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EFFECT OF REGIONAL ELECTRONIC CARGO TRACKING SYSTEM ON CUSTOMS REVENUE COLLECTION AT NAMANGA BORDER IN KENYA

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ABSTRACT

Purpose: Customs plays a vital role in the economic stability of any nation. Globally, customs administrations are tasked with essential duties, including revenue collection, societal protection, and safeguarding the security of supply chains. As the world increasingly operates as an interconnected global village, the exchange of goods and services across borders has become a universal priority. In Kenya, however, the Customs and Border Control Department has often fallen short of meeting the revenue targets set by the treasury. The main objective was to determine the effect of Regional Electronic Cargo Tracking System on customs revenue collection at Namanga border in Kenya. The study was supported by System Theory, Diffusion of Innovation theory.

Methodology: The study adopted descriptive research design. The target population was 234 KRA officials at Namanga border and a sample size of 148 respondents. This study used primary data which was collected using structured questionnaires. The inferential statistics comprises correlation analysis and multiple regression analysis.

Results: The inferential statistics comprises correlation analysis and multiple regression analysis. The correlation results revealed significant positive associations between Regional Electronic Cargo Tracking System with customs revenue collection (r=.640, p=.002. Regression analysis further indicated that Regional Electronic Cargo Tracking System (β=.227, p=0.002) were positively and significantly related to customs revenue collection.

Recommendation: Based on the results, findings, and conclusions, the study formulated several key recommendations. The findings revealed a statistically significant relationship between the Regional Electronic Cargo Tracking System in enhancing customs revenue collection at the Namanga border in Kenya. In light of these findings, the study recommends that KRA enhance customs revenue collection by improving RECTS use through staff training, system integration,

inter-agency coordination, clear enforcement, and regular performance evaluations, ensuring greater efficiency, compliance, and revenue at the Namanga border. This study acknowledges several limitations. The descriptive research design limits the ability to establish causal relationships fully, and the reliance on cross-sectional data may not capture variations in customs revenue collection over time. For future research, comparative studies across multiple border points, longitudinal designs tracking RECTS performance over time, and cost–benefit analyses evaluating the economic impact of the system are recommended to provide deeper insights into the effectiveness and efficiency of electronic cargo tracking in enhancing revenue collection.

Key words: *Regional Electronic Cargo Tracking System on customs revenue collection at Namanga border in Kenya*

1.1 Introduction

Taxation is essential for a state's development, providing funds for infrastructure, social redistribution, and establishing a fiscal social contract between the government and its citizens. When tax revenues are insufficient to cover necessary expenditures in critical sectors like infrastructure, health, and education, this gap becomes a persistent issue (Forstater, 2019). Generally, citizens are willing to pay taxes if they believe the tax system is fair and perceive that tax revenues are used to serve their interests.

Customs also plays a critical role in any country's economy, with customs administrations worldwide responsible for revenue generation, societal protection, and securing the supply chain. Additionally, customs operations focus on enhancing trade facilitation to stimulate investment and help reduce poverty (World Customs Organization, 2022). Yet, 21st-century challenges have placed unprecedented demands on customs. Today, customs administrations must respond swiftly to these evolving challenges, which require an in-depth understanding of globalization, international trade dynamics, the technical intricacies of supply chains, emerging political directions, and the increasing complexity of the global environment (Gordhan, 2020).

Customs revenue collection is the process by which customs authorities gather taxes, tariffs, and duties on goods entering or exiting a country. The revenue is crucial for national budgets, providing funds that support public services and infrastructure. Customs revenue collection also serves as a regulatory tool, helping to control imports and exports, protect local industries, and enforce trade policies. Effective customs revenue collection relies on accurate valuation, classification, and risk management to minimize evasion and fraud (World Customs Organization, 2020).

The Regional Electronic Cargo Tracking System (RECTS) is a multidimensional independent variable that can be disaggregated into four key components that influence customs revenue collection. Cargo visibility enables real-time monitoring of transit goods, improving transparency and reducing cargo diversion and revenue leakage (World Customs Organization, 2022; Karingi & Ndung'u, 2021). Tamper detection**,** achieved through electronic seals and sensors, detects unauthorized interference and route deviations, thereby reducing smuggling and false transit declarations (Mwangi & Ochieng, 2020; EAC Secretariat, 2021). Response time refers to the speed

at which customs authorities act on system alerts, with faster responses strengthening enforcement and enhancing revenue recovery (Awasthi & Engman, 2019; Kibet, 2022). System integration ensures seamless data sharing between RECTS and other customs and regional trade systems, improving coordination, risk profiling, and accountability, which collectively enhance customs revenue performance (UNECA, 2020; World Bank, 2021).

The Namanga One Stop Border Post (OSBP) is a joint border crossing facility between Tanzania and Kenya, it is one of the busiest border crossings between the two countries. Prior to the opening of the OSBP, it could take up to two days to clear customs at the Namanga border crossing, average crossing times are now 30 minutes. Introduction of the One Stop Border Post (OSBP) included improvements in the road infrastructure and simplification of the customs procedures. Namanga OSBP has very good infrastructure housed in a modern building with good facilities, ample parking available and very good road to Arusha. Inspection is conducted by a multiagency team resulting in smooth processing and quick flow of traffic and no matter from which side of the border the crossing takes place there is only a requirement for customs procedure to take place at the point of entry reducing the customs/immigration administrative process in half.

1.2 Problem Statement

Customs departments globally are tasked with several mandates, including revenue collection, border security, the compilation of international trade statistics, and trade facilitation (Ayuma, 2018). Within Kenya, revenue generation has long been the primary metric used to assess the performance of the Customs and Border Control Department (Morini, De'SaPorto, & Inaciao, 2017). However, the department has faced criticism for its failure to consistently meet its revenue targets. Specifically, there have been instances where the department has failed to achieve its revenue collection goals. For example, in the 2016/2017 financial year, the department managed to collect KSh 443.5 billion, falling short of its target of KSh 462 billion. The following year, in 2017/2018, the shortfall persisted, with the department collecting KSh 469.97 billion against a target of KSh 484.97 billion (KRA, 2019). Despite these efforts, Kenya's share in global merchandise trade remains relatively low, accounting for only 2.7% of global trade in 2021. Moreover, Kenya's share in world exports declined significantly from 3.5% in 2018 to just 2.5% in 2022, marking the lowest regional share (KRA, 2022).

From the existing empirical studies by previous researchers such as Duval, Utoktham and Kravchenko (2018) who conducted a study on the effect of implementation of digitalization on trade costs in Asia. Hence conceptual gap and contextual gap. Sameti and Rafie (2020) analyzed the effects of customs duty tax and economic growth in South Africa. They used panel data regression thus conceptual and methodological gaps. This study therefore sought to fill in the gaps by focusing on the determine the effect of Regional Electronic Cargo Tracking System on customs revenue collection at Namanga border in Kenya.

2.0 Theoretical Literature

2.1 System Theory

The system theory, developed by notable scholars such as Ludwig von Bertalanffy (1974), Boulding (1985), Rapoport (1986), and Skyttner (1996), was initially formulated outside the business context but has since found significant application in organizational management (McSherry & Warr, 2010). The fundamental premise of systems theory is that an organization is viewed as a whole entity composed of interrelated sub-units, which collectively form the complete system (von Bertalanffy, 1974). Skyttner (1996) further emphasizes that the primary purpose of systems theory is to explain the entire system, not just isolated parts or components of the organization.

The influence of systems theory spans across various fields, with contributions from thinkers in multiple disciplines. For example, Alexander Bogdanov in the field of physics, Ludwig von Bertalanffy in biology, Béla H. Bánáthy in linguistics, and Talcott Parsons in sociology have all contributed to the broader understanding of systems. Other notable figures include Howard T. and Eugene Odum, who studied ecological systems, Fritjof Capra, who explored organizational theory, Peter Senge, who focused on management, and Richard A. Swanson, who applied the theory to human resource development. Educational theorists like Debora Hammond and Alfonso Montuori also applied systems theory in their respective fields.

In contrast to the mechanistic view of organizations, systems theory presents organizations as organic systems dynamic entities that evolve and adapt in response to external and internal factors (Morgan, 1986). This shift in perspective gave rise to key theoretical developments, including the influential open systems approach (Katz & Kahn, 1966), which highlights the importance of an organization's interactions with its environment. Due to the abstract nature of systems theory, the contingency view was introduced to address the specific relationships within and between subsystems of the organization, as well as the organization's interactions with its external environment. This perspective helps explain how organizations operate and adapt to changing conditions (Lawrence & Lorsch, 1967).

According to systems theory, the effectiveness of an organization depends on the proper functioning of each of its components. Therefore, improving outcomes, such as revenue collection in the customs department, cannot be achieved by focusing solely on one part of the system, like automating the customs system. While the implementation of technologies like cargo tracking systems, scanner technology, and customs valuation systems may streamline customs procedures, reduce clearance times, and increase transparency, these technologies are only a part of the broader system. As such, the customs department may still struggle to meet its revenue collection targets despite technological advances. This highlights the importance of examining other factors that could be influencing revenue performance. In this study, systems theory will be applied to better understand how the integrated customs management system, as a whole, affects customs revenue collection. By considering the entire system, including its components and interactions, the study

aims to uncover the underlying factors that impact the efficiency and effectiveness of revenue collection in the customs sector.

Systems Theory posits that organizations operate as interrelated subsystems working together to achieve common goals (Bertalanffy, 1968). Applied to customs revenue collection, the Regional Electronic Cargo Tracking System (RECTS) functions as a critical subsystem within the national revenue system, where effective coordination and interaction enhance overall performance. By monitoring and tracking cargo movements in real time, RECTS ensures that all processes within the customs system are synchronized, reducing revenue leakage, preventing fraud, and improving compliance (Shafritz et al., 2024). In line with Systems Theory, the system transforms inputs such as cargo data into outputs in the form of increased revenue collection and higher compliance, emphasizing that optimization of subsystems leads to better organizational outcomes. Consequently, hypotheses for this study, such as the positive relationship between RECTS and revenue collection, are grounded in the understanding that improved system integration and efficiency enhance overall customs performance.

2.1.2 Diffusion of Innovation Theory

The Diffusion of Innovation (DOI) theory, advanced by Rogers (1995) and later elaborated by others such as Chong and Ooi (2008), outlines five key attributes that influence the adoption of an innovation. These attributes are relative advantage, compatibility, complexity, trialability, and observability. Relative advantage refers to the degree to which an innovation is perceived as superior to the idea or technology it replaces. Compatibility is defined as how consistent the innovation is with the existing values, past experiences, and needs of potential adopters. Complexity involves the perceived difficulty of using and understanding the innovation, while trialability is the extent to which an innovation can be tested or experimented with on a limited basis. Finally, observability is the visibility of the innovation's benefits or results to others (Rogers, 1995).

Rogers (2003) further expanded the theory, focusing on the process of how, why, and at what rate new ideas and technologies spread within society. In this context, diffusion is the process through which an innovation is communicated over time among members of a social system. The theory suggests that adoption occurs when an individual or organization fully integrates a new innovation into their activities, while rejection occurs when they decide not to adopt it. Four key components influence the transfer of innovation: the innovation itself, the communication channels through which it spreads, the time required for diffusion, and the social system involved (Rogers, 2003).

The Diffusion of Innovation theory is closely tied to the adoption of new technologies, such as the introduction of the Regional Electronic Cargo Tracking System (RECTS) to secure transit cargo. This innovation theory provides a framework for understanding why and how such technological advancements might be adopted within a social system. As one of the oldest theories in social sciences, the DOI theory explains the gradual adoption of an idea or product by a population over time. It highlights the importance of the five attributes in determining how easily an innovation will be accepted by its target audience. In the case of the RECTS system, the theory provides

insight into the potential barriers to adoption, such as the relative advantage it offers over traditional cargo tracking systems, the compatibility of the technology with existing practices, and the perceived complexity or ease of use for potential adopters.

The Diffusion of Innovation Theory (DOI)**,** developed by Everett Rogers (1962)**,** explains how new ideas, technologies, or practices spread within a social system over time. In the context of the Regional Electronic Cargo Tracking System (RECTS)**,** this theory helps to understand how transporters, customs authorities, and logistics firms adopt and integrate the technology to enhance cargo security and trade facilitation across borders. According to Rogers (2003), adoption depends on factors such as perceived usefulness, compatibility with existing systems, complexity, trialability, and observability.

The implementation of RECTS across East African countries demonstrates the innovation's diffusion through early adopters like Kenya and Uganda, who recognized its ability to curb cargo diversion, reduce transit time, and improve transparency in regional trade. As stakeholders observed these benefits, adoption spread to other nations, supported by regional cooperation and policy harmonization (Mutua & Kiarie, 2021). Therefore, the DOI theory provides a valuable framework for explaining how the RECTS has been embraced across the region, influencing efficiency, compliance, and trust among supply chain actors.

Diffusion of Innovation Theory explains how new ideas, technologies, or practices are adopted and spread within a social system over time (Rogers, 2003). In the context of customs revenue collection, RECTS represents an innovative technological intervention aimed at improving compliance and reducing revenue leakage. Its adoption by customs authorities at Namanga Border involves awareness, evaluation, trial, and full implementation stages, which determine the effectiveness of the system in enhancing revenue collection. Accordingly, the study's hypotheses, including the positive impact of RECTS on revenue collection, are grounded in DOI Theory, asserting that successful adoption of innovative tracking technologies will lead to measurable improvements in customs revenue performance**.**

2.2.Empirical literature review

2.2.1 Regional Electronic Cargo Tracking System

In a study by Odago (2021), the impact of adopting the Electronic Cargo Tracking System (ECTS) on excise revenue collection at Jomo Kenyatta International Airport in Kenya was analyzed. The findings of the study revealed that the introduction of ECTS had a significant and positive effect on excise revenue collection in the country, underscoring the importance of the system in enhancing the efficiency and effectiveness of customs operations. Similarly, Lweis (2012) highlighted the profound impact that Information and Communication Technology (ICT) has on customs clearance processes, especially in West Africa, where all stakeholders rely heavily on ICT to ensure the smooth flow of information, facilitate the digital payment of duties, monitor cargo

movement, and eventually clear and forward goods. The study emphasized the role of ICT in streamlining customs procedures and improving overall trade efficiency.

Mugambi (2021) conducted a study to assess the effect of the Electronic Cargo Tracking System (ECTS) on cross-border trade between Kenya and Uganda. The research found that the system, adopted by the Kenya Revenue Authority, has significantly reduced the diversion of cargo to the local market, leading to a more secure and transparent system of handling goods in transit. Additionally, the ECTS has reduced the time required to clear cargo at border points, making customs procedures faster and more efficient. This system has also simplified the collection of duties and fines, further enhancing the efficiency of customs operations and improving the overall trade experience between the two countries.

Kabiru (2020) investigated the relationship between the electronic cargo tracking system and operational performance at the Kenya Revenue Authority, as well as its impact on transporters. The study identified that one of the main challenges in implementing the system was a slight disconnect between the expectations of the revenue authorities and the systems provided by the vendors. The research also highlighted the critical role of IT infrastructure in ensuring the successful implementation of the ECTS. A robust and reliable IT infrastructure is essential for the effective functioning of the system, enabling real-time tracking and ensuring that any violations or deviations are promptly reported.

According to Njuguna and Maina (2020), the Regional Electronic Cargo Tracking System (RECTS) utilizes GPS technology to offer real-time tracking of goods as they move from the point of entry to their final destination. The system significantly reduces unauthorized diversions, smuggling, and transit fraud by sending alerts whenever a vehicle deviates from its authorized route or if tampering is detected. The literature stresses the importance of the RECTS in ensuring cargo security, reducing revenue leakage, and maintaining the integrity of goods during transit. By guaranteeing that goods declared at customs are not tampered with during the journey, the system helps to prevent revenue loss and improves the overall efficiency of customs operations.

2.2.2 Customs Revenue Collection

Over the past decade, customs performance in Kenya has been under continuous evaluation and improvement. Key reforms in customs duties have included streamlining tariff codes, lowered average tariff rates, and narrowed the range of tariff bands. These changes, which have been ongoing since the 1990s, were motivated by conditions tied to development assistance, preferential trade agreements, and adherence to World Trade Organization (WTO) standards. As part of these efforts, tariff rates (especially those affecting imported intermediate goods) and the number of tariff bands have been progressively reduced. Customs reform has coincided with trade liberalization initiatives aimed at shifting the focus from an import-substitution industrial strategy toward a model that supports export-led industrialization, ultimately promoting greater trade openness (Kamau, 2021).

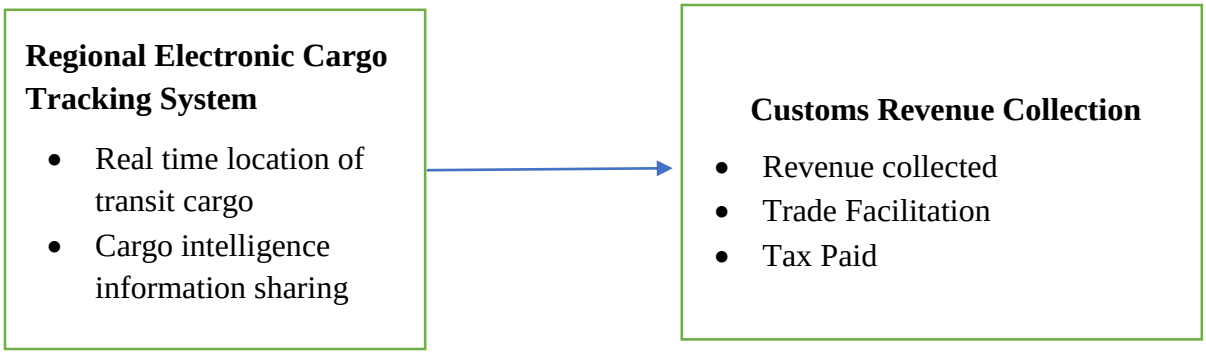
A critical foundation for any effective customs administration is the establishment of a reliable, automated IT infrastructure capable of speeding up cargo clearance and facilitating the electronic transfer of information within the trade network. Various consultancy reports by the International Monetary Fund's fiscal advisory division have repeatedly identified the lack of such a system as a significant obstacle to trade efficiency. In response, the Kenya Revenue Authority's 2008 report highlighted the Simba 2005 system as a core component of customs modernization efforts in Kenya. This web-based platform has enabled automation for approximately 90% of customs operations, significantly reducing the need for taxpayers to make physical visits to KRA offices. Over recent years, this system has contributed to substantial gains, with customs revenue increasing from KShs. 96 billion in the 2003/04 fiscal year to KShs. 331 billion by the 2013/14 fiscal year.

The implementation of the New Computerized Transit System (NCTS) marks a significant advancement in customs procedures, representing a collaborative endeavor among customs officers, international freight forwarders, and business owners to establish conditions for a smoother, faster, and more effective flow of goods. The NCTS offers numerous advantages for customs officials and business stakeholders, notably benefitting forwarders, certified importers and exporters, transport companies, and various other participants in the transport and trade ecosystem (Babić, 2022).

According to Djankov (2010), even a single day's delay in getting goods to their destination can result in a 1 percent reduction in the total trade volume of an affected country, effectively adding an equivalent of 70 kilometers to transport distances. Delays impacting time-sensitive goods have an even greater effect, with trade volume decreasing by as much as 6 percent. While larger firms often have the capacity to absorb the expenses associated with time delays and continue trading, these additional costs may prevent smaller firms from entering or participating in cross-border transactions. To avoid these delays, firms may attempt to optimize their supply chains, reduce the volume of goods traded, or change the nature of products they export or import. Consequently, recognizing that trade can be a significant driver of economic growth, many countries have prioritized streamlining inefficient customs practices by adopting advanced technology solutions to eliminate bottlenecks.

2.3 Conceptual Framework

According to Mugenda (2008), a conceptual framework is a concise description of the phenomenon under the study, accompanied by a graphical description of the major variables of the study. The independent variable of the study was (independent variables), including the regional electronic cargo tracking system and dependent variable was Customs Revenue Collection As indicated in figure 1.



Independent Variable **Dependent Variable**

Figure 1 Conceptual Framework

Source: Researcher (2025)

3.0 Research Methodology

A research design is essentially a structured plan developed to gather and utilize data in a way that facilitates the efficient extraction of the necessary information (Siedlecki, 2020). According to Khan (2018), a research design is akin to a blueprint, outlining the methods and techniques used by the researcher to investigate the relationship between dependent and independent variables. For this particular study, a descriptive research design was employed to systematically examine the nature, patterns, and extent of the relationship between the Regional Electronic Cargo Tracking System (RECTS) and customs revenue collection at the Namanga border. The design enabled the study to describe how specific components of RECTS cargo visibility, tamper detection, response time, and system integration are associated with variations in customs revenue performance. In this study, the target population consisted of 234 customs officers from the Kenya Revenue Authority (KRA) stationed at the Namanga border and a sample size of 148 respondents. The study distributed 148 questionnaires to the target firms, with 120 respondents completing and returning them, yielding a response rate of 81%.

Procedurally, data was collected using multiple sources, including customs officers' responses, secondary revenue records from the Kenya Revenue Authority (KRA), and system-generated reports from the Regional Electronic Cargo Tracking System (RECTS). This triangulation reduces reliance on a single source, mitigating respondent bias and social desirability effects (Podsakoff et al., 2012). Additionally, the survey instrument was designed to assure anonymity, use neutral wording, and separate measurement of independent and dependent variables, further reducing the potential for biased responses.

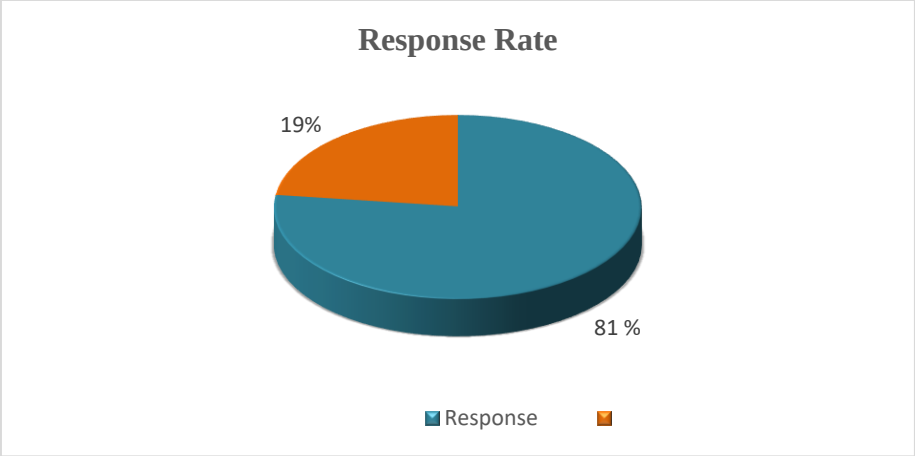


Figure 2: Response Rate

(Source: Research Data 2025)

Reliability Test

Typically, reliability coefficients of 0.70 or higher are considered adequate (deVaus, 2012) Nunnally (1978) suggested that a Cronbach's alpha value of 0.7 or higher indicates that the research instrument is reliable. Typically, a value above 0.7 is considered acceptable. Cronbach's alpha was calculated based on the correlations between individual items in a scale. The findings of the test are found in table 2. Table 2 shows the test for reliability for items of the questionnaires for each variable constrict. For customs revenue collection the α =0.981 and for Regional Electronic Cargo Tracking System α=0.974. The alpha values are high and >0.7 signifying high levels of reliability in the responses.

Table 1: Test of Reliability of Questionnaire

Factor	Number of Items	Cronbach Alpha score	Conclusion
Customs revenue collection	5	0.981	Reliable
Regional Electronic Cargo Tracking System	5	0.974	Reliable

Source: Researcher, (2025)

3.1 Data Analysis, Presentation, Interpretation and Discussion

Yin (2009) defines data analysis as the process of editing and reducing accumulated data into a manageable form, summarizing it, identifying patterns, and applying statistical techniques. The collected data was edited, cleaned, and coded for completeness. After cleaning, the data was analyzed using both descriptive and inferential statistics. Descriptive statistics, such as the mean and standard deviation, were used to summarize the data, while inferential statistics, including correlation analysis and multiple regression analysis, were applied to test the hypotheses. In relation to establishing the relationship between the dependent and independent variables the study used multiple regression analysis:

$Y= \beta_0 + \beta_1 X_1 + \varepsilon$

Where;

Y= Customs revenue collection

β_0=Constant

β_1, =Coefficient

X1= Regional Electronic Cargo Tracking System

e =Error term

4.0 Diagnostic Tests

The regression assumptions include assumptions for normality, multicollinearity and homoscedasticity

4.1 Normality Test

According to Razali & Wah (2011), the best and powerful test to use when doing normality test is the Shapiro-Wilk tests. Where p-values are above 0.05, this means that the residuals of the variables are normally distributed. Regional electronic cargo tracking system had a p-value of 0.210>0.05 and customs revenue collection had a p-value of 0.136>0.05. This indicated that the assumption of normality was not violated.

Table 2: Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
Regional electronic cargo tracking system	.838	120	.210
Customs revenue collection	.801	120	.136

(Source: Research 2025)

4.1.1 Multicollinearity Test

According to Osborne & Waters (2014), multicollinearity makes significant variables non-significant by enlarging their standard errors. A VIF value of ≥10 shows there is multicollinearity. The results shows that Regional electronic cargo tracking system had a VIF 1.698<10 and customs revenue collection had VIF of 1.015<10 respectively. The results indicated that the independent variables were not highly intercorrelated.

Table 3: Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	Regional electronic cargo tracking system	.589	1.698
	Customs revenue collection	.985	1.015

a. Dependent Variable: Customs revenue collection

(Source: Research 2025)

4.1.2 Homoscedasticity Test

Table 4. shows that the prob>chi2 = 0.9350>0.05 indicating that the distribution of residuals was homoscedastic. The results indicated that the assumption of homoscedasticity was not violated.

Table 4: Breusch-Pagan / Cook-Weisberg Test for Heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of Customs revenue collection	
chi2(1)	= 0.01
Prob > chi2	= 0.9350

(Source: Research 2025)

4.2 Descriptive statistics Regional Electronic Cargo Tracking System

Table 5: illustrates the level of regional electronic cargo tracking system on customs revenue collection. The statement on RECTS has reduced cases of loss of cargo by putting tracking measures during cargo transport had a mean score of 4.06 (SD = 0.811). In addition, RECTS has facilitated the tracking of Transit vehicles and Cargo the mean score was 4.03 (SD = 0.867). Further, RECTS has helped in the Transit tamper detection was 4.01 (SD = 0.832). RECTS has reduced labor time incurred previously during tracking of transit goods was 4.00 (SD = 0.804). Lastly, tracking of cargo in transit using the RECTS system ensures Rapid Response Unit immediate and fast response to alerts within their jurisdiction was 3.92 (SD = 0.810).

Table 5: Regional Electronic Cargo Tracking System

Items	Mean	Std. Deviation
RECTS has reduced cases of loss of cargo by putting tracking measures during cargo transport.	4.06	.811
RECTS has facilitated the tracking of Transit vehicles and Cargo	4.03	.867
RECTS has helped in the Transit tamper detection	4.01	.832
RECTS has reduced labor time incurred previously during tracking of transit goods.	4.00	.804
Tracking of cargo in transit using the RECTS system ensures Rapid Response Unit immediate and fast response to alerts within their jurisdiction	3.92	.805

(Source: Research 2025)

4.2.1 Descriptive statistics for Customs Revenue Collection

Table 6: illustrates the level of Customs Revenue collection. The statement on System automation has enhanced tax revenue collection, this item had a mean score of 3.95 (SD = 0.798). For Customs Revenue collection in terms of volume has increased tremendously, the mean score for this item was 4.28 (SD = 0.841). Further, For All taxpayers have reported satisfaction with the revenue system Respondents rated this item with a mean score of 3.99 (SD = 0.809). In addition, for KRA has offered an enabling environment for tax filing, this statement received a mean score of 4.20 (SD = 0.813). Time taken to declare goods to Customs has reduced significantly. The mean score of 4.02 (SD = 0.808).

Table 6: Customs Revenue Collection

Items	Mean	Std. Deviation
System automation has enhanced tax revenue collection	3.95	.798
Customs Revenue collection in terms of volume has increased tremendously	4.28	.841
All taxpayers have reported satisfaction with the revenue system	3.99	.809
KRA has offered an enabling environment for tax filing	4.20	.813
Time taken to declare goods to Customs has reduced significantly	4.02	.808

(Source: Research 2025)

4.2.2 Correlation Analysis

Correlation analysis assesses the strength and direction of the relationship between variables. Pearson correlation analysis was conducted to examine the relationship between the study variables. It is important to note that a Pearson coefficient of less than 0.3 indicates a weak relationship, while a coefficient of 0.5 suggests a strong correlation between the variables being tested (Cooper & Schindler, 2014). Regional Electronic Cargo Tracking System had a significant association and strong correlation with customs revenue collection at r=0.640 and p=0.002<0.05..

Table 7 Correlations Statistics

	Customs revenue collection	**Regional Electronic Cargo Tracking System**
Customs revenue collection	1	0.640**
Regional Electronic Cargo Tracking System	0.640**	1
Sig.	0.002	

**. Correlation is significant at the 0.05 level (2-tailed).
Source: Author (2025)

4.2.3 Model Summary

The results presented in Table 5indicate that the Regional Electronic Cargo Tracking System is significantly correlated with customs revenue collection, with a correlation coefficient of 64% (R = 0.640). These variables explain 40.9% of the variation in customs revenue collection (R^2 = 0.409). This suggests that 59.1% of the changes in customs revenue collection are influenced by other factors not included in the study. Additionally, even after adjustments, the study accounts for 40.5% of the variation in customs revenue collection (Adjusted R^2 = 0.405).

Table 8: Model Summary

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.640[a]	0.409	.405	.38903

a. Dependent Variable: Customs revenue collection
b. Predictors: (Constant), Regional Electronic Cargo Tracking System
Source: Author (2025)

Table 9 showed that there was F statistic of 305.723 and p-value of 0.000<0.05, which indicates that the model was significant in explaining the variance caused on Customs revenue collection

Table 9: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.470	1	46.470	305.723	.000[b]
	Residual	18.128	119	.152		
	Total	64.598	120			

a. Dependent Variable: Customs revenue collection

b. Predictors: (Constant), Regional Electronic Cargo Tracking System

Source: Author (2025)

Table 10 showed unit change in Regional Electronic Cargo Tracking System causes a 0.227 increase in Customs revenue collection (β = 0.227, p = 0.002). Hence, the hypothesis was rejected.

Table 10: Regression Coefficient analysis

Variable	Standardized β	Std. Error	Unstandardized β	t-statistic	Prob.
constant	0.368	0.159		2.314	0.022
Regional Electronic Cargo Tracking System	0.227	0.044	233	5.159	0.002

Source: Author (2025)

4.2.4 Discussion of the Findings

The study reveals strong positive correlations between the Regional Electronic Cargo Tracking System and Customs Revenue Collection, with a beta coefficient (β) of 0.227 and a p-value of 0.002, which is below the commonly accepted significance threshold of 0.05. This indicates that the relationship between the adoption of the electronic cargo tracking system and improved customs revenue collection is statistically significant. The finding that the adoption of the Regional Electronic Cargo Tracking System (RECTS) has a statistically significant relationship with improved customs revenue collection at Namanga Border confirms the system's effectiveness in enhancing compliance and reducing revenue leakage. However, RECTS explains only a portion of the variation in revenue collection, indicating that other factors also influence outcomes. These findings are in line with the research conducted by Odago (2021), who explored the influence of Electronic Cargo Tracking System adoption on excise revenue collection at Jomo Kenyatta International Airport in Kenya. The study found that the implementation of the Electronic Cargo Tracking System (ECTS) had a notable positive impact on excise revenue collection, underscoring the potential for such technologies to enhance revenue generation in customs operations.

5.0 Conclusions

The study established that Regional Electronic Cargo Tracking System has a positive effect on customs revenue collection at the at Namanga border in Kenya. The study findings found out that RECTS has reduced cases of loss of cargo by putting tracking measures during cargo transport

5.1. Recommendations

Based on the results, findings, and conclusions, the study formulated several key recommendations. The findings revealed a statistically significant relationship between the Regional Electronic Cargo Tracking System in enhancing customs revenue collection at the Namanga border in Kenya. In light of these findings, the study recommends that the Kenya Revenue Authority (KRA) should develop and implement comprehensive policies that regulate Regional Electronic Cargo Tracking System and customs revenue collection more broadly. These policies should aim to enhance the efficiency and effectiveness of the systems involved in the customs process, ensuring greater compliance and revenue generation. The study recommends that KRA enhance customs revenue collection by improving RECTS use through staff training, system integration, inter-agency coordination, clear enforcement, and regular performance evaluations, ensuring greater efficiency, compliance, and revenue at the Namanga border. This study acknowledges several limitations. The descriptive research design limits the ability to establish causal relationships fully, and the reliance on cross-sectional data may not capture variations in customs revenue collection over time. For future research, comparative studies across multiple border points, longitudinal designs tracking RECTS performance over time, and cost–benefit analyses evaluating the economic impact of the system are recommended to provide deeper insights into the effectiveness and efficiency of electronic cargo tracking in enhancing revenue collection.

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