

**MODERATING EFFECT OF TECHNOLOGY STAFF COMPETENCE ON
THE RELATIONSHIP BETWEEN SCANNING TECHNOLOGICAL
ATTRIBUTES AND CUSTOM REVENUE PERFORMANCE: A CASE
STUDY OF JOMO KENYATTA INTERNATIONAL AIRPORT**

BY

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DECLARATION

Declaration by the Candidate

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DEDICATION

I dedicate my research to my family and friends, who have helped me. You have put up with my extended absence. You and I had to remain apart while I was studying.

ACKNOWLEDGEMENT

I want to thank my family, friends, and coworkers whose encouragement has allowed me to progress this far in my academic career. I would also like to thank the Moi University professors and fellow students; whose abundance of information I have so far benefited from. A particular thanks goes out to my supervisors, Dr. Joel Tuwey and Dr. Robert Odunga who have worked tirelessly to help me.

ABSTRACT

Customs plays a crucial role in the enforcement of indirect tax regimes at the border. However, statistics has shown that customs revenue performance has been declining in the recent past. Numerous variables have conspired to arrange this, including the absence of scanners, which might facilitate evasion. Although there have been attempts to understand this situation, not much has been done on whether scanning technological attributes factors improves customs revenue performance; and not much has been done on technological staff competence as a potential moderator. The study therefore examined the moderating effect of technology staff competence on the relationship between scanning technological attributes and custom revenue performance at Jomo Kenyatta International Airport. The specific objectives were to determine the effect of baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning and scanning technology integration on custom revenue performance. The study also tested the moderating effect of technology staff competence on the relationship between scanning technological attributes and custom revenue performance. The study was anchored on the Technological Determinism Theory, Human capital theory and Task Technology Fit theory. The study made use of an explanatory research design. The target population for this study was the customs officers working at the KRA customs department at Jomo Kenyatta International Airport who totaled 538. Simple random sampling was used in the study to choose the customs officials. The sample size of 229 was determined using the Yamane (1973) formula. A semi-structured questionnaire was used as the study's data gathering tool. The data was analyzed using both inferential and descriptive statistics, including regression and correlation, as well as mean and percentage calculations. Utilizing hierarchical regression analysis, the moderating impact of technological competency was examined. Conclusions and suggestions were developed based on the study's findings. The correlation analysis revealed a positive and significant correlation between independent variables and dependent variable. The study found that Baggage scanning accuracy has a positive and significant effect on custom revenue performance $\beta=0.138$ p-value =0.010, cargo scanning efficiency has a positive and significant effect on custom revenue performance $\beta=0.041$ p-value =0.048, customs declaration scanning has a positive and significant effect on custom revenue performance $\beta=0.111$ p-value =0.010, scanning technology integration has a positive and significant effect on custom revenue performance $\beta=0.033$ p-value =0.022. The study also found that technology staff competence moderates the relationship between baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning, scanning technology integration and custom revenue performance $\beta=0.057$ p-value =0.000, $\beta=0.010$ p-value =0.003, $\beta=0.135$ p-value =0.002, $\beta=0.031$ p-value =0.013). Recommendations were made that the management of JKIA should ensure that the baggage scanning technology maintains accuracy, cargo scanning technology is efficient and that the customs declaration scanning runs efficiently and effectively. The study also suggested that the management should ensure the problems are attended to with urgency and that all staff dealing with scanning technology should be properly trained. The policy makers were also advised to make policies that will guide the management of JKIA customs department to effectively and efficiently use scanning technology in the scanning process.

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OPERATIONAL DEFINITIONS OF TERMS

Baggage scanning accuracy refers to the degree to which scanning technologies effectively detect prohibited or dangerous items within luggage and cargo passing through airport security checkpoints. (Belobaba, P. S., Odoni, A. R., & Barnhart, C. (2009)

Cargo scanning efficiency refers to the effectiveness and speed at which scanning technologies inspect cargo shipments for security and customs purposes at airports. (Odoni, A. R., & Russo, F. 2010).

Custom revenue performance refers to ability of customs authority to collect revenue in accordance with the Customs laws (Muathe, 2021).

Customs declaration scanning refers to the process of electronically capturing and verifying information provided by travelers or shippers regarding the goods they are bringing into or exporting out of a country. (O'Connell, J. F., & Williams, G. 2011).

Scanning technological attributes: refers to various aspects of technology used for scanning purposes of airport operations such as security checks and customs inspections. (Amedeo Odoni, 2022)

Scanning technology integration refers to the use of electronic devices, such as barcode scanners, RFID (Radio Frequency Identification) scanners, or other similar tools, to capture and process information from physical objects or documents. (David Simchi-Levi, et al, 2019).

Technology staff Competence refers to ability of a firm to organize other resources using their own existing technology resources (Ainin, Kamarulzaman & Farinda, 2010).

ABBREVIATIONS AND ACRONYMS

AEO	:	Authorized Economic Operators
ANSC	:	Air Navigation Service Charge
APSC	:	Air passenger service charge
ATD	:	Advanced Technology Demonstration
ATS	:	Automated Targeting System
CAARS	:	Cargo Advanced Automated Radiographic System
CBP	:	Customs and Border Protection
CFA	:	Confirmatory factor analysis
CITES	:	Convention on International Trade in Endangered Species
DHS	:	Department of Homeland Security
DNDO	:	Domestic Nuclear Detection Office
EAC	:	East African Community
ERPs	:	Exploratory Research Programs
EU	:	European Union
IT	:	Information Technology
JKIA	:	Jomo Kenyatta International Airport
KRA	:	Kenya Revenue Authority
NACOSTI	:	National Commission for Science, Technology and Innovation
NRIP	:	Nuclear and Radiological Imaging Platform
RFID	:	Radio Frequency Identification
RPMs	:	Radiation Portal Monitors
SCT	:	Single Customs Territory
SPSS	:	Statistical Packages for Social Sciences
SSA	:	Sub Saharan Africa

TD : Technological Determinism

TTF : Task-technology fit

U.S. : United States

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter provides background information in relation to Scanning technological attributes and custom revenue performance. This is done from the global perspective to the regional and local perspective. The chapter also provides the problem statements for the study and then the general and specific objectives. The chapter also lists the hypothesis of the study and also discusses the significance of the study. Finally, the scope of the study is provided.

1.1 Background to the Study

The modern era of globalization has expanded international trade and the degree of freedom with which we may do it because to advancements in information technology and transportation (McDonald, 2018). The massive volume of freight traffic necessitates adequate inspection processes, and the ongoing threat of terrorism and smuggling demands that these procedures be implemented effectively. There are a growing number of new issues due to the rapid growth in international trade, as demonstrated by cargo volumes, travelers, and conveyances. They include illicit financial flows (money laundering), trade in drugs that endanger public health and safety, unlawful commerce in natural resources, terrorism as a security hazard, and sea piracy (Hulme, 2021).

To manage the rising quantities of international trade and travel while boosting supply chain security, customs administrations and other participants in the global supply chain must constantly develop and improve their capacity. In order to protect public safety and security, this endeavor necessitates striking a balance between the enforcement of customs regulations and the facilitation of trade and travel (Kshetri, 2018). Therefore,

cargo inspection is crucial to preserving supply chain security, protecting society from organized transnational crimes of terrorism, hazardous chemicals, and environmental crimes, and promoting legal trade, claims Kshetri (2018).

The functions that customs administrations serve are significant and differ amongst nations. Facilitating the movement of lawful commodities across administrative borders is one of their main responsibilities (Azcarraga, Matsudaira, Montagnat-Rentier, Nagy & Clark, 2022). Along with these responsibilities, they also implement a wide range of government policies, including protection against terrorist activity, enforcement of quantitative restrictions on imports or cargo of commodities, and revenue collection from export taxes and import tariffs (Montagnat-Rentier & Bremeersch, 2022).

Taderera and Al Balushi (2018) contend that the customs administrations must adopt more advanced techniques that use higher levels of security. Thus, scanners were introduced. It has been demonstrated that automated solutions can significantly improve corporate process efficiencies, which can lead to higher revenue collections (Olarinde, 2021). Around the world, scanners are used to check freight and luggage for forbidden and hidden objects. According to Mukuwa and Phiri (2019), since every activity is documented as a case, the scanning procedure also gets rid of fraud, theft, and bribery. Moreover, this scanning technology contributes to increased auditability. Customs can examine, reinvestigate, verify quality control, question evidence, and ascertain who was responsible for what.

According to Solla, Pérez-Gracia, and Fontul (2021), non-intrusive inspection, often known as cargo scanning, refers to non-destructive techniques for examining and identifying items in transportation networks. Compared to a physical inspection, it is faster, less expensive, and more efficient. The device reduces port traffic, has the ability

to detect specific nuclear materials, and has a deterrent impact. Policymakers and administrators must acknowledge and manage the inevitable conflict of interest between government agency expectations and the commercial community's desire for quick, predictable, and dependable clearance and release formalities that are harmonized across nations in order to develop and implement effective and efficient customs controls (Oduor & Mincu, 2018). Scanner technology aims to identify products in transportation networks through a non-destructive and non-intrusive form of inspection. They employ x-ray imaging to see the contents of a tanker or container. Trade policy, customs, and port infrastructure all have a direct impact on port-of-entry delays caused by clearance procedures (Khuzwayo, 2021).

Custom Revenue Performance refers to the effectiveness and efficiency with which a country's customs authority collects revenue from international trade-related taxes, duties, and levies. It measures the extent to which customs achieve their revenue collection goals while ensuring compliance with trade regulations, facilitating legitimate trade, and preventing revenue leakage. To improve custom revenue performance, several countries have adopted reforms, such as streamlining processes, using risk-based assessments, and leveraging digital technologies like ASYCUDA, which "enhances customs performance by automating procedures and increasing transparency, thus reducing opportunities for fraud" (World Customs Organization, 2023)

Competencies are the set of abilities, knowledge, attitudes, values, motivations, and beliefs people need to have in order to succeed in their line of work. Principe (1997) defined technological staff competency as the capacity to create and design new products as well as the emotional process of operating facilities, including the capacity for learning. Many people have theorized that technological competence has a major

role in a firm's performance. Businesses that can effectively use tools and technology data are considered technologically competent (Toma, 2019). Businesses that are technologically competent can outpace their competitors in terms of growth, which boosts their market share and overall performance (Ainin, Kamarulzaman & Farinda, 2010).

Product portfolios inside a business can be enhanced by technological staff proficiency. This can be achieved in a number of ways, for as by adding new features to an innovative product that enables the user to carry out tasks that were previously impossible or very difficult. Technological proficiency also adds new features, such as the ability to modify an existing product to make it more functional while maintaining its core usefulness. Businesses are always looking for new ways to differentiate their products from those of their rivals. Even while these inventions may start off little, over time they might add up to represent a significant advancement in technology. Better dependability is an additional benefit. Product distinctiveness becomes significantly influenced by product dependability as technology advances to a more sophisticated level. Proficiency in technology also translates into lower expenses. As the product reaches a more developed stage, technological progress can focus more on reducing costs (Acur et al., 2020).

An organization's performance is defined as its degree of success (Bohórquez, Caiche, Benavides & Benavides, 2022). According to Nganda (2021), the fundamental components of Custom Revenue Performance can be described using a minimum of three dimensions. Researchers frequently employ the qualitative method of utilizing a Likert scale to measure performance. Researchers typically use a subjective technique to quantify success because most organizations are unwilling to share crucial data, such

financial data. Time, cost, simplification, and risk are the four high-level outcomes that can be used to gauge Custom Revenue Performance (Čevers & Gaile-Sarkane, 2019).

1.1.1 Global Perspective

It has been determined that cargo containers and rail cargo are likely means of bringing nuclear material into the United States (U.S.) illegally (Bendahan, 2018). Every day, 5,400 railcars cross US borders and about 32,000 cargo containers arrive in US ports. With the growth in commerce, these figures should increase (Bhattacharya, Miller, Wart, Brecher & Nagarkar, 2018). Congress enacted a law in 2007 mandating that cargo arrive in the United States by 2012 and be checked using image scanners. Due to the difficulty of procurement and operational logistics as well as, to some part, the lack of practical technology, only 4.1% of all containers passing border control were scanned, which led to the authorization of an extension through 2018. (Bendahan, 2018). The duty of protecting the United States against nuclear and radiological (also known as "RadNuc") dangers to the nation was placed on the Domestic Nuclear Detection Office (DNDO) of the Department of Homeland Security (DHS) by the National and Homeland Security Directives. Prior to its final implementation, DNDO has been searching for commercially available technology that can satisfy the needs for threat detection with the least amount of disturbance to commerce, regardless of the complexity of the cargo or level of shielding (Jovanovic & Erickson, 2018).

DNDO has provided support for a number of Advanced Technology Demonstration (ATD) programs pertaining to nuclear detection activities, including the Cargo Advanced Automated Radiographic System (CAARS), Shielded Nuclear Alarm Resolution (SNAR), and Nuclear and Radiological Imaging Platform (NRIP). DNDO has also funded further exploratory research projects (ERPs) for the advancement of enhanced rail freight scanners, portable systems, system components, general aviation,

and other areas (Bendahan, 2018). Currently, radioactive items and ordinary contraband are inspected by Customs and Border Protection (CBP). To determine a portion of cargo for imaging scanner examination, CBP uses a technique known as the Automated Targeting System (ATS) (Enders & McAmis, 2018). Radiation Portal Monitors (RPMs) currently examine every container entering American ports and border crossings; if an alarm is detected, the container is additionally subject to secondary screening. Given this, enhancements to radiological and general contraband detection are being pursued for imaging cargo scanners (Marques, Félix, Cruz, Coelho, Caetano, Vale & Vaz, 2023).

After an assessment revealed that several customs scenes in the nation lacked the necessary infrastructure requirements for the digitization program, Indian Customs began using Radio Frequency Identification (RFID) closing devices for the factory-bloated cargo in January 2018 (World Bank, 2018). In addition to recommending the use of e-sealed containers as a reform strategy to Authorized Economic Operators (AEOs), the agency worked to ensure that the RFID program was enforced nationwide by providing customs locations with scanner readers and other necessary equipment. The implementation of a technology-driven initiative made sure that the supply chain's cargo velocity increased (Hanningtone, 2022).

Germany launched a Custom Information System in 1991. Reducing trade barriers and increasing customs revenue collected, the method worked well (Mikalef, Lemmer, Schaefer, Ylinen, Fjørtoft, Torvatn & Niehaves, 2022). A nation like China has modernized and reformed its Custom Revenue Service, and since then, it has demonstrated efficacy and efficiency in a number of areas, including distribution and transportation, streamlining customs procedures, and guaranteeing compliance with regulations (Shujie & Shilu, 2019). Komarov (2018) investigated Ukrainian Customs'

automated risk assessment. The report claims that in order to facilitate automatic identification of high-risk transactions, the system classifies transactions into risk categories and generates risk profiles. "Light green" transactions (6.48%) are subject to "information message"; "yellow" transactions (15.60%) are subject to documentation checks; and the remaining "green" transactions (73.58%) are not subject to extra checks. High risk transactions, or "red," make up 4.34% of all transactions.

1.1.2 Regional Perspective

Effective transit times have been a major challenge in the African context. Due to their heavy reliance on tax revenue, many African nations frequently experience tension between the private sector and customs authorities (Saruchera, 2019). The commercial sector is directly impacted financially by the exceptionally high delays in the southern African region (Hoffman et al. 2018). Poor customs procedures are one of the main causes of delays in Africa, according to some studies (Hoffman et al. 2018; Hassan, 2020). Over half of the national revenue collected in several African nations comes from customs revenue. This indicates that both economic growth and trust in either are fueled by international trade (Chalendard, Raballand & Rakotoarisoa, 2019).

Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda are among the members of the East African Community (EAC) who established the Single Customs Territory (SCT) in 2013. By standardizing and streamlining internal regulatory processes and expediting border documents to guarantee the timely passage of commodities across borders, the project aims to facilitate commerce amongst EAC member nations (Kamau & Odongo, 2020). Furthermore, the goal of modernizing customs programs was to lower expenses and the quantity of paperwork needed for cross-border clearance (Sindiga, 2021). Since the project's inception, all EAC countries have achieved significant success; the average export time decreased from 28 days in 2013 to about

three days in 2019 (World Bank, 2020). Despite the uneven implementation of the SCT among the EAC countries, two significant concerns remain: the timely movement of goods across borders and the coordination between local and cross-border agencies. Comparing countries reveals that Tanzania clears export goods at the border in an average of four days, Rwanda in three and a half days, Burundi in two and a half days, and Kenya in sixteen hours (Kamau & Odongo, 2020).

The cost of border compliance and paperwork varies as well; Tanzania has the greatest border compliance cost, at US\$1,175, which is higher than the SSA average of US\$603, while Burundi has the lowest, at US\$109 (Kamau & Odongo, 2020). Trade facilitation initiatives under the SCT aim to reduce trade costs and times, harmonize and simplify trade procedures, and facilitate the movement of commodities across borders; however, this has not been the case in every EAC country. Due to their lack of experience with complex cross-border trade procedures, small exporters may be deterred by the high expense of exporting internationally. Furthermore, export competitiveness may be impacted by lengthy transaction times when it comes to the export of perishable and time-sensitive items (Demena & van Bergeijk, 2022).

1.1.3 Kenyan Perspective

Through the operationalization of X-ray cargo scanning solutions at the Mombasa seaport and airports, the Kenya Revenue Authority has been using contemporary equipment for cargo inspection for the past 15 years (Kitolo, 2022). The Safe Framework of Standards of the World Customs Organization, which stipulates that radiation detection and non-intrusive inspection tools should be accessible and utilized for conducting inspections in compliance with risk assessment, is compatible with the use of non-intrusive inspection tools. As per Danet (2019), this apparatus is necessary to promptly evaluate cargo that poses a risk and/or transit vehicles while ensuring that

the normal course of business is not disrupted. Therefore, the installation of three more scanners at the Port of Mombasa—donated by the People's Republic of China—marked a significant advancement in stopping revenue leaks and combating the unauthorized import and export of items that are prohibited or restricted. These scanners were introduced and placed into use, greatly increasing the KRA scanning assets under the national scanner solution framework and improving the port's capacity to scan up to 1,000 containers every day (Kimote, 2019).

The Port of Mombasa's X-ray cargo screening unit made several well-publicized interceptions in 2015–2016. Nine high-end cars from the United Kingdom that were traveling to Uganda in luggage under the guise of bicycles and toys were previously intercepted. Following an investigation into the syndicate, other automobiles with irregular registration were found, and the owners were apprehended. In other situations, there were over twenty-one containers of brand-new apparel and three containers of milk powder hidden as gypsum boards. Moreover, over the same time period, scanning also turned up unreported electronics, spare parts, ivory, and sandalwood under CITES (Kitolo, 2022).

The scanners have helped stop criminals from disposing of cheap, subpar, and harmful products in the local market at the expense of the public, in addition to preventing the interception of unlawful commodities (Njau, 2022). The Peoples' Republic of China donated an additional 10 baggage scanners to KRA to supplement the capacity of the current scanners. The purpose of the baggage scanners is to screen passengers' bags at airport terminals and improve customer convenience. Furthermore, KRA is now integrating smart gate technology at the points of entry in order to enhance the integrity of cargo release records and phase out manual operations. This technology will

automatically capture vehicle and container registration marks and numbers before cargo is released from ports and container freight stations (Kitolo, 2022).

In October 2020, Kenya's overall customs revenue increased by 7.3%, while trade and petroleum taxes saw increases of 4.7% and 12.3%, respectively. For the first four (4) months of 2020–2021, petroleum taxes have continuously showed positive revenue growth, while trade taxes have shown the same in September and October 2020. It is noteworthy that the largest monthly collection of Kshs 50,574 million in customs income occurred in November 2020. Furthermore, in November 2020, Kshs 1,492 million in non-oil revenue was collected every day, the greatest amount since the start of the Covid-19 pandemic. KRA collected KShs in 2021. 728.530 billion, or 103.6 percent, is the performance rate (Kenya Revenue Authority, 2022).

1.2 Statement of the Problem

At the border, customs is essential to the implementation of indirect tax regimes. Customs administrations are therefore responsible for ensuring that products entering the country pay all applicable duties and taxes upon clearance, and that goods that are declared for export actually leave the country free of indirect taxes and are not brought back to the domestic market (Montagnat-Rentier & Bremeersch, 2022). The customs administration is also tasked with the role of facilitation of legitimate goods across administrative boundaries (Azcarraga, Matsudaira, Montagnat-Rentier, Nagy & Clark, 2022). Jomo Kenyatta International Airport (JKIA) serves as a regional hub for trade facilitation and collection of taxes on behalf of KRA and the government of Kenya from air shipments Air passenger service charge (APSC) and the Air Navigation Service Charge (ANSC) (Cheruiyot, 2019). As such, the government set up a number of initiatives aimed at improving service delivery and consequently Custom Revenue Performance at the JKIA. Such initiatives include the provision of enforcement tools

such as baggage scanners at the international arrival terminals (Odago, Bonuke & Nekesa, 2021).

However, a report by the Departmental committee on finance and national planning (2020) revealed that the customs department at the JKIA has been facing a number of challenges one of them being the lack of scanners which provides loophole for tax evasion. This has led to poor Custom Revenue Performance. It was reported that the average kilograms pf cargo received at JKIA declined form a monthly average of 4,284,076 kgs in 2018 to 3,659,408 kgs in 2019 and 2,793,167 kgs in 2020. This led to a 25% decline in customs revenue collection which was a decline from a monthly average from ksh 2, 215, 609, 985 in 2019 to ksh 1,660, 106,826. It is therefore important to assess how scanning technological attributes affect custom revenue performance.

Notwithstanding the foregoing, very little research has been done to evaluate the impact of scanning technological qualities on custom revenue performance, with the majority of studies concentrating on alternative automation systems. Hanningtone (2022), for instance, studied how Kenya's income performance was affected by the automation of customs processes. The impact of system automation on Custom Revenue Performance at the Kenyan port of Mombasa was the main topic of Nganda's (2021) study. Omosa, Ogaga, and Cheboi (2020) carried out a second study to examine the impact of system automation on Kenya's customs revenue performance. This study hence addresses this gap by investigating the moderating effect of technology staff competence on the relationship between scanning technological attributes and custom revenue performance at Jomo Kenyatta International Airport.

1.3 Research Objectives

1.3.1 Main Objective

The main objective of the study was to establish the moderating effect of technology staff competence on the link between scanning technological attributes and custom revenue performance at Jomo Kenyatta International Airport.

1.3.2 Specific Objectives

The specific objectives were

- i. To determine the effect of baggage scanning accuracy on custom revenue performance at the Jomo Kenyatta International Airport.
 - ii. To examine the effect of cargo scanning efficiency on custom revenue performance at the Jomo Kenyatta International Airport.
 - iii. To investigate the effect of customs declaration scanning on custom revenue performance at the Jomo Kenyatta International Airport.
 - iv. To assess the effect of scanning technology integration on custom revenue performance at the Jomo Kenyatta International Airport.
 - v. To test the moderating effect of technology staff competence on the link between scanning technological attributes and custom revenue performance at the Jomo Kenyatta International Airport.
- 5a. To determine the moderating effect of technology staff competence on the link between baggage scanning accuracy and custom revenue performance at the Jomo Kenyatta International Airport.
 - 5b. To determine the moderating effect of technology staff competence on the link between cargo scanning efficiency and custom revenue performance at the Jomo Kenyatta International Airport.

5c. To determine the moderating effect of technology staff competence on the link between customs declaration scanning and custom revenue performance at the Jomo Kenyatta International Airport.

5d. To determine the moderating effect of technology staff competence on the link between scanning technology integration and custom revenue performance at the Jomo Kenyatta International Airport.

1.4 Research Hypotheses

The study sought to evaluate the following hypotheses:

- i. **HO₁:** Baggage scanning accuracy has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport.
- ii. **HO₂:** Cargo scanning efficiency has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport.
- iii. **HO₃:** Customs declaration scanning has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport.
- iv. **HO₄:** Scanning technology integration has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport.
- v. **HO_{5a}:** Technology staff competence does not moderate the relationship between baggage scanning accuracy and custom revenue performance at the Jomo Kenyatta International Airport.
- vi. **HO_{5b}:** Technology staff competence does not moderate the relationship between cargo scanning efficiency and custom revenue performance at the Jomo Kenyatta International Airport.

- vii. **HO_{5c}**: Technology staff competence does not moderate the relationship between customs declaration scanning and custom revenue performance at the Jomo Kenyatta International Airport.
- viii. **HO_{5d}**: Technology staff competence does not moderate the relationship between scanning technology integration and custom revenue performance at the Jomo Kenyatta International Airport.

1.5 Significance of the Study

The Kenya Revenue Authority would benefit from the study since the study highlights how scanning technological attributes affects Custom Revenue Performance. The management of KRA would therefore be able to come up with strategies to enhance Custom Revenue Performance through the scanning technological attributes as per the study findings. The management would also be in a position to align their customs department operations in line with the study findings and in terms of the use of scanning technological attributes. They would also be able to come up with proper budgeting that would cater for the scanning technological attributes especially at the JKIA as need be.

Technology providers offering scanning technology solutions for airports could find value in this research by: Gaining insights into the factors that influence the effectiveness of their technology solutions in real-world customs environments. Identifying opportunities to enhance the usability and user-friendliness of their technology products to support customs officers with varying levels of Technology Staff Competence. Collaborating with customs agencies and airport authorities to tailor training and support services for the successful implementation and utilization of their scanning technological attributes solutions.

Airport management and authorities at Jomo Kenyatta International Airport can benefit from this research by gaining insights into how the level of technology staff competence among customs officers affects the relationship between scanning technological attributes and custom revenue performance. Identifying areas for improving training and professional development programs to enhance technology staff competence among customs personnel. Informing decisions regarding the procurement and deployment of scanning technological attributes based on its potential impact on revenue performance and the moderating effect of Technology Staff Competence.

Policy makers would also find this study to be useful. This is because they will be in a position to understand the effect of scanning technological attributes on Custom Revenue Performance. The policy makers will therefore have proper guidance when formulating policies regarding the adoption and use of the scanning technological attributes. They will also be able to come up with policies in regard to scanning technological attributes aimed at improving customs departments in Kenya and more specifically at the JKIA.

The study would also benefit the researchers and scholars. This is because the study forms a theoretical basis from which the future researchers and scholars can refer for their studies. The study will also make recommendations for further studies which may guide the future researchers on the topics to cover in order to further the analysis.

1.6 Scope of the Study

The study covered the concepts of Technology Staff Competence, scanning technological attributes and custom revenue performance. The variables for scanning technological attributes were baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning, and scanning technology integration and the moderating

variable was Technology Staff Competence. The study was conducted at the JKIA customs department with a target population of 538. The period for the study was September 2023 to October 2024. The study made use of an explanatory research design and collected data through the management of the customs department at JKIA by use of a questionnaire.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Review of the literature pertaining to the research concepts is the focus of this chapter. The study ideas are covered at the beginning of the chapter, followed by a review of the relevant theories. The conceptual framework that illustrates the anticipated relationship between the study variables is also provided in this chapter. The chapter concludes with a summary of the literature and a critique of the literature review.

2.1 Concept of the Study

The following section discussed the study variable concepts

2.1.1 Concept of Customs Revenue Performance

The concept of custom revenue performance relates to a customs administration's efficiency and effectiveness in collecting revenue on imported goods, aligning with legal, economic, and social goals. Key aspects include optimizing tax collection processes, ensuring compliance, minimizing fraud and evasion, and balancing trade facilitation. Custom revenue performance often uses indicators such as tax yield, compliance rate, processing speed, and effectiveness in fraud detection World Customs Organization (WCO), (2021).

An organization's performance is defined as its degree of success (Bohórquez, Caiche, Benavides & Benavides, 2022). According to Nganda (2021), the fundamental components of Custom Revenue Performance can be described using a minimum of three dimensions. Researchers frequently employ the qualitative method of utilizing a Likert scale to measure performance. Researchers typically use a subjective technique to quantify success because most organizations are unwilling to share crucial data, such

financial data. Time, cost, simplification, and risk are the four high-level outcomes that can be used to gauge Custom Revenue Performance (Čevers & Gaile-Sarkane, 2019).

Useful indicators of customs performance include the costs associated with processing trade and customs documents, the time it takes for documents to be approved, the number of employees needed for processing and managing documentation and customs services, the time it takes for cargo to be cleared, and the quantity of stock that businesses carry (Matsumoto & Lee, 2007). Since transparency is important to both the government and enterprises as a measure of Custom Revenue Performance, it is seen as a high-level performance result (Holloway, 2010). Reductions in clearing times and expenses are indicators of custom revenue performance (Wei, 2013).

2.1.2 Concept of Baggage Scanning Accuracy

The concept of Baggage Scanning Accuracy pertains to the precision and reliability of imaging and detection technologies used in security settings—such as airports and customs—to identify prohibited or dangerous items within baggage. High scanning accuracy is essential to balance security with efficiency, reducing false positives that cause unnecessary delays and false negatives that could allow threats to pass undetected. This accuracy is influenced by factors such as the quality of X-ray or CT technology, operator training, and the integration of artificial intelligence for automated threat detection Gordon, (2020)

The transportation of products subject to customs authorizations is known as customs baggage. It is usually accompanied by other customs procedures, such as exit procedures for exporting or baggage exits from the country, or local business transfer processes in local markets. Most of the time, customs baggage processes should be simple to avoid needless delays and expenses (Papa, 2013). Less information is

typically needed for luggage customs declarations than for import trading, and few other government agencies are engaged in the process when there are no dangers of contamination because they are not as concerned with technical standards like health and veterinary on baggage. Therefore, customs and other government authorities do not need to check baggage cargo as frequently as they would in the case of import trade. During the luggage transit operation, the owner or, in most situations, his representative (forwarder, agent, or carrier) is accountable for adhering to all legal obligations (Uzzaman & Yusuf, 2011).

2.1.3 Concept of cargo scanning efficiency

The concept of Cargo Scanning Efficiency refers to the ability of customs and security agencies to screen high volumes of cargo quickly and accurately to detect contraband, illegal goods, or other security risks. Efficient cargo scanning involves using advanced imaging technologies (such as X-ray, gamma-ray, or neutron imaging) combined with data analytics or AI to streamline the scanning process, reducing bottlenecks without compromising security. Key metrics include scanning speed, detection accuracy, throughput capacity, and the rate of false positives or negatives Smith, (2021).

The quantity of cargo cleared or scanned from import, as well as the efficiency of baggage and cargo scanning, are metrics used to evaluate the effectiveness of scanner technology, a non-intrusive method of cargo verification employed at ports of entry (Peterson, 2017). The process of "baggage" enables goods to be moved from the Customs exit department to the Customs office at the final destination. Allink and Kommer (2010) distinguish between two categories of baggage. The first is the international trip (baggage) from an arrival desk to a departure desk. The movements take place if they are a part of a specific transportation service that, under national or international transportation schemes, crosses multiple states. The other is national

luggage, which travels from a domestic department to an internal customs department within the same nation, and internal baggage, which travels from one internal department to another within the same nation (Barrett, 2004).

2.1.4 Concept of Customs Declaration Scanning

The concept of Customs Declaration Scanning refers to the process by which customs authorities review and analyze documents submitted by importers and exporters to declare the nature, quantity, and value of goods entering or exiting a country. This scanning process aims to ensure compliance with customs regulations, detect misreported goods, and assess applicable duties and taxes. Using automation, digital scanning, and risk assessment algorithms can help customs departments streamline this process, improving accuracy and reducing manual oversight World Customs Organization (WCO), (2019)

Scanning is integrated into the overall customs workflow, facilitating the electronic submission and processing of customs declarations. This streamlines administrative procedures, reduces paperwork, and accelerates the clearance process for legitimate shipments. Advanced scanning technologies, such as X-ray scanners, gamma-ray scanners, or explosive trace detection (ETD) systems, are deployed for non-intrusive inspection of cargo and containers. These technologies enable customs authorities to detect hidden contraband, narcotics, weapons, or other security threats.

Effective utilization of scanning technological attributes in customs declaration scanning contributes to the facilitation of international trade by reducing delays, minimizing administrative burdens, and promoting compliance with customs regulations. This fosters a conducive environment for legitimate traders and enhances supply chain efficiency.

Scanning technological attributes, such as barcode scanners or optical character recognition (OCR) systems, is used to capture information from customs declaration forms, including details such as the description of goods, quantity, value, country of origin, and declaration of any restricted or prohibited items. The scanned data is automatically processed by customs management systems, which may include customs clearance software or integrated customs declaration platforms. These systems interpret the scanned information, perform risk assessments, and generate alerts for further inspection if necessary. Scanning technological attributes allows customs authorities to verify the accuracy and authenticity of the declared information against internal databases, international trade agreements, and regulatory requirements. This helps prevent customs fraud, smuggling, and the illegal transportation of goods.

Nwankwo and Olayinka (2019) state that effective cargo scanning aids customs officials in guaranteeing efficient cargo control both ashore and at sea. Additionally, it aids customs authorities in maximizing revenue collection, preventing fraud and smuggling, and facilitating the release of goods. Cargo scanning is a crucial part of the non-intrusive inspection of export and security regulations. When combined with effective profiling strategies, non-intrusive scanners can greatly improve Customs and Security operations by examining cargo flows at land and maritime crossings (Papa, 2013).

Before leaving a port, every cargo that arrives goes through radiation portal monitors to check for radiation (Bakshi, Flynn & Gans, 2011). Before they reach the portal monitors at the port's exit, however, containers that are deemed high risk (or designated for random checks) go through extra radiation monitoring and nonintrusive imaging. The containers return to the normal flow if those extra steps reveal no issues. However,

the containers are subjected to additional radiation inspections and physical searches if the extra processes cause more worries (Min, Lim & Park, 2013).

2.1.5 Concept of Scanning Technology Integration

The concept of Scanning Technology Integration involves the coordination and unification of various scanning systems (such as X-ray, gamma-ray, and neutron detection) with other customs and security technologies, including data analytics, artificial intelligence, and electronic data interchange (EDI). This integration allows for a more comprehensive and seamless approach to screening goods and identifying security threats across different checkpoints and transport nodes. Key benefits include faster processing, enhanced accuracy, and improved resource allocation. Integrated scanning systems are vital for customs and border security, allowing agencies to share data, track suspicious patterns, and make data-driven decisions, *International Customs Journal*, (2022)

With assistance from EU member states and the business community, the European Commission conducted an initial impact assessment of 100% scanning in April 2008. This was forwarded to US Customs Border Protection (CBP) and was part of the Department of Homeland Security's June 2008 report to the US Congress. The study made the case that implementing 100% scanning at export in European ports would be extremely expensive, unlikely to increase global security, take resources away from EU security interests, and disrupt international and intra-EU trade and transportation. Alternatively, investments in improving multilayered risk management systems for identifying and examining hazardous cargo, as well as bolstering international collaboration to expedite this procedure, have to be prioritized (European Commission, 2010).

Big businesses are relying more and more on cloud-based IT services and apps with high availability. Server clusters can be implemented by IT departments in order to increase availability and decrease unplanned downtime. A cluster of connected computers that enhances system performance, load balancing, and service availability is called a server cluster. When a server fails, its burden and functions can be assumed by other servers in the cluster. For companies of all sizes, IT downtime can also mean a decrease in productivity and negative customer experience, both of which impact the bottom line (Avram, 2014).

The main tool used by Customs and Border Protection (CBP) to find nuclear and radioactive materials is radiation portal monitoring (Kouzes, 2009). Before leaving the port, each container must go past a sizable radiation detector. This stage takes place when the container departs the terminal via railroad or vehicle. The detector shows the radiation level and approximate location (front to back and top to bottom) of the source inside the container as it moves through the portal. The CBP officer determines whether the container has to be examined more closely if the radiation level is high by comparing the signal with the manifest, which is stored in ATS. Certain naturally radioactive items, such as cat litter or ceramics from specific nations, will set off the detector. According to Marques et al. (2023), CBP teaches its agents to differentiate between typical and possibly dangerous signal and manifest combinations.

Nonintrusive imaging is used on containers that ATS indicates as having a risk beyond a predetermined threshold. This allows CBP agents to view inside a container without having to go through the labor- and time-intensive process of unpacking it. X-rays or gamma rays are used by nonintrusive imaging devices to breach the container and produce an image of the contents. CBP agents are taught to recognize suspicious cargo and inconsistencies between the manifest in the ATS and what they observe inside the

container. For instance, in the same way that an X-ray may identify the site of shrapnel in a wound, the devices can identify shielding or dense nuclear materials (Medalia, 2010).

Downtime can be one of the metrics used to measure system availability in IT environments. Availability is frequently evaluated in comparison to a never-fails or 100% operational benchmark. Ninety-nine percent is a typical availability benchmark, or "five nines" availability. According to Heath, Martin, and Nguyen (2002), a system with two 9s would guarantee 99% availability for a year, with 1% downtime, or 3.65 days of unavailability, allowed. Monthly availability or downtime percentages are frequently used in service level agreements (SLAs) to determine billing amounts. SLA contracts often do not include scheduled downtime for regular maintenance and system updates in their availability percentages. Uptime and downtime percentages can be used in service level agreements for provisioning, describing the dependability of the different services that clients can access. Given that most customers want constant real-time availability (zero downtime), these percentages also aid in evaluating the worth of each service (Qiu, Zhou & Wang, 2013).

2.1.6 Concept of Technological Staff Competence

Technological competency is the capacity of an organization to arrange other resources with its own current technological resources, according to Bharadwaj (2000). Jiao, Chang, and Lu (2008) defined technological competency as the formation, transfer, and deployment of enterprise technological resources to combine with other resources, support and improve other uniqueness functions that are competent at strength and skill, creating the latent potential for maintaining continuous competitive advantage. According to Rousseva (2008), as various organizations embrace technology at varying

rates, multiple metrics should be employed to assess technical capability. Moreover, firms differ in terms of industry, size, and structure. Thus, many methods are applied.

Numerous research has suggested ways to measure technological competency, as may be shown from a review of the literature. Feeny and Willcocks (1998) delineated nine fundamental technical proficiencies, namely: vendor development, contract facilitation, contract monitoring, informed buying, architectural planning, business system thinking, leadership, relationship building, and architecture. Technological competency was assessed by Shu-en and Ming (2007) using the manufacturing process, new product development capability, and technology development capability. Technological competency is examined from the perspective of the firm's technological infrastructure, technology-enabled intangible resources, and human technological resources by Huang et al. (2006) and Jiao, Chang, and Lu (2008).

A review of the literature also shows that Zhang, Sarker, and McCullough's (2008) and Zhang and Tansuhaj's (2007) constructions were more thorough. After researching and analyzing six major models of technical competency, they developed a model that allows technological competency to be assessed through the use of technological infrastructure, technological architecture, technological human resources, and technological relationship resources. They define technical architecture as the organizational consensus and clarity about technology, data, and process standards as well as the high-level map of the information and technology requirements of the entire company. A technical human resource is a valuable resource that can be used to continuously employ technology to solve business difficulties and take advantage of business possibilities. Technological relationship resources are the vital links that business units have with technology, while technological infrastructure is the shared

resource that data and applications access through communication networks for organizational use (Zhang and Tansuhaj, 2007; Zhang, Sarker & McCullough, 2008).

2.2 Theoretical Perspectives

The study was anchored on the Technological Determinism Theory was the main Theory followed by Human capital theory and Task Technology Fit theory discussed herein.

2.2.1 Technological Determinism Theory

Veblen is credited with coining the term "technological determinism" (1978). It alludes to the notion that civilization's structure is determined by technology. The concept of technological determinism holds that fundamental aspects of behavior and society, including as our thoughts and actions, how we interact with others, our values, and how we learn, are shaped and altered by technology. Basic tools, social institution and interpersonal behavior standards and frameworks, and contemporary computer and Internet technologies are examples of technology.

According to the technological determinism (TD) idea, change is driven by technology. Among other things, TD modifies an organization's cultures, structures, reporting lines, conventions, and operational procedures (Buchanan & Huczynski, 2019). TD is a philosophical worldview that operates under the premise that technology controls human society by causing unavoidable societal changes. Technology is viewed as an independent force that functions independently of society (Hofmann, 2006). Thanks to technological advancements, completing a variety of transactions is now simple (Balconi, 2002).

Technological determinism (TD) holds that technology is a social system or a power that drives change. It is perceived as a culture's driving force behind civilization,

dictating the course of its history (Brette, 2003). Technology affects not just the switching states but also the organization, attitude, responsibility line, norms, and other aspects of the organization. Technological determinism is based on two basic ideas: first, technology advances according to a predictable, traceable route that is unaffected by political or cultural factors; and second, technology organizes society in a way that advances technology itself (Mardiana & Daniels, 2019).

By applying the theory to the research, it can be inferred that the necessity to increase Custom Revenue Performance and notice changes in the way customs operations are conducted has made the use of technology in scanning necessary. Thus, the independent variables in this study—baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning, and scanning technology integration—were anchored by this hypothesis.

2.2.2 Human Capital Theory

The human capital theory is given to Schultz (1961). The human capital theory states that increasing education and skill development can increase productivity. Businesses are forced to find and develop the human capital within their current workforce, claims Becker (1994). Human capital theory states that investing in education is necessary to acquire the knowledge and expertise that will increase a person's capital (Blundell et al., 1999). Tan (2014) asserts that possessing these skills and knowledge will increase a person's productivity at work.

This theory holds that human capital can spur technological advancement, inventions, and innovations, all of which can contribute to growth. Human capital increases a nation's capacity to adopt technologies that have already been developed elsewhere, which promotes convergence. This has been the consistent finding of several recent

studies (Griffith et al., 2004, Benhabib and Spiegel, 2005, Kneller and Stevens, 2006). According to Nelson and Phelps (1966), the adoption of new technology is facilitated by a workforce with higher levels of education. Employee development and training must be done in a methodical way since technological advancement is accelerating in today's industrial environment. The organization manages its workforce to increase workability and enable them to execute at a greater level (Jones & Jenkins, 2010).

This theory was used to anchor the variable Technology Staff Competence. The employees of the customs department at JKIA need to improve their skills and knowledge of scanning. This would see to it that they improve their performance through improvement on human capital.

2.2.3 Task Technology Fit theory

Goodhue and Thompson (1995) created the task technology fit theory. According to task technology adaptation theory, tasks can be made more efficient by integrating new technologies (Zhou, Lu, & Wang, 2010). Task-technology fit, according to Goodhue and Thompson (1995), is the dependency of the individual (a technology user), the technology (hardware, software, and data tools, and the services they offer), and the task (individuals' tasks performed to produce the desired result).

The five constructs that comprise task-technology fit (TTF), the model's representation, are task characteristics, technology characteristics, task-technology fit, technology use, and performance impact. While task characteristics and technology characteristics reflect the specific features of the technology and its application, the overall task-technology fit factor gauges people's opinions of task-technology fit (Goodhue, 1992; Goodhue & Thompson, 1995).

The TTF model contains three more propositions. The first proposition states that the user's evaluation of a task and technology fit is influenced by both task and technology aspects. To assess how much a system aids in an individual completing their portfolio of tasks, users rank eight criteria: quality, floatability, authorization, compatibility, production timeliness, systems reliability, ease of use/training, and relationship with users. Work characteristics are measured using work title, task non-routineness, and interdependence. These are the factors that may cause a user to become increasingly reliant on specific IT system capabilities. Technology characteristics are properties or capabilities unique to a certain technology. The theory's second thesis states that an individual's use of information systems is contingent upon their social integration. According to the third theoretical assumption, a favorable evaluation of task-technology fit, which also predicts utilization, has a beneficial impact on an individual's perceived performance, or the completion of a portfolio of activities (Goodhue & Thompson, 1995).

The adoption of scanning technology has led to greater standardization and efficiency in customs operations. Advanced scanning technologies, such as X-ray scanners and gamma-ray scanners, have enhanced security measures at customs checkpoints. These technologies enable customs authorities to detect hidden contraband, narcotics, and other security threats more effectively, thereby strengthening border security and law enforcement efforts.

Scanning has fundamentally transformed customs operations by automating and streamlining processes that were previously manual and time-consuming. The introduction of barcode scanners, RFID systems, and advanced imaging technologies has revolutionized the way customs declarations are processed, inspected, and cleared. Scanning technological attributes has reduced the need for direct human intervention in

customs procedures. Automated scanning systems can quickly and accurately capture information from customs declaration forms and cargo shipments, minimizing errors and increasing efficiency in customs clearance processes.

In addition to demonstrating how utilization and user attitude affect individuals' performance, the TTF explains how scanning enhances performance (DeLone & McLean, 1992). This was made possible by the task-technology fit factor and a precise examination of the relationships between technology and task, usage, and performance. Second, the TTF model offered a theoretical framework for considering a variety of challenges connected to performance. Information systems management effectiveness measurement, the significance of technology engagement and its impact on performance, and the use of TTF to identify issues with IS utilization were among the subjects discussed (Goodhue & Thompson, 1995). Third, the TTF model makes clear the roles of technical fit and utilization in performance by demonstrating that 14% of the variance in perceived performance is attributable to the function of TTF and only 4% is attributable to the influence of usage (Goodhue & Thompson, 1995). This theory was used on the study to show the link between scanning technological attributes and custom revenue performance.

2.3 Empirical Review

2.3.1 Baggage scanning accuracy and Custom Revenue Performance

The goal of Cheruiyot's (2019) study was to determine how well KRA's methods for enforcing customs on tax collection worked. Both qualitative and quantitative methods of data collection were used to accomplish these goals. While customs officers and importers of goods provided qualitative data, shipping and clearing agents provided quantitative data. Various analysis techniques were used on the various kinds of data

that were gathered. The regression analysis revealed that custom escort which includes scanning is statistically significant at enhancing collection of revenues.

John Smith (2019) studied the impact of baggage scanning accuracy on custom revenue performance. Using a combination of quantitative data analysis and qualitative interviews with customs officials, the study assesses the effectiveness of baggage scanning technological attributes in detecting undeclared or misdeclared goods and its subsequent influence on revenue collection. The findings suggest a positive correlation between higher baggage scanning accuracy rates and increased custom revenue performance. The study also identifies factors such as the level of technology staff competence among customs officers and the efficiency of enforcement procedures as important determinants of revenue performance. These insights contribute to our understanding of the role of technology in enhancing customs operations and revenue collection efficiency at airports. Key Findings: Improved baggage scanning accuracy leads to higher rates of detection for undeclared or misdeclared goods. Higher detection rates contribute to increased custom revenue performance due to enhanced enforcement capabilities.

Mumia (2021) sought to ascertain how the performance of custom income at the port of Mombasa, Kenya, was affected by automation in the customs release process. The target demographic for the study consisted of fifteen hundred Clearing Agents. The method used to choose responders from the population was simple random sampling. The questionnaire, which respondents self-administered, served as the primary data gathering tool for this study. According to the study, improving baggage cargo scanning automation raises custom revenue performance.

The goal of Nganda (2021) was to determine how system automation affected the performance of custom revenue at the port of Mombasa, Kenya. The research design used in the study was a descriptive survey. There were 124 shipping brokers, cargo owners, KPA officers, and customs officers that made up the study's target population. Standard deviations, averages, percentages, and frequencies were the descriptive statistical techniques used in the investigation. Multiple regression analysis and correlation were used in inferential analysis. The study found out that that improving automation of customs release process such as cargo scanning leads to improved custom revenue performance.

2.3.2 Cargo scanning efficiency and Custom Revenue Performance

Oduor and Mincu (2018) aimed to ascertain how cargo scanning affected Kenya's port of Mombasa's ability to collect revenue. A sample of the customs officers was chosen through the use of cluster sampling. There were 165 custom officers among the population of interest. The data was gathered via a formal questionnaire. To examine the data, percentages and frequencies were employed. It was discovered that there is a significant negative impact on revenue collection from scanner downtime.

The goal of Omosa, Ogaga, and Cheboi's (2020) study was to determine how scanner technology affected Kenya's customs and border control department's revenue performance. The study, which covered the years 2017 to 2019, included secondary data from pertinent sources that represent academic research in addition to primary data collected through the use of structured questionnaires. Descriptive and inferential statistics were generated from the data analysis. It was discovered that the effectiveness of cargo scanning has a major impact on Kenya's customs revenue performance.

2.3.3 Customs declaration scanning and Custom Revenue Performance

A study on the impact of customs processes on the performance of import businesses for Small and Medium Enterprises in Kenya was carried out by Mpekethu (2018). This study used a descriptive research approach to ascertain how customs processes affect the performance of Kenyan import businesses. Semi-structured questionnaires were used to collect information from small importers and customs officers employed by the DPC. Approximately one thousand SMEs in the Nairobi region made up the study's target group. Using a linear regression model, the gathered data was examined to ascertain the impact of particular customs procedures on the performance of import businesses for SMEs in Kenya. Data analysis revealed that customs verification processes, like customs declaration scanning, had a detrimental impact on small importers' ability to conduct business.

The goal of Nabwire and Mincu's (2019) study was to determine how Mombasa County's used car dealers' performance has been impacted by the implementation of customs import inspections. The study used a structured questionnaire as its primary data collection tool, with a population of 110 used automobile dealers in Mombasa and a descriptive design. Simple random sample and simple purposive random sampling were employed by the researcher. Using Slovin's formula, the sample size of 86 auto dealers was determined. Import inspections by customs had a significant and adverse effect on Mombasa County's used car dealers' performance.

Kipkoech (2020) set out to ascertain the ways in which customs procedures impacted the multi-agency stakeholders' performance at Kenyan customs entry ports. A descriptive survey research design was employed in the study. 350 clearing and forwarding companies with headquarters in Nairobi, Kenya's industrial sector were the target population. Thirty percent of the target population, or 105 firms, made up the

sample size. For this particular project, primary data was gathered and created. The quantitative data that was gathered was assessed by regression analysis. Performance was shown to be significantly improved by customs verification and release.

The goal of Hannington's (2022) study was to ascertain how Kenya's revenue performance was affected by the automation of customs processes. The study used a descriptive research methodology using 1132 personnel at Nairobi's clearing and forwarding companies as well as the customs agency as its target population. According to the study, the performance of customs revenue was significantly improved by scanning customs declarations. The findings also indicated a decrease in the amount of hazardous goods that was being sent to Kenya's local market.

2.3.4 Scanning technology integration and Custom Revenue Performance

Njigigua and Mincu (2018) conducted a study on the effect of technology on Custom Revenue Performance at the Port of Mombasa. As the research approach, a descriptive research design was chosen, which outlined the steps taken to collect field data. The Mombasa port authorities, particularly the customs officers and KRA employees positioned at the main terminal berths, were among the target populace. Clearing agents, who help move cargo from the port to the destination, were also included in the study. The main instrument utilized in the data gathering process was a structured, closed-ended questionnaire. A 5-point Likert scale was included in the questionnaire to gauge respondents' responses to each item. According to the study, non-intrusive technology had a favorable effect on custom revenue performance.

The goal of Kitolo (2022) was to evaluate the variables influencing the Scanner Management unit's performance at the Nairobi Inland Container Depot. The study's precise goals were to look into how the Scanner Management Unit's performance was

impacted by system integration, capacity building, and infrastructure. Systems theory, human capital theory, and resource-based view theory served as the study's pillars. The population of this study, which used a descriptive research design, consisted of customs officials working in the Nairobi region. The 265 customs officials in the Nairobi area were the target population. Monthly network outages were one of the factors that greatly impacted scanner management efficiency.

Metet, Gitonga, and Kipsang (2021) investigated the effect of risk management strategies on company performance using the Kenyan Customs and Border Control Department as a case study. The precise goals of the study were to ascertain how Kenyan customs and border control operations were affected by cargo monitoring, cargo scanning, customs intelligence, and integrated systems. The study found that the KRA customs department performs better when its scanning equipment is updated on a regular basis.

2.3.5 Moderating Role of Technology Staff Competence

Pitafi, et al. (2018) looked at the moderating effects of information technology (IT) competency and work cooperation on workers' work performance in relation to their use of enterprise social media (ESM). 175 employees who implemented ESM at work provided the data. The results of the study demonstrated that IT competency increases the relationship between the use of ESM and task interdependence as well as teamwork.

Kim (2021) carried out a study to ascertain the connection between performance and required competencies based on industry classification for SMEs to grow sustainably. Using an online questionnaire, data was gathered from 205 CEOs (response rate: 62.1% from 330 CEO). Structural models, measurement models, and fundamental statistical analysis were used to verify and examine the data. The results demonstrated that the

mediating role of technological capabilities accounts for the differences in SMEs' performance by industry.

Ul Abidin et al.'s (2021) study looked at how information technology competencies affected both organizational and financial success. 165 IT officers and senior managers from Pakistan provided the data, which was gathered using the main data gathering approach. Moreover, there is statistical significance between organizational performance and financial performance. IT competencies did not significantly affect financial performance in a direct or indirect way. Furthermore, the study showed that maintaining financial performance requires more than just IT competencies.

Amoako et al. (2022) looked at the effects of organizational leadership, organizational structure, and staff technological capabilities on the installation success of e-HRM systems. Data was collected from a fresh dataset and published on a list of human resource practitioners and professionals by the Chartered Institute of Human Resource Practitioners, Ghana. The study's findings showed that employee technological efficacy and competency as well as organizational structure have a favorable and significant impact on the successful implementation of e-HRM.

2.4 Conceptual Framework

A conceptual framework may be defined as an end result of bringing together a number of related concepts to explain or predict a given event, or give a broader understanding of the phenomenon of interest or simply, of a research problem (Mugenda & Mugenda, 2009). The study had four independent variables and one dependent variable. The independent variables were Baggage scanning accuracy, Cargo scanning efficiency, Customs declaration scanning and Scanning technology integration. Dependent

variable was Custom Revenue Performance While the moderating variable was Technology staff competence.

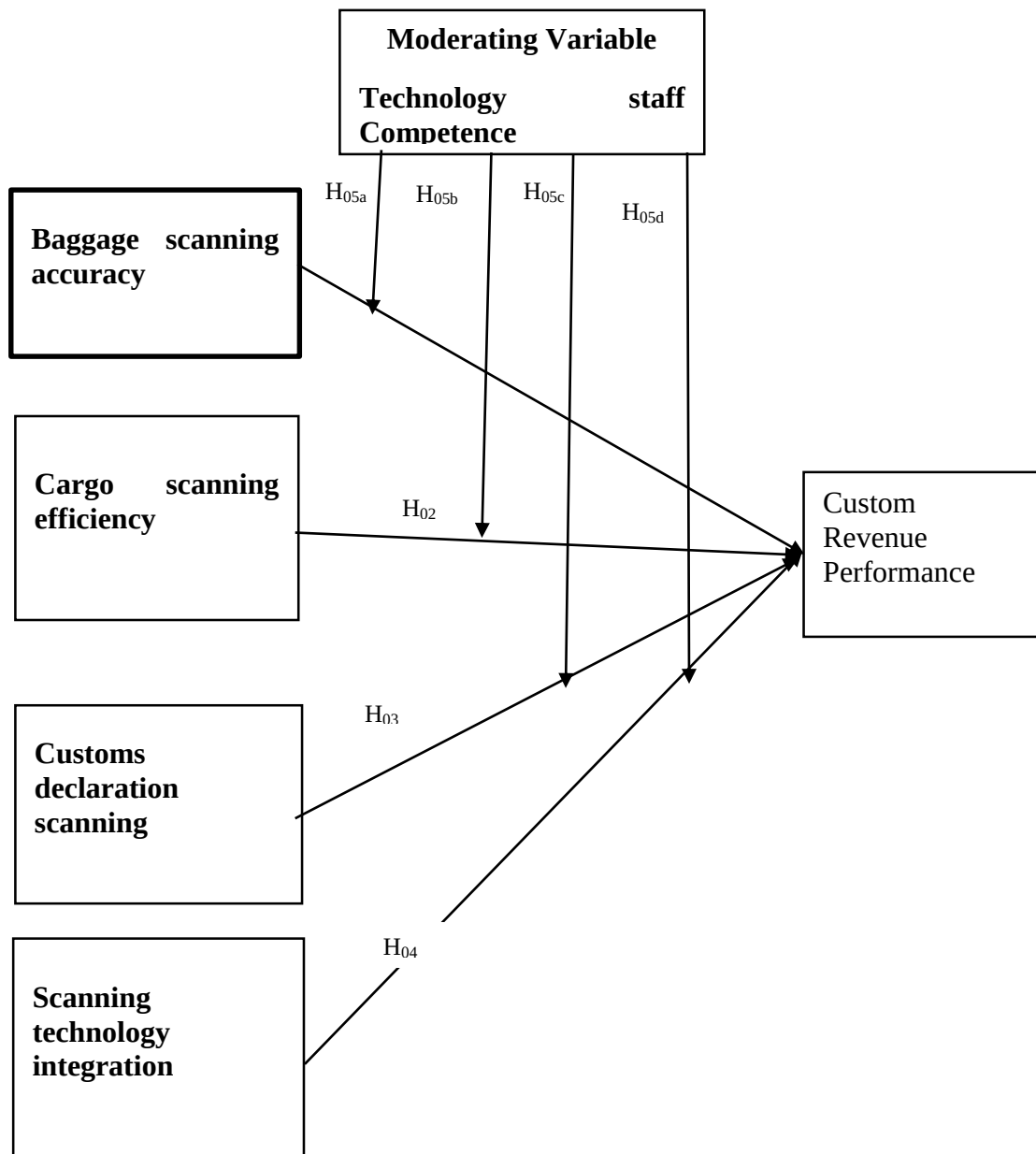


Figure 2.1: Conceptual Framework

Source: Researcher (2023)

2.5 Critique of Literature Review

According to the reviewed studies, there have been attempts by various researchers to study the effect of scanning technological attributes on Custom Revenue Performance. The majority of these research discovered that custom revenue performance is positively impacted by scanning technology features (Njigigua & Mincu, 2018; Cheruiyot, 2019; Kipkoech, 2020; Omosa, Ogaga & Cheboi, 2020; Metet, Gitonga & Kipsang, 2021; Mumia, 2021; Nganda, 2021; Hanningtone, 2022). However, other studies revealed a negative effect (Oduor & Mincu, 2018; Nabwire & Mincu, 2019; Kitolo, 2022). Additionally, the studies that were being conducted majorly focused on the sea ports specifically in Mombasa. However, there has been no study that has focused on the customs department of the Jomo Kenyatta International Airport.

2.6 Summary of Literature Review and Research Gaps

Table 2.1 presents the summary of literature reviewed.

Table 2.1: Summary of Literature Review and Research Gaps

Author & Year	The focus of the study	Research Gap	Focus on the current study
Cheruiyot (2019) the	efficacy of KRA's methods for enforcing customs on revenue collection	Focused on revenue collection process	Focused on custom revenue performance
Mumia (2021)	Impact of automated customs release procedure on custom revenue generation at Kenya's Port of Mombasa	Focused on Custom Revenue Performance at the port of Mombasa	Focused on Custom Revenue Performance at JKIA
Nganda (2021)	system automation's implications on custom revenue performance at Kenya's Port of Mombasa	Focused on Custom Revenue Performance at the port of Mombasa	Focused on Custom Revenue Performance at JKIA
Njigigua and Mincu (2018)	technology's impact on the Port of Mombasa's Custom Revenue Performance	Focused on Custom Revenue Performance at the port of Mombasa	Focused on Custom Revenue Performance at JKIA
Omosa, Ogaga and Cheboi (2020)	the impact of scanner technology on Kenya's customs and border control department's revenue performance.	Did not specify on any point of entry and exit	The study focused on the JKIA as a point of entry and exit
Mpekethu (2018)	implications of customs processes on Kenyan small and medium-sized enterprises' import business performance	Focused on performance of SMEs	Focused on Custom Revenue Performance
Nabwire and Mincu (2019)	how Mombasa County's used car dealers' performance has been impacted by the implementation of customs import checks	Focused on performance of Used vehicle dealers in Mombasa County	Will focus on Custom Revenue Performance at JKIA
Kipkoech (2020)	implications of customs processes at Kenyan customs entry points on multi-agency stakeholders' performance	Focused on performance of multi-agency stakeholders	Focused on Custom Revenue Performance at JKIA
Hanningtone (2022)	impact of customs system automation on Kenya's revenue performance	The focus was on revenue performance	Was specific on customs revenue
Oduor and Mincu (2018)	consequences of cargo scanning on income collection at Kenya's Port of Mombasa	Focused on revenue collection at the port of Mombasa	Focused on Custom Revenue Performance at JKIA

Kitolo (2022)	elements influencing the Nairobi Inland Container Depot's Scanner Management unit's performance	Focused on factors affecting performance of scanner management Focused on Inland Container Depot, Nairobi	Focused on effect of scanner technology system on Custom Revenue Performance Focused on customs at JKIA
Metet, Gitonga and Kipsang (2021)	Examined the impact of risk management techniques on business performance, using the Kenyan Customs and Border Control Department as a case study.	Focused on firm performance	Focused on customs performance
Pitafi, et al (2018)	How employees' use of enterprise social media (ESM) affects their productivity and the moderating effects of information sharing and teamwork technology (IT) competency.	Focused on enterprise social media and performance of employee	The study focused on customs revenue performance
Kim (2021)	To determine the relationship between performance and the skills required for SMEs to thrive sustainably based on industry classification	The focus of the study was growth in the context of SMEs	The study was based in the context of customs and the performance of revenue
Ul Abdin, et al (2021)	Information technology capabilities' impact on financial performance and their subsequent impact on organizational performance	The study focused on IT competencies only	The study focused on technology staff competence without being specific to IT competence
Amoako, et al (2022)	the impact of employee technology skills, organizational leadership, and organizational structure on the effectiveness of an e-HRM system's deployment.	The focus was on e-HRM system	The focus was scanning technological attributes

Source: Researcher (2023)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents a discussion of the methodology that the study adopted. The chapter begins by defining the research design to be applied and then states the population of interest. The chapter then discusses the sampling design where the sampling techniques to be applied are discussed and then the way to determine the sample size. Further, the data collection procedure and instruments are discussed. The pilot study methodology and validity and reliability testing procedures are then explained in the chapter. The display styles and techniques for data analysis are covered in the next paragraph. Subsequently, the study's assumptions are examined, followed by a discussion of the study's ethical implications.

3.1 Research Design

The research design used in the study was explanatory. A technique for locating details in places with little information is explanatory research. By giving more details about a particular issue, explanatory research aids in the in-depth understanding of a particular problem by researchers. An explanatory research design helps lay the foundation of a research, which can lead to further research. The research design was appropriate for this study since this topic had not been researched on extensively since the scanning technological attributes were new. This therefore helped in findings in-depth information about the effect of Scanning technological attributes on Custom Revenue Performance.

3.2 Target Population

A population has been defined as the total collections of elements about which inferences are made and refers to all possible cases which are of interest for a study

Sekaran, (2008). Other scholars like Smith (2011) view population as the large collection of all subjects from where a sample is drawn. The target population of the study was 538 Customs officers (KRA JKIA). KRA, (2024)

Table 3.1: Target Population

Category	Target Population
Customs officers (KRA JKIA)	538
Total	538

Sources: Researcher (2023)

3.2.1 Sampling Technique

The entire population, or group, that a researcher is interested in studying and examining is referred to as the target population. 538 customs officers employed by the KRA customs department at Jomo Kenyatta International Airport were the study's target group. The target population's distribution is displayed in Table 3.1. Simple random sampling was applied to sample out the customs officers. Simple random sampling is appropriate since it enables every member of the population to have a chance to be sampled out without bias. The target population was categorized into Customs officers (KRA JKIA) then selected by simple random sampling.

The study adopted Taro Yamane (1973) formula to calculate the sample size as follows;

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

Where

n = the sample size

N = the population of the study

e = the margin error in the calculation assumed to be 0.05

$$n = \frac{538}{1 + 538(0.05)^2} = 229$$

The sample was distributed as in Table 3.2.

Table 3.2: Sample Size

Category	Target Population	Sample Size
Customs officers (KRA JKIA)	538	229
Total	538	229

Sources: Researcher (2023)

3.4 Data Collection Instrument

The data collection instrument for this study was a questionnaire. A structured questionnaire was used in this study. The questionnaire, according to Cohen et al. (2007), is the most favoured method because it is easier to conduct and has lower expenses. Subsections of the questionnaires asked about the study variables of baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning, scanning technology integration and Technology Staff Competence. The last section consisted of questions on Custom Revenue Performance. The questionnaire was created using a 5-point Likert scale.

3.5 Data Collection Procedure

Following approval of the study design and questionnaire, the researcher distributed the surveys to the selected participants. To do this, the drop and pick method was applied. The researcher handed the questionnaires to the respondents without the help of research assistants because this was done in a single station. Since primary data is directly derived from the original source and is virtually objective, it is extremely accurate. The researcher first took consent from the management of KRA and the Jomo Kenyatta International Airport who also approved of an appropriate day for the activity.

The researcher then proceeded to administer the questionnaires on the appointed day. The researcher then waited for two weeks before proceeding to collect the filled in questionnaires. During the two weeks' period, the researcher made making follow ups through phone calls and emails.

The researcher then distributed the surveys to the selected respondents after the study proposal and questionnaire were approved. To do this, the drop and pick method was employed. The questionnaires were distributed to the respondents by the researcher without the help of research assistants because this was done in a single station.

3.6 Pilot Testing

Prior to a larger study, a smaller study known as a pilot study is conducted (Mugenda & Mugenda, 1999). The pilot study's objective is to evaluate the study data collection instrument's efficacy on a sample group that shares features with the research sample. This is also used to assess the usefulness of the questionnaire, find questions that respondents find confusing, and make sure there are no biases in the questions. The pilot testing was conducted on 23 respondents (10 percent of the study population) who were recruited from Mombasa International Airport customs department. The researcher subjected the data to the necessary testing upon which necessary improvements were made on the questionnaire after distributing the questionnaires to the pilot study respondents and collecting the data.

3.6.1 Reliability

The term reliability refers to a test that determines if a tool will produce the same results when used repeatedly (Mugenda & Mugenda, 2003). The pilot testing was conducted on 4 respondents (10 percent of the study population) who were recruited from KRA customs department, were be used to test reliability. The data was evaluated to see if it

meets the Cronbach's alpha standard for measuring reliability. Cronbach's alpha values vary from 0 to 1, with a threshold of 0.7. A Cronbach's alpha of 0.7 to 1 is considered reliable, whereas anything less than that is considered unreliable. Items with reliability of less than 0.7 would be eliminated, while those with a reliability of more than 0.7 would be retained.

3.6.2 Validity

Validity is defined by Orodho (2005) as the appropriateness and correctness of a data collection tool in measuring the intended metric. Depending on the goal of the study instruments, a number of validities are generally measured. Criteria validity, content validity, face validity, and construct validity are the four categories. Content validity is the degree to which the statements or questions assess the content under examination. The content validity of this study was determined by expert assessment, with the instrument being given to supervisors who made ideas for enhancements to the questionnaire. The construct validity test determines whether the tool accurately measures the study constructs. The technique of confirmatory factor analysis (CFA) was employed to evaluate the construct validity. The face validity test establishes if the instrument measures what it purports to measure with accuracy. Face validity was measured using the opinion of respondents who reported whether in their view the questionnaire measures the intended purpose. The criterion validity test determines whether the tool's results match those of another test. This was measured by embedding questions in the main survey.

3.7 Measurement of Variables

3.7.1 Dependent Variable

The dependent variable of the study was customs revenue performance. Customs revenue performance was measured based on Likert type scale based on four items

validated by Čevers and Gaile-Sarkane (2019). The respondents were questioned about how much they agreed with assertions made about the performance of customs revenue.

3.7.2 Independent Variable

The independent variables were baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning and scanning technology integration.

Baggage scanning accuracy was measured using a Likert type scale based on five items validated by Peterson (2017). The respondents were questioned about how much they agreed with comments made about the accuracy of luggage screening.

Cargo scanning efficiency was measured using a Likert type scale based on five items validated by Peterson (2017). The degree of agreement with comments regarding the effectiveness of cargo scanning was inquired of the respondents.

Customs declaration scanning was measured using a Likert type scale based on five items validated by Peterson (2017). When it came to the scanning of customs declarations, the respondents were asked to rate their agreement or disagreement.

Scanning technology integration was measured using a Likert type scale based on four items validated by Gunawi et al (2016). The degree of agreement with comments about the scanning technical qualities integration was inquired of the responders.

3.7.3 Moderating Variable

The moderating variable for the study was technological competence. Technological competence was measured based on Likert type scale based on four items validated by Zhang and Tansuhaj (2007) and Zhang, Sarker and McCullough (2008). The respondents were asked to state the extent of agreement on statements regarding the technological competence.

Table 3.3 illustrates the measurements of study variables.

Table 3.3: Measurement of Variables

Variable	Measurements	Author
Custom revenue performance	• Time • Cost • Simplification • Risk	Čevers and Gaile-Sarkane (2019).
Baggage scanning accuracy	• Efficiency • Effectiveness • Cost of purchasing scanners • Imaging process time • Scanning procedure	Peterson (2017).
Cargo scanning efficiency	• Cost of purchasing scanners • Imaging process time • Scanning procedure • Efficiency • Effectiveness	Peterson (2017).
Customs declaration scanning	• Scanning procedure • Efficiency • Effectiveness • Imaging process time • Cost of purchasing scanners	Peterson (2017).
Scanning technology integration	• Efficiency • Stakeholder satisfaction • Internet outages • Hardware failure	Gunawi et al (2016).
technology staff competence	• Technological architecture • Technological infrastructure • Human resources technology • Technology relationship resource	Zhang and Tansuhaj (2007) Zhang, Sarker and McCullough (2008).

Source: Researcher (2023)

3.8 Data Analysis and Presentation, Model Specification and Regression

Assumptions

3.8.1 Data Analysis and Presentation

After the researcher collected the data, it was entered into an Excel worksheet, sent to Statistical Packages for Social Sciences (SPSS), and coded. The data was analyzed using both inferential and descriptive statistics, including regression and correlation, as

well as mean and percentage calculations. The study employed Pearson's correlation analysis to ascertain the degree of association between the variables under investigation. Multiple regression analysis was used to establish the relationship between the dependent variable and the study independent factors. The study's findings were presented in tabular form or through figures like graphs and charts.

3.8.2 Model Specification

The multiple regression model that was tested in the study was as follows;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where

Y represent Custom Revenue Performance

$\beta_0, \beta_1, \beta_2, \beta_3$ and β_4 are coefficients

X_1 represent baggage scanning accuracy

X_2 represent cargo scanning efficiency

X_3 represent customs declaration scanning and;

X_4 represent scanning technology integration.

e is the standard error

The following Hierarchical Regression models was used in assessing the moderating role of Technology Staff Competence.

$$\text{Model 1: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \quad H_{01}-H_{04}$$

$$\text{Model 2: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 M_5 + \varepsilon$$

$$\text{Model 3: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 M_5 + \beta_6 X_1 * M + \varepsilon \quad H_{05a}$$

$$\text{Model 4: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 M_5 + \beta_6 X_1 * M + \beta_7 X_2 * M + \varepsilon \quad H_{05b}$$

$$\text{Model 5: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 M_5 + \beta_6 X_1 * M + \beta_7 X_2 * M + \beta_8 X_3 * M + \varepsilon \quad H_{05c}$$

Model 6: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 M_5 + \beta_6 X_1 * M + \beta_7 X_2 * M + \beta_8 X_3 * M + \beta_9 X_4 * M + \epsilon$ H_{05d}

Where:

Y = Dependent variable (custom revenue performance)

β_0 = Y intercept

β_1 - β_4 = coefficients of independent variables

X_1 - X_4 - Independent variables

M –moderating variable (Technology Staff Competence)

M*X= Interaction terms (independent variable*moderator)

3.9 Regression Assumptions

Regression assumptions refer to the requirements that should be met for regression analysis to yield accurate and reliable results. An examination of the relationship between one or more independent variables (predictors) and a dependent variable (outcome) is possible through the statistical technique of regression analysis. The data was examined for regression assumptions prior to the inferential analysis. Diagnostic tests, such as Heteroscedasticity of errors, Normality, Multicollinearity were conducted.

3.9.1 Heteroscedasticity

When the variance of the residuals is uneven throughout a range of measured values, this is referred to as heteroscedasticity. The Breusch-Pagan test was employed in the study to evaluate heteroscedasticity. We conclude that heteroscedasticity exists in the regression model and reject the null hypothesis if the test's p-value is less than a certain significance level (i.e., $\alpha = .05$).

3.9.2 Normality

To ascertain if sample data was taken from a population that was regularly distributed, a normality test is utilized. In this study, the normality of the data was tested using the Shapiro Wilk.

3.9.3 Multicollinearity

Multicollinearity is a statistical concept that characterizes the relationship between several independent variables in a model. When there are several collinearities among independent variables, statistical findings become less reliable. Multicollinearity was tested using the variance inflation factor (VIF). According to Myres (1990), multicollinearity is present when $VIF \geq 10$.

3.9.4 Linearity

The linearity test, according to Boldina and Beninger (2016), is used to ascertain whether all linear regression models that involve an independent and dependent variable are connected to a bottom-right or straight line to the right. When a regression is said to be linear, it indicates that the relationship between the predictor and result variables is straight-line. The residual plots were used to test for linearity.

Table 3.4 shows the operationalization and measurement of the study variables.

Table 3.4: Operationalization and Measurement of Study Variables

Variable	Type of variable	Indicators	Type of Questions	Tool of Analysis
Baggage scanning accuracy	Independent	• Efficiency • Effectiveness • Cost of purchasing scanners • Image process time • Scanning procedure	Likert scale	Descriptive & inferential statistics.
Cargo scanning efficiency	Independent	• Cost of purchasing scanners • Imaging process time • Scanning procedure • Efficiency • Effectiveness	Likert scale	Descriptive & inferential statistics.
Customs declaration scanning	Independent	• Scanning procedure • Efficiency • Imaging process time • Effectiveness • Cost of purchasing scanners	Likert scale	Descriptive & inferential statistics.
Scanning technology integration	Independent	• Efficiency • Stakeholder satisfaction • Internet outages • Hardware failure	Likert scale	Descriptive & inferential statistics.
Custom revenue performance	Dependent	• Time • Cost • Simplification • Risk	Likert scale	Descriptive & inferential statistics.

Source: Researcher, 2023

3.10 Ethical Considerations

Being ethical when conducting research is beneficial since it ensures that no one is hurt or suffers adversely as a result of the research (Mugenda & Mugenda, 1999). To ensure ethics, the researcher received an introductory letter from the university and handled the information with the utmost care. These are crucial, especially when conducting research, because they ensure that respondents cooperate during data collection. The researcher wished to keep information private and confidential, and to keep the

respondents' identities hidden in this regard. This was accomplished by utilizing the information obtained from the questionnaires without mentioning the respondents' individual names, and the respondents should be anonymous.

The university's Ethics Review Board was consulted by the researcher in addition. After receiving approval, the researcher applied to the National Commission for Science, Technology, and Innovation (NACOSTI) for a research permit license to ensure the legitimacy of the study. The research requested permission from KRA and JKIA administration to acquire data after getting the research licensing authorization.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

In this chapter, the findings of the study are presented, discussed and interpreted. The chapter starts with the presentation of the response rate then goes on to provide the findings on the assumptions of linear regression. The next section presents the descriptive analysis results followed by the correlation and multiple and hierarchical analysis results. The final decision on the hypotheses finding is then made and a discussion of key findings provided.

4.2 Response Rate

Figure 4.1 presents the response rate for the study questionnaires according to the number that was distributed and those that were completed and returned.

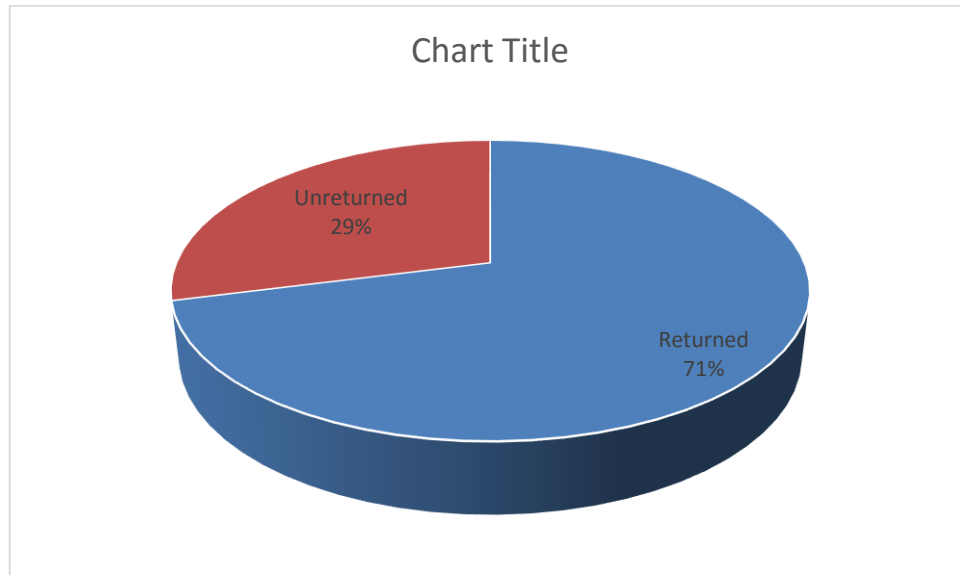


Figure 4.1: Response Rate

Source: Research Data (2024)

The number of distributed questionnaires was 229. However, only 162 were completed and returned which produced a response rate of 71%. This response rate was considered

adequate for the study since Baruch (1999) advocates that the average and also reasonable, acceptable response rate is 60%.

4.3 Reliability tests

The data was evaluated to see if it meets the Cronbach's alpha standard for measuring reliability. Cronbach's alpha values vary from 0 to 1, Nunnally (1978) argued that a Cronbach's alpha value of 0.7 and above proves that the research instrument used is reliable. The reliability test for the variables was conducted, whereas anything less than that is considered unreliable. Items with reliability of less than 0.7 would be eliminated, while those with a reliability of more than 0.7 would retain. Table 4.1 presents the reliability results.

Table 4.1: Reliability Results

Variable	Cronbach's Alpha
Baggage scanning accuracy	0.720
Cargo scanning efficiency	0.739
Customs declaration scanning	0.762
Scanning technology integration	0.747
technology staff competence	0.745
Customs revenue performance	0.816

All the variable had a Cronbach's alpha that was greater than 0.7 hence were reliable and the implication was that the questionnaire was reliable.

4.4 Factor Analysis

4.4.1 MCAR test

It is imperative to conduct tests for outliers and missing data in order to ensure the dependability and precision of your study. Here are a few tests and approaches to deal with such problems. For every questionnaire item, the MCAR (Missing Completely at Random) test was used to find outliers and missing values. Table 4.2 shows that there are no missing values and that if they existed, they would occur completely at random.

Table 4.2: MCAR Test

	N	Missing		No. of Extremes ^a	
		Count	Percent	Low	High
Customs revenue performance		0	.0	0	0
Baggage scanning accuracy		0	.0	0	0
Cargo scanning efficiency		0	.0	0	0
Customs declaration scanning		0	.0	0	0
Scanning technology integration		0	.0	0	0
technology staff competence	162	0	.0	0	0

4.4.2 Confirmatory Factor Analysis

The degree of coherence between variables is measured by the Kaiser-Meyer-Olkin test, or KMO test, which determines whether or not data is suitable for factor analysis. Test scores range from 0 to 1, with values above 0.5 being deemed appropriate for factor analysis. The variables in the correlation matrix are sufficiently related to each other to be useful in factor analysis, as demonstrated by the Bartlett's test of the homogeneity of the correlation matrix. Meyer (1974). Every variable item has a KMO

statistic >0.5 , according to the KMO test, and each variable group is appropriate for factor analysis if the Bartlett's significance is less than 0.05.

Table 4.3: KMO& Bartlett's test

	Customs	Baggage	Cargo	Customs	Scanning	technology
	revenue	scanning	scanning	declaration	technology	staff
	performance	accuracy	efficiency	scanning	integration	competence
KMO	0.776	0.855	0.789	0.501	0.608	0.501
Measure						
of						
Sampling						
Adequacy						
Sig	0.000	0.000	0.000	0.000	0.000	0.000

(Source: Research 2024)

4.4.3 Factor Loadings

The factor Loadings for factors higher than 0.5 were selected and after Varimax rotation was conducted on the factors the subsequent loadings resulted in transformed variable elements that were to be used for regression analysis.

Table 4.4: Confirmatory Factor Loadings

	Customs revenue performance	Baggage scanning accuracy	Cargo scanning efficiency	Customs declaration scanning	Scanning technology integration	technology staff competence
CRP1	.024					
CRP2	.013					
CRP3	.732					
CRP4	.623					
CRP5	.829					
CRP6	.727					
CRP7	.626					
CRP8	.837					
BSA1		.951				
BSA2		.872				
BSA3		.942				
BSA4		.961				
BSA5		.987				
BSA6		.982				
BSA7		.968				
CSE1			.972			
CSE2			.935			
CSE3			.954			
CSE4			.943			
CSE5			.918			
CSE6			.972			
CDS1				.942		
CDS2				.630		
CDS3				.950		
CDS4				.939		
CDS5				.540		
CDS6				.948		
STI1					.307	
STI2					.875	
STI3					.676	
STI4					.442	
STI5					.335	
STI6					.328	
STI7					.803	
TEC1						.733
TEC2						.761
TEC3						.899
TEC4						.899
TEC5						.589
TEC6						.618

(Source: Research 2024)

4.4.4 Validity analysis

Discriminant validity assesses whether factors that are supposed to measure different constructs are distinct from one another. Table 4.5 illustrates the matrix for each

variable items of the questionnaire CRP = custom revenue performance, BSA =baggage scanning accuracy, CSE = cargo scanning efficiency, CDS =customs declaration scanning, STI =scanning technology integration, TEC = Technology staff competence. Convergent and discriminant validity were assessed using a correlation matrix for Customs Revenue Performance (CRP), Baggage Scanning Accuracy (BSA), Cargo Scanning Efficiency (CSE), Customs Declaration Scanning (CDS), Scanning Technology Integration (STI), and technology staff competence (TEC). The high correlations within each construct, such as CRP1-CRP8 (ranging from .537 to .967) and BSA1-BSA7 (ranging from .898 to .991), indicate strong convergent validity. Lower correlations between different constructs suggest good discriminant validity, ensuring that the constructs are distinct from each other.

Table 4.5: Matrix Discriminant Validity

	CRP1	CRP2	CRP3	CRP4	CRP5	CRP6	CRP7	CRP8
CRP1	1.000							
CRP2	.601	1.000						
CRP3	.840	.852	1.000					
CRP4	.653	.572	.947	1.000				
CRP5	.911	.086	.831	.621	1.000			
CRP6	.965	.672	.855	.884	.829	1.000		
CRP7	.841	.734	.819	.778	.914	.537	1.000	
CRP8	.967	.681	.849	.953	.899	.555	.894	1.000
	BSA1	BSA2	BSA3	BSA4	BSA5	BSA6	BSA7	
BSA1	1.000							
BSA2	.915	1.000						
BSA3	.963	.925	1.000					
BSA4	.941	.939	.969	1.000				
BSA5	.967	.930	.959	.982	1.000	.986		
BSA6	.972	.916	.954	.959	.986	1.000		
BSA7	.963	.898	.945	.950	.976	.991	1.000	
	CSE1	CSE2	CSE3	CSE4	CSE5	CSE6		
CSE1	1.000							
CSE2	.934	1.000						
CSE3	.939	.978	1.000					
CSE4	.930	.960	.982	1.000				
CSE5	.916	.946	.959	.986	1.000			
CSE6	.996	.939	.944	.926	.913	1.000		
	CDS1	CDS2	CDS3	CDS4	CDS5	CDS6		
CDS1	1.000							
CDS2	.830	1.000						
CDS3	.910	.959	1.000					
CDS4	.892	.964	.923	1.000				
CDS5	.610	.632	.745	.860	1.000			
CDS6	.923	.860	.900	.911	.995	1.000		
	STI1	STI2	STI3	STI4	STI5	STI6	STI7	
STI1	1.000							
STI2	.184	1.000						
STI3	.868	.938	1.000					
STI4	.905	.596	.869	1.000				
STI5	.982	.774	.767	.627	1.000			
STI6	.875	.898	.683	.808	.991	1.000		
STI7	.803	.723	.809	.926	.897	.841	1.000	
	TEC1	TEC2	TEC3	TEC4	TEC5	TEC6		
TEC1	1.000							
TEC2	.731	1.000						
TEC3	.687	.718	1.000					
TEC4	.658	.689	.963	1.000				
TEC5	.857	.784	.768	.788	1.000			
TEC6	.018	.817	.869	.878	.607	1.000		

(Source: Research 2024)

4.5 Descriptive Analysis

The descriptive analysis was done to summarize the data. The questionnaire consisted of statements against which respondents indicated their level of agreement using a scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree.

4.5.1 Baggage Scanning Accuracy

The questionnaire consisted of statements on baggage scanning technology against which respondents indicated their level of agreement using a scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. As a result, a mean greater than three indicated that most respondents agreed with the specific statement, whilst a mean lower than three indicated that most respondents disagreed with it. The results are shown in Table 4.6.

Table 4.6: Descriptive Statistics for Baggage Scanning Accuracy

	Mean	SD	Kurtosis	Skewness	Mini	Maxi
Baggage scanning is very efficient since it is more straightforward	3.80	1.25	-0.56	-0.774	3.0	5.0
Baggage scanning is effective in ensuring security	3.74	1.18	-0.219	-0.807	2.0	5.0
Baggage scanners are not expensive	3.86	1.37	-0.305	-0.991	2.0	5.0
The imaging process time for baggage scanning is reduced	3.84	1.23	-0.297	-0.864	2.0	5.0
Baggage scanning is less intensive using scanner	3.86	1.32	-0.159	-1.023	3.0	5.0
Baggage scanning procedure does not involve other agencies for the process	3.98	1.17	0.448	-1.118	3.0	5.0
Baggage scanning reduces delays	4.09	1.23	0.823	-1.369	3.0	5.0
Overall	3.88	1.25				

Source: Research Data (2024)

The findings, which are displayed in Table 4.6, demonstrated that the luggage scanning statement is highly effective because it is simpler and yielded a mean of 3.80 and a standard deviation of 1.25. This indicates that the majority of respondents agreed with

the statement indicating the effectiveness of luggage scanning technology. The claim that luggage scanning ensures security was met with a mean score of 3.74 and a standard deviation of 1.18. This suggested that the majority of responders accepted the assertion, proving the efficacy of baggage scanning technology. There was a mean of 3.86 and a standard deviation of 1.37 for the claim that luggage scanners are not pricey. This indicated that most respondents agreed with the claim that luggage scanning technology is reasonably priced. With a standard deviation of 1.23, the statement "The imaging process time for baggage scanning is reduced" had a mean of 3.84. The majority of respondents, it was found, agreed with the statement that luggage scanning technology saves time. The majority of respondents agreed with the assertion that utilizing a scanner to scan baggage is less laborious, as indicated by the mean and standard deviation of 3.86 and 1.32, respectively. This means that baggage scanning technology is not intensive.

Additionally, the majority of respondents stated that the baggage screening method did not include other agencies, as indicated by the statement's mean of 3.98 and standard deviation of 1.17. In other words, baggage scanning technology is universal. Lastly, the majority of respondents agreed with the statement that baggage screening minimizes delays, as demonstrated by the mean of 4.09 and standard deviation of 1.23. This indicates that luggage scanning technology contributes to a decrease in delays. The majority of respondents agreed with the claims, as indicated by the overall mean of 3.88 and the standard deviation of 1.25 for all the statements. This implied that baggage scanning technology is accurate hence can be considered to be better than traditional baggage scanning methods. These findings coincide with John Smith (2019) who established that efficiency of enforcement procedures is an important determinant of revenue performance.

4.5.2 Cargo Scanning Efficiency

The questionnaire consisted of statement regarding cargo scanning efficiency where the respondents indicated their level of agreement using the scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. Since most respondents agreed with the statement in question, a mean above three indicates that this was the case, whereas a mean below three indicates that this was not the case. Table 4.7 presents the results.

Table 4.7: Descriptive Statistics for Cargo Scanning Efficiency.

	Mean	SD	Kurtosis	Skewness	Mini	Maxi
Cargo scanner is more efficient than physical inspection	4.4	0.85	2.417	-1.608	2.00	5.00
Using cargo scanning is more effective	3.85	1.15	-0.532	-0.673	2.00	5.00
The cargo scanner uses an intensive procedure	4.19	1.01	1.206	-1.302	2.00	5.00
The time taken in scanning cargo is reduced	4.28	0.99	1.48	-1.443	3.00	5.00
The scanners for cargo are less costly	4.34	0.88	1.337	-1.334	3.00	5.00
The resources needed in cargo scanning are less costly	4.06	1.12	0.634	-1.186	2.00	5.00
Overall	4.19	1				

Source: Research Data (2024)

The results, which are displayed in Table 4.7, yielded a mean score of 4.4 and a standard deviation of 0.85, indicating that the cargo scanner is more effective than physical inspection. This indicates that most respondents agreed with the statement suggesting that technology for cargo scanning is more effective. The claim that cargo scanning yields better results was met with a mean score of 3.85 and a standard deviation of 1.15. This suggested that the majority of responders accepted the assertion, proving the efficacy of cargo scanning technology. The claim that the cargo scanner employs a rigorous process had a 4.19 mean and a 1.01 standard deviation. This indicated that the statement was supported by the majority of responders. The statement "Time taken for cargo scanning is reduced" had a mean of 4.28 and a standard deviation of 0.99. The majority of respondents, it was found, agreed with the statement that cargo scanning

technology saves time. The majority of respondents agreed with the statement that cargo scanners are less expensive, as indicated by the mean and standard deviation of 4.34 and 0.88, respectively.

Lastly, a mean of 4.06 and a standard deviation of 1.12 were obtained for the assertion that the resources required for cargo scanning are less expensive, indicating that most respondents agreed with the statement. Since the standard deviation was 1.00 and the overall mean for all the statements was 4.19, it was clear that most respondents agreed with the statements. This implied that cargo scanning technology is efficient hence can be considered to be better than traditional cargo scanning methods. These results were in line with those of Hanningtone (2022), who discovered that a decrease in the amount of hazardous goods being diverted to the local market occurred with increased cargo scanning efficiency. The results also supported those of Papa (2013), who discovered that non-intrusive scanners can significantly enhance the Customs and Security functions by checking cargo flows at both land and sea borders when paired with efficient profiling techniques.

4.5.3 Customs Declaration Scanning

The questionnaire consisted of statement regarding customs declaration scanning where the respondents indicated their level of agreement using the scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. Since most respondents agreed with the statement in question, a mean above three indicates that this was the case, whereas a mean below three indicates that this was not the case. Table 4.8 displays the outcomes.

Table 4.8: Descriptive Statistics for Customs Declaration Scanning

	Mean	SD	Kurtosis	Skewness	Min	Max
Additional steps in customs declaration scanning are effective	4.52	0.76	9.324	-2.578	4.00	5.00
Customs declaration scanners are efficient and reduce threats	4.54	0.63	3.102	-1.513	2.00	5.00
The scanning process time is shorter than traditional methods	4.48	0.84	4.757	-2.05	4.00	5.00
The cost of purchasing the equipment for customs declaration scanning is lower than traditional equipment	4.59	0.65	3.49	-1.753	2.00	5.00
The procedure for scanning customs declarations is intensive	4.59	0.65	4.353	-1.863	1.00	5.00
The resources needed for customs declaration scanning are readily available and not costly	4.36	0.93	3.534	-1.865	3.00	5.00
Overall	4.51	0.74				

Source: Research Data (2024)

The results, which are displayed in Table 4.8, demonstrated that the extra stages in customs declaration scanning are successful. The mean and standard deviation were 4.52 and 0.76, respectively. This indicates that the majority of those surveyed accepted the statement. A mean of 4.54 and a standard deviation of 0.63 were drawn to the claim that customs declaration scanners are effective and lessen hazards. This suggested that the majority of those surveyed agreed with the assertion. With a mean of 4.48 and a standard deviation of 0.84, the claim that the scanning procedure takes less time than conventional methods was made. This indicated that the majority of those surveyed agreed with the assertion. The statement "Buying equipment for customs declaration scanning is less expensive than traditional equipment" had a mean of 4.59 and a standard deviation of 0.65. This showed that the statement was accepted by the majority of responders. The assertion that the process for screening customs declarations is extensive has a mean and standard deviation of 4.59 and 0.65, respectively, indicating that most respondents agreed with the statement.

The majority of respondents, as indicated by the mean of 4.36 and standard deviation of 0.93, agreed with the statement regarding the procedure for the resources needed for customs declaration scanning being easily accessible and affordable. With a mean score of 4.51 across all claims and a standard deviation of 0.74, it was evident that most respondents agreed with the statements. This implied that customs declaration technology is efficient hence can be considered to be better than traditional cargo scanning methods. These results were in line with those of Kipkoech (2020), who discovered that customs verification and release significantly increased performance. This also rhymed with Heath, Martin and Nguyen (2002) who found that effective utilization of scanning technological attributes in customs declaration scanning contributes to the facilitation of international trade by reducing delays, minimizing administrative burdens, and promoting compliance with customs regulations.

4.5.4 Scanning Technology Integration

The questionnaire consisted of statement regarding scanning technology integration where the respondents indicated their level of agreement using the scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. As a result, a mean greater than three indicated that most respondents agreed with the specific statement, whilst a mean lower than three indicated that most respondents disagreed with it. The results are shown in Table 4.9.

Table 4.9: Descriptive Statistics for Scanning Technology Integration

	Mean	SD	Kurtosis	Skewness	Min	Max
Security measures has been put in place to avoid failure and threats of the technology	3.85	1.34	0.02	-1.142	3.00	5.00
All employees working with the scanner technology system in the custom department are properly trained	3.94	1.35	0.118	-1.21	2.00	5.00
Downtime due to internet outages are sometimes experienced	3.7	1.37	-0.419	-0.951	2.00	5.00
Departmental employees ensures that customers and other stakeholders are satisfied	3.81	1.31	0.361	-1.245	2.00	5.00
Department has adopted offsite server hosting and cloud hosting to mitigate loses during internet outages	4.1	1.23	1.271	-1.518	2.00	5.00
Both fibre optic and cable internet providers have been contracted to avoid delays in internet connections	3.97	1.22	1.216	-1.467	2.00	5.00
Scanning technology hardware is regularly replaced to mitigate technology downtime	4.06	1.17	1.738	-1.568	2.00	5.00
Overall	3.92	1.28				

Source: Research Data (2024)

The findings, which are displayed in Table 4.9, demonstrated that security precautions have been taken to prevent technological failure and threats. The mean score was 3.85, with a standard deviation of 1.34. This indicates that the statement was accepted by the majority of responders. The claim that all staff members in the custom department who use the scanning technology system are appropriately taught garnered a mean score of 3.94 and a standard deviation of 1.35. This suggested that the statement was accepted by the majority of responders. The statement "Internet outages occasionally cause downtime" had a mean of 3.70 and a standard deviation of 1.37. This indicated that the statement was accepted by the majority of responders. The statement "Departmental employees ensure the satisfaction of customers and other stakeholders" had a mean of 3.81 and a standard deviation of 1.31. This showed that the statement was accepted by the majority of respondents. The majority of respondents affirmed the assertion that the

department has utilized offsite server hosting and cloud hosting to limit losses during internet outages, as indicated by the mean and standard deviation of 4.10 and 1.23, respectively.

Furthermore, the majority of respondents affirmed the statement, as indicated by its mean of 3.97 and standard deviation of 1.22, which stated that both fiber optic and cable internet providers have been hired to prevent delays in internet connections. Lastly, the majority of respondents agreed with the statement that replacing technological gear on a regular basis helps reduce downtime. This statement received a mean score of 4.06 and a standard deviation of 1.17. The majority of respondents agreed with the claims, as indicated by the overall mean of 3.92 and the standard deviation of 1.28 for all the statements. This implied that scanning technology integration has been adopted at JKIA and has improved the scanning process. These findings concur with Medalia (2010) that Scanning technological attributes is integrated into the overall customs workflow, facilitating the electronic submission and processing of customs declarations. This streamlines administrative procedures, reduces paperwork, and accelerates the clearance process for legitimate shipments.

4.5.5 Technology Staff Competence

The questionnaire consisted of statement regarding technology staff competence where the respondents indicated their level of agreement using the scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. Since most respondents agreed with the statement in question, a mean above three indicates that this was the case, whereas a mean below three indicates that this was not the case. Table 4.10 displays the outcomes.

Table 4.10: Descriptive Statistics for Technology Staff Competence

	Mean	SD	Kurtosis	Skewness	Min	Max
The level of technology staff competence influences your ability to effectively leverage scanning technological attributes for enhancing custom revenue performance	4.3	1.05	-1.985	3.609	2.00	5.00
I have the capability to operate all the hardware, software, networks, and facilities of the Scanning technology at the customs department	4.4	0.91	-2.242	5.68	1.00	5.00
I understand all the features of the scanning technology infrastructure	4.31	1.06	-1.958	3.389	2.00	5.00
Our human resource personnel possess the required scanning human resource competence	4.46	0.96	-2.354	5.567	2.00	5.00
The technological human resource competence helps us solve custom problems and address customs opportunities through scanning process.	4.31	0.89	-1.894	4.49	2.00	5.00
The role of technology staff competence is related in shaping decision-making processes strategies	4.5	0.76	-2.079	5.774	2.00	5.00
Overall	4.38	0.94				

Source: Research Data (2024)

The results shown in Table 4.10 showed that the statement the level of technology staff competence influences your ability to effectively leverage scanning technological attributes for enhancing custom revenue performance produced a mean of 4.30 and a standard deviation of 1.05. This means that the majority of the respondents agreed to the statement. The claim that every employee in the customs department is capable of operating all of the scanning technology's hardware, software, networks, and facilities had a mean score of 4.40 and a standard deviation of 0.91. This suggested that the majority of those surveyed agreed with the assertion. The mean and standard deviation of the statement "I understand all the features of the scanning technology infrastructure" were 4.31 and 1.06, respectively. This indicated that the majority of those surveyed

agreed with the assertion. The standard deviation was 0.95 and the mean was 4.46 for the statement "Our human resource personnel possess the required scanning human resource competence are satisfied." This showed that the statement was accepted by the majority of responders. The statement that technical human resource competency helps us solve customs difficulties and address customs opportunities through the scanning process has a mean of 4.31 and a standard deviation of 0.89, respectively. These numbers indicate that the majority of respondents agreed with the statement.

Lastly, a mean of 4.50 and a standard deviation of 0.76 were obtained for the statement "The role of technology staff competence is related in shaping decision-making processes strategies," indicating that the majority of respondents agreed with the statement. The majority of respondents agreed with the claims, as indicated by the overall mean of 4.38 and the standard deviation of 0.94 for all the statements. This suggested that most staff members possess a good understanding of technology, enabling them to use it for scanning. These results support Zhang and Tansuhaj's (2007) claim that technological architecture, technological infrastructure, human resources technology, and technological relationship resource may all be used to gauge technological competency.

4.5.6 Custom Revenue Performance

The questionnaire consisted of statement regarding customs revenue performance where the respondents indicated their level of agreement using the scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. Since most respondents agreed with the statement in question, a mean above three indicates that this was the case, whereas a mean below three indicates that this was not the case. Table 4.11 displays the outcomes.

Table 4.11: Descriptive Statistics for Customs Revenue Performance

	Mean	SD	Kurtosis	Skewness	Min	Max
Amount of custom revenue has increased overtime	4.49	0.78	6.912	-2.286	3.00	5.00
There has been reduction in time taken for customs procedures since the adoption of scanning technology	4.22	1.01	3.3	-1.817	2.00	5.00
The cost of verifying goods at the customs is minimal	4.2	0.98	3.491	-1.823	3.00	5.00
The cost incurred at the customs department has been reduced	4.52	0.5	-2.019	-0.075	2.00	5.00
The customs process for clearing goods has been simplified	4.5	0.5	-2.025	0	1.00	5.00
The risks associated with customs revenue has been reduced	4.2	1.12	2.453	-1.744	2.00	5.00
It is now possible to identify and intercept high-risk goods with greater efficiency.	4.06	1.18	1.551	-1.533	2.00	5.00
The transparency in baggage and cargo related transactions has been enhanced	4.08	1.09	2.355	-1.663	1.00	5.00
Overall	4.28	0.89				

Source: Research Data (2024)

The findings displayed in Table 4.11 demonstrated that the custom revenue statement has grown over time, with a mean of 4.49 and a standard deviation of 0.78. This indicates that the statement was accepted by the majority of responders. The claim that customs processes take less time now that scanning technology has been implemented had a mean score of 4.22 and a standard deviation of 1.01. This suggested that the statement was accepted by the majority of respondents. The mean and standard deviation of the statement "The cost of verifying goods at the customs is minimal" were 4.20 and 0.98, respectively. This indicated that the statement was supported by the majority of responders. The statement's mean The standard deviation was 0.50 and the expense expended at the customs department was decreased to 4.52. This demonstrated that the majority of responders accepted the assertion. The majority of respondents

agreed with the assertion that the customs process for clearing products has been simplified, as indicated by the mean and standard deviation of 4.50 and 0.50, respectively. Moreover, the majority of respondents agreed with the assertion that the risks related to customs income have decreased, as indicated by the statement's mean of 4.20 and standard deviation of 1.12. Additionally, the claim that higher-risk goods may now be identified and interdicted had a mean of 4.06 and a standard deviation of 1.18. This indicates that the majority of respondents agreed with the statement.

Lastly, the majority of respondents agreed with the assertion that there has been an enhancement in the transparency of transactions relating to baggage and cargo, as demonstrated by the mean score of 4.08 and standard deviation of 1.09. The majority of respondents agreed with the claims, as indicated by the overall mean of 4.28 and the standard deviation of 0.89 for all the statements. This suggested that JKIA's customs revenue performance has been improving. These results were consistent with those of Čevers and Gaile-Sarkane (2019), who defined time, cost, simplification, and risk as the four high level outcomes that can be utilized to quantify Custom Revenue Performance. It was also in line with Wei's (2013) claim that the speed and cost of clearance can be used to gauge the success of custom income generation.

4.6 Assumptions of Linear Regression

The assumptions of regression were tested to determine if the dataset was fit to perform regression analysis. These tests included heteroscedasticity, multicollinearity, normality and linearity.

4.6.1 Homoscedasticity

The Breusch-Pagan test was used to check for homoscedasticity. The homoscedasticity null hypothesis is evaluated by the test. In a linear regression model, this test is used to

find homoscedasticity. The relationship between the independent variables and the squared residuals is investigated. Regressing the squared residuals on the independent variables yields the Breusch-Pagan statistic, which is then tested for significance using the F-statistic. Homoscedasticity affects the model if the F-statistic is significant (Raza, Ahmed, Razzaque & Hina, 2023). The Breusch Pagan test was therefore selected since the study performed a linear regression. Therefore, p values less than 0.05 means there is heteroscedasticity. Table 4.12 resents the results.

Table 4.12: Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of rental income tax compliance	
chi2(1)	= 1.28
Prob > chi2	= 0.1336

Source: Research Data (2024)

More than 0.05 was shown by the p value of 1.00 that was obtained. It was determined that the data did not exhibit heteroskedasticity as a result of the null hypothesis of homoscedasticity not being rejected. Therefore, the data was fit to perform a regression analysis

4.6.2 Normality

To assess the normality of the dataset, the Skewness and Kurtosis test was adopted. To test if the data comes from a normally distributed population, skewness and kurtosis statistics are observed. The distribution can be deemed normal if the skewness or kurtosis values are both smaller than ± 1.0 , indicating that the distribution's skewness or kurtosis falls within the normal range. The distribution cannot be regarded as normal

if the values are greater than ± 1.0 because the skewness or kurtosis of the distribution falls outside the range of normalcy. Skewness and Kurtosis test were selected since it works well with even big samples and is more efficient than the graphical method (Hatem, Zeidan, Goossens & Moreira, 2022). The results were tabulated in Table 4.13.

Table 4.13: Shapiro Wilk Test for Normality

	Obs	W	V	z	Prob>z
Baggage scanning accuracy	162	0.995	0.594	-1.184	0.882
Cargo scanning efficiency	162	0.996	0.438	-1.877	0.970
Customs declaration scanning	162	0.996	0.458	-1.776	0.962
Scanning technology integration	162	0.990	1.298	0.593	0.277
Technology Staff Competence	162	0.970	1.711	0.984	0.601
Customs Revenue Performance	162	0.978	0.678	1.242	0.912

Source: Research Data (2024)

The results for table 4.13 showed that for baggage scanning accuracy ($W = 0.995$, $p = .882$), cargo scanning efficiency ($W = 0.996$, $p = .970$), customs declaration scanning ($W = 0.996$, $p = .962$), scanning technology integration ($W = 0.990$, $p = .277$), technology staff competence ($W = 0.970$, $p = .601$), and customs revenue performance ($W = 0.978$, $p = .912$) all showed p-values greater than .05. Therefore, the distributions of all study variables did not significantly deviate from normality, suggesting that each variable was approximately normally distributed according to the Shapiro-Wilk test.

4.6.3 Multicollinearity

Multicollinearity among the variables was tested by using the Variance inflation test. In a multiple regression model, a variance inflation factor (VIF) gives an indication of how multicollinear the independent variables are. According to Tay (2017), it measures the extent to which the presence of associated predictors has inflated the variance of the

estimated coefficients for each predictor variable. The VIF test was therefore the most suitable because the study estimated a multiple linear regression. This test produces VIF statistics and values less than 10 show absence of multicollinearity. The results were as shown in Table 4.14.

Table 4.14: VIF test for Multicollinearity

Variable	Tolerance	VIF
Baggage scanning accuracy	0.62	1.613
Cargo scanning efficiency	0.786	1.273
Customs declaration scanning	0.628	1.592
Scanning technology integration	0.723	1.382

Source: Research Data (2024)

As indicated in Table 4.14, the VIF value for the variable baggage scanning accuracy was 1.613, the value for cargo scanning efficiency was 1.273, the value for customs declaration scanning was 1.592 and the value for scanning technology integration was 1.382. All these values were less than 10 hence revealing that there is no multicollinearity. This suggested that regression analysis may be carried out on the data.

4.6.4 Linearity

The residual plots were used to check for linearity. The residual plot displays both the degree of linearity and its direction as well as the degree of divergence from linearity. Single least squares fit yields a wealth of information, much of which is succinctly shown in these charts (Darlington & Hayes, 2016). Figure 4.2 shows the results.



Figure 4.2: Linearity Test

Source: Research Data (2024)

The results showed that there is a linear relationship among the independent variables and the dependent variable. This implied that the data was fit to run a regression analysis.

4.7 Correlation Analysis

To determine the association that exists between the independent variables and the dependent variable in the study in terms of strength and direction, a correlation analysis was performed. Table 4.15 presents the correlation matrix showing the correlation coefficients thereof.

The results revealed a positive and significant correlation between baggage scanning accuracy and customs revenue performance ($r=0.617$) for a two tailed test. This means that the correlation between baggage scanning accuracy and customs revenue performance is significant at 99% confidence level. This implied that whenever baggage scanning accuracy would increase, customs revenue performance would also increase. This was in line with John Smith (2019) who found a positive correlation between higher baggage scanning accuracy rates and increased custom revenue performance.

The results also revealed a positive and significant correlation between cargo scanning efficiency and customs revenue performance ($r=0.461$) for a two tailed test. Therefore, the correlation can be explained to be significant at 99% confidence level. This means that customs revenue performance would increase with increase in cargo scanning efficiency. This was in line with Nganda (2021) who found out that that improving automation of customs release process such as cargo scanning leads to improved custom revenue performance.

The results further revealed that there is a positive and significant correlation between customs declaration scanning and customs revenue performance ($r=0.584$, $P=0.000$) for a two tailed test. Therefore, the correlation between customs declaration scanning and customs revenue performance is significant at 99% confidence level. This means that the correlation between customs declaration scanning and customs revenue performance is significantly different from zero at 99% confidence level. This implies that when customs declaration scanning increase, customs revenue performance also increases. This was consistent with the findings of Hannington (2022), who discovered a strong positive association between the performance of customs revenue and the scanning of customs declarations.

Finally, the findings showed that scanning technology integration and customs revenue performance have a positive and significant association ($r=0.539$, $p=0.000$) for a two tailed test. Therefore, customs revenue performance would go up when scanning technology integration is increased. This was in line with the findings by Njigigua and Mincu (2018) who established that integrated positively impacted on the Custom Revenue Performance.

Table 4.15: Correlation Matrix

	A	B	C	D	E	F	G
Customs Revenue Performance	1						
Baggage scanning accuracy	.617**	1					
Cargo scanning efficiency	.461**	.351**	1				
Customs declaration scanning	.584**	.510**	.389**	1			
Scanning technology integration	.539**	.441**	.314**	.357**	1		
technology staff competence	.449**	.332**	.211*	.335**	.213**	1	

Source: Research Data (2024)

4.8 Regression Analysis

4.8.1 Model Summary Without moderator

This was useful in testing hypothesis one to hypothesis four. It was evidenced by the study findings that the independent variables of the study which were baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning and scanning technology integration explain 56.2% of all the variations in customs revenue performance. This means that there are other variables that were not included in this study that could explain the remaining 43.8% of the variances in customs revenue performance.

Table 4.16: Model Summary without Moderator

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.750	0.562	0.551	0.220897

Source: Research Data (2024)

4.8.2 Analysis of Variance without moderator

Table 4.17 shows that the variation caused by the effects of scanning accuracy, cargo scanning efficiency, customs declaration scanning and scanning technology integration on custom revenue performance was statistically significant $F=33.214$, $p\text{-value}=0.000<0.05$.

Table 4.17: Analysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.844	6	1.641	33.214	0.000
Residual	7.657	155	0.049		
Total	17.501	161			

Source: Research Data (2024)

4.8.3 Regression coefficient Analysis without moderator

The independent variables and the dependent variable. The regression equation was

$$Y = 1.887 + 0.115C_1 + 0.180X_1 + 0.106X_2 + 0.180X_3 + 0.107X_4$$

Table 4.18 shows that the coefficient regression without the moderator indicates that a positive and significant coefficient for the relationship between baggage scanning accuracy and customs revenue performance ($\beta=0.180$, $P=0.000$). This implied that if baggage scanning accuracy is increased by one unit, customs revenue performance would be increase by 0.18 units.

The findings also showed that the coefficient for cargo scanning efficient and customs revenue performance was positive and significant ($\beta=0.106$, $P=0.005$). Therefore, with a one-unit increase in cargo scanning efficiency, customs revenue performance would increase by 0.106 units. It was further revealed that the coefficient for the relationship between customs declaration scanning and customs revenue performance was positive and significant ($\beta=0.180$, $P=0.000$). Hence increasing customs declaration scanning by one unit would lead to 0.18 units increment in customs revenue performance.

Finally, the coefficient for the relationship between scanning technology integration and customs revenue performance was positive and significant ($\beta=0.107$, $p=0.000$). Therefore, when scanning technology integration is increased by one unit, customs revenue performance would increase by 0.107 units.

Table 4.18: Coefficients of Regression

	Standardized Coefficients β	Std Err	t	Sig.
(Constant)	1.887	0.365	5.169	0.000
Baggage scanning accuracy	0.180	0.026	6.923	0.000
Cargo scanning efficiency	0.106	0.017	6.235	0.005
Customs declaration scanning	0.180	0.045	4.000	0.000
Scanning technology integration	0.107	0.016	6.688	0.000

(Source: Research 2024)

4.9 Moderation Analysis

The Hierarchical Regression was used to test the moderating effect of technology staff competence on the link between scanning technological attributes and custom revenue performance at the Jomo Kenyatta International Airport.

4.9.1 Model Summary with moderator

The model summary on table 4.19 shows that there is a moderating effect caused by technology staff competence on the link between scanning technological attributes and custom revenue performance since the correlation improves from 75% to 76% after moderation, also the variation caused on custom revenue performance improves from 56.3% to 57.8% in the final overall model. The remaining 42.2% variation is caused by factors not captured in the model

4.9.2 ANOVA with Moderator

The Analysis of variance on table 4.19 showed a constant increase in the F statistic showing that the change in variance is attributed by moderating effects of technology staff competence on the link between scanning technological attributes and custom revenue performance $F=18.647$ $p\text{-value}=0.000$

4.10 Hierarchical Regression analysis

The regression models for each model after introduction of a moderator are

Model (ii) : $Y = 1.980 + 0.115C_1 + 0.112X_1 + 0.079X_2 + 0.091X_3 + 0.077X_4 + 0.187M$

Model (iii): $Y = 2.784 + 0.109C_1 + 0.046X_1 + 0.060X_2 + 0.109X_3 + 0.075X_4 + 0.012M + 0.047X_1 * M$

Model (iv): $Y = 2.832 + 0.108C_1 + 0.074X_1 + 0.052X_2 + 0.107X_3 + 0.075X_4 + 0.033M + 0.047X_1 * M + 0.004X_2 * M$

Model (v): $Y = 2.830 + 0.108C_1 + 0.074X_1 + 0.051X_2 + 0.107X_3 + 0.075X_4 + 0.034M + 0.047X_1 * M + 0.004X_2 * M + 0.013 X_3 * M$

Model (vi): $Y = 3.415 + 0.108C_1 + 0.138X_1 + 0.041X_2 + 0.110X_3 + 0.033X_4 + 0.214M + 0.057X_1 * M + 0.010X_2 * M + 0.135 X_3 * M + 0.031 X_4 * M$

Table 4.19 shows that unit change in baggage scanning accuracy caused a 0.138 increase in custom revenue performance, the study further showed that a unit change in cargo scanning efficiency caused a 0.041 increase in custom revenue performance. Further investigation showed that a unit change in customs declaration scanning causes a 0.110 increase in custom revenue performance. Also, a unit change in scanning technology integration causes a 0.033 increase in custom revenue performance. A unit change in technology staff competence causes a 0.214 increase in custom revenue performance. Lastly the coefficient model showed that technology staff competence moderates the effects of baggage scanning accuracy on custom revenue performance $\beta=0.057$ p-value $=0.000<0.05$. technology staff competence also moderates the effects of cargo scanning efficiency accuracy on custom revenue performance $\beta=0.010$ p-value $=0.003<0.05$. technology staff competence also moderates the effects of customs declaration scanning on custom revenue performance $\beta=0.135$ p-value $=0.002<0.05$. Lastly technology staff competence moderates the effects of scanning technology integration on custom revenue performance $\beta=0.031$ p-value $=0.013<0.05$.

The regression model showing the steps of moderation was summarized on table 4.19.

Table 4.19: Coefficients of Regression

	Mode I Direct effects no moderator	Model Moderator	II Model III 1st interaction	Model IV 2nd interaction	Model V 3rd Interaction	Model VI 4th Interaction
Baggage scanning accuracy	0.180 (0.026)*	0.112 (0.049)*	0.046(0.022)*	0.074(0.021)*	0.074(0.012)*	0.138(0.053)*
Cargo scanning efficiency	0.106 (0.017)*	0.079(0.028)*	0.060(0.015)*	0.052(0.011)*	0.051(0.016)*	0.041(0.020)*
Customs declaration scanning	0.180 (0.045)*	0.091(0.031)*	0.109(0.045)*	0.107(0.041)*	0.107(0.017)*	0.110(0.049)*
Scanning technology integration	0.107 (0.016)*	0.077(0.011)*	0.075(0.034)*	0.075(0.021)*	0.075(0.023)*	0.033(0.012)*
technology staff competence		0.187(0.033)*	0.012(0.002)*	0.033(0.010)*	0.034(0.011)*	0.214(0.103)*
Baggage scanning accuracy* technology staff competence			0.047(0.008)*	0.047(0.022)*	0.047(0.023)*	0.057(0.011)*
Cargo scanning efficiency* technology staff competence				0.004(0.001)*	0.004(0.001)*	0.010(0.003)*
Customs declaration scanning* technology staff competence					0.013(0.003)*	0.135(0.040)*
Scanning technology integration* technology staff competence						0.031(0.012)*
F statistic	33.214*	28.459*	25.354*	22.528*	20.393*	18.647*
R	0.750	0.751	0.755	0.756	0.758	0.760
R Square	0.563	0.564	0.570	0.572	0.575	0.578
R Square Δ	0.563	0.002*	0.006*	0.002*	0.003*	0.003*

Dependent Variable: custom revenue performance

* Significant at 95% confidence level () shows standard error

4.10.1 Mod graphs

Mod graphs were computed to show the effect of scanning technological attributes on custom revenue performance at different levels of Technology Staff Competence.

Figure 4.3 shows the Mod graph for the moderation effect of technology staff competence on the link between baggage scanning technology and customs revenue performance.

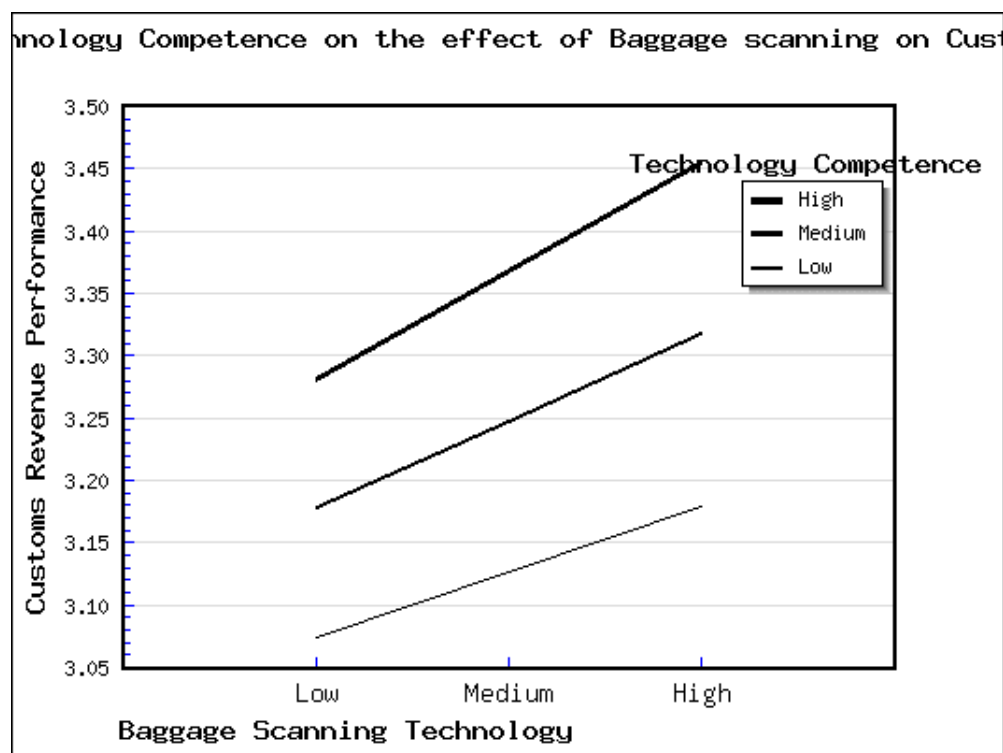


Figure 4.3: Mod Graph Technology Staff Competence, Baggage Scanning Technology and Customs Revenue Performance

The figure shows that the steepest slope is the one for high Technology Staff Competence. This means that the highest link between baggage scanning technology and customs revenue performance occurs when there is a high level of Technology Staff Competence. This implies that technology staff competence enhances the positive effect of baggage scanning technology on customs revenue performance. With high

levels of Technology Staff Competence, baggage scanning technology increases customs revenue performance by a higher percentage than at low Technology Staff Competence.

Figure 4.4 shows the Mod graph for the moderation effect of technology staff competence on the link between cargo scanning technology and customs revenue performance.

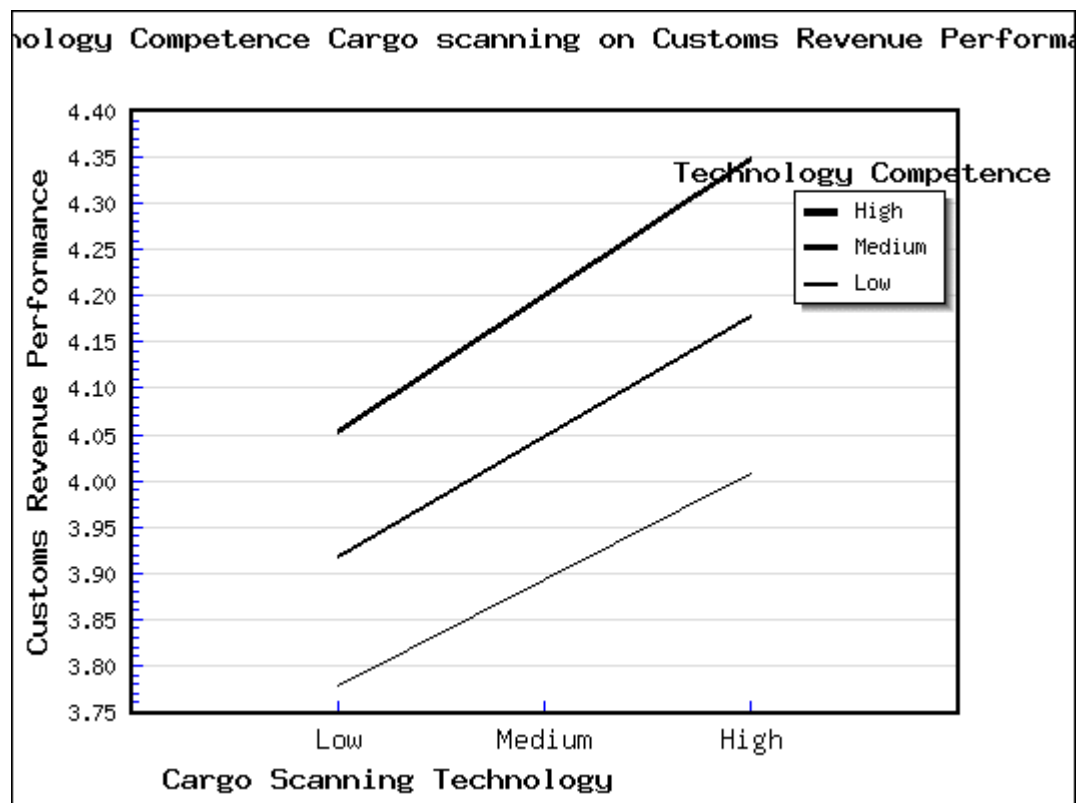


Figure 4.4: Mod Graph Technology Staff Competence, Cargo Scanning Technology and Customs Revenue Performance

The figure shows that the steepest slope is the one for high Technology Staff Competence. This means that the highest link between cargo scanning technology and customs revenue performance occurs when there is a high level of Technology Staff Competence. This implies that technology staff competence enhances the positive effect of cargo scanning technology on customs revenue performance. With high levels

of Technology Staff Competence, cargo scanning technology increases customs revenue performance by a higher percentage than at low Technology Staff Competence.

Figure 4.5 shows the Mod graph for the moderation effect of technology staff competence on the link between customs declaration technology and customs revenue performance.

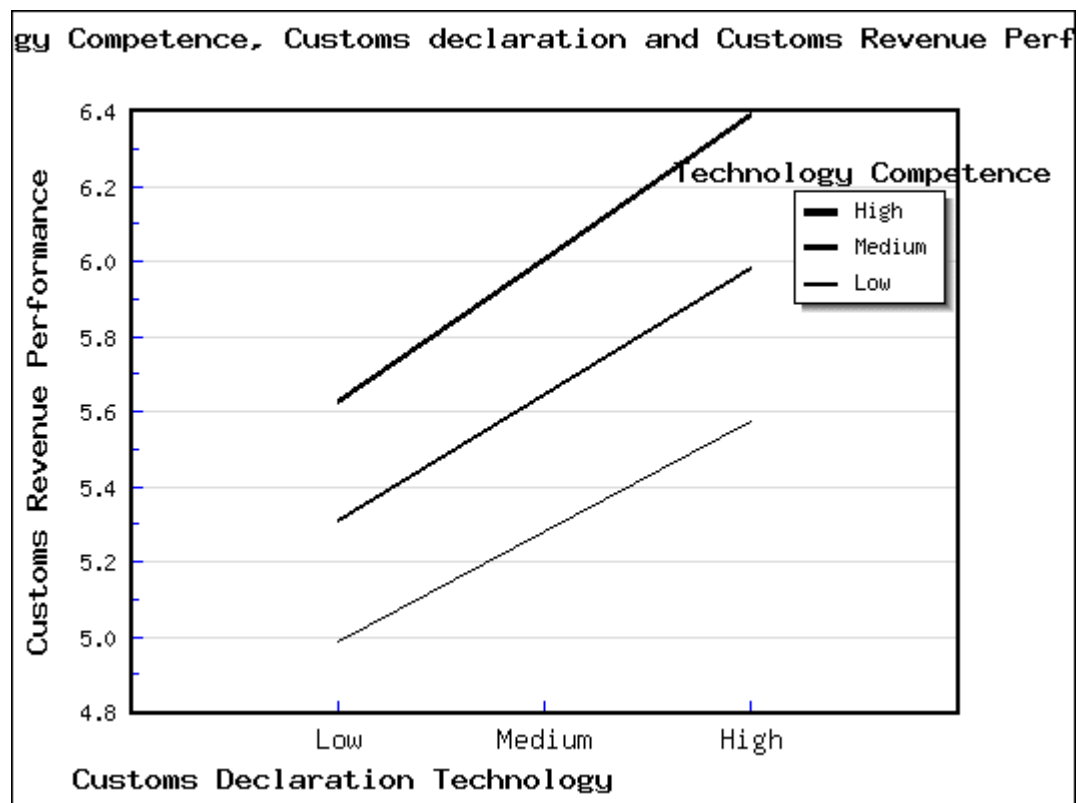


Figure 4.5: Mod Graph technology staff competence, Customs Declaration Technology and Customs Revenue Performance

The figure shows that the steepest slope is the one for high technology staff competence. This means that the highest link between customs declaration technology and customs revenue performance occurs when there is high level of technology staff competence. This implies that technology staff competence enhances the positive effect of customs declaration technology on customs revenue performance. With high levels of

technology staff competence, customs declaration technology increases customs revenue performance by a higher percentage than at low technology staff competence.

Figure 4.6 shows the Mod graph for the moderation effect of technology staff competence on the link between scanning technology integration and customs revenue performance.

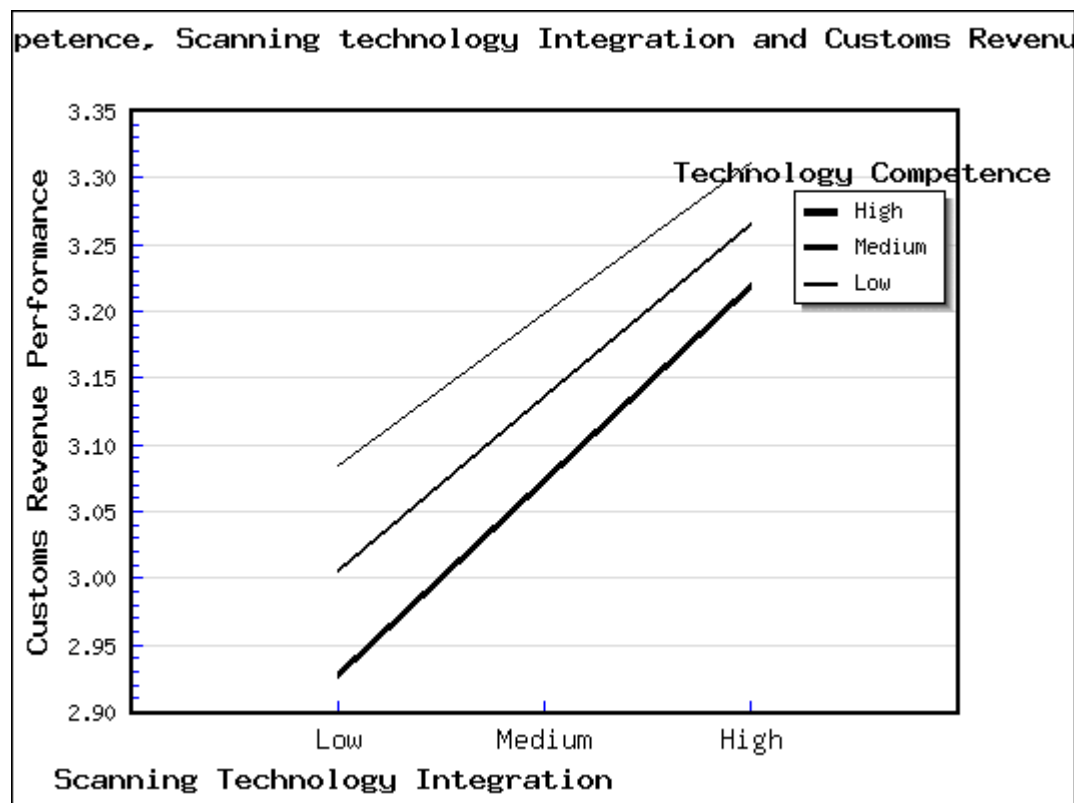


Figure 4.6: Mod Graph technology staff competence, Scanning Technology Integration and Customs Revenue Performance

The figure shows that the steepest slope is the one for high low technology staff competence. This means that the highest link between scanning technology integration and customs revenue performance occurs when there is low level of technology staff competence. This implies that technology staff competence does not enhance the positive effect of scanning technology integration on customs revenue performance

4.11 Discussion of the Key Findings

4.11.1 Baggage scanning accuracy and Custom Revenue Performance

The first objective of the study was to determine the effect of baggage scanning accuracy on custom revenue performance at the Jomo Kenyatta International Airport. The findings of correlation analysis revealed a positive and significant correlation between baggage scanning accuracy and customs revenue performance $r=0.617$ ($p\text{-values}=0.000<0.05$) implying that when baggage scanning accuracy increases customs revenue performance also increases. The findings on multiple linear regression were similar to the correlation findings where a positive and statistically significant effect of baggage scanning accuracy on customs revenue performance $\beta=0.138$ ($p\text{-value}=0.010<0.05$). This implied that increasing baggage scanning accuracy will result in an increase in customs revenue performance. This concurred with Cheruiyot (2019) who established that custom escort which includes scanning is statistically significant at enhancing collection of revenues. It also agreed with Mumia (2021) enhancing automation of baggage cargo scanning leads to enhancement of Custom Revenue Performance.

4.11.2 Cargo scanning efficiency and Custom Revenue Performance

The second objective was to examine the effect of cargo scanning efficiency on custom revenue performance at the Jomo Kenyatta International Airport. Correlation analysis revealed a positive and statistically significant association between cargo scanning efficiency and customs revenue performance $r=0.461$ ($p\text{-values}=0.000<0.05$) which meant that when cargo scanning efficiency goes up, customs revenue performance also goes up. Similarly, regression analysis revealed a positive and statistically significant effect of cargo scanning efficiency on customs revenue performance $\beta=0.041$ ($p\text{-value}=0.048<0.05$). This implied that an increment in cargo scanning efficiency would result

in an increment in customs revenue performance. This was in line with the findings of Omosa, Ogaga, and Cheboi (2020), who discovered a substantial relationship between the effectiveness of cargo scanning and the performance of customs revenue.

4.11.3 Customs declaration scanning and Custom Revenue Performance

The third objective was to investigate the effect of customs declaration scanning on custom revenue performance at the Jomo Kenyatta International Airport. The results of the correlation between customs declaration scanning and customs revenue performance also presented a positive and statistically significant association $r=0.584$ ($p\text{-value}=0.000<0.05$) which was an indication that when customs declaration scanning increases, customs revenue performance also increases. Similar findings were obtained in the regression analysis where a positive and statistically significant effect of customs declaration scanning on customs revenue performance $\beta=0.110$ ($p\text{-value}=0.010<0.05$) was found. This means that if customs declaration scanning is increased, customs revenue performance would be increased. This was in however in contrast with Mpekethu (2018) whose findings indicated that customs verification procedures such as customs declaration scanning had negative effects on import business performance for small importers.

4.11.4 Scanning technology integration and Custom Revenue Performance

The fourth specific objective was to assess the effect of scanning technology integration on custom revenue performance at the Jomo Kenyatta International Airport. The findings from the correlation analysis revealed a positive and significant correlation between scanning technology integration and customs revenue performance $r=0.539$ ($p\text{-value}=0.000<0.05$). The regression analysis results also revealed a positive and significant effect of scanning technology integration on customs revenue performance $\beta=0.033$ ($p\text{-value}=0.022<0.05$), implying that whenever scanning technology

integration is increased, customs revenue performance increases. This was consistent with the findings of Metet, Gitonga, and Kipsang (2021), who found that the KRA customs department performs better when its scanning equipment is updated on a regular basis.

4.11.5 Moderating Role of Technology Staff Competence

The first specific objective was to test the moderating effect of technology staff competence on the link between scanning technological attributes and custom revenue performance at the Jomo Kenyatta International Airport. The results showed that technology has a positive and significant correlation to Custom Revenue Performance $r = 0.449$ $p\text{-value} = 0.000 < 0.05$. This implies that as technology staff competence improves so does Custom Revenue Performance. The study further showed that the technology staff competence significantly moderates the relationship between baggage scanning accuracy and customs revenue performance. $\beta = 0.057$ ($p\text{-value} = 0.000 < 0.05$). An significant moderation effect of technology staff competence on the link between cargo scanning efficiency and customs revenue performance $\beta = 0.010$ ($p\text{-value} = 0.003 < 0.05$). It was found that technology staff competence significantly moderates the link between customs declaration scanning and customs revenue performance $\beta = 0.135$ ($p\text{-value} = 0.002 < 0.05$). The results further established that technology staff competence significantly moderates the relationship between scanning technology integration and customs revenue performance $\beta = 0.031$ ($p\text{-value} = 0.013 < 0.05$), implying that increase in scanning technology integration with technologically competent staff would increase customs revenue performance more than with technologically incompetent staff. This was in line with the findings of Amoako et al. (2022), who discovered that employee technical efficacy and competence have a positive and significant impact on the execution of e-HRM successfully.

4.12 Hypotheses Testing

Table 4.20 shows the final decision on the hypotheses. The study found that Hypothesis H01, which posited that baggage scanning accuracy has no statistically significant relationship with customs revenue performance, was rejected based on a p-value of 0.010, which is less than the significance threshold of 0.05. Hypothesis H02, asserting that cargo scanning efficiency has no statistically significant relationship with customs revenue performance, was also rejected. The p-value of 0.048 is less than 0.05, indicating a statistically significant relationship.

Hypothesis H03 suggested that customs declaration scanning has no statistically significant relationship with customs revenue performance. This hypothesis was rejected, with a p-value of 0.010, again less than 0.05, confirming a significant relationship. Hypothesis H04, which stated that scanning technology integration has no statistically significant relationship with customs revenue performance, was rejected as well. The p-value for this hypothesis was 0.022, below the 0.05 threshold, indicating statistical significance. Regarding the moderating effects of technology staff competence, hypothesis H05a proposed that technology staff competence does not moderate the relationship between baggage scanning accuracy and customs revenue performance. This hypothesis was rejected with a p-value of 0.000, significantly below 0.05. Hypothesis H05b posited that technology staff competence does not moderate the relationship between cargo scanning efficiency and customs revenue performance. This hypothesis was rejected, with a p-value of 0.003, demonstrating a statistically significant moderating effect. Hypothesis H05c, which stated that technology staff competence does not moderate the relationship between customs declaration scanning and customs revenue performance, was also rejected. The p-value of 0.002, less than 0.05, indicates a significant moderating role of technology staff competence. Lastly,

hypothesis HO5d suggested that technology staff competence does not moderate the relationship between scanning technology integration and customs revenue performance. This hypothesis was rejected with a p-value of 0.013, confirming a statistically significant moderating effect. In summary, all hypotheses were rejected, indicating significant relationships between the various scanning technologies and customs revenue performance, as well as the moderating role of technology staff competence.

Table 4.20: Hypotheses Testing

No	Hypothesis	P value	Decision
H0 ₁	Baggage scanning accuracy has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport	0.010	Reject
H0 ₂	Cargo scanning efficiency has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport	0.048	Reject
H0 ₃	Customs declaration scanning has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport	0.010	Reject
HO ₄	Scanning technology integration has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport	0.022	Reject
HO _{5a}	Technology staff competence does not moderate the relationship between baggage scanning accuracy and custom revenue performance at the Jomo Kenyatta International Airport.	0.000	Reject
HO _{5b}	Technology staff competence does not moderate the relationship between cargo scanning efficiency and custom revenue performance at the Jomo Kenyatta International Airport	0.003	Reject
HO _{5c}	Technology staff competence does not moderate the relationship between customs declaration scanning and custom revenue performance at the Jomo Kenyatta International Airport.	0.002	Reject
HO _{5d}	Technology staff competence does not moderate the relationship between scanning technology integration and custom revenue performance at the Jomo Kenyatta International Airport.	0.013	Reject

Source: Research Data (2024)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter consists of a summary of the study findings together with the conclusions of the study and the recommendations for practice, and policy and the contribution to knowledge. The chapter ends with recommendations for further research.

5.2 Summary

5.2.1 Baggage scanning accuracy and Custom Revenue Performance

The study found that majority of the respondents agreed with the statements that showed that baggage scanning technology is accurate. According to these findings, baggage scanning technology is efficient and effective, reduces delays and is not costly. Results also showed that baggage scanning technology is intensive. The correlation analysis further revealed a positive and significant correlation between baggage scanning accuracy and customs revenue performance $r=0.617$ ($p\text{-values}=0.000$). The regression analysis further revealed a positive and significant effect of baggage scanning accuracy on customs revenue performance $\beta=0.138$ ($p\text{-value}=0.010$). Based on this, the hypothesis that Baggage scanning accuracy has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport was reduced.

5.2.2 Cargo scanning efficiency and Custom Revenue Performance

The descriptive analysis revealed that majority of the respondents agreed with the statements defining cargo scanning efficiency revealing that cargo scanning is efficient. These findings showed that cargo scanning technology is efficient and effective, reduces time, is less costly and is intensive. The results of correlation analysis showed a positive and significant correlation between cargo scanning efficiency and customs

revenue performance $r=0.461$ ($p\text{-values}=0.000$). The outcomes of the regression study also demonstrated a strong and positive effect of cargo scanning efficiency on customs revenue performance $\beta=0.041$ ($p\text{-value}=0.048$). The hypothesis that Cargo scanning efficiency has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport was therefore rejected.

5.2.3 Customs declaration scanning and Custom Revenue Performance

Descriptive analysis showed that customs declaration scanning is effective and efficient, reduces time, is less costly and more intensive than the traditional method. The results of the correlation study indicated a strong and favorable relationship between the performance of customs revenue and the scanning of customs declarations $r=0.584$ ($p\text{-value}=0.000$). A positive and significant correlation between the performance of customs revenue and the scanning of customs declarations was found through regression analysis $\beta=0.110$ ($p\text{-value}=0.010$). This led to the rejection of the hypothesis that Customs declaration scanning has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport.

5.2.4 Scanning technology integration and Custom Revenue Performance

The findings of descriptive analysis showed that scanning technology integration had been implemented at JKIA and security measures put in place to avoid failures and threats. Scanning technology integration was achieved by training employees, keeping internet providers informed of outages to avoid delays, adopting offsite server hosting and cloud hosting to mitigate losses during internet outages and maintain the hardware regularly. Correlation analysis revealed a positive and significant correlation between scanning technology integration and customs revenue performance $r=0.539$ ($p\text{-value}=0.000$). These findings were complimented by regression analysis findings

which revealed a positive and significant link between scanning technology integration and customs revenue performance $\beta=0.033$ (p-value =0.022). The findings led to the rejection of the hypothesis that Scanning technology integration has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport.

5.2.5 Moderating Role of Technology Staff Competence

The findings showed that technology staff competence significantly moderate the link between baggage scanning accuracy and customs revenue performance. Therefore, the hypothesis that technology staff competence does not moderate the relationship between baggage scanning accuracy and custom revenue performance at the Jomo Kenyatta International Airport was rejected. $\beta=0.057$ (p-value =0.000)

The findings also showed that technology staff competence significantly moderated the link between cargo scanning efficiency and customs revenue performance. This led rejecting the hypothesis that technology staff competence does not moderate the relationship between cargo scanning efficiency and custom revenue performance at the Jomo Kenyatta International Airport. $\beta=0.010$ (p-value =0.003)

Further, technology staff competence was found to significantly moderate the link between customs declaration scanning and customs revenue performance. $\beta=0.135$ (p-value =0.002)

The findings also showed that technology staff competence does moderate the link between scanning technology integration and customs revenue performance. The hypothesis that Technology staff competence does not moderate the relationship between scanning technology integration and custom revenue performance at the Jomo Kenyatta International Airport was therefore rejected. $\beta=0.031$ (p-value =0.013)

5.3 Conclusion

The first objective of the study was to determine the effect of baggage scanning accuracy on custom revenue performance at the Jomo Kenyatta International Airport which was linked with testing the hypothesis that Baggage scanning accuracy has no statistically significant relationship with custom revenue performance at the Jomo Kenyatta International Airport. The study findings established a positive and significant association and relationship between the two constructs. Based on these findings, this study concludes that baggage scanning accuracy has a positive effect on customs revenue performance. Baggage scanning technology makes the baggage scanning process to be more effective and efficient than the traditional methods leading to increased customs revenue performance. Baggage scanning technology also reduces scanning time as not many agencies are involved in the process. Further, baggage scanning technology is less costly than the traditional scanning methods. All these leads to increased customs revenue performance.

The second objective sought to examine the effect of cargo scanning efficiency on custom revenue performance at the Jomo Kenyatta International Airport. The study found a strong and positive correlation between the effectiveness of cargo scanning and customs revenue performance. The study concluded that the performance of customs revenue is positively impacted by the efficiency of cargo scanning. This is so since cargo scanning technology makes the cargo scanning process to be more effective and efficient than the traditional methods. It also reduces time spent in cargo scanning and since cargo scanner are not expensive, it makes the whole process of cargo scanning to be less costly than the traditional method.

The third objective was to investigate the effect of customs declaration scanning on custom revenue performance at the Jomo Kenyatta International Airport. The results

showed a strong and favorable correlation between the performance of customs revenue and the scanning of customs declarations. Because of this, the study came to the conclusion that the performance of customs revenue is positively and significantly impacted by scanning customs declarations. Customs declaration scanning technology is more efficient and reduces threats. It is also intensive, less time consuming and the equipment for customs declaration scanning are less costly. This makes the customs declaration scanning technology to enhance customs revenue performance.

The fourth objective was to assess the effect of scanning technology integration on custom revenue performance at the Jomo Kenyatta International Airport. The study discovered a strong and favorable correlation between the performance of customs income and the incorporation of scanning technology. This leads the study to the conclusion that the performance of customs revenue is positively and significantly impacted by the integration of scanning technology. Scanning technology integration ensures that the scanning process is safe, that downtimes due to internet outages are reduced and customers and stakeholders are satisfied. This makes the customs revenue performance to be increased by reducing delays in scanning process, reducing threats and reducing costs incurred in the scanning process.

The last objective was to test the moderating effect of technology staff competence on the link between scanning technological attributes and custom revenue performance at the Jomo Kenyatta International Airport. The study concludes that technology staff competence does moderate the link between baggage scanning accuracy, scanning technology integration and customs revenue performance. Technology staff competence ensures that employees have the capability to use scanning technology hardware and software in the scanning technology integration enhance leading to

efficient and effective scanning process and leading to improved scanning technology performance.

5.4 Limitations of Study

While this study provided valuable insights into the relationship between scanning technology and customs revenue performance at Jomo Kenyatta International Airport, several limitations were acknowledged. First, the study's reliance on a specific target population limited the generalizability of the findings. Data were collected solely from respondents directly involved in customs operations at JKIA, which did not fully represent the experiences or perceptions of customs officials in other airports or contexts within Kenya or globally. Consequently, the findings might reflect context-specific outcomes that may differ in other customs environments with varying technological infrastructure or regulatory conditions.

Additionally, the use of a questionnaire as the primary data collection tool introduced certain methodological limitations. Questionnaires, while useful for gathering large amounts of information efficiently, can sometimes lead to self-reporting biases. Respondents may overestimate the effectiveness of technology or their own competence due to social desirability bias, potentially skewing the data. Moreover, the structured nature of questionnaires limited the depth of responses, preventing participants from fully elaborating on complex issues or challenges they may face with scanning technology in customs operations. This constraint could have led to an incomplete understanding of certain nuanced factors impacting technology's effectiveness in enhancing revenue performance.

5.5 Recommendations

5.5.1 Policy Implications for Government

The study's findings underscore the need for government policy that promotes the integration and maintenance of advanced scanning technologies at customs facilities like Jomo Kenyatta International Airport (JKIA). The positive and significant correlation between scanning accuracy, cargo scanning efficiency, customs declaration scanning, and revenue performance suggests that government policies should prioritize investment in these technologies to enhance customs efficiency and revenue generation. Policies should also address training programs for customs staff, as the competence of technology staff was shown to significantly moderate the relationship between scanning technology and revenue performance. By instituting clear guidelines on regular maintenance, training, and cybersecurity measures, the government can ensure that technology integration remains robust, enhancing customs revenue collection and reducing inefficiencies.

5.5.2 Practical Implications

For management and KRA, the results imply a critical need for ongoing investment in technology and employee training. Since scanning accuracy, cargo scanning efficiency, and declaration scanning are positively associated with revenue performance, management should focus on enhancing the technical skills of their staff to operate these systems effectively. KRA can prioritize the regular maintenance of scanning equipment and develop protocols to minimize delays, such as backup internet connections and secure cloud storage to mitigate losses from outages. For taxpayers, the study's findings offer reassurance that improved scanning technology can reduce delays and operational costs, providing faster and more efficient customs processing.

Increased efficiency can also reduce tax evasion opportunities, ensuring a fairer taxation system.

5.5.3 Theoretical Implications

The findings of this study support and extend the Technological Determinism Theory, which posits that technology shapes organizational and societal outcomes. The significant impact of scanning technology on customs revenue performance at JKIA validates this theory by demonstrating that advanced scanning systems can indeed improve revenue collection. The moderating effect of technology staff competence further aligns with Human Capital Theory, emphasizing that employee skills amplify technological impacts on organizational performance. Task Technology Fit Theory is also supported, as the study highlights the importance of task-specific technology such as baggage, cargo, and customs declaration scanning in achieving the desired outcomes. These findings imply that for optimal performance, both the choice of technology and the competence of users must align with organizational tasks, directly supporting the study's main objective of understanding technology's moderating role in customs revenue performance.

5.6 Recommendations for Further Research

The scope for this study was limited to the effect of scanning technology attributes including baggage scanning accuracy, cargo scanning efficiency, customs declaration scanning and scanning technology integration on customs revenue performance at JKIA and the moderating effect of technology staff competence on the relationship. A study on the effects of tax incentives on customs duty revenue performance should be conducted.

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APPENDICES

Appendix I: Introduction Letter

Annastacia Tabitha Nzioki

P.O. Box 1001, 90100.

Machakos, Kenya.

20th March, 2024.

Dear respondent,

RE: REQUEST TO FILL THE QUESTIONNAIRE

I am a postgraduate student of Kenya School of Revenue and Administration pursuing Master of Tax and Customs. I am currently on research work and the questionnaire has been designed to collect information on: ***Moderating Effect of technology staff competence on the Link between Scanning Technological attributes and Custom Revenue Performance: A Case study of Jomo Kenyatta International Airport.***

The information you provide will be used only for academic purposes and shall be kept strictly confidential. Therefore, you are kindly requested to give accurate information.

Thank you for your cooperation.

Appendix II: Questionnaire

This questionnaire is aimed at collecting data to determine the moderating effect of technology staff competence on the relationship between scanning technological attributes and custom revenue performance at Jomo Kenyatta International Airport. The data will be used for academic purposes only, and will be treated with strict confidence. You are requested to participate in the study by providing answers to the items in the sections as indicated.

Section A: Baggage scanning accuracy

Please tick (✓) the extent of agreement to each of the statements provided below:

Key: *SA -Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD- Strongly Disagree*

		SD	D	N	A	SA
1	Baggage scanning is very efficient since it is more straightforward					
2	Baggage scanning is effective in ensuring security					
3	Baggage scanners are not expensive					
4	The imaging process time for baggage scanning is reduced					
5	Baggage scanning is less intensive using scanner					
6	Baggage scanning procedure does not involve other agencies for the process					
7	Baggage scanning reduces delays					

Section B: Cargo scanning efficiency

Please tick (✓) the extent of agreement to each of the statements provided below:

Key: *SA -Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD- Strongly Disagree*

		SD	D	N	A	SA
1	Cargo scanner is more efficient than physical inspection					
2	Using cargo scanning is more effective					
3	The cargo scanner uses an intensive procedure					
4	The time taken in scanning cargo is reduced					
5	The scanners for cargo are less costly					
6	The resources needed in cargo scanning are less costly					

Section C: Customs declaration scanning

Please tick (✓) the extent of agreement to each of the statements provided below:

Key: *SA -Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD- Strongly Disagree*

		SD	D	N	A	SA
1	Additional steps in customs declaration scanning are effective					
2	Customs declaration scanners are efficient and reduce threats					
3	The scanning process time is shorter than traditional methods					

4	The cost of purchasing the equipment for customs declaration scanning is lower than traditional equipment					
5	The procedure for scanning customs declarations is intensive					
6	The resources needed for customs declaration scanning are readily available and not costly					

Section D: Scanning technology integration

Please tick (✓) the extent of agreement to each of the statements provided below:

Key: *SA -Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD- Strongly Disagree*

		SD	D	N	A	SA
1	Security measures has been put in place to avoid failure and threats of the technology					
2	All employees working with the scanner technology system in the custom department are properly trained					
3	Downtime due to internet outages are sometimes experienced					
4	Departmental employees ensures that customers and other stakeholders are satisfied					
5	Department has adopted offsite server hosting and cloud hosting to mitigate loses during internet outages					

6	Both fibre optic and cable internet providers have been contracted to avoid delays in internet connections					
7	Scanning technology hardware is regularly replaced to mitigate technology downtime					

Section E: Technology Staff Competence

Please tick (✓) the extent of agreement to each of the statements provided below:

Key: *SA -Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD- Strongly Disagree*

		SD	D	N	A	SA
1	The level of technology staff competence influences your ability to effectively leverage scanning technological attributes for enhancing custom revenue performance					
2	I have the capability to operate all the hardware, software, networks, and facilities of the Scanning technology at the customs department					
3	I understand all the features of the scanning technology infrastructure					
4	Our human resource personnel possess the required scanning human resource competence					
5	The technological human resource competence helps us solve custom problems and address customs opportunities through scanning process.					
6	The role of technology staff competence is related in shaping decision-making processes strategies					

Section F: Custom Revenue Performance

Please tick (✓) the extent of agreement to each of the statements provided below:

Key: *SA -Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD- Strongly Disagree*

		SD	D	N	A	SA
1	Amount of custom revenue has increased overtime					
2	There has been reduction in time taken for customs procedures since the adoption of scanning technology					
3	The cost of verifying goods at the customs is minimal					
4	The cost incurred at the customs department has been reduced					
5	The customs process for clearing goods has been simplified					
6	The risks associated with customs revenue has been reduced					
7	The capacity for identification and interdiction of high-risk cargo has improved					
8	The transparency in baggage and cargo related transactions has been enhanced					

Appendix III: Field Letter**KENYA REVENUE
AUTHORITY**

ISO 9001:2015 CERTIFIED

PUBLIC

KENYA SCHOOL OF REVENUE ADMINISTRATION**REF: KESRA/NBI/036**18th March 2024**TO: WHOM IT MAY CONCERN**

Dear Sir/Madam,

**RE: REQUEST FOR ASSISTANCE TO ANASTACIA TABITHA NZIOKI OF
REGISTRATION NO.: KESRA105/0083/2020 UNDERTAKING MASTERS
AT KESRA**

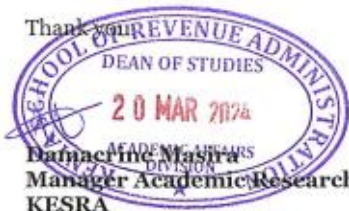
This is to confirm that the above named is a student at Kenya School of Revenue Administration (KESRA) Nairobi Campus pursuing Masters in Tax and Customs Administration.

The named student is undertaking Research on TOPIC: "*Scanning technological factors, technology competence and custom revenue performance at Jomo Kenyatta International Airport.*"

The purpose of this letter is to request for your kind facilitation in enabling the student progress in her research project by allowing access to any relevant information and/or conduct interviews, which are relevant to the project.

Your support to the student in this regard will be highly appreciated.

Thank you


Danacrine Masira
Manager Academic Research,
KESRA

Tulipe Ushuru, Tujitegemeel

Appendix IV: Stratford Acceptance Letter



<https://stratfordjournals.org/>

3rd October 2024

Dear Author Anastacia Tabitha Nzioki,

ACCEPTANCE LETTER

This is to formally inform you that your manuscript entitled;

“Moderating Effect of Technology Staff Competence on the Relationship between Scanning Technological Attributes and Custom Revenue Performance: A Case Study of Jomo Kenyatta International Airport.”

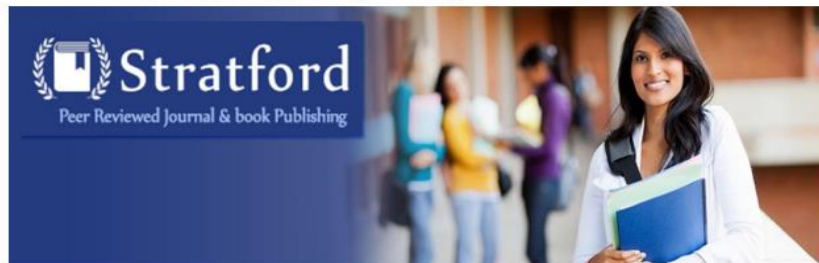
Has been accepted for publication in the **Journal of Human Resource & Leadership** of ISSN **2616-8421**.

Thank you for sending your manuscript to us and we hope to receive more manuscripts from you and your colleagues.

Best,

Editorial Team
Stratford Peer Reviewed Journal and Book Publishing

Contact Mail: journal_editor@stratfordjournals.org



Appendix V: NACOSTI

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 854260	Date of Issue: 14/June/2024
RESEARCH LICENSE	
	
This is to Certify that Miss. Annastacia Tabitha Nzioki of Kenya School of Revenue Administration, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: MODERATING EFFECT OF TECHNOLOGY COMPETENCE ON THE LINK BETWEEN SCANNING TECHNOLOGICAL ATTRIBUTES AND CUSTOM REVENUE PERFORMANCE: A CASE STUDY OF JOMO KENYATTA INTERNATIONAL AIRPORT. for the period ending : 14/June/2025.	
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See overleaf for conditions	

Appendix VI: Plagiarism Awareness Certificate



SR655

ISO 9001:2019 Certified Institution

THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

ANNASTACIA TABITHA NZIOKI

MU/KESRA 105/0083-2020

In recognition for passing the University's plagiarism

Awareness test for Thesis entitled: **MODERATING EFFECT OF TECHNOLOGY STAFF COMPETENCE ON THE RELATIONSHIP BETWEEN SCANNING TECHNOLOGICAL ATTRIBUTES AND CUSTOM REVENUE PERFORMANCE: A CASE STUDY OF JOMO KENYATTA INTERNATIONAL AIRPORT** similarity index of 3% and striving to maintain academic integrity.

Word count:24353

Awarded by

Prof. Anne Syomwene Kisilu

CERM-ESA Project Leader Date: 03/09//2024