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Electronic Cargo Tracking and Trade Facilitation Among Clearing and Forwarding Companies at Inland Container Deport Nairobi, Kenya

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Abstract

The increasing forces of globalization around the world require that goods and services are moved from one part of the country to the other hence the need for customs. It is the responsibility of KRA to ensure that all taxes have been collected on behalf of the government of Kenya. However, several challenges have been evident in the operations of KRA as far as the realization of its objectives of customs system automation on trade facilitation is concerned. The purpose of this study was to establish the effect of electronic cargo tracking on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi, Kenya. The study was grounded by the New Trade Theory. The explanatory research design was used. The target population of this study was the 369 clearing and forwarding agents and KRA staff and transporters, and a sample size of 191 respondents. Primary data was collected through a close-ended questionnaire. The data was analyzed using descriptive and inferential statistics. The study found that electronic cargo tracking has a positive and significant effect on trade facilitation ($\beta = 0.323$; $p = 0.000$). The study emphasized the direct contribution of electronic cargo tracking to the enhancement of trade facilitation processes. KRA is recommended to support research initiatives that focus on the continuous improvement of customs systems and trade facilitation technologies. The study recommends that KRA establish robust monitoring and evaluation mechanisms to assess the implementation and impact of electronic cargo tracking. The study recommends that the treasury establishes and implement policies that encourage the seamless integration of advanced technological solutions within the customs and trade facilitation processes.

Keywords: *Electronic Cargo Tracking, Trade Facilitation, Clearing and Forwarding Companies, Inland Container Deport*

1.0 Introduction

The use of global value chains by nations has increased economic connectivity and openness on a global scale. Cross-border trade has consequently taken on essential importance (Amin, 2019). International trade is hampered by capacity issues caused by inadequate infrastructure, ineffective port operations, onerous customs processes, unnecessary documentation requirements, poor human capital standards, and border corruption (Diamond, 2020).

The use of computerized systems in customs involves the use of information and communication technologies (ICT) to attain the core business of customs, and that is to improve the entire clearance process - from the lodging of entries, acceptance, and processing of cargo

and goods declarations for import, export, and transit, payment of relevant taxes and assessments, to arrival of the goods from Customs (UNECE, 2019). ICTs include a scope of quickly advancing technologies that incorporate telecom innovations, for example, mobile phones, Television and Radio, PC intervened conferencing and video conferencing, and in addition, computerized advances which incorporate personal computers, data systems, for example, web, World Wide Web, intranets and extranets and programming applications (Chisenga, 2019).

OECD (2019) examines the economic impact of trade facilitation and, in particular, the link between trade facilitation and trade flows, government revenue, and foreign direct investment. The paper finds strong positive causal links between improvement in trade facilitation with trade flows and government revenue (mostly for developing countries by implementing customs modernization programmes that result in more efficient collection of trade taxes).

In developed countries, Customs schemes based on trade facilitation have become common and have been applied to the ever-increasing amount of trade sector operations (WCO, 2018). Trade facilitation has been acknowledged as one of the key drivers of export competitiveness aimed at smoothening the efficient flow of trade. Trade facilitation represents a deepening of the high trade policy agenda, from the legislation and regulation to real operational practice and execution, including multilateral obligations administration. Trade across international borders enables individual traders, companies, or countries to expand their markets, which would otherwise not have been possible (Sedgwick, 2013). Customs reform attempts have been led by the development of supply chain globalization, and e-commerce (Liliana Avelar-Sosa, 2019).

African countries have managed to rise to the challenge the improved economic growth and better living standards for their people, reforms and modernization especially geared towards improved resource mobilization are of extreme importance. Therefore, several African countries that work together with international bodies such as the World Bank, World Customs Organizations (WCO), United Nations Conference on Trade and Development (UNCTAD), and World Trade Organization (WCO) have currently employed initiatives leading to increased volumes of trade and thus increasing revenue collection. Customs reforms and initiatives in Africa have been greatly relied on as a strategy for improving revenue collection (Blinder, 2008).

In the KRA 6TH corporate plan, C&BC is mandated to take on board a completely fledged border control function and electronically control all the goods and services entering and leaving the country's borders. Pursuing a policy decision by the significant government arm to allow the legal mandate to KRA to oversee border agencies' activities which incorporate, among others, pre-clearance of freight and passengers through Advance Passenger Information (API), and Advance Cargo Information systems, single customs territory which eliminates numerous clearance procedures through, Integrating ICT platforms of all partners, One-stop border post, where all organizations sit under one rooftop, and all consignment stop once for checks, Integrated scanner administration which has been required by the way that it's impractical to do 100% confirmation of all the load that enters the port, Electronics cargo tracking system which empowers all transit cargo to be tracked as it leaves the border(Sixth Corporate Plan, 2015).

Kenya has embarked on modernization projects and Customs Services Department (CRM) reform where the objective of this project is to help transform customs departments into modern customs administration to be lined with accepted standards worldwide and best practices as

outlined in the WCO Revised Kyoto, WTO treaties and Harmonization Convention although Kenya has not yet formalized the Revised Kyoto Convention (EA, 2018). In addition, Kenya is one of the members of WTO, implemented trade facilitation contracts and various processes, including the Agreement on Customs Valuation and Pre-Shipment Inspection, Rules of Origin, Import Licensing Procedures, Technical Trade Barriers, and more (Koul, 2019).

1.1 Problem Statement

In today's era of globalization, international trade has evolved to the level where almost no nation can be self-sufficient, and global trade has fostered an interdependency and interconnectivity between countries. Issues related to customs automation and the use of information and communication technology (ICT) in trade procedures have attracted considerable attention in WTO discussions on trade facilitation OECD, (2020). Trade facilitation has been a major point of focus due to its ability to enhance the efficiency, effectiveness, and ease of doing business, especially in cross-border trade (Bazaar Voice, 2020).

Container traffic, according to the annual performance report, indicates that there has been an increase in imports from 489,000 to 520,000 (KPA, 2019). Port inefficiency is attributed to poor management, which results in more time taken to clear cargo having poor machines like cranes and loaders, being understaffed, and having illiterate staff (KPA, 2020). Due to the increase of volumes of containers and congestion being on a high note, as a strategy to reduce congestion and increase trade, Kenya has resorted to the construction of an inland container depot as a sustainable project.

However, even after establishing the inland container terminal, to date, there is still so much congestion at the inland container depot; this is evident according to the many containers pending clearance at ICD. If congestion of the containers continues to increase at that rate, then it means measures have to be put in place to deal with the situation so that port performance to increase (OECD, 2019). Kenya's share in merchandise trade remains very low at 2.7% in 2021; and over the past 5 years, Kenya's share in world exports declined from 3.5% in 2018 to 2.5% in 2022, the lowest regional share. In 2022, 79% of people who imported goods experienced delays in facilitation. There are also many complaints about the compatibility of the computer system used in ICD. Between October 2019 and August 2021, the number of containers that had overstayed at Inland Container Depot Nairobi was 4923 (KPA, 2022).

Despite the numerous researches that have been done on trade facilitation in the other sectors of the economy, a few researches have been done on trade facilitation in Kenya. This research thus has filled the gap investigating the effect of electronic cargo tracking on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi, Kenya.

1.2 Research Objective

To establish the effect of electronic cargo tracking on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi, Kenya

1.3 Research Hypothesis

H_{01}: Electronic cargo tracking has no significant effect on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi.

2.0 Literature Review

2.1 Theoretical Review

In contrast to the classical theories, the new trade theory (Krugman, 1979; 1980) explains why countries engage in intra-industry trade and firms' heterogeneity. This theory originated in the work of Bernard *et al.* (2003) and Melitz (2003). This is a valuable result because the great bulk of global trade is intra-industry rather than inter-industry in nature. The ability of the theory to explain this feature of global trade is made possible by several assumptions: consumers prefer variety in consumption, the market is populated by firms selling different varieties of goods, and there are increasing internal returns to scale in production, meaning that a firm's average cost of production falls as its volume of production increases.

Paul Krugman, a new trade theory economist, believes that international commerce can support economic growth in two ways. The first is the influence of trade-based economies of scale, and the second is that international commerce can stimulate economic growth by increasing the optimal allocation of resources between materials and knowledge sectors (Chen, 2009). New Commerce Theory (NTT) is a new growth theory that evolved in the context of international trade and economic growth (Lam, 2015). As explicit variables that determine economic growth, the new growth theory stresses both technology and the externalities offered by the invention and application of new knowledge. NTT was created to explain why these countries have such a high degree of intra-industrial trade and a substantial share of global trade (Dicken, 1998). This implies that even when countries are comparable in terms of variables, increasing returns to scale and imperfect competition give grounds for specialization and trade (Poon, 1997).

Although most jobs in NTT assume that income increases are intrafirm, income increases are extra firms (Krugman 1991). Krugman's (1991) model also illustrates that trade leads to a regional concentration of major industries in the presence of external economies of scale. Krugman also points out that the long-term regional consequences of trade are typically cumulative and self-reinforcing. The emergence of globalization is also explained by the new trade theory. As a result, poorer developing countries may struggle to grow some industries in the future because they are too far off from the economies of scale that industrialized countries enjoy. This is due to the economies of scale that mature enterprises already have rather than a fundamental comparative advantage. The theory can be applied to this research because it explains the role of trade facilitation in helping developing countries compete in the global market.

2.2 Empirical Review

2.2.1 Concept of Trade Facilitation

Trade facilitation is a concept directed toward reducing the complexity and cost of the trade transaction process and ensuring that all these activities take place in an efficient, transparent, and predictable manner (Park, 2020). According to WCO (2020), trade facilitation refers to the simplification, harmonization, and automation of international trade procedures, particularly import and export procedures, transit requirements, and procedures applied by customs and other agencies.

Trade facilitation is carried out in Kenya by several institutions carrying out different functions (Omwansa, 2021). The responsibilities of a trade promotion agency include collecting revenue, providing facilities for carriers to load and unload cargo, and verifying the goods comply with certain health standards and regulations. Another function that is part of trade facilitation is the transportation of goods to their destination (Beverelli, Neumueller & Teh, 2019).

Recent customs reforms, especially in developed countries, have raised the potential for buyer-supplier-like collaboration in customs dealings (Ellram, Zsidisin, Siferd, & Stanly, 2022). global trade continues to expand, and governments worldwide are increasingly engaging in customs reforms. In recent years the international trading environment has been transformed dramatically in terms of how goods are carried and traded, the speed of such transactions, and the sheer volume of goods now being traded around the globe.

This, together with mounting pressure from the international trading community to minimize government intervention, has caused customs authorities to place an increasing emphasis on the facilitation of trade. To achieve an appropriate balance between trade facilitation and regulatory control, customs administrations are generally abandoning their traditional, routine "gateway" checks and are now applying reforms in customs administration (Haughton & Desmeules, 2021) and the principles of risk management, with varying degrees of sophistication and success.

2.2.2 Concept of Electronic Cargo Tracking

Electronic Cargo Tracking System: According to Dongo, Rono & Nuwagaba (2020), the ECTS is defined as a technological solution that allows authorities to track cargo on a real-time basis between the loading and discharge points to prevent cargo dumping. Peter (2019) writes that systems of automation help in the improvement of revenue collection. Applications such as toll revenue collection, automatic fare collection, bus revenue systems, and parking systems are based on an electronic payment system, for example. Also, through automation of revenue collection, providers of services are in a better position of trailing audits since all transactions that are captured are in detail according to time, where, and whoever owns the information.

It thus prevents the loss of revenue via abuses because there is an electronic recording of moves. Automation offers the opportunity to turn around huge transactions to be handled in a highly effective manner. One of the vital areas of application that relate to IT use in public services is taxation. Applications of electronic tax management began in America; later, they spread to other developed and developing nations worldwide. This reduces costs while increasing the sharing of information capabilities. Hence, electronic tax management applications are everywhere in the world (de Wulf & Sokol, 2020).

Digital technology, which includes telecommunications and computerized systems, is expected to greatly increase tax output, saving time and resources while providing consumers with improved service at the same time. The human factor, on the other hand, is also affected by technological developments in different ways because it makes work much easier for some while at the same time posing a threat to others. Both tax information systems, including databases and resources, are also available at the click of a button to resolve tax non-compliance, facilitate tax compliance, and satisfy operational, administrative, and internal control information criteria to effectively manage the current tax administration (deWulf & Sokol, 2020).

According to Gidisu (2012), the Ghana Revenue Authority (GRA) has adopted the Automated Framework for Customs Data and Management (ASYCUDA) developed by UNCTAD, which is fully integrated and covers the full tax clearance processes. The system manages, inter alia, the generation of trade data which can be used for statistical and economic analysis, Customs declarations, accounting procedures, and transit procedures (United Nations Economic Commission for Europe, 2019). ASYCUDA has also been adopted by other African countries,

including Zimbabwe, which migrated from ASYCUDA ++ to ASYCUDA World, which is a web-based system (WCO, 2020).

3.0 Methodology

3.1 Research Design

According to Kombo and Tromp (2009), a research design holds all elements of a research project together. It is used to structure the research to show how all the significant parts of the research project will work together. This study employed an explanatory approach as it is the most effective in testing the relationship between electronic cargo tracking and trade facilitation.

3.2 Target Population

Mugenda and Mugenda (2003) described population as the entire group of individuals or items under consideration in any field of inquiry and have a common attribute. The target population for the study was the 369 managers from clearing and forwarding agents, KRA customs officers, and transporters from companies at Inland Container Deport Nairobi KRA, (2023). The respondents were ideal because they are directly or indirectly involved in decision-making that ensures success in customs system automation and trade facilitation.

3.3 Sample Size and Sampling Technique

Sampling is the process of selecting units from a population of interest Dell, Holleran, & Ramakrishnan, (2019). The advantage of sampling is that by selecting a part of the subject on which measurement is being taken in a population, conclusions may be drawn about the entire population. The study used a stratified random sampling technique to select respondents forming the sample size. The following formula by Yamane (1967) was used to calculate the study sample size;

$$\mathbf{n = N / (1 + Ne^2)}$$

n = is the desired sample size

N = is the target population

e = is the acceptable margin of error estimated at 0.05 (at 95% confidence interval)

Therefore, Sample size (n) = 160 / (1+369(0.0025)

n= 191 respondents

3.4 Data collection

The research instrument was a structured questionnaire covering all the study parameters. The questionnaire covered three sections. Section A covered background information on the respondents. Section B consists of questions pertaining to the research objectives. Section C covered moderating variable statements. The responses were rated using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree)

3.5 Data Analysis

The analysis of the data started by editing and inspecting the data pieces to identify spelling mistakes, items that were wrongly responded to, and any blank spaces left unfilled by the

respondents. The computer statistical package for social sciences (SPSS) was used to process all the responses from the questionnaire. The collected data was screened for accuracy, consistency, and completeness and then presented in the form of percentages, pie charts, and tables.

4.0 Results and Discussion

4.1 Descriptive Analysis

4.1.1 Descriptive statistics on electronic cargo tracking

Table 1 suggests that firstly, respondents overwhelmingly agreed that there has been effective training and capacity building on Cargo Tracking Systems (Mean = 4.04, Std. Deviation = 0.834). This suggests a positive perception among participants regarding the adequacy of training in this area. The standard deviation of 0.834 indicates a moderate level of agreement among respondents, with some variability in opinions.

Similarly, the perception of cargo tracking systems being costly to implement was positive, with a mean score of 4.05 and a standard deviation of 0.855. Despite the slight increase in standard deviation, the respondents generally agree that the implementation of such systems incurs a considerable cost.

Moreover, the respondents expressed a high level of agreement (Mean = 4.08, Std. Deviation = 0.820) that containerized cargo theft has reduced since the incorporation of the cargo tracking system. The relatively low standard deviation suggests a consistent consensus among respondents on the positive impact of the system on reducing theft.

However, opinions were somewhat divided when it comes to the preference for using physical escorts during transit (Mean = 3.99, Std. Deviation = 0.960). The standard deviation of 0.960 indicates a higher degree of variability in responses, reflecting a more nuanced perspective on the necessity of physical escorts.

Lastly, the tool's effect on trade volumes and accountability received positive feedback (Mean = 4.10, Std. Deviation = 0.821). Respondents generally agree that the cargo tracking system positively influences trade volumes and accountability. The standard deviation of 0.821 suggests a relatively consistent agreement among participants.

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Table 1: Descriptive statistics electronic cargo tracking

Items	N	Mean	Std. Deviation	Skewness	Kurtosis
There has been training and capacity building on Cargo Tracking Systems.	166	4.04	.834	-.080	-1.559
Cargo Tracking systems are costly to implement.	166	4.05	.855	-.222	-1.314
Containerized cargo theft has been reduced since the incorporation of the cargo tracking system.	166	4.08	.820	-.158	-1.494
The use of physical escorts during transit is preferable.	166	3.99	.960	-.475	-.888
This tool affects the volumes of trade and accountability.	166	4.10	.821	-.192	-1.492

Source: Researcher 2024

4.1.2 Descriptive statistics on trade facilitation

Table 2 presents the descriptive statistics for trade facilitation based on responses from 166 participants.

The item "Cooperation with neighboring countries could facilitate trade" received a high mean score of 4.13 (SD = 0.832), indicating a generally positive perception among respondents. The low standard deviation suggests a relatively consistent agreement among participants. The negative skewness (-0.242) indicates a slight leftward skew, suggesting a mild tendency for respondents to lean towards stronger agreement.

In relation to "There is cooperation in regard to payment of fees and charges imposed on imports and exports," participants exhibited a favorable perception with a mean score of 4.11 (SD = 0.853). The standard deviation implies a moderate level of variability in responses. The negative skewness (-0.269) indicates a similar leftward skew, suggesting a mild inclination towards stronger agreement.

The item "There is an increase in the publication of trade information through channels such as the Internet" also garnered positive feedback, with a mean score of 4.10 (SD = 0.850). The standard deviation suggests a moderate degree of variability in responses. The negative skewness (-0.258) indicates a slight leftward skew, reinforcing the overall tendency towards stronger agreement.

Regarding "There is improved cooperation between various ICD agencies," respondents expressed a positive perception, yielding a mean score of 4.14 (SD = 0.838). The standard deviation suggests a relatively consistent agreement among participants. The negative skewness (-0.267) indicates a mild leftward skew, reinforcing the overall inclination towards stronger agreement.

The final item, "There is enhanced exchange of data through automation of border procedures," received a high mean score of 4.15 (SD = 0.821). The standard deviation suggests a relatively consistent agreement among respondents. The negative skewness (-0.286) indicates a mild leftward skew, emphasizing the overall tendency towards stronger agreement.

Table 2: Descriptive statistics trade facilitation

Items	N	Mean	Std. Deviation	Skewness	Kurtosis
Cooperation with neighboring countries could facilitate trade	166	4.13	.832	-.242	-1.518
There is cooperation in regard to the payment of fees imposed on imports and exports	166	4.11	.853	-.269	-1.425
There is an increase in the publication of trade information through channels such as internet	166	4.10	.850	-.258	-1.418
There is improved cooperation between various ICD agencies	166	4.14	.838	-.267	-1.527
There is an enhanced exchange of data through automation of border procedures	166	4.15	.821	-.286	-1.460

Source: Researcher 2024.

4.2 Correlation Analysis

The correlation analysis in Table 3 shows that electronic cargo tracking has a positive and significant correlation with trade facilitation r= 0.634 p=0.000<0.05. indicating that as electronic cargo tracking improves so does trade facilitation.

Table 3: Correlation analysis

		Trade facilitation	Electronic cargo tracking
Trade facilitation	Pearson Correlation	1	
	N	166	
Electronic cargo tracking	Pearson Correlation	.634	1
	Sig. (2-tailed)	.000	
	N	166	166

Source: Researcher 2024.

4.3 Regression Analysis

Regression model was conducted to test the effects of electronic cargo tracking on trade facilitation among clearing and forwarding companies at inland container deport Nairobi, Kenya. Table 4. shows that at a constant of 0.539, a unit change in electronic cargo tracking causes a significant increase of 0.323 in trade facilitation. Based on the findings, the null

hypothesis that electronic cargo tracking has no significant effect on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi was rejected.

Table 4: Coefficient direct effects

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	β		
1	(Constant)	0.539	0.256		2.105	0.037
	Electronic cargo tracking	0.339	0.085	0.323	3.8	0.000

Source: Researcher 2024.

4.4 Discussion

The objective was to establish the effect of electronic cargo tracking on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi, Kenya. A correlation analysis showed that there is a positive and significant relationship between electronic cargo tracking and trade facilitation r= 0.634 p=0.000<0.05. this suggests that as electronic cargo tracking techniques improve the facilitation of trade among clearing and forwarding companies has improved in ways that cannot be attributed to chance. The direct effect of electronic cargo tracking on trade facilitation was determined to be positive and significant β= 0.323 p=0.000<0.05. This means that efforts to improve electronic cargo tracking directly contribute to improved trade facilitation. The study concurs with a study by Wulf & Sokol, (2020) which stated that Digital technology, which includes telecommunications and computerized systems, is expected to greatly increase tax output, saving time and resources while providing consumers with improved service at the same time. The human factor, on the other hand, is also affected by technological developments in different ways because it makes work much easier for some while at the same time posing a threat to others.

5.0 Conclusion

The study sought to establish the effect of electronic cargo tracking on trade facilitation among clearing and forwarding companies at inland containers deport Nairobi, Kenya, the study revealed a positive and significant relationship with trade facilitation. The study emphasized the direct contribution of electronic cargo tracking to the enhancement of trade facilitation processes.

6.0 Recommendations

KRA is recommended to support research initiatives that focus on the continuous improvement of customs systems and trade facilitation technologies. The study recommends that KRA establish robust monitoring and evaluation mechanisms to assess the implementation and impact of electronic cargo tracking. The study recommends that the treasury establish and implement policies that encourage the seamless integration of advanced technological solutions within the customs and trade facilitation processes.

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