, (n.d.), The key features of the system are: The system automates import and export transit operations, generates T1s from Djibouti Asycuda World system transit declarations, controls transit bonds, and lodges airport electronic manifests using IATA XML and Cargo IMP standards. It also features a comprehensive dynamic risk management system and complex manufacturing raw material processing monitoring.

The Ethiopian government has been using different customs modernization measures among them is customs automation. The main features of customs automation systems that are currently applied by the Ethiopian customs commission are categorized and summarized as electronic documents submission and monitoring system, electronic transit system, electronic customs clearance system and electronic single window system.

2.1.5.2.1. Electronic Document Submission and Monitoring System

Submitting goods declaration to customs is the first step of contacting customs. Any person or organization who brought goods to customs needs to declare to customs about the details of its goods. A person who is responsible for importing or exporting of cargo is expected to submit customs declaration either in written form or electronically to the customs branch where he/she is receiving the service. The declaration needs to indicate the details of the goods being imported/exported as this information is used as a basis for classification of items, for valuation purpose and for calculating the amount of tax and duties to be paid if any.

FDRE Negarit Gazeta (2014) defined goods declaration as "a statement made in accordance with the provisions of this proclamation, by which the declarant indicates the customs procedures to be applied to import, export or transit goods and finish the particulars which the authority requires for its application".

Declaration of goods can be presented in written forms manually or paperless(electronically). The federal government of Ethiopia allowed electronic declaration in its proclamation 859/20214.According to FDRE Negarit Gazeta (2014), goods declaration can be presented to customs in oral way, in written form, in body actions and electronically. Based on the above proclamation the Ethiopian customs have applied paperless declaration of goods. The electronic management system enables declarants to present their goods declaration and supporting documents electronically to customs with no need to submit hardcopy documents.

The system also enables the storage, access of declarations and attached documents accompanied the declaration. Declarants have the option to assess their own Customs declarations on the web. Above all the system supports different features that can help classification of commodities, tax simulation, smooth and fast communication with customs and customs clearing agents.

2.1.5.2.2. Electronic Transit System

Through the transit process, products can be moved from one point of customs departure to the other point of final destination while being governed by Customs. One of the main barriers to international trade is the high cost of transportation caused by malfunctioning customs transit

systems (WCO,2014). To create a functional and efficient transit system the World customs organization recommends measures to be taken. For instance, the efficient flow of products throughout transit depends on carefully thought-out guarantee schemes that pay import tariffs, taxes, and other fees. Transit procedures are simple and transparent if they have improved documentation flows and information sharing throughout Customs offices.

"According to Standard 2 of Chapter 1 of Specific Annex E to the RKC, national Customs transit can be divided into three types of transportation, as follows. Transit for importation (transportation from an office of entry to an inland Customs office), Transit for exportation (transportation from an inland Customs office to an office of exit), Internal transit (transportation from one inland Customs office to another inland Customs office)" (WCO,2014:2)

In Ethiopia three of the transit types are applicable and are currently using the customs management system. It has enabled the transit automation as stated by Webb Fontaine Group, (n.d.) ,automation of all import and export transit operations, both multimodal and unimodal, along the nation's main transit corridors, which link the Kalitti and Mojo Customs offices near Addis Ababa to the Galafi Customs office (Djibouti border); through- transit as well as imports and exports from/to Kenya, Somaliland, and Sudan; Using bar code readers, transit customs officials and checkpoint officers can obtain information in real time.

2.1.5.2.3. Electronic Customs Clearance System

The procedure known as customs clearance involves the submitting of paperwork to the relevant customs agency, followed by supervision and clearance of the items while they are in transit (Goddyn, 2023).

Once goods are electronically declared, there are numerous customs clearance procedures to be accomplished. Payment of tax and duties (if it applies), risk assignment, inspection, classification of tariff, and goods valuation are performed by customs. Finally, after all the necessary clearance processes are accomplished goods need to be released for free circulation in the country.

FDRE Negarit gazeta(2014) defined release of goods as the process of releasing goods that were under customs control for their intended purpose. Thus, electronic release of goods is the final part of clearing goods from customs or custom designated warehouses.

Ethiopian Customs commission is currently using an electronic customs clearance process. It means the releasing process of items is accomplished after confirmation by customs officers that the declaration and supporting documents submitted by the declarant are correct, and the appropriate duties and taxes have been paid, and that they are goods that do not pose a problem for national security. Goods are released electronically using the electronic customs management system (ECMS) unlike the old manual goods releasing system that was time consuming and subject to personal judgements.

2.1.5. Electronic Single Window System (SWS)

From a theoretical standpoint, the Single Window Concept is an online platform that facilitates the transmitting of information pertaining to commerce over a single digital portal. After that, the data is shared with several government departments and business organizations for processing. The system provides the merchants with access to all regulatory services linked to import or export in international trade. The system, which can be electronic or physical that is, a building basically provides data related to international trade with just one point of entry and processing. It is typically run by one entity using different approaches that include unified, standalone, as well as hybrid methods (Abeywickrama & Wickramarachchi, 2015).

In the recommendation by UN/CEFCAT (2020), SWS is referred to as an establishment offering trade facilitation services that enables participants in commerce and transport to provide standardized information and paperwork in one place to satisfy all importation, exportation and transit related legal obligations. Each individual piece of data should only be electronically submitted once.

This recommendation also further clarifies the benefits that can be obtained from the adoption of the systems. For both the community and private sectors, a Single Window can greatly shorten and accelerate the process of supplying and exchanging the data required to satisfy trade-related regulatory obligations. If it is fully implemented, there will be a number of advantages, such as higher government revenue, better trade statistics, increased rule compliance, and more efficient resource allocation. Less opportunity for face-to-face encounters should lead to better government, less corruption, and better transparency for the country's economy (UN/CEFCAT,2020)

Single window systems are currently applied in many countries. According to Chibomba (2022), the majority of the Common Market for Eastern and Southern Africa (COMESA) Member States have prioritized the Electronic Single Window System (eSW) as one of the key trade and transport facilitation instruments to improve the ease of doing business and to enhance intra-regional trade in the region. The COMESA Council of Ministers decided that Member States should adopt an electronic single window (eSWS) among government agencies and private stakeholders as a standardized and harmonized data connectivity platform in order to improve the intra-regional trade and investment environment at the national and regional levels (Chibomba, 2022).

2020 saw the system's initial implementation in Ethiopia. As part of the government's commitment to boosting trade and investment, the Ethiopian Customs Commission created an electronic single window (eSW) for commerce with support from the World Bank Group. Most of the main cross-border regulatory agencies are linked by the new single window system. By using a single window submission process, it allows merchants to submit documentation and obtain electronic licenses related to import and export, greatly cutting down on trading time and expense (World Bank Group, 2020)

2.1.6. Customs Cargo Clearance Efficiency

According to Faster capital (2024), Efficient customs clearance of goods is a crucial process for businesses importing or exporting goods. It involves several steps, including documentation, inspection, and payment of taxes and duties. Efficient customs clearance saves time by reducing the dwell time consumed on the clearance process, letting businesses to obtain their goods in a timely manner. It also reduces costs, as demurrage charges accrue when goods are held beyond the agreed time. Efficient clearance also improves cash flow by avoiding demurrage charges, allowing businesses to allocate resources to other areas. Furthermore, it enhances customer satisfaction by allowing timely delivery of products, leading to repeat business and positive reviews. Traditional customs processes are characterized more as manual operations.

The manual processes make it challenging to complete the clearing processes accurately and on time, particularly in this day and age when globalization is contributing to an increase in transaction volume. Customs officers can frustrate and delay firms in clearing their products from the port by making arbitrary decisions. Because extra costs are incurred as a result of corruption,

transportation costs for enterprises are increased. Because the merchandise is held in bonded warehouses, the cost of keeping it increases due to port clearance delays (Kahyarara, 2018).

A country's economy is largely shaped by trade, so it is imperative that imported/exported items reach the market as soon as possible and without needless delay. Thus, it is obvious that improved logistics performance is needed. The performance of logistics is measured by the logistics performance index (LPI). This index was developed by World Bank and is collaborative benchmarking tool, to support countries to identify their prospects and matters related to performance of their trade logistics as well as measures they can practice just to improve that (World bank, n.d)

The World Bank developed the Logistics Performance Index (LPI), which rates nations based on six factors: the effectiveness of border management and customs clearance; the standard of trade and transportation infrastructure; the ease of organizing affordable shipments; the caliber and competence of logistics services; the ability to track and trace shipments; and the dependability of on-time delivery to consignees within the scheduled or anticipated timeframe (Arvis et al. 2016).

From this, it can be seen that the efficiency of procedures in customs as well as the speedy release of goods in customs borders play a very important role in the development and success of a country's logistics sector. As it is indicated, customs clearance efficiency is among the six components that contribute to the index of logistics performance. Thus, improving customs clearance efficiency positively or negatively contributes to LPI.

Kilibarda, Andrejić & Popovića (2017) identified two sections that display the assessment of customs efficiency: the global LPI and the local LPI. They further explained them as customs efficiency in the international LPI gauges the efficiency of border control agencies, including customs, by assessing the speed, simplicity, and predictability of procedures involved in the clearance process. The efficiency of customs in local LPI measures the superiority and capability of delivering services, as well as expediting the clearance and delivery of imports and exports, ensuring transparency in customs procedures during clearance, and providing timely and comprehensive information regarding regulatory changes. In LPI, the efficiency of customs administration is given particular attention. Thus, this index takes into account the degree of services offered by customs officials and associated agencies, along with the private sector's

assessment of the effectiveness of customs processes and the efficiency and productivity of clearing procedures.

Raja, Djayasinga and Aida (2022) explained the association between efficiency in customs clearing and efficiency logistics, as the efficiency of customs, which measures how quick and simple customs matters may be resolved, is a component of the logistical performance aspects. It can be calculated using service time as a benchmark and based on human resources and internet usage.

2.2. Empirical literature Review

In this section, studies that were conducted in relation to customs automation effect on cargo clearance efficiency in different parts of the world were reviewed.

2.2.1. Electronic Submission and Monitoring System and cargo clearance efficiency

Cheruiyot (2015) conducted a study on the I-tax systems implemented by the Kenya Revenue Authority and their service delivery at the Nairobi station. The research revealed that the insights of the staff towards technology meaningfully influence the level of service provided to clients. Moreover, it was found that when consumers are well-informed about and have a good understanding of the tax and internet access systems, the quality of services offered to them is greatly improved.

In 2015, Alcedo and Cajala evaluated the computerization program that the Philippine Bureau of Customs had put in place, concentrating on import and export activities. The study employed a validated questionnaire to collect data using a descriptive survey approach. The results showed that respondents were in complete agreement with the perceived advantages of the BOC computerization program that had been attained. Corrupt practices were also said to have decreased dramatically. All respondents expressed agreement with the BOC computerization's efficacy. The study also shown a respectable degree of efficacy in import/export documentation. The influence of automated customs processing on the efficiency of cargo clearance in the research area was not examined, though.

2.2.2.Electronic Transit System and cargo clearance efficiency

Customs transit declarations may now be submitted online in many nations, for example, by utilizing ASYCUDA's transit module. Furthermore, tracking and tracing of transit items in transit is made possible by contemporary IT technologies including radio frequency identification (RFID)-based automated cargo identification systems and monitoring systems based on the Global Positioning System (GPS) these technologies improve the commerce supply chain's connectedness and visibility (APEC,2012)

Erceg (2016) contended that the implementation of e-customs in Croatia brings about substantial changes in the roles of international forwarders and customs authorities. The study discovered that the utilization of the New Computerized Transit System (NCTS) facilitated a reduction in transit time for business operators from the Croatian border to their desired product destinations. Furthermore, the NCTS effectively reduced waiting time at the border, resulting in significant savings in transit time. Additionally, it reduced the cost of preparing the customs documentation procedures at the border and enabled a more efficient, professional, and expedient work-related cargo transit method.

2.2.3.Electronic Customs Clearance System and Cargo Clearance Efficiency

A study made by Al-Taani, Jarradat, and Taani(2022) evaluated the effect of application of custom automation on the performance of Jordanian customs from customs officials point of view. The study dealt with the magnitude of Jordanian customs department ability to match between government policies, the policy of openness and the removal of customs barriers to foreign trade and the basic objectives of the Customs Department, (revenue preservation, security, and social objectives, ...) from the point of view of the Jordanian Customs employees. To arrive at the result, the study used a descriptive research method. The study indicated that the computerized systems and the latest devices and equipment applied by the Jordanian customs has a positive impact with the performance of the Jordanian Customs Department in terms of customs revenue, combating smuggling, and speed of delivery. However, the study didn’t include customs automation like single window’s effect on the efficiency of cargo clearance.

Mumia (2021) looked at how automating customs release procedures affected customs operations at the Kenyan port of Mombasa. A descriptive survey and self-administered questionnaire were employed as data collection instrument. The study results show that enhancement of customs performance was observed with improving automation of customs verification. Additionally, it was found that enhancing system automation will enhance customs operations at Kenya's Port of Mombasa. In order to improve the Customs performance at Mombasa port, a recommendation was made to establish interconnectivity between all systems of the Partner Government Agencies, including the Kenya Revenue Authority. However, it is important to note that this study specifically concentrates on assessing the influence of customs on the goods release processes only.

Sakhasia, E. (2017) conducted a study to examine the service provision of the Kenyan Revenue stationed in Eldoret town, specifically focusing on computerized customs administration systems. The research used a descriptive research strategy and questionnaire as well as interviews were used to collect data. The results show that participants displayed some uncertainty regarding the impact of e-customs clearance and revenue systems. However, there was unanimous agreement among the respondents that electronic monitoring systems and risk analysis systems in customs significantly influence service delivery.

Wondemagegne (2014) carried out research on Ethiopia's tax and customs reform, with a particular emphasis on the adoption of the ASYCUDA++ system. A descriptive research design was employed and follows a mixed approach to arrive at its results. The study examined one of the customs automation systems, the ASYCUDA system. The implementation of the system has led to the institution to be streamlined and simplified. But it did not emphasize customs automation's effect on the efficiency of customs when it is measured by overall expenses for transactions linked to import and export and when evaluated by port clearance time.

Berhe (2017) investigated the Effects of Customs Functions Automation in Ethiopian revenue and customs authority (ERCA) on revenue collection improvements. A quantitative research approach and descriptive research methods were used. SPSS software was used and collected data was analyzed using inferential and descriptive statistics. Outcomes showed that improving revenue collection and automating Customs functions were positively correlated. However, the study only

focuses on revenue collection and doesn't cover effects of automation in customs work processes over efficiency in cargo clearance as measured using time and cost.

2.2.4.Single Window System and Cargo Clearance Efficiency

Serete (2015) noted elements influencing containerizing freight clearing at Kenya Ports Authority. The study discovered significant positive correlation between the KPA's process of documenting and clearing of containerized cargos. It was remarked that single window reduced bottlenecks for movement of goods at the port. But it lacks, detail examination on how system automation affected the efficiency of customs cargo clearance as determined by the total expenses of transactions for importing and exporting, transparency, cargo clearing easiness, and spotting and exclusion of non-compliant goods.

Kabui, Gakobo, and Mwaura (2019) conducted a study to investigate impact of the SWS on the effectiveness of goods clearing at Mombasa port, Kenya. A quantitative research design was used. To analyze data obtained via a structured questionnaire, an inferential as well as descriptive statistics were applied. The study revealed that the implementation of the idea of Single Window positively influences operations in shipping, permits for prearrival, and processing declaration for cargos, leading to improved efficiency in cargo clearance at the port of Mombasa. Nevertheless, automation effects of the other customs procedures on the efficiency of cargo clearance are not taken into account in this study; instead, it just looks at the automation of the single window only.

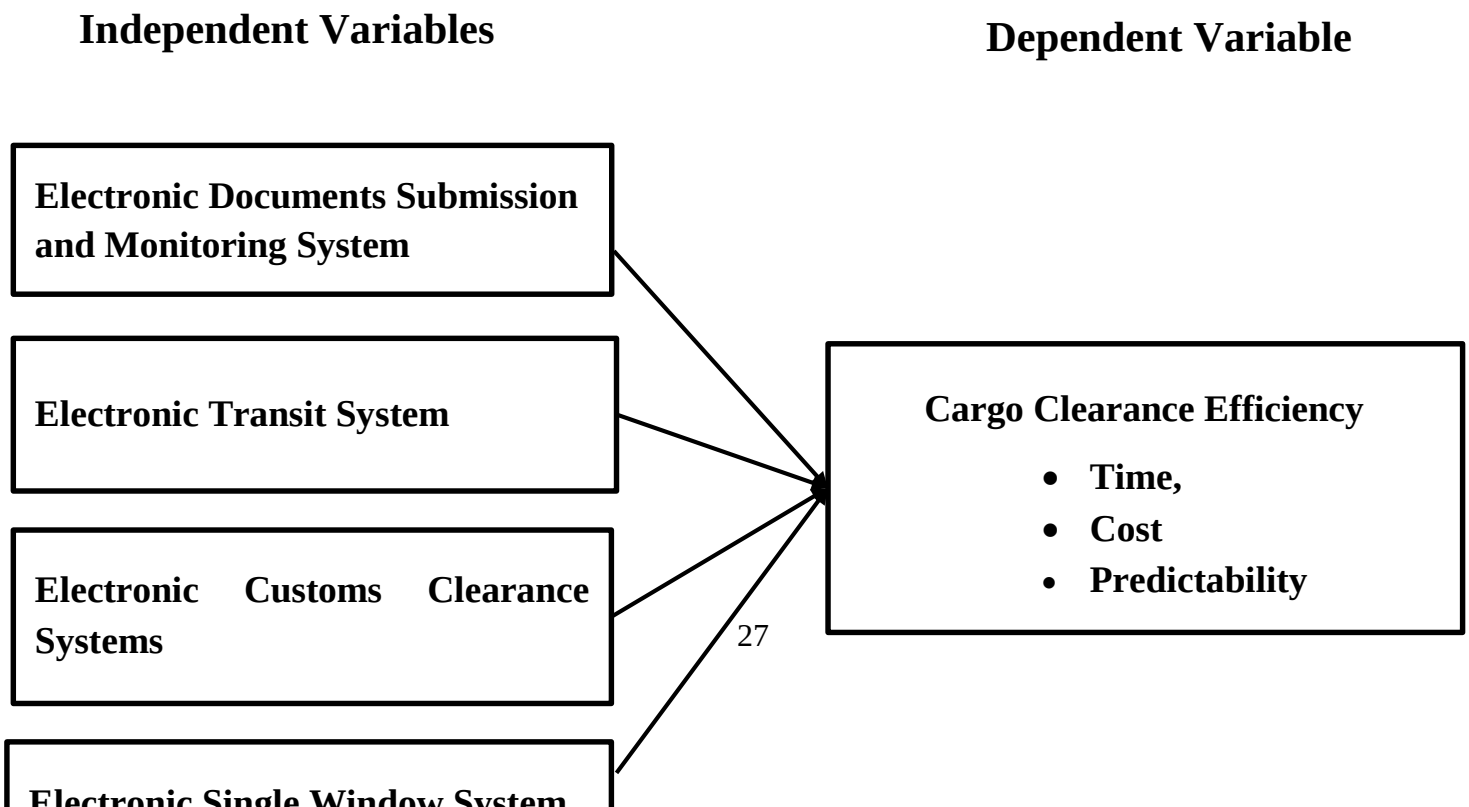
A study made by Mutai,R.J(2022) in Kenya, on how automating of customs systems affect facilitation in trade. The study came in to conclusion that Kenya's trade facilitation is influenced by components of customs systems automation. The Electronic Cargo Tracking System trailed the Integrated Customs Management System in terms of its influence on trade facilitation. The report suggests that in order to increase efficiency and profitability, the Customs administration should automate its operations. Findings indicate they have a significant impact on traders as well as clearing and forwarding organizations. These results implicate that the installation of different customs systems led to a rapid flow of goods. The study was done in a country other than where the study area is located.

2.3. Gap Analysis

Despite the fact that various researches were done related to automation and process in customs, there is lack of research that specifically addresses the different systems like the electronic customs management system (ECMS)that are considered as part of customs automation. Furthermore, very few researches had been done that relate single window idea and the effectiveness of cargo clearance for Ethiopian customs in general and Addis Ababa kality customs in particular. This study differs from others because it will focus on investigating the effects of automation systems like the single window system, Electronic Transit system, electronic submission and monitoring system as well as electronic customs clearance systems on efficiency of cargo clearance.

2.4. Conceptual Framework

According to Miles and Huberman (1994) A conceptual framework is a thorough illustration of the key topics to be researched, either in textual or graphic form. With the inclusion of important elements, ideas, or variables and their assumed correlations, it offers a methodical comprehension of the topic.Based on the literature review and gap analysis, a conceptual framework that shows the relationship between customs automation and cargo clearance efficiency is developed as follows:



CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

To improve their customs operations, countries implement various measures. To ensure if the intended purpose of the actions is met, continuous evaluation is necessary. In order to obtain the highest possible study outcome, the goal of the research methodology is to ensure that the research methods adequately addressed the research questions. In this section, research approach, research design, target population and sampling, data source and collection instruments, data analysis, reliability and validity issues were discussed. At the end ethical considerations and model specification are presented.

3.2. Research Approach

A research approach is a strategy and process that includes all stages of the research process, from general hypotheses to specific methods for gathering, analyzing, and interpreting data. The choice of research technique is influenced by the study's audience, the researchers' background, and the nature of the research problem (Creswell, 2014). This research considered a quantitative research approach. This approach aims to collect quantitative data, and utilizes various forms of measurement and statistical analysis techniques.

3.3. Research Design

Research Design was explained by Creswell (2014) that, it is a general strategy for establishing a link between the relevant and feasible empirical research and the conceptual research problems. Design of a research to be adopted is governed by the kind of problem under study. An explanatory design was used as it makes an effort to show relationship between variables. To address study questions necessary data was collected from individual staff of custom commission and customs clearing agents.

3.4. Sampling Design

3.4.1.Target Population of the study

The targeted study population are of two types: employees of Ethiopian customs commission currently working in main operational departments in Addis Ababa Kality customs as well as clearing brokers in which their office is located at kality customs, comet compound. According to the sources from the branch's human resource team, there are a total of 1177 employees out of which only 150 employees were directly involved in customs clearance processes and are considered relevant for the study. Thus, the study will consider 150 employees as the target population. On the customs clearing agents' side, the records of customs commission (customers' education & support directorate) shows that there are 701 companies that are registered to give customs clearing service. Out of the total, only 51 customs clearing agent companies have permanent offices in Kality dry port (Comet compound) and are considered as the target population. One individual familiar with customs and customs procedures from each clearing agent

company is considered. Therefore, the study considers a total number of targeted populations as 201 respondents.

3.4.2.Sampling Frame

To choose possible respondents, a sample frame is used and it is one of the components of the sample design. Sampling frames are used to draw the sample. For enhancing the sample representativeness, the frame of samples needs to be adequately big and needs to be an equivalent chance of selection. It is a group of components that a scholar uses to chooses a member to be considered for the study from targeted once. Thus, frame of the sample is presented below.

Table 1 Sampling frame

S/N	Target Population from where sample is to be drawn	Target population
1	Customs commission employees working in operational departments	150
2	Customs clearing agents that have permanent office at A.A Kality customs Comet compound	51
TOTAL		201

Source: Researchers own compilation (2024)

3.4.3.Sample Size

As number of customs brokers targeted for the study are manageable in number (51), census method is used. Whereas, sample respondents from the targeted population of 150 employees of A.A kality customs were determined using a sample size determination formula. To calculate the population sample size, the researcher employed Yamane's (1967) sample determination formula. With only a 5% variation factor, this formula offers a 95% reliability rate.

Using the formula: $n = \frac{N}{1+N(e)2}$

Where n = the sample size

N = size of population 150, n (size of sample) =109

e = the level of precision (e = 0.05)

Thus, the total sample size is 109+51=160 respondents.

3.4.4. Sampling Technique

There are several ways to choose samples. Based on how the sample sizes were chosen, Blalock (1960) divided sampling techniques into two groups: the random sampling technique (probability sampling) and non-random sampling technique (non-probability sampling). Every unit in the population has an equal likelihood of being chosen as a sample unit in probability sampling. In

contrast, units in the population have uneven or no chance of being chosen as a sample unit in non-probability sampling. To obtain valuable data from respondents a purposive sampling technique was used in the case of customs employees whereas for the customs clearing agents that are situated at Kality customs are fully enumerated.

v. Sampling Procedure

As the targeted population's members consist of customs employees and customs clearing agents, the researcher first stratified the study population based on whether they are internal customers or external customers to Addis Ababa kality customs branch office. Proportion is calculated in order to decide how many units to be considered from each stratum. However, as the study considers a census technique the target population for the customs clearing agents, the total target population of clearing agents is equal to the proportionate sample.

Table 2 Proportionate stratified sampling

S/n	Category	Target population	Proportionate Sample
1	Employees of Addis Ababa Kality Customs working in operational departments	150	109
2	Customs clearing agents that have permanent office at Addis Ababa Kality customs Comet compound	51	51
TOTAL		201	160

Source: Researcher's own compilation (2024)

3.5. Data Source and Types

Both primary and secondary data were collected data sources. The researcher concentrates mainly on primary original data sources. Staffs of customs commission Addis Ababa kality branch as well as staff of customs clearing agents, who have direct relation with the topic under study were the sources of the data. Data also was collected from published and non-published materials.

3.6. Data Collection methodology

To obtain quality data, the researcher prepared and distributed standard questionnaires to collect primary data from a total of 160 respondents (109 customs employees and 51 staff of clearing agent companies). Secondary data was collected by reviewing government and non-government published materials, conference papers, journals, as well as by browsing different websites.

3.7. Data Collection Instrument

The key tool of this research was a questionnaire. The questionnaire had six parts. A Forty-one (41) item questionnaire was distributed to respondents to collect the necessary data for the study. Likert scale was used to rank cases that range from 1–5 where 1= strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

3.8. Data Analysis Methods

Data analysis is the process through which a researcher derives relevant conclusions from a large amount of data. It essentially consists of applying statistical techniques to a database in order to make inference about variables or study objects. Data collected from respondents was prepared for analysis. Once data is collected from the sample, both descriptive and inferential statistics methods of data analysis are used. Descriptive statistics like Frequency, percentage, standard deviation and mean were used to describe the existing situation under study. Whereas inferential statistics like correlation analysis and regression analysis were used to show the casual relationship between variables, and to implicate the effect of independent variables on the dependent variable. Data was analyzed using SPSS v.27 software.

3.9. Validity and reliability

3.9.1. Validity

The most crucial element that determines how reliable a study instrument is its validity. It determines if the results are accurate from the perspective of the investigator, the subjects, or the audience of a report (John, 2009). To make sure the data instrument is valid, the data collection process was done in a very careful manner without negligence. Clarifications were provided for questions from respondents.

In addition, the questionnaire was prepared following a thorough examination of relevant literature on customs automation. A pilot test was conducted on sample populations to assess how the subjects would respond to it, whether the items are sufficiently clear and easy to understand, and whether more items should be included in some areas. As a result, the questionnaire that was distributed has been returned filled complete (92.5%). Afterwards, the feedback from the pilot study was added to the primary surveys.

3.9.2.Reliability

The consistency and dependability of a measuring method are aspects of reliability. It focuses on the reliability and consistency of the results of an evaluation or measure throughout various intervals, environments, or circumstances. A trustworthy measurement shows that there is less chance that measurement mistakes or random variables would affect the final result (Geoffrey et al, 2005). For checking the instruments are within the acceptable range, items of the questionnaire were checked using Cronbach's alpha coefficients and the results are presented in the below table.

Table 3 Reliability Test Results

Variables	Cronbach's alpha	Result
Electronic Documents Submission and Monitoring Systems	0.848	Acceptable
Electronic Transit System	0.781	Acceptable
Electronic Customs Clearance System	0.896	Acceptable
Electronic Single window systems	0.867	Acceptable
Cargo clearance efficiency	0.935	Acceptable

Source: Research data (2024)

3.10. Research Ethics

The goal of the research was clearly explained to respondents and were given the options for answering the questionnaire anonymously. They were also given the option of skipping any questions they did not want to answer. The researcher analyzed the participants' responses without making any changes. Other researchers' and writers' work that are used in this study were cited suitably.

3.11. Model Specification

The model of regression employed is presented as follows:

$CCE = \beta 0 + \beta 1\ EDSMS + \beta 2\ ETS + \beta 3\ ECCS + \beta 4\ ESWS + e$

Where:

CCE=cargo clearance efficiency

$\beta 0$ = Constant Term

$\beta 1$= Beta coefficients

ESDMS= Electronic Documents Submission and Monitoring Systems

ETS= Electronic Transit System

ECCS= Electronic Customs Clearance System

ESWS= Electronic Single window system

e= error term i.e., a residual term that comprises measurement errors in the dependent and independent variables as well as the net influence of other factors not included in the model.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1. Introduction

participants' information gathered have been presented and analyzed in this chapter. The response rate and respondents' backgrounds under the demographic characteristics were presented at the beginning of the chapter, which is then followed by the data presentation, analysis and discussion on findings.

4.2. Response Rate

As indicated in chapter three, the respondents were customs commission kality customs branch employees and Customs clearing agents. One hundred sixty (160) questionnaires were distributed and 148(92.5%) were returned with full information. From distributed questionnaires 12(7.5%) were not returned. And finally, data collected from 148 respondents were analyzed.

Table 4 Return rate

Questionnaire	**Freq.**	**%**
Returned	148	92.5
Not returned	12	7.5
TOTAL	160	100.00 %

Source: Survey Data (2024)

4.3. Demographic Information

This part included information about the respondents who took part in the survey, including their gender, age, and educational background. As such, it displays the length of time an individual has worked in the industry. The distribution of respondents' genders, academic backgrounds, ages, and job experiences, as well as their acquaintance with customs automation and location of employment, are shown in the following topics.

4.3.1.Respondents' Gender

To identify their sex participants were asked to choose if they are male or female. The below table 5, indicates that the highest in number are male which account for 87(58.78%) of the total, the remaining (41.22%) were female. It can be concluded that male participants dominate the study and the workforce in customs is characterized by male dominancy.

Table 5 Gender of Respondents

Gender	Freq.	%
Male	87	58.78%
Female	61	41.22%
Total	**148**	**100.00 %**

Source: Survey Data (2024)

4.3.2. Respondents' Age

The results in Table 6 below show that, according to the age distribution of the respondents, a greater proportion (62.2%) were between the ages of 25 and 35, 4.7% were under 25, and 33.1% were over 35. These data suggest that most workers in these industries are young, tech-savvy individuals who are eager to pick up new skills and put them to use.

Table 6 Respondents Age

Age in years	**Freq.**	**%**
Below 25 years	7	4.7%
25–35 years	92	62.2%
More than 35 years	49	33.10%
TOTAL	**148**	**100%**

Source: Survey Data (2024)

4.3.3.Educational level

Members of the study were asked to identify their educational attainment, and the findings are shown in the table 7 below.

Table 7 Educational Level of Respondents'

Level of Education	**Freq.**	**%**
Certificate	2	1.4%
Diploma	9	6.08%
BA/BSC	102	68.92%
MA/MSC & Above	35	23.6%
Total	148	100%

Source: Survey Data (2024)

The study wanted to understand the participants' level of education. According to Table 7's findings, higher number of participants 102 (68.92%) have a bachelor's degree, while 35, or 23.60%, have an MA or MSc or higher. Only 2 (1.4%) of the respondents have certificates, whereas 9 (6.08%) of the respondents possess diplomas. This demonstrates that the majority of responders who come from both groups are with a Bachelor's degree, suggesting that they have familiarity of how to handle various technologies used in customs operations based on formal education and training.

4.3.4.Respondents' work experience in the sector

In order to grasp respondents' work, experience they were requested to specify how many years do they work in the sector. Table 8 below shows the obtained results.

Table 8 Respondents' Years of Experience

Experience in Years	Freq.	%
less than 3 years	4	2.7%
3-6 years	51	34.46%
7-10 years	57	38.52%
More than 10 years	36	24.32%
Total	**148**	**100.00%**

Source: Survey Data (2024)

A question about the length of time respondents had worked in the customs clearing area was posed to them. According to Table 8's findings, shows that respondents' majority 57 (38.52%), said they had worked for the customs clearing operations service for seven to ten years. These respondents were followed by 51 (34.46%) who had worked there for three to six years. Of the responders, 36 (24.32%) had worked for ten years or more, and just 4 (2.7%) had worked for less than three years. The results implicate those respondents were with a great deal experience with customs clearance procedures.

4.3.5.Respondents' work Area

The study asked respondents if they work for customs commission, for a clearing agent or freight forwarding company. Table 9 depicted the results as follows

Table 9 Table of respondents' work

work	Freq.	%
Customs commission	103	69.59%
Customs Clearing agents	45	30.41%
Total	**148**	**100.00%**

Source: Survey Data (2024)

The study considered 103(69.59%) customs employees who had been working in operational activities that are directly related to customs clearance. 45(30.41%) customs clearing agents who were actively working at Addis Ababa Kality and have their office at kality comet compound are also considered for the study in order to grasp different views on the study.

4.3.6.Respondents' familiarity with Customs automation systems

Respondents were asked if they are familiar, neutral or not familiar with customs automation systems. Table 10 below shows their responses:

Table 10 Table of respondents' familiarity with customs automation systems

Familiarity	Freq.	%
Familiar	105	70.95%
Neutral	35	23.65%
Not familiar	8	5.40%
Total	**148**	**100.00%**

Source: Survey Data (2024)

As the preceding table 10 demonstrates, the higher number of respondents (105, or 70.95%) are familiar with customs automation systems, 8 (5.4%) Of the respondents, said they were unfamiliar with Customs automation systems, while 35 (23.6%) said they were neutral. The outcome demonstrates that the respondents who were taken into consideration had a greater familiarity with customs automation even though considerable number of respondents are neutral which indicates that there is a lot to be done to train both internal and external stakeholders.

4.4. Descriptive Analysis

4.4.1.Electronic Documents Submission and Monitoring Systems

The level of agreement on different statements regarding electronic documents submission and Monitoring systems of participants are presented in the table 11 below.

Table 11 Descriptive Statistics of Electronic Documents Submission and Monitoring System

Source: Survey data, SPSS output (2024)

	No.	Min	Max	Mean	Std. Deviation
Supports electronic submission of declaration.	148	1	5	3.8311	0.97860
Reduce declaration submission time as it can be submitted from anywhere using the internet.	148	1	5	3.6824	1.12508
Documents can be viewed, downloaded, stored, and attached, when necessary, when using the system.	148	1	5	3.8176	1.07562
Simplifies communication between customs and clearing agents as communication can be done online.	148	1	5	3.7905	1.07066
Improves accuracy of declaration information	148	1	5	3.7905	0.89787
Customers can pay their tax and duties at the comfort of their home/office electronically	148	1	5	3.5608	1.12017
There is Cost savings for importers/exporters with electronic declaration of goods.	148	1	5	3.8986	1.04809
Average				3.7674	1.04516
Valid N (list wise)	**148**				

From Table 11 respondents agreed on the statement that electronic documents submission and monitoring systems support electronic submission of declaration with mean of 3.8311 and standard deviation of 0. 9786). Participants were also in agreement to the statement that reduced declaration submission time as it can be submitted from anywhere using the internet with mean 3.6824 and std. deviation of 1. 2508.This high standard deviation indicates that there are diverse opinions on the statement.

The idea that documents can be viewed, downloaded and stored when using the system was supported by the agreement of respondents with mean 3.8176 and standard deviation of 1.07562.The statement that electronic documents submission and monitoring system simplifies communication between customs and clearing agents was supported by the respondents with mean 3.7905 and level of dispersion of 1.07060.Responders were agreed with the statement of electronic documents submission and monitoring system improves accuracy of declaration information with (Mean= 3.7905 SD=0.89787).Research findings regarding the statement that customers can electronically pay their taxes and duties at the comfort of their home or office shows that participants favored agreement with (mean=3.5608 and standard deviation =1.12017).The study also indicates that respondents agreed with mean 3.8986 and standard deviation of 1.04809 that cost saving for importers/exporters were associated with adoption of electronic declaration of goods that is supported by electronic documents submission and monitoring system.

4.4.2.Electronic Transit System

Members of the sample were questioned to select their level of agreement on different statements regarding Electronic Transit System. Table 12 shows the findings.

Table 12 Descriptive Statistics of Electronic Transit Systems

	No.	MIN	MAX	Mean	Std. Deviation
Transit Permit granted with electronically submitted documents.	148	1	5	3.7568	0.97326
Improved accuracy of cargo data and information	148	1	5	3.8851	0.86915
Real time tracking, visibility, and reporting of cargo movements.	148	1	5	3.7095	0.89787
Reduced paperwork and manual documentation.	148	1	5	3.9189	1.03354
Enhanced communication and collaboration between stakeholders e.g., Djibouti customs, Kality customs, check points, and clearing agents.	148	1	5	3.8581	0.84925
Better tracking and visibility of cargo movements.	148	1	5	3.7365	0.92847
Saves time and resources for importers/exporters.	148	1	5	3.9662	0.89150
Average				**3.833**	**0.92043**
Valid N (list wise)	**148**				

Source: Survey data, SPSS output (2024)

The data depicted in the above Table 12, shows respondents were in agreement with average 3.7568, and standard deviation 0.97326 on the statement that transit Permit is granted with electronically submitted documents. It is also indicated that with the use of electronic transit systems, respondents agreed there is Improved accuracy of cargo data and information with mean 3.8851 and standard deviation of 0. 86915.small standard deviation shows data are clustered firmly around the mean. With mean 3.7095 and standard deviation 0.89787, respondents agreed that the electronic transit system supports real time trucking, visibility and reporting of cargo movements. They also agreed that electronic transit system reduced paperwork and manual documentation, enhanced communication and collaboration between stakeholders e.g., Djibouti customs, Kality

customs, check points, and clearing agents with mean 3.9189,3.8581 and standard deviation 1.03354,0.84925 respectively.

The statement that electronic transit system saves time and resources for importers/exporters with mean 3.9662 and the dispersion level of 0.8915.

4.4.3.Electronic Customs Clearance Systems

Participants were asked to indicate how much they agreed with various assertions regarding electronic customs clearance systems, and results are shown in table 13 below.

Table 13 Descriptive Statistics of Electronic Customs Clearance Systems

	No.	MIN	MAX	Mean	Std. Deviation
Faster submission and processing of customs documentation.	148	1	5	3.7162	1.02380
The system determines the risk level of goods as green, yellow and red.	148	1	5	3.9257	0.89664
Automated validation of data and reduced data entry errors.	148	1	5	3.5743	0.88902
Improved customs compliance and reduced risk of penalties.	148	1	5	3.4797	0.95097
Enhanced transparency in clearance procedures as every decision of customs officials can be viewed online.	148	1	5	3.8041	0.91591
Facilitates communication and collaboration between customs & other stakeholders.	148	1	5	3.8311	0.84426
Simplifies procedures like document verification, tariff classification, valuation and payment of duties.	148	1	5	3.8311	0.88363

Predictable customs formalities are associated with the system.	148	1	5	3.6622	0.90014
The need for face-to-face interaction between customs officials and traders eliminated as result reduces corruption incidents.	148	1	5	3.6689	0.92132
Saves time and resources of importers/exporters.	148	1	5	3.9595	0.87192
Average				**3.7453**	**0.90976**
Valid N (list wise)	**148**				

Source: Survey data, SPSS output (2024)

As it is indicated in the Table 13 above, respondents agreed with (Mean= 3.7162 and standard deviation =1.02380) that faster submission and processing of documentation resulted from the use of electronic customs clearance processes. The research discovered that the level of agreement of respondents for the electronic clearance system determines the risk level of goods as green, yellow and red is agreed with mean 3.9257 and SD=0. 89664.Responders were favoring agreement on Automated validation of data and reduced data entry errors (Mean =3.5743 and std.dev. =0.88902), Improved customs compliance and reduced risk of penalties with Mean of 3.4797 and Std. Deviation of 0.95097. The mean and standard deviation of Enhanced transparency in clearance procedures as every decision of customs officials can be viewed online (Mean= 3.8311and St. Deviation= 0.84426), Facilitates communication and collaboration between customs & other stakeholders (Mean= 3.8311 and St. Deviation= 0.84426), Simplifies procedures like document verification, tax and duty payment, methods of valuation and tariff classification (Mean= 3.8311; St. Deviation= 0.88363) indicated that respondents were agreed with less dispersion of responses from the mean.

Moreover, respondents agreed with higher value of mean (3.9595) that the adoption of electronic customs clearance system process had saved time and resources of importers/exporters with standard deviation of 0.87192, which shows the response of respondents is less dispersed far from the mean. Further respondents agreed with mean of 3.6622 and St. Deviation of 0.90014 those predictable customs formalities are associated with the electronic customs clearance system. The

paper also revealed, the level of agreement by respondents about statement that corruption instances were decreased because of businessmen and customs authorities can communicate virtually without face-to-face contact with mean 3.6689 and standard deviation of 0. 92132.This shows similarity of agreements of respondents as the SD is less than 1.

4.4.4.Electronic Single Window System

Research's findings of the effect of the single window system are depicted in the below table.

Table 14 Descriptive Statistics of Electronic Single Window System

	No.	Min	Max	Mean	Std. Deviation
Single window system is easy and convenient to use.	148	1	5	3.5541	0.84341
Single window system Improved coordination between government agencies involved in the cargo clearance process.	148	1	5	3.6689	0.95752
Authorization processing Time taken to request regulatory agencies import permits has reduced significantly with using Single window.	148	1	5	3.5811	0.88073
Time taken to process permits by regulatory agencies has reduced significantly with using Single window.	148	1	5	3.6014	0.92391
Average				**3.6014**	**0.90139**
Valid N (list wise)	**148**				

Source: Survey data, SPSS output (2024)

The averages and standard deviations of the descriptive statistics for every single window system component are displayed in Table 14.Findings showed that score of the mean were ranged from 3.6689,the statement that signifying Single window system upgraded coordination between government agencies involved in cargo clearance process with standard deviation of 0.95752 to mean score of 3.5541 for the item indicating that Single window system is easy and convenient to use with standard deviation score of 0.84341. Time taken to request regulatory agencies import permits has declined meaningfully with using Single window was with (Mean =3.5811; Standard deviation = 0.88073).

4.4.5.Cargo Clearance efficiency

Table 15 Descriptive Statistics of Cargo Clearance efficiency

	No.	MIN	MAX	Mean	Std. Deviation
Reduced clearance time.	148	1	5	3.7365	0.94301
Improved compliance level.	148	1	5	3.5338	0.97879
Improved collaboration and communication between stockholders.	148	1	5	3.8041	0.90094
Reduced clearance cost for importers and exporters.	148	1	5	3.7095	0.95656
Predictability of customs clearance formalities.	148	1	5	3.6351	0.87403
Simplicity of customs clearance processes.	148	1	5	3.9189	0.82076
Facilitated international trade.	148	1	5	3.7635	0.89869
Average				**3.7288**	**0.9104**
Valid N (list wise)	**148**				

Source: survey data (2024)

The outcomes of the descriptive statistics are shown in Table 15 for each item of efficiency in cargo clearance, together with the means and standard deviations. The findings discovered that the lowest mean score was **3.5338** for item signifying improved compliance level and higher value of mean 3.9189 for the item suggesting simplicity of operations in customs clearance with standard deviations of 0.97879 and 0.82076 respectively which shows less dispersion of views between respondents. Respondents also agreed with mean 3.7365 and standard deviation of 0.94301 that the adoption of the systems had brought changes in reducing customs clearance time, while they agree with the statement that Improved collaboration and communication between stockholders with mean 3.8041 and St. Deviation of 0. 90094.The statements that the adoption of customs automation has brought changes in reducing clearance cost for importers and exporters (Mean=3.7095 and standard deviation=0.95656), predictability of customs clearance formalities (Mean=3.6351and standard deviation of 0.87403) were agreed by the respondents. Moreover, the study showed that facilitated international trade was brought by the implementation of system automation in customs and this was supported by the agreement of respondents (Mean = 3.7636, std.dev= 0.89869).

4.5. Correlation Analysis

To compute the correlation coefficients between variables, Pearson Bivariate correlation coefficient was applied. Person correlation analysis was done between the dependent variable cargo clearance efficiency and the independent variables. It shows the strength of the relationship between variables. Results are showed in table 16. Correlation results indicates a positive and moderate relationship between Electronic Documents Submission and Monitoring Systems and efficiency of cargo clearing. This implies any change in electronic Documents Submission and Monitoring Systems upgraded the efficiency goods clearing processes. The association has been demonstrated by co-efficient of correlation (r = .533).

The efficiency of cargo clearance was likewise positively and significantly correlated with the Electronic Transit System. This indicates that improvements to the Electronic Transit System have a beneficial impact on efficiency. The correlation coefficient of r=.650 shows how they are related to one another. Additionally, there is a substantial and positive correlation between the efficiency of cargo clearance and electronic customs clearing systems. With a correlation coefficient of r=.775, this indicates that the use of electronic customs clearing systems significantly increases the productivity of

cargo clearance. There was also a strong and positive correlation between the efficiency of the cargo clearing process and the electronic single window system. Their correlation coefficient score of r=.696 indicates that adoption of one point service system in customs has a notable beneficial impact on the efficiency of cargo clearance.

Table 16 Correlation Coefficients

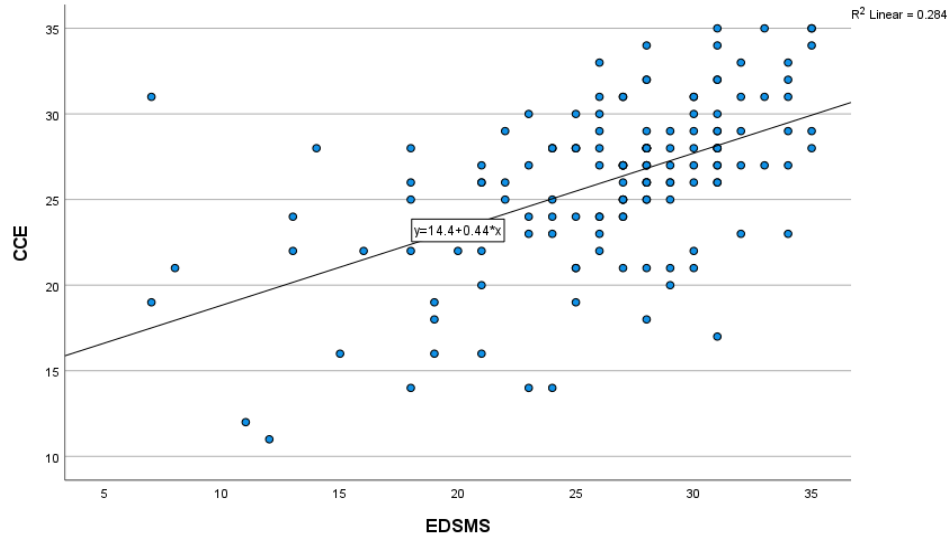
		Electronic Documents Submission and Monitoring Systems	Electronic Transit System	Electronic Customs Clearance System	Electronic Single window system	Cargo clearance efficiency
Electronic Documents Submission and Monitoring Systems	Pearson Correlation	1				
	N	148				
Electronic Transit System	Pearson Correlation	.704**	1			
	N	148	148			
Electronic Customs Clearance System	Pearson Correlation	.616**	.703**	1		
	N	148	148	148		
Electronic Single window system	Pearson Correlation	.506**	.568**	.675**	1	
	N	148	148	148	148	
Cargo clearance efficiency	Pearson Correlation	.533**	.650**	.775**	.696**	1
	N	148	148	148	148	148
**. Correlation is significant at the 0.01 level (2-tailed).						

4.6. Regression Analysis

4.6.1.Test of Variables

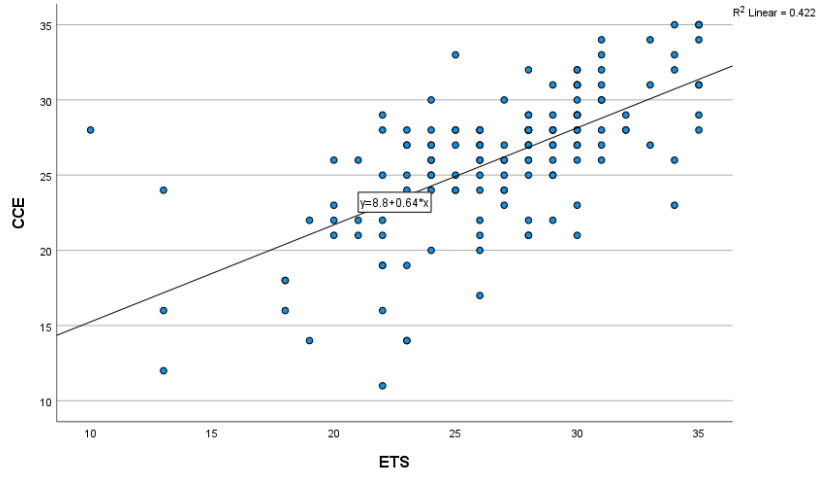
4.6.1.1. Linearity Test

Figure 1 Linearity test for Electronic Documents Submission &Monitoring System



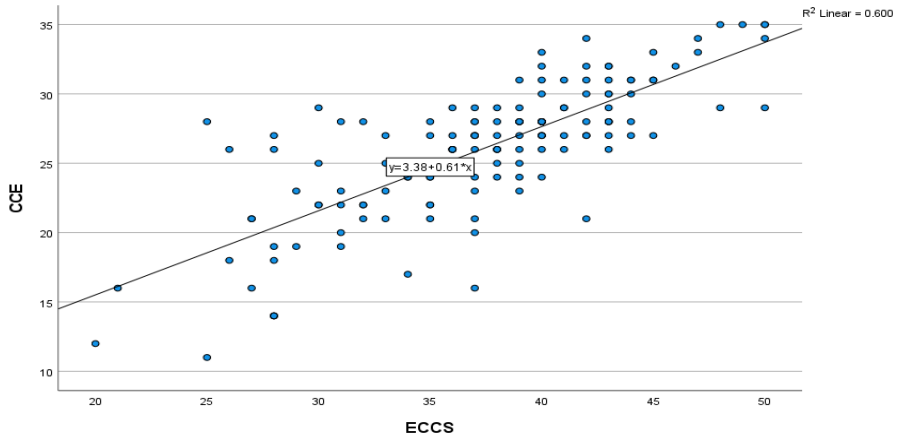
The above fig.1 shows the relationship between electronic documents submission and monitoring system and cargo clearance efficiency. As it can be seen from the fig, it fulfills the linearity assumption.

Figure 2 Linearity test for Electronic Transit System



The link between electronic transit systems and the effectiveness of cargo clearance is depicted in the above figure 2. The linearity assumption is satisfied as the figure illustrates a linear connection between the variables.

Figure 3 Linearity test for electronic customs clearance system



The above fig.3 shows the relationship between electronic customs clearance system and the dependent variable. As fig indicated, there is a linear relationship between electronic customs clearance system and efficiency in cargo clearance.

Figure 4 Linearity test for electronic single window systems

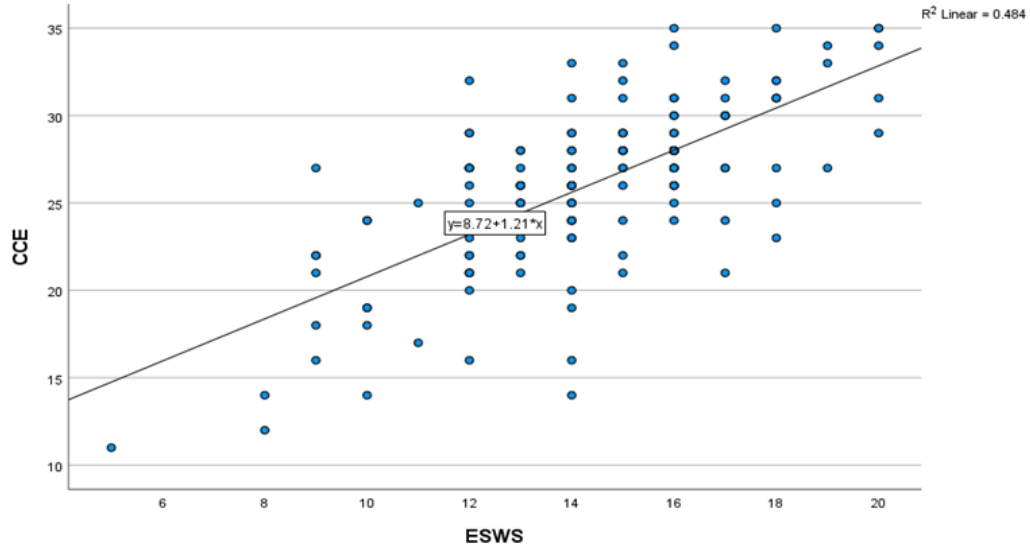


fig.4 shows the relationship between electronic single window systems and cargo clearance efficiency. It shows the linear relationship between single window and efficiency in cargo clearance.

4.6.1.2. Collinearity Test

Table 17 Collinearity Test.

	Collinearity Statistics	
	Tolerance	VIF
Electronic Documents Submission and Monitoring Systems		
Electronic Transit System	0.473	2.114
Electronic Customs Clearance System	0.382	2.618
Electronic Single window system	0.381	2.627
Cargo clearance efficiency	0.524	1.910

a. Dependent Variable: Cargo clearance efficiency

Source: Survey data, SPSS Output (2024)

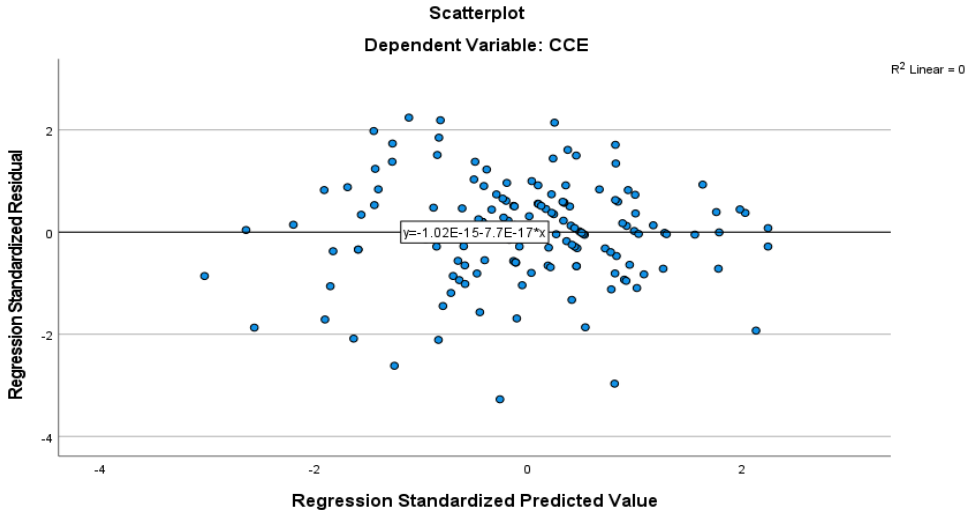
Table 17 depicts the tolerance level and the VIF (variance inflation factor). From the results it can be seen that the scores of tolerances are all greater than 0.1 and the VIF results are less than 10. Therefore, it can be concluded that multi-collinearity was not a problem in the regression model.

4.6.1.3. Autocorrelation Test

According to Ihantola and Kihn (2017), autocorrelation is the presumption that prediction mistakes are unrelated to one another. On the other hand, Johnson and Wichern (2019) proposed that the ideal Durbin-Watson's value to test for autocorrelation between variables. According to them, the value should be between 1.5 and 2.5 to indicate a lack of autocorrelation, but Field (2018) proposed that the Durbin-Watson statistic performs better if it is nearer to 2.0. As can be seen from table 18 below, the result of Durbin-Watson showed 2.17 implying no auto correlation.

4.6.1.4. Homoscedasticity Test

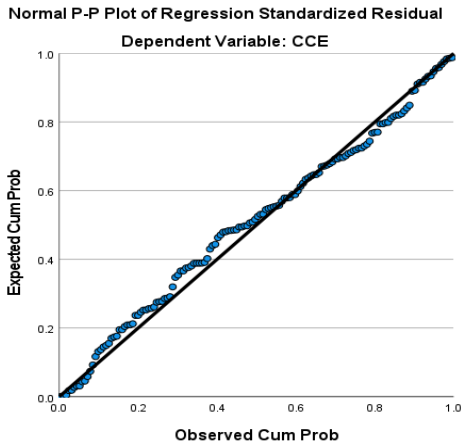
Figure 5 Homoscedasticity Test



The scatter plot of the regression standardized predicted value and residuals is displayed in the above figure 5. It is evident from the graphic that the residuals have a reasonably dispersed distribution. Consequently, the assumption of homoscedasticity is met and there is no heteroscedasticity.

4.6.1.5. Normality Test

Figure 6 Normality Test



The residuals are regularly distributed and satisfy the assumption of normality, as seen in the above figure 6.

4.6.2.Model Summary

The study used linear regression analysis with multiple variables to examine how the Addis Ababa kality customs branch's cargo clearance efficiency was affected by customs automation. The coefficients of determination explain the percentage of variance in the dependent variable that can be explained by all the four independent variables, or the extent to which changes in the independent variables may account for changes in the dependent variable.

Table 18 Regression Model Summary

Model	R	R square	Adjusted R square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.817[a]	0.667	0.658	2.774	0.667	71.609	4	143	0.000	2.170

a. Predictors: (Constant), Electronic documents submission and monitoring system, single window system, electronic transit system, electronic customs clearance system.

b. Dependent Variable: Cargo Clearance Efficiency

Source: Survey data, SPSS Output (2024)

The study's predictor variables (electronic documents submission and monitoring system, electronic transit system, electronic customs clearance system, and electronic single window system) explain 66.7% of the changes in the predicted variable (cargo clearance efficiency) as indicated by the R square of 0.667. It indicates 33.3% of the unexplained disparities in dependent variables was accounted for by other variables. The adjusted R squared value of 0.658 suggests that the electronic documents submission and monitoring system, electronic transit system, electronic customs clearance system, and electronic single window system contribute for 65.8

variations in cargo clearing efficiency. R is the correlation coefficient, and a value of 0.817 indicates a strong relationship between the research variables.

4.6.3.Analysis of Variance (ANOVA)

Table 19 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2204.772	4	551.193	71.609	.000[b]
	Residual	1100.708	143	7.697		
	Total	3305.480	147			

a. Dependent Variable: Cargo Clearance Efficiency

b. Predictors: (Constant), Electronic documents submission and monitoring system, single window systems, electronic transit system, electronic customs clearance system

Source: Survey data, SPSS Output (2024)

The results of the study are displayed in Table 19 above. The findings showed that the model was statistically significant overall. The F statistic of 71.609 corroborated the p value of 0.000, which is less than the usual likelihood of the 0.05 significant threshold. These results imply that the independent variables may predict the dependent variable with accuracy. This indicates a good fit with the model that was employed.

4.6.4.Regression coefficients

To predict the dependent variable from the independent variables, the following regression model was used as follows;

CCE = β0+ β1 EDSMS + β2 ETS + β3 ECCS + β4 ESWS + e

Where CCE=Cargo clearance efficiency, β0 = Constant Term, β1, β2, β3, β4= Coefficients

EDSMS= Electronic Documents Submission and Monitoring Systems

ETS= Electronic Transit System

ECCS= Electronic Customs Clearance System

ESWS= Electronic Single window system

e= error term (residual term that includes the net effect of other factors not in the model and measurement errors in the dependent and independent variables).

Thus, **CCE = 0.952-0.025EDSMS + 0.167ETS + 0.475ECCS + 0.293ESWS + e**

When all other independent variables are taken to be zero, cargo clearance efficiency is explained by the y-intercept(constant) term 0.952. It suggests that even in the absence of independent variables, Addis Ababa kality customs has an efficient system for clearing cargo. As shown in the table 20 below, a unit change in Electronic Documents Submission and Monitoring Systems affects efficiency of cargo clearance by -0.025(-2.5%). The paper also discovered that the electronic transit system has a positive effect in which a unit change in the electronic transit system leads to increased cargo clearance efficiency by 0.167(16.7%). Major improvement is observed from change of electronic customs clearance on the dependent variable. A unit increase in electronic customs clearance improves cargo clearance efficiency by 0.475(47.5%). Finally, it is found that the single window system affects efficiency of cargo clearance. A unit improvement in the system's usage leads to improvement of the dependent variable by 0.293(29.3%).

Table 20 Table of regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1		0.959	1.515		0.633	0.528		
	Electronic Documents Submission and Monitoring Systems	-0.021	0.058	-0.025	-0.354	0.724	0.473	2.114
	Electronic Transit System	0.166	0.077	0.167	2.137	0.034	0.382	2.618
	Electronic Customs Clearance System	0.372	0.061	0.475	6.067	0.000	0.381	2.627
	Electronic Single window system	0.509	0.116	0.293	4.400	0.000	0.524	1.910

a. Dependent Variable: Cargo clearance efficiency

Source: Survey data, SPSS Output (2024)

4.7. Discussion of findings

4.7.1. Electronic Documents Submission and Monitoring Systems and cargo clearance efficiency

Investigating the effect of electronic Documents Submission and Monitoring Systems and cargo clearance efficiency was the first objective of the research. Respondents on average agreed on the statements that electronic documents submission and monitoring system facilitates electronic declaration submission, reducing submission time and simplifying communication between customs and clearing agents. It improves accuracy of declaration information, allows customers to pay taxes and duties electronically, and saves costs (Mean=3.7674 and standard deviation =1.04516). Pearson correlations between the variables also showed a positive correlation. The findings are similar to these obtained by Mumia (2021) who studied the Effect of automation of

customs release process's effect on the performance of Kenyan customs at the port of Mombasa. According to the study, improving the automation of customs verification results in an improvement in customs performance. However, regression analysis indicates a negative effect of electronic Documents Submission and Monitoring Systems as shown by the values $\beta 1 = -0.025$, $p>0.05$.

4.7.2.Electronic transit systems and cargo clearance efficiency

The second goal was to investigate how electronic transit systems affect the efficiency of cargo clearance. With an overall mean of 3.833 and standard deviation of 0.92043, responders concurred on several claims demonstrating how the electronic transit system enhances the effectiveness of cargo clearance.

The results of Pearson correlation analysis also showed significant correlation between transit systems that applied automation and efficiency of cargo clearing ($r= 0.65$, $P <0.05$).

The findings of the regression analysis also demonstrated that electronic transit systems had a favorably significant impact, as seen by the values of $\beta 2 = 0.167$, $t = 2.137$, The study found that a one unit increase in electronic transit systems would result in a 0.167 unit rise in the dependent variable.

The findings support Erceg's (2016) claim that the introduction of e-customs drastically changes the function of international forwarders and customs officials. Erceg discovered that business persons might shorten the time it took to get from the Croatian border to their product destinations by using the NCTS (New Computerized Transit System).

4.7.3.Electronic Customs Clearance System and cargo clearance efficiency

This system's effect on cargo clearance efficiency was descriptively analyzed. Respondents aggregately agreed with mean 3.7453 and standard deviation of 0.90974 on the improvement of clearance producers like risk assessment, valuation, classification as well as reduced a personal contact between customs officials and customers and leads to improvement in clearance time, cost and predictability of customs procedures.

The results of a Pearson correlation study indicated a substantial positive relationship ($r=0.775$, $P<0.05$) between the efficiency of cargo clearance and the computerized Customs Clearance System. The findings of the regression analysis, which revealed $\beta 3 = 0.475$, $t = 6.067$, $p<0.05$, further support this. The study's result was that an increase of one unit in electronic customs clearing systems increases cargo clearance efficiency by 0.475 units, or 47.5%. The outcomes of the research were similar with a study made by Lihanda, B.A, and Kilongi, F (2022) who studied the adoption Customs Electronic Procedures' Effects of on the facilitation of Trade by Agents in Nairobi, Kenya. According to their analysis, the deployment of cargo information systems, automation of customs electronic procedures, and harmonization of electronic processes of customs had a significant influence on trade facilitation in Kenya.

4.7.4.Electronic single window System and cargo clearance efficiency

Examining the effect of the electronic Single Window System on the cargo clearance efficiency was the fourth goal of the study report. The respondents, with an overall mean score of 3.6014 and a standard deviation of 0.90139, concurred that the system has improved stakeholder government agency cooperation and collaboration, which had shortened the cargo clearing time.

After doing a Pearson correlation analysis, the results showed a high positive significant connection ($r = 0.696$, $P< 0.05$). Additionally, a regression analysis was performed, and the findings demonstrated that the electronic Single Window System had a positively significant influence on the dependent variable, as shown by the numbers $\beta 4 = 0.293$, $t = 4.4$, $p<0.05$. According to the study's findings, a one-unit improvement in the Single Window System would result in a 0.293-unit gain in clearing efficiency.

The findings were agreeable with Kabui, Gakobo and Mwaura (2019) who made a study to identify the Single Window System influence on cargo clearance efficiency in Kenya at the port of Mombasa. In addition, The findings are also aligned with the research results of study made by Mutai,R.J (2022) on the impact of automated customs systems on trade facilitation in Kenya. They discovered that because custom systems cut the mean lodging and clearing time of merchandize, they have a significant impact on traders as well as clearing and forwarding organizations.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER STUDY

5.1. Introduction

In order to address the research objectives, appropriate data was collected on effects of Customs automation systems (electronic documents submission and monitoring system, Electronic Transit system, electronic customs clearance systems and system of one window) on efficiency of cargo clearing. This chapter includes a summary of the results, recommendations, and areas that need more investigation.

5.2. Summary of the Findings

5.2.1.Electronic Documents Submission and Monitoring Systems

First goal in the research was investigating the effects of electronical documents submission and monitoring system on cargo clearance efficiency at Addis Ababa kality customs branch. The study results indicated that electronic documents submission and monitoring systems have a positive association with cargo clearance efficiency. Pearson Correlation analysis revealed that clearance efficiency and electronic documents submission and monitoring system were moderately correlated.

5.2.2.Electronic Transit System

In its second objective, research aimed to examine effects of the electronic system in transit process on cargo clearance efficiency at Addis Ababa kality customs branch. Analysis results of Pearson correlation indicated positive and significant association between electronic transit system and the dependent variable and found that electronic transit system is a good predictor. Regression of coefficients also revealed a positive relationship between efficiency of cargo clearance and electronic transit systems. The implication is an enhancement in the electronical transit system results in an enhancement of efficiency in cargo clearance.

5.2.3.Electronic Customs Clearance System

The third goal of this study was to look at how the computerized customs clearance system impacts the effectiveness of cargo clearing. It was discovered that electronic systems for clearing customs were adequate at forecasting the effectiveness of cargo clearance. According to the findings, the efficiency of cargo clearance may be accurately predicted by the electronic system for customs clearing. This system was favorably and strongly correlated with the efficiency of cargo clearing, according to correlation analysis. The efficiency of cargo clearance and the computerized customs clearing system have a favorable and substantial association, according to regression analysis results. This suggests that an improvement to the electronic system for customs clearance results in an improvement to the cargo clearance efficiencies.

5.2.4.Electronic Single Window Systems

Study objective of investigating effects of electronic one window system on efficiencies of customs cargo clearing at Addis Ababa Kality Customs branch was fourth objective. The study shows that the electronic single window system was a good predictor of the dependent variable. Correlation analysis between electronic single window systems and cargo clearance efficiency illustrates a positive and significant connection. This result was also substantiated by the regression coefficients that shows positive and significant bond of electronic single window and efficiency in cargo clearing. The Result implies modifications in electronic single window systems usage results in improvement of efficiency in cargo clearance operations.

5.3. Conclusions

The general objective guided the study to investigate custom automation's effect on cargo clearance efficiency at Addis Ababa kality. The research revealed that electronic transit system, electronic customs clearance system and electronic single window system positively affect cargo clearance efficiency. Electronic documents submission and monitoring system had a negative regression coefficient even though it had a positive correlation with cargo clearance efficiency.

Primary definite objective of the study was obtaining results that show how cargo clearance efficiency was affected by electronic documents submission and monitoring systems. It concluded

that electronic documents submission and monitoring systems have a positive correlation with efficiency of cargo clearance at the study area.

Regarding to second goal, it was concluded that the usage of electronic transit system positively affects cargo clearing efficiency at Addis Ababa Kality customs. The adoption of electronic transit system enables customs officers and clearing agents to perform real time tracking, visibility, and reporting of cargo movements which improves the clearing process as it reduces time and cost in the customs clearance process.

Examining customs electronic clearance systems' effect on the efficiency of cargo clearance at Addis Ababa Kality Customs was the third specific goal of the study. The correlation as well as regression results indicated the availability of significant and positive effect of the independent variable on the predicted variable. Thus, it was concluded that improving electronic system for customs clearance significantly improves the efficiency of cargo clearance.

With regard to investigating the electronic single window system's effect on the dependent variable, it is concluded that electronic single window has positive and significant effect on cargo clearing efficiencies. Obtaining service in one place simplifies the process of requesting and receiving regulatory agency requirements on time by stakeholders. It supports cargo clearance because with this system, it is simple for customs officials to obtain regulatory agency permits helps them simplify clearance of goods.

5.4. Recommendations

Based on the findings of the study, the researcher would like to recommend the following:

- Customs commission in general and Addis Ababa Kality customs in particular and other stakeholders such as traders, clearing agents should continuously train their employees to enhance the usability of customs automation features like electronic document submission and monitoring system to advance customs efficiency in clearance of different cargo. As technology is changing from time-to-time human resources that are capable of grasping the new changes are becoming mandatory.
- In order to improve compliance and ease the movement of cargo in transit, the researcher recommended the application of GPS based tracking as well as application of modern cargo

scanning machines. It improves smooth transit process and compliance level as well as reduces inspection, warehousing, release time and as a result improves customs efficiency.

- All Operational procedures needs to be harmonized, simplified, automated, and made understandable and accessible to traders, customs officers, and clearing agents. The customs branch should invest more in harmonization, Simplification and support of customs clearance activities like document verification, inspection, risk analysis, tariff classification, valuation, payment of tax and duties, warehousing etc.
- Finally, the implementation of appropriate ICT infrastructure supporting electronic data exchange for customs cargo clearance and control is necessary by Customs in order to guarantee effective collaboration and coordination between the Branch Office and other governmental regulatory agencies. Additionally, customs need to set up an effective system for cooperation, communication, and stakeholder consultation.

5.5. Areas for further study

The research's purpose was to investigate the effect of customs automation on cargo clearance efficiency in the case of Addis Ababa Kality customs branch by considering four variables (electronic documents submission and monitoring system, electronic transit system, and electronic single window system).

Therefore, it is suggested to conduct research on the areas of system automations like the cargo GPS trucking as well as cargo scanning systems and their contribution in facilitating trade and hindering illegal import and export activities.

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APPENDIX-I
QUESTIONNAIRE

Addis Ababa University School of Commerce

Department of Logistics and Supply Chain Management

Dear Respondents,

I would like to thank you in advance for giving me 5-10 minutes of your valuable time to fill this questionnaire. This survey is designed to obtain practical data for the study entitled **"The Effect of Customs Automation on Cargo Clearance Efficiency: The Case of Addis Ababa Kality Customs Branch, Ethiopia"** for the partial fulfillment of master's degree in logistics and supply chain management. The answers for the questions will be treated as anonymous and confidential, and will only be used for academic purposes.

For further information, you can contact **Tewelde G/Slassie Tel: 0935981734** or email **tewye2000@gmail.com**

Part 1: Background information

Please put "√" mark on the space below

1.1 Gender: Male ☐ Female ☐

1.2. Age (Years): Below 25 ☐ 25 – 35 ☐ More than 35 ☐

1.3. Level of Education: Certificate ☐ Diploma ☐ BA/BSC ☐ MA/MSC& Above ☐

1.4. Work Experience in the sector (Years): Less than 3 ☐ 3–6 ☐ 7–10 ☐ More than 10 ☐

1.5 You Work at: Customs Commission ☐ Customs clearing company or Freight Forwarding company ☐

1.6. Familiarity with Customs automation systems

Not familiar ☐ Neutral ☐ Familiar ☐

PART 2: The Effects of Electronic Documents Submission and Monitoring System on Cargo Clearance Efficiency

Please put "√" mark on the box below that best represents your level of agreement about The Effects of Electronic Submission and Monitoring System on Cargo clearance efficiency at Addis Ababa Kality Customs Branch.

2	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2.1	Supports electronic submission of declaration.					
2.2	Reduce declaration submission time as it can be submitted from anywhere using internet.					
2.3	Documents can be viewed, downloaded, stored, and attached, when necessary, when using the system.					
2.4	Simplifies communication between customs and clearing agents as communication can be done online.					
2.5	Improves accuracy of declaration information					
2.6	Customers can pay their tax and duties at the comfort of their home/office electronically					
2.7	There is Cost savings for importers/exporters with using electronic declaration of goods.					

PART 3: The Effects of Electronic Transit and tracking System on Cargo clearance efficiency

Please put "√" mark on the box below that best represents your level of agreement about The Effects of Electronic Transit System on Cargo clearance efficiency at Addis Ababa Kality Customs Branch.

3	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.1	Transit Permit granted with electronically submitted documents.					
3.2	Improved accuracy of cargo data and information					
3.3	Real time tracking, visibility, and reporting of cargo movements.					
3.4	Reduced paperwork and manual documentation.					
3.5	Enhanced communication and collaboration between stakeholders e.g., Djibouti customs, Kality customs, check points, and clearing agents.					
3.6	Better tracking and visibility of cargo movements.					
3.7	Saves time and resources for importers/exporters.					

Part 4: The Effects of Electronic Customs Clearance System on Cargo clearance Efficiency

Please put "√" mark on the box below that best represents your level of agreement about The Effects of Electronic Customs Clearance System on Cargo clearance efficiency at Addis Ababa Kality Customs Branch.

4	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.1	Faster submission and processing of customs documentation.					
4.2	The system determines the risk level of goods as green, yellow and red.					

4.3	Automated validation of data and reduced data entry errors.					
4.4	Improved customs compliance and reduced risk of penalties.					
4.5	Enhanced transparency in clearance procedures as every decision of customs officials can be viewed online.					
4.6	Facilitates communication and collaboration between customs & other stakeholders.					
4.7	Simplifies procedures like document verification, tariff classification, valuation and payment of duties.					
4.8	Predictable customs formalities are associated with the system.					
4.9	Elimination of the need for face-to-face interaction between customs officials and traders reduces corruption incidents.					
4.1	Saves time and resources of importers/exporters.					

Part 5: The Effects of Electronic Single Window System on Cargo Clearance Efficiency

Please put "√" mark on the box below that best represents your level of agreement about The Effects of Single Window System on Cargo clearance efficiency at Addis Ababa Kality Customs Branch.

5	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.1	Single window system is easy and convenient to use.					
5.2	Single window system Improved coordination between government agencies involved in cargo clearance process.					
5.3	Time taken to request regulatory agencies import permits has reduced significantly with using Single window.					
5.4	Time taken to process permits by regulatory agencies has reduced significantly with using Single window.					

Part 6: The Effects of Customs Automation on Cargo Clearance efficiency

Overall, what changes have brought the adoption of Customs Automation Systems on the following? (Please put "√" mark on the box below to show your level of agreement)

6	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.1	Reduced clearance time.					
6.2	Improved compliance level.					
6.3	Improved collaboration and communication between stockholders.					
6.4	Reduced clearance cost for importers and exporters.					
6.5	Predictability of customs clearance formalities.					
6.6	Simplicity of customs clearance processes.					
6.7	Facilitated international trade.					