

**FACTORS INFLUENCING EFFICIENCY OF SCANNER MANAGEMENT AT THE
INLAND CONTAINER DEPOT IN NAIROBI, KENYA**

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DECLARATION

This research project is my original work and has not been presented for a Post Graduate Diploma in any other University

Signature

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HDB335 C016-0371/018

This research project has been submitted for examination with my approval as University Supervisor

Signature.....

Date.....

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DEDICATION

This is for my family; my mother Dali who has always encouraged and supported the pursuit for infinite knowledge, my partner Wakabu who's love, whose friendship and occasional chiding has ensured I stay on course and lastly my daughter Wanjiru; all this grind is for you baby.

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It would have been impossible to do any of this on my own so I especially thank my colleague and now friend Francis Matata for his willingness to offer a 'second eye' through every bit of this writing. I appreciate my supervisor Samuel Owuor Ominde for his patience, his much valued guidance and his prompt feedback all through, nobody would have done a better job, thank you! My colleagues Scanner Management Unit team Nyati who were there for the most part of writing my project, thank you for all the helpful comments they did me good. The Kenya School of Revenue Administration fraternity I am grateful for the opportunity and endless support.

ABSTRACT

Globalization and regional economic integrations witnessed in the few decades have brought about an increase in volume of international trade. This has resulted to increased demand for higher efficiency of the logistics industry with trade facilitation being a major agenda amid growing concern on cargo security in face of terrorist threat. Customs administrations have come up with ways to modernize their systems and processes to counter the threat as they improve on their performance. The purpose of this study was to assess factors affecting performance of Scanner Management unit at Inland Container Depot, Nairobi. The specific objectives of the study were to investigate the effects of infrastructure, capacity building and system integration on the performance of Scanner management unit. The study was anchored on resource-based view theory, human capital theory and systems theory. Descriptive research design was employed in this study and the population was customs officers operating within Nairobi region. Target population was 265 customs officers in Nairobi region. Random sampling was used to obtain a representative sample size from the target population. Research instrument of structured questionnaire was used to collect primary data. Pilot test of 10% of the respondents was conducted using Cronbach's alpha (α) to measure the reliability of the research instrument. The collected primary data was edited, coded, classified and tabulated then entered into a spreadsheet and analyzed using frequencies and percentages. Data was analyzed with the help of statistical packages for the social sciences version 25, and presented in tables, pie charts, graphs and histograms. Multiple linear regression model was used to show the hypothesized relationships between variables. The research findings indicated that independent variables accounted for 51.3 percent change in dependent variable. The F value of 58.910 showed that combined influence of all the independent variables was significant in forecasting the dependent variable. The independent variables which affected significantly the efficiency of scanner management were infrastructure ($\beta_1 = 0.314$), capacity building ($\beta_2 = 0.275$) and system integration ($\beta_3 = 0.202$). These findings indicate that the three independent variables are significant in enhancing efficiency of scanner management at Inland Container Depot, Nairobi and may help in improving the process. The study recommends; Continuous improvement of scanner infrastructure to reduce the scanner downtime, hence improving the number of containers and the efficiency of non-intrusive verification. This will reduce the time and costs incurred in verification and clearance of cargo. Training of both the scanner operators and image analysts to be done regular basis to boost on image quality, reduce time used in submission and analysis, with objective conclusions. Training increases the staff efficiency in conducting their roles reducing clearance costs due to errors from staff. Monitoring and continuous maintenance of the integrated scanner management system and the integrated customs management system to reduce system downtimes for faster image analysis. Improvement in system integration will lead to faster information sharing and processing of data increasing the efficiency of managing clearance data.

TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	x
ACRONYMS	xi
DEFINITION OF TERMS	xii
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the Study.....	1
1.1.1 Global Perspective of Scanner Management.....	2
1.1.2 Regional Perspective of Scanner Management	3
1.1.3 Local Perspective of Scanner Management.....	4
1.2 Statement of the Problem	4
1.3 Research Objectives	6
1.3.1 General Objective	6
1.3.2 Specific Objectives.....	6
1.4 Research Questions	6
1.5 Justification of Study.....	7
1.5.1 The Government.....	7
1.5.3 Importers.....	7
1.5.2 Customs Administration.....	7
1.6 Scope of the Study.....	7
1.7 Limitation of the Study	8
CHAPTER TWO	9
LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Theoretical Review	9
2.2.1 Resource-Based View Theory	9
2.2.2 Human Capital Theory	10
2.2.3 Technology Acceptance model	11

2.2.4 Systems Theory	11
2.3 Conceptual Framework	12
2.3.1 Infrastructure	13
2.3.2 Capacity Building	14
2.2.3 System Integration	15
2.2.4 Efficiency of Scanner Management	16
2.4 Empirical Review	17
2.4.1 Infrastructure	17
2.5 Critique of the Existing Literature	19
2.6 Research Gaps	20
2.7 Summary of the Literature Review	20
CHAPTER THREE	21
RESEARCH METHODOLOGY	21
3.1 Introduction	21
3.2 Research Design	21
3.3 Target Population	21
3.4 Sampling frame	22
3.5 Sample Size and Sampling Technique	22
3.6 Research Instrument	23
3.7 Data Collection Procedure	23
3.8 Pilot Testing	24
3.8.1 Validity	24
3.8.2 Reliability	24
3.9 Diagnostic Tests	25
3.9.1 Normality Test	25
3.9.2 Multicollinearity Test	25
3.10 Data Analysis and Presentation	25
3.11 Operationalization of the Study Variables	26
CHAPTER FOUR.....	28
RESEARCH FINDINGS AND DISCUSSION.....	28
4.1 Introduction	28
4.2 Response Rate	28

4.3. Reliability Test Results	28
4.4 Demographic characteristics of the respondents	29
4.4.1 Level of Education.....	29
4.4.2 Role of Respondent	30
4.4.3 Position of the Respondent	30
4.4.4 Respondents Work Experience.....	30
4.5 Descriptive analysis.....	31
4.5.1 Descriptive analysis for Infrastructure	31
4.5.2 Descriptive analysis for Capacity building.....	32
4.5.3 Descriptive analysis for system integration.....	33
4.5.4 Descriptive analysis for efficiency of scanner management	34
4.6 Diagnostic Tests	35
4.6.1 Normality test results.....	35
4.6.2 Multicollinearity test results	35
4.6 Correlation Analysis.....	36
4.7 Regression Analysis	38
4.7.1 Coefficient of Determination.....	38
4.7.2 Analysis of Variance	38
4.7.3. Coefficients.....	39
CHAPTER FIVE	42
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	42
5.1 introduction	42
5.2 Summary of the Findings of the Study	42
5.2.1 Infrastructure	42
5.2.2 Capacity building.....	42
5.2.3 System integration	42
5.3 Conclusions of the Study.....	43
5.3.1 Infrastructure	43
5.3.2 Capacity building.....	43
5.3.3 System integration	43
5.4 Recommendations of the Study	43
5.5 Suggestions for Further Research	44

REFERENCES.....	45
APPENDICES.....	50
Appendix I: Introduction letter.....	50
Appendix II: Questionnaire.....	51

LIST OF TABLES

Table 3.1 Target Population	21
Table 3.2 Sample size.....	23
Table 3.3 Operationalization of the Study Variables	27
Table 4:1 Response Rate.....	28
Table 4:2 Reliability Test Results	29
Table 4:3 Level of Education.....	29
Table 4:4 Role of Respondent.....	30
Table 4:5 Position of the Respondent	30
Table 4:6 Work Experience	31
Table 4:7 Descriptive analysis for Infrastructure.....	31
Table 4:8 Descriptive analysis for Capacity building.....	32
Table 4:9 Descriptive analysis for system integration.....	33
Table 4:10 Descriptive analysis for efficiency of scanner management	34
Table 4:11 Shapiro-Wilk test	35
Table 4:12 Multicollinearity Test	36
Table 4:13 Karl Pearson’s correlation	37
Table 4:14 Coefficient of Determination.....	38
Table 4:15 Analysis of Variance.....	39
Table 4:16 Regression coefficients	39

LIST OF FIGURES

Figure 2.1: Conceptual Framework	13
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ACRONYMS

CIP	Centralized image processing
ICDN	Inland Container Depot, Nairobi
KPA	Kenya Ports Authority
KRA	Kenya Revenue Authority
NII	non-intrusive inspection
OSBP	One Stop Border post
RKC	Revised Kyoto Convention
SMU	Scanner Management unit
SPSS	Statistical Package for Social Sciences
WCO	World Customs Organization
WTO	World Trade Organization

DEFINITION OF TERMS

- Capacity building** The process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt, and thrive in a fast-changing world (Kozak, 2014).
- Infrastructure** The basic physical and organizational structures and facilities (Nyena, 2014)
- System integration** This involves integration of systems of various organizations to increase knowledge sharing and increase efficiency. The use of integrated systems in the operations of customs administration is to increase productivity and greater economic growth (Simataa, 2016).
- Performance** Act of completing a given assignment or role gauged against preset standards of precision, completeness, cost, and speed (Van Dooren, Bouckaert, & Halligan, 2015).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

With the rapid development of economic globalization and regional economic integration, the scale, volume and efficiency of international trade has been on the rise in the past few decades. This has resulted to increased demand for higher efficiency of the logistics industry with trade facilitation being a major agenda amid growing concern on cargo security in face of the terrorist threat. Being the government organization responsible for controlling and administering international movement of goods, Customs administrations find themselves under increasing pressure to carry out border controls efficiently and effectively, with minimum disruption and cost to legitimate trade (Ndunda, 2013).

Due to the above factors of trade facilitation and security, customs procedures are governed and advised by relevant international organizations and treaties among them: The World Customs Organization (WCO) and World Trade Organization (WTO). The treaties guiding the operations and procedures of customs where the factors above are concerned are; the WCO's Revised Kyoto Convention (RKC 2006) and also the WCO's SAFE Framework of Standards (SAFE Framework) which was adopted to Secure and Facilitate Global Trade (Zartman, 2010). The SAFE Framework was to act as a deterrent to international terrorism, to secure revenue collections and to promote trade facilitation worldwide. The SAFE Framework prescribes the baseline standards that have been tested and are working well around the globe. This unique international instrument endeavors to usher in a safer world trade regime and also heralds a new approach to working methods and partnership for both Customs and business towards a common goal based on trust (Trade Mark East Africa, 2020).

One of the key objectives and principles of the SAFE Framework of Standards is to secure and Facilitate Global Trade (SAFE Framework) by promoting a seamless movement of goods through secure international trade supply chains. The SAFE Framework consists of four key elements: Harmonization of advanced cargo information requirements, Employment of a consistent risk management approach, Out-bound inspection of high risk containers and cargo, preferably by

using nonintrusive inspection equipment, as well as definition of benefits that customs will provide to businesses that meet minimal supply chain security standards and good practices.

As identified in standard 3 of SAFE; Customs to Customs Pillar, non-intrusive equipment and radiation detection equipment should be available and used for conducting inspections where available and in accordance with risk assessment. The equipment is necessary to inspect high-risk containers or cargo quickly without disrupting the flow of legitimate trade. Research has shown that such equipment requires a large capital outlay from conception through to commissioning and deployment, followed by significant operational expenditure throughout the operational lifespan of the equipment. (WCO, 2020)

1.1.1 Global Perspective of Scanner Management

Internationally, 100% cargo scanning has been introduced for all US-bound cargo. It is one of the measures employed to ensure smooth functioning of international trade while securing the global supply chain. This measure was introduced to curb the terrorism threat after 9/11 incident. Most ports in the world have adopted cargo scanning to detect contents of cargo while reducing the inspection time required. Cargo scanning of containers and loose cargo is now a well-established technology, although the cycle of improvement remains rapid in the world. (Zuckerman, 2013).

In US, greater attention is focused on cross-border issue security and trade facilitation in the post-9/11 world. The introduction of 100% scanning of cargo entering the US with non-intrusive inspection (NII) technologies has led to increased compliance from traders and transporters who transact via their borders. Many contraband and illegal substances have been detected at the start of the supply chain rather than in the destination country. This has brought about more security to the supply chain with more benefits being seen in the destination country (Qi & Wang, 2010).

In China, non-intrusive imaging using x-ray powered scanners has been advanced but faced with some challenges. To cope with the challenges of strengthening security access control and promoting trade facilitation, as well as manpower resources shortage caused by the rapid growth of freight volume and the professional requirements for NII scan image analysis since 2010, China Customs has initiated centralized image processing (CIP) to enable networking of NII equipment used for cargo/vehicle inspection (Trade Mark East Africa, 2020). According to World Customs Organisation (2018), China Customs handled over 105 million TEUs of sea cargo and 33.98

million across land border in 2017. To China customs, the increased traffic brought challenges to its operation in terms of enhancing the clearance efficiency and strengthening the risk prevention. High-tech was applied to counter the challenges which included the wide application of NII technology to enhance the clearance speed while keeping the costs lower for both the traders and the administration.

In Netherlands, Rotterdam port has been installed with high power X-rays scanners which have reduced inspection costs and delays. The costs incurred by traders have been reduced since Dutch customs bears the cost of scanning while traders bear the cost of availing the goods for scanning. Scanning time incurred has been reduced to one second per container on a rail moving 60 kilometers per hour while clear X-ray images are produced. This has improved port's efficiency while still enabling the Dutch customs to facilitate trade and prevent security threats through the supply chain (Andrew, 2014).

1.1.2 Regional Perspective of Scanner Management

South African Revenue Services (SARS) in effort to combat illicit trade activities, a new high-technology cargo container scanner was officially launched at Cape Town Harbor in 2015. The scanner was installed in 2014 is the second of its kind to be acquired by SARS Customs in its fight against the illicit economy which robs South Africa of millions of rands in unpaid duties and taxes every year and puts the security of its citizens at risk. With the new high-tech scanners in Durban and Cape Town, SARS established end-to-end integrated cargo scanning for the first time. The new integrated scanning process has helped in reduction of fraud, theft and bribery, because all actions are recorded as cases.

Uganda revenue Authority introduced scanner in 2018 at Malaba and Busia borders as a measure to facilitate trade by offering a faster and cheaper method to perform non-intrusive verification of cargos at the borders. The new scanners were connected to existing systems like the Asycuda World, a customs system that is used by importers and exporters in different parts of East Africa to clear goods even before they reach their destination. With precision of the scanners, cargoes were cleared more efficiently and there was a reduction in mis-declaration.

1.1.3 Local Perspective of Scanner Management

Kenya Revenue Authority (KRA), customs and border control department has employed contemporary cargo verification equipment such as X-ray cargo scanning to conduct non-intrusive inspection at ports and border points for around 15 years (Musyoki, 2017). According to Omosa (2020) the NII employed meets World Customs Organization's (WCO) Safe Framework of Standards that requires that countries to conduct verification through non-intrusive means in accordance with risk assessment.

The launch and deployment of the scanners was expected to increase the port's capacity to scan up to 1,000 containers per day, while increasing considerably the KRA assets under the National Scanner Solution framework. Since Kenya serves as the gateway to East and Central Africa through the Mombasa port, which is a transport and logistics hub for the Northern Corridor, the scanning unit is necessary for the inspection of high-risk cargo and quick transport conveyances without disrupting the flow of legitimate trade. The recent commissioning of three additional scanners donated by China at the Port of Mombasa is a major breakthrough in sealing revenue leakages and in the fight against importation and exportation of restricted and prohibited goods.

Trade Mark East Africa (2018) highlighted that in 2015/ 2016, the X-ray cargo scanning unit made a number of high-profile interceptions. The cargo scanning unit has helped in trade facilitation as well as in promoting legitimate trade. At one point, nine top-of-the range vehicles concealed as bicycles and toys from the United Kingdom and in transit to Uganda were intercepted. Further investigations unearthed more vehicles which had been registered irregularly and the culprits were brought to book. Also, the scanners have also helped in the interception of over 20 containers of new garments declared as cold rooms, three containers of milk powder disguised as gypsum boards, undeclared electronics, and spare parts as well as interception of ivory and sandalwood. The scanners have also helped to prevent dumping of cheap, substandard and harmful products in the local market. The KRA expects to receive another 10 baggage scanners from China for use in the airport terminals to boost customer facilitation.

1.2 Statement of the Problem

Globalization and regional economic integrations witnessed in the few decades have brought about increase in volume international trade. This has resulted to increased demand for higher efficiency of the logistics industry with trade facilitation being a major agenda amid growing concern on

cargo security in face of the terrorist threat. Due to globalization effect, most customs administrations in developing countries have adopted measures that streamline the customs processes by use of technology to improve their performance. Though there is progress in adoption of modernization of the customs processes in order to improve on revenue collection and trade facilitation, the speed and extend of modernization is still inadequate, specifically in coming up with customs control and enforcement capabilities, and improving operational resources and management (Montagnat-Rentier & Parent, 2012).

KRA Customs and border control department(C&BC) introduced modernization plans for its processes and procedures. This was necessitated to cope with increasing pressure from international traders to ensure reduction of both time and costs involved in clearance. The government treasury is continually increasing the targets for Customs to collect more revenue to fund projects (Kabui, Gakobo, & Mwaura, 2019). C&BC introduced scanners in major ports and border point to enhance compliance among traders while providing a faster means of cargo verification, which is non-intrusive and less costly. According to report presented by National assembly (2020) 99.4% of all containerized cargo was scanned in Mombasa Port, with increased image analysis and 24/7 information sharing due system integration. To customs, it was expected that it will reduce costs for verification while enhancing revenue collection.

However, with the above achievements of the scanner unit, it is also faced with numerous challenges and setbacks which are not allowing for the full realization of its objectives of facilitating legitimate trade and conducting effective and efficient checks. The World Bank has in many occasions raised the alarm on the high cost of doing business in Kenya. Despite their introduction, the compliance level with customs rules and regulations have not reached the required levels of 100% (Omosa, 2020). 20% Scanned cargo is still being subjected to physical verification and the costs of unpacking and repackaging is weighing on the traders. Inefficiencies in the customs procedures, scanning systems downtime and many different systems involved in clearing processes have been highlighted as some of the challenges (Nganga, 2021). Delayed cargo clearance has been witnessed through port congestion and increased traffic congestion for trucks entering and exiting the port attributed to scanner infrastructure challenges. Multiple and incompetent image analysis conclusions have been cited as some of the factors that lead to increased dwell time and costs for traders in Inland Container depot, Nairobi.

Studies carried out by Eliakunda, Hamis, Mihayo, & Mashoke (2018), on challenges of implementation of WCO SAFE framework of standards. The study focused on highlighting challenges on implementation of the standards but did not specifically focus on scanners and their performance in enhancing the security. Another study (Nwankwo & Olayinka, 2019) focused on implementing a Risk Management and X-Ray Cargo Scanning focused risk profiling using images produced by scanning. The study aimed at transmission and security of images from scanners. In the studies, none focused on establishing the performance of scanner management. Therefore, this study will aim to establish factors affecting the performance Scanner Management at Inland Container Depot, Nairobi.

1.3 Research Objectives

1.3.1 General Objective

To assess factors influencing efficiency of scanner management at the inland container depot, Nairobi.

1.3.2 Specific Objectives

- i.** To establish influence of infrastructure on the efficiency of scanner management at the inland container depot, Nairobi.
- ii.** To establish influence of capacity building on the efficiency of scanner management at the inland container depot, Nairobi.
- iii.** To establish influence system integration on the efficiency of scanner management at the inland container depot, Nairobi.

1.4 Research Questions

- i.** How does infrastructure influence the efficiency of scanner management at the inland container depot, Nairobi?
- ii.** How does capacity building influence the efficiency of scanner management at the inland container depot, Nairobi?
- iii.** How does system integration influence the efficiency of scanner management at the inland container depot, Nairobi?

1.5 Justification of Study

International trade plays a pivotal role in the economy of any country. It's from this nature of trade that the country imports what they don't have in the form of goods and services and in turn exports what they have in surplus. The customs department among other government agencies plays an important role in ensuring that business runs smoothly and traders incur minimal costs so as to conduct trade across the borders hence improve the business performance in any country. It's evident that long dwell times at the ports are major hindrances to trade hence affecting business performance in any state. This study is therefore necessary so as to determine factors influencing customs cargo scanning hence not attaining the desired outcome and at the same time advice on how to mitigate the impact of such factors. This study will therefore be beneficial to:

1.5.1 The Government

The findings of this study will inform the policy makers in the policy making process. These findings and recommendations will therefore enable the government to come up with policies to strengthen the operations of the Scanner Management Unit of the Customs and Border Control Department hence making the customs operations more efficient to the advantage of the importers.

1.5.3 Importers

This study will be beneficial to the importers and traders since it will analyze the factors influencing the performance of SMU at the ICD, Nairobi. The study findings shall then be used for realization of necessary measures for the full realization of the unit's objectives which shall positively impact expedited cargo release.

1.5.2 Customs Administration

The customs department plays an important role in implementing the government policies on international trade. Findings and recommendations from this study will therefore enable customs to come up with ways of improving the performance of the scanner unit as a trade facilitating unit of trade and at the same time enable them to carry out their roles as stipulated.

1.6 Scope of the Study

This research focuses on factors affecting performance of Scanner Management Unit. The study will concentrate particularly on; infrastructure, capacity building and integrated scanner management system and their impact on scanner performance. The population of the study will be

customs officers based in Nairobi region. This study will be carried out at the Inland Container Depot, Nairobi.

1.7 Limitation of the Study

The study was based on assumptions that respondents would spare their time to answer questionnaires in the study and that they were sincere in their responses therefore providing a reliable data for the research, the reliability of this data was based on the respondents' honest opinions as some respondents were not willing to provide information. The research activities required a lot of funds and time to conduct this study which proved to be challenging. Despite of these challenges, the researcher managed to have reliable data responses from the research respondents and maximized efforts from the respondents who took their time. The study utilized a well-structured questionnaire and guaranteed confidentiality of the information of the respondents. For the collected data, the respondents were assured that the will be treated with highest degree of confidentiality and only used for academic purposes. The challenge of costs and time limitation were handled through proper planning before carrying out the research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers the literature that will guide the study as well as explain on theories and models focusing on factors that affect the performance of scanner management unit. This chapter will also highlight theoretical review related to the study. Empirical review will also be covered in this chapter with conceptual framework giving the pictorial representation of the relation. Critique of literature, identified research gaps and summary will also be addressed.

2.2 Theoretical Review

A theory as a set of interconnected concepts, definitions, and propositions that underline a gradual or systematic viewpoint of phenomena by clearly defining relationships between variables targeting the explanation and/or prediction of phenomena (Kimani, 2016). This study will be anchored on resource based theory, human capital theory and systems theory to explain how the variables relate to the independent variable.

2.2.1 Resource-Based View Theory

The resource-based theory was introduced by Barney Jay in the year 1991. This theory is said to contend that possession of the strategic resources offers or give an entity golden chance of developing competitive advantage over all its competitors. Such processes could in turn assign the concerned party high profitability or returns. This theory is very important to the study problem since the theory contend that possession of the strategic resources offers an entity golden chance of developing competitive advantage over all its competitors (Bifwoli, 2016).

Resources are usually viewed as the set of capacities and assets, both intangible and tangible that when competitively scarce, inappropriate or superior, they have the possibility of generating values from the diversification. In addition, resources are usually input into an organization's production process for example the capital equipment, skills of individual staffs, finance, talent and patents. Furthermore, resources are viewed as criteria building blocks of the strategies that identify both what an organization needs to do as well as what it could do (Omosa, 2020).

Resource based-approach to the strategies execution mainly assumes the capital assets and infrastructural structures as the different source of competitive advantages of an organization. This has resulted to different researchers declaring existence of some relationship in between an organization's strategy execution and utilization of the resources (Griffin, 2016). This model will help in application of available resources to achieve optimal performance in an organization. The model proposes usage of all of the available infrastructure and assets, and strategies based on them to achieve optimal performance.

2.2.2 Human Capital Theory

Human capital theory which was popularized by Adam Smith in 1976 is anchored on the assumption that there is great positive influence on the population's productive capacity when people are given formal education. The proposers of this theory argue that for a productive population, people are most likely to be educated (Yamoah, 2014). This theory highlights that an increase in education results to increased efficiency and productivity of the employees by elevating the degree of intellectual capacity of economically viable person's capability, which results from distinctive abilities and investment in people.

The theory emphasizes that formal education provision is considered as investing in human capital and the proponents of this theory view it as equal to physical investment. This theory will be applied to explain the reason why organizations invest in their employees in ways like recruiting staff with set skills, training and keeping the required numbers through reduction of employee turnovers (Kozak, 2014). This model gives education an important position in the productivity of an organization. Investment in formal education in an organization, training of staff leading to increased performance from the group as well as at individual level.

Human capital theory proposes that increase in education enhance productivity in the workplace. This translates to the assumption that by attaining high levels of quality education it will lead to higher productivity from the employees. Such assumption on education becomes a limitation of this theory since the process of human capital development differs from one person to another and in different teams (Marginson, 2019). To solve this, the researcher will put into consideration that learning differs from one person to another and the quality of training in one context may show ineffectiveness in another.

2.2.3 Technology Acceptance model

Technology Acceptance Model (TAM) was advanced by Fred Davis in 1989 centered on the model of reasoned Action which expressly deals much with the predicting of new technology acceptability. This theory helps in projecting the appropriateness of a new technology and aids in pointing modifications to be initiated into to the system to create a better and more acceptable system for the users. Technology Acceptance Model suggests that acceptability of a new technology is determined by issues such as the perceived usefulness and perceived ease of use (Mutisya, 2016). Davis (1989) introduced TAM to forecast the reason why users accepts or rejects information technology and ways to improve the acceptability.

TAM was suggested to help explain the casual relationship between external elements of user's acceptance and the real technology application while attempting to know the user's behavior about the utility facts and utilization of the facility perceived by him or her. Perceived usefulness is described as the degree to which someone trusts that the utilization of technology in a process will improve operations contributing to better results. Perceived ease of use is described as the degree to which someone considers that employment of technology in a process improves user-friendliness and the efficiency of the processes (Nasri & Charfeddine, 2012). This study will apply Technology Acceptance Model to explain why customs administrations utilize technology, especially integrated information systems to improve the scanning processes with perceived usefulness of improving the efficiency of scanner management.

2.2.4 Systems Theory

System theory was proposed by Ludwig von Bertalanffy and treats an organization or firm as a set of linked entities which are interrelated to each other to come up with an entire system. System theory attempts to explain the existence of a firm from a holistic approach considering the existing subsystems. The theory when applied in a firm, it generally focuses on the interaction of structures and their inter-dependence in achieving of firm's objectives. The theory insinuates that a firm does not work in a vacuum and it made up of people who work together in a setting with available resource and external influence from the surrounding. A system is defined by structures and purpose, expressed through its functioning and one sub-system when changed the functioning of the entire system can be predicted (Ruben, 2018).

Principle of systems theory can be applied to explain how different agencies or departments come to work together. Since no firm exists in a vacuum, there are both internal and external interferences (Kabui, Gakobo, & Mwaura, 2019). The systems don't exist in without reliance on each other for data or support. The system theory proposes interactions can be interlinked with either internal ones in an organization or external ones from other organizations. System theory will explain interaction of SMU with other units within the whole organization. System theory will give an explanation of systems collaborations with each other to improve the workflow in an organization. Integration in scanner management with other customs management systems is explained in systems theory whereby images and analysts' conclusions on cargos can be easily accessed quickly from other interlinked systems increasing the productivity of the whole organization.

2.3 Conceptual Framework

A conceptual framework refers to a group of concepts that are broadly defined and systematically organized to provide a focus, rationale and a tool for the integration and interpretation of information, usually expressed abstractly through word models (Leavy, 2017). Conceptual framework will offer a pictorial representation showing how the independent variables are linked to the dependent variable.

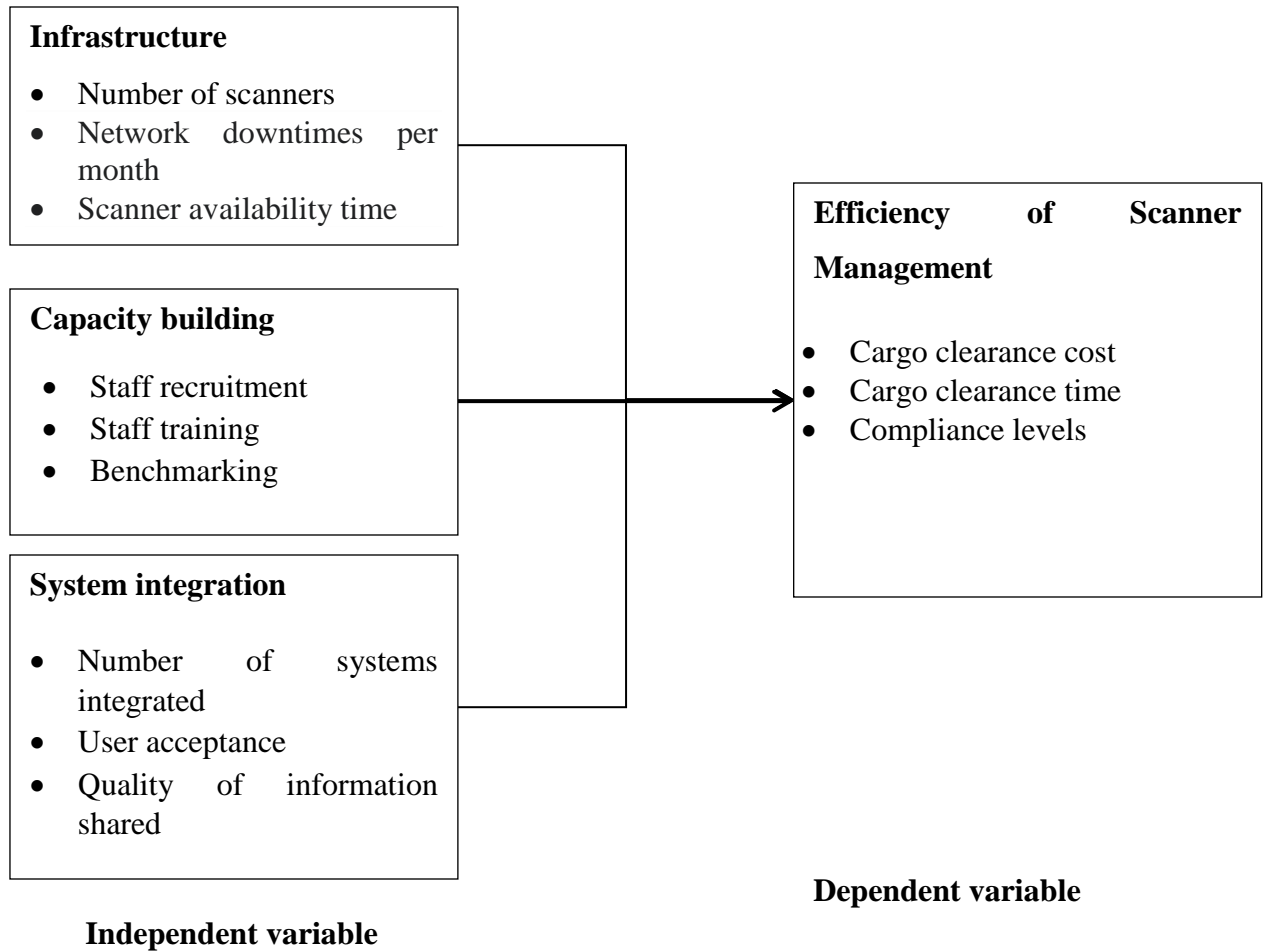


Figure 2.1: Conceptual Framework

2.3.1 Infrastructure

In a study conducted by Cheruiyot & Rotich (2018), established that sufficient infrastructural capability like roads, internet connection and buildings are very vital in the implementation of OSBP Strategy. They improve the efficiency and effectiveness of delivery of services. The study also highlighted that customs administrations cooperation is very important in development of border points, their surveillance parking space, place for customer reception and infrastructure involved in customs operations. The study also noted that integration of operations brought about by availability of infrastructure reduces procedures from being duplicated by the different border agencies.

In another study conducted at Chirundu located at Zambia and Zimbabwe border point by Kwaramba (2010) assessing opportunities and challenges posed by centralization of infrastructure. The study focused on direction on execution of OSBP guidelines and infrastructural sufficiency on success of the OSBP. The researcher concluded that centralization and sufficient infrastructure leads to a great reduction in the time, human labor and costs incurred in clearance of both cargo and passengers in both the border points. The study also highlighted the need of ensuring that the OSBP facilities be well designed for accommodation of both countries at the border to ensure streamlining of processes, better data sharing and physical inspection of cargo is centralized. This in turn will lead to reduction of duplication of processes at the border.

2.3.2 Capacity Building

According to Collins, Smith, & Hannon (2012) capacity building is the effort to generate knowledge, skills and expertise to increase analytical capacity that is important in increasing productivity and sustenance of an organization. Human resource capacity is a concept whereby an organization ensures that it's sufficiently equipped with people with the required skill set to realize its goals. Yamoah (2014) noted that an organization performance is as effective as the driving workforce. The quality of the workforce determines the quality of its output, both goods and services. The employees productivity can be assessed through the accomplishment of allocated tasks. The actual employee productivity should be evaluated against preset standards from which underperformance or overperformance conclusion can be drawn. Training has been highlighted as one of key variables required to improve employee performance and overall firm performance.

Employee empowerment is defined as the ability to accomplish tasks willingly. Employees who have the feeling of strong empowerment possess characteristics that tend to have increased performance, improved self-esteem and continuous job progression. It is mainly consisting of issues with responsibility, purpose, decision making and ensuring that management and employee limits are broken. Employee empowerment gives employees a platform to be involved in making decision about the firm (Daft & Marcic, 2015).

Cheruiyot & Rotich (2018) conducted a study on factors affecting the implementation OSBP at the Malaba border. From the study, the researchers concluded that there was limited human resources at the facility and that the financing of human manpower was low. The study recommended an increase of customs staff and funding. The study also recommended increased training on the

available staff and any incoming staff on operation at OSBP. The researchers highlighted that sufficient human resource capacity and financing were important for the success of an OSPB implementation and its performance.

2.2.3 System Integration

The scope of technological innovations is continuously shaping the way numerous business activities are undertaken in the world, especially in regard to the levels of sophistication on the area of information management. This has been central in the implementation of technological platforms in the execution of various customs operations. The use of integrated systems in the operations of customs administration is to increase productivity and greater economic growth (Simataa, 2016).

The system automates all functions of customs administration, including the entire series of activities carried out by customs officers in the control procedures on the import and export of goods. Its main aim is connecting the internal and external systems to hasten cargo clearance. Scanner management unit utilizes a non-intrusive and non-destructive mode of inspection in a bid to identify goods in transportation systems. They use an x-ray imaging of goods in a container or tanker (Omosa, 2020)

Kirimi (2015) carried out a study on the effect of revenue collection automation process and integration systems on the efficiency of organizations efficiency in Meru County Kenya. The 20 findings showed that the online method of automating collection methods and integration of different systems has had a substantial effect on results in the Meru County Office. Madegwa, Makokha and Namusonge (2018) conducted a report on the impact of automation of revenue collection on the efficiency of Trans Nzoia County Government, Kenya. Their study findings revealed that this automation processes have a major influence on efficiency. In addition, their study showed that process automation processes promote effective management.

Ngeno (2018) analyzed how computerized enterprise resource planning strategy impacts the collection of revenue in Kericho County, Kenya. The study revealed that integrated internal control process had a positive substantial influence on the collection of revenue. It was hence concluded that integrated internal control process led to a reduction in the loss and risks pointed out by

management that will be beneficial to the County governments. It was also established that increasing automation by a unit would increase the collection of revenue.

2.2.4 Efficiency of Scanner Management

Cargo Scanning plays a critical part in the non-intrusive inspection of import, export and security controls. When combined with effective profiling methods, non-intrusive scanners can greatly improve the Customs and Security functions by screening cargo flows at both sea and land borders. Scanner management unit is mandated with the scanning, analyzing and supporting revenue collection in Kenya Revenue Authority. They provide non-intrusive verification method which is fast and cost effective means of verification (Musyoki, 2017).

Scanners were introduced to Kenya revenue authority in 2005 with aim of modernizing the customs as enforcement tool with aim of facilitating trade. Since their introductions, Kenya customs has been able to capture concealed cargo and increase the amount of revenue collected. Utilization of scanning equipment for non- intrusive inspection is a recently implemented concept which was put in place after the events of September 2011 in New York City to enhance security at major ports. The use of the scanning technique proves very useful in the protection of our sources of revenue and proper taxation of goods (WTO, 2015). More illegal substances have been intercepted by customs improving the security provided by customs. The study also notes that compliance of cargo declarations to laws and regulations has improved since introduction of scanner.

According to Munda (2018) increased use of cargo scanners at the port of Mombasa and the Jomo Kenyatta International Airport largely helped the taxman to grow daily non-oil revenue by Sh131 million in six months in 2018. The Scanner Integration Project, which connects all readers at border entry points to a command centre at Time Tower, has been largely funded by the Chinese government. The integration was expected to help customs officials monitor and analyze contents of cargo entering and leaving the country from the command centre. Another study by Trademark East Africa (2020) noted that the number of containers scanned increased to about 1000 containers per day with acquisition of the new modernized scanners.

2.4 Empirical Review

2.4.1 Infrastructure

Cheruiyot & Rotich (2018) carried out a study on the factors determining implementation of OSBP Strategy at the Busia border. The study focused on establishing the effects that infrastructure had on the implementation. It revealed that established sufficient infrastructural capability like roads, internet connection and buildings are very vital in the implementation of OSBP Strategy. They improve the efficiency and effectiveness of delivery of services. The study also noted that infrastructural improvements resulted to faster benefits of OSBP idea been realized.

A study conducted by Philpott (2014) noted that availability of specialised machines to be used in ports or border points determines the speed in handling of the cargo, these handling machines choice depends on their versatility and maneuverability and cost speed in operation. The study noted that in port set up, to increase their performance infrastructure and trained work force was important at ensuring efficiency in deliverance of their objectives.

2.4.2 Capacity Building

Mbatha (2010) studied how capacity building affects the performance of small and micro enterprises in Kisumu City, Kenya and established that research, management, and training on development of policy among the SME sector should be more open and flexible to address the distinctive nature of the requirements of SME's. Another study on the effect of capacity building on the financial performance and development of women owned by small and medium-sized enterprises in the Gikomba market, Nairobi County, Kenya. The study found that Entrepreneurship Training was crucial to improving the financial results and development of female SMEs (Chege, 2013)

In another study by Griffin (2016) observed that the competency levels in customs tasks execution offered an important indicator which can be used to evaluate the quality service in port operations. The customs labor force is expected to demonstrate skillfulness in performing their duties, through demonstrating high levels of agility and prowess in the use of tools and equipment in performing their duties as it affects the overall customs operational productivity and performance (Rastogi & Arvis, 2014)

2.4.3 System integration

A study by Kirimi (2015) on the effect of revenue collection automation process and integration of systems on the efficiency of organizations efficiency in Meru County Kenya revealed that system integration resulted to increased revenue being collected by the county. Another study conducted in Kericho County by Ngeno (2018) analyzed how computerized enterprise resource planning strategy impacts the collection of revenue. The study revealed that integrated internal control process had a positive substantial influence on the collection of revenue

Smith (2014) conducted a study on implementation of integrated customs systems. The study noted that custom departments in partner states have recorded delivery of customer-focused services, collect accurate data, high revenues and prevented illegal trade within the constraints of limited resources. Integration of systems lowers turnaround time for clearing of goods. However, at times interfaced customs clearing processing systems errors have hindered effective implementation of SCT. According to Zulu (2014) in his presentation during the northern corridor stakeholders of Mombasa Kampala transit section in Kampala, stated that business systems of the stakeholders involved in the clearance of goods are poorly connected Internet network downtimes and slow speed of systems due to slow migration or mapping of information from one system to another contribute to ineffective implementation SCT.

2.4.4 Performance of Scanner Management Unit

Musyoki (2017) highlighted that increased use of cargo scanners at the port of Mombasa and the Jomo Kenyatta International Airport largely helped the taxman to grow daily non-oil revenue by Sh131 million in six months in 2018. Customs performance is examined on the quantifiable metrics on quality and efficiency in the execution of the port duties. Performance indicators in the scope of customs administration include factors such as; quality of service delivery, speeds in task executions, perceived levels of efficiency, and levels of technology integration.

Trade Mark East Africa (2018) observed that, the competency levels in customs tasks execution offered an important indicator which can be used to evaluate the quality service in port operations. The customs labor force is expected to demonstrate skillfulness in performing their duties, through demonstrating high levels of agility and prowess in the use of tools and equipment in performing

their duties as it affects the overall customs operational productivity and performance (Rastogi & Arvis, 2014).

2.5 Critique of the Existing Literature

A study conducted at Chirundu located at Zambia and Zimbabwe border point by Kwaramba (2010) assessing opportunities and challenges posed by centralization of infrastructure. The study focused on direction on execution of OSBP guidelines and infrastructural sufficiency on success of the OSBP. The researcher concluded that centralization and sufficient infrastructure leads to a great reduction in the time, human labor and costs incurred in clearance of both cargo and passengers in both the border points. Cheruiyot & Rotich (2018) conducted a study on factors affecting implementation of Malaba OSBP. The study was guided by diffusion of innovation theory, stakeholder theory and theory of planned behavior. The study used a descriptive research design and targeted 159 officials from the departments at the border. The research noted that sufficient infrastructural capability like roads, internet connection and buildings are very vital in the implementation of OSBP Strategy.

Mbatha (2010) studied how capacity building impacts the performance of small and micro enterprises in Kisumu City, Kenya and established that research, management, and training on development of policy among the SME sector should be more open and flexible to address the distinctive nature of the requirements of SME's. Another study carried by Muthoni (2013) on the effect of capacity building on the financial performance and development of women owned by small and medium-sized enterprises in the Gikomba market, Nairobi County, Kenya. The study found that Entrepreneurship Training was crucial to improving the financial results and development of female SMEs. However, the fact that the majority of owners of small and medium-sized businesses were not educated in entrepreneurship; they lacked skills

A study conducted by Ngeno (2018) analyzed how computerized enterprise resource planning strategy impacts the collection of revenue. The study was conducted in Kericho county and used automation, integrated internal controls and human resource management system as the independent variables. The study used descriptive survey as the research design with 120 county revenue staff as the target population. The study concluded that integration of internal control systems was very critical and recommended that more integration in various systems be integrated

internal control system is well managed 59 in the revenue collection departments so as to enable all parties within the department to freely access and utilize the official information.

2.6 Research Gaps

There has been a lot of improvement in customs clearance process yet there are still lags and increased cost of clearing cargo. Studies have been carried out on ways to improve the process of cargo verification in various fields. Studies carried by Cheruiyot & Rotich (2018) and Mbatha (2010) focused mostly on improvement of border stations with factors like infrastructure and technology endorsement. Nevertheless, this studies did not consider scanner technology and infrastructure as part of their study.

Studies conducted by Kirimi (2015) and Ngeno (2018) focused on system integration in the county government in Kenya and their effect on revenue collection. Most of the studies focused on cargo clearance efficiency and revenue performance but non focused on scanners and their performance as a measure of trade facilitation. Therefore, this study will capitalize on scanners and the performance of the scanner management unit incorporating variable like connection infrastructure, capacity building and integrated scanner management system.

2.7 Summary of the Literature Review

Majority of the studies undertaken by the researchers and scholars has put more emphasis on various border stations. This study focuses on stabling factors affecting performance of scanner management unit. This chapter uses resource based-view theory, human capital theory and systems theories to explain the effects of the independent variables on the performance of SMU. This chapter covers relevant literature that is useful to the existing study. The variables are reviewed and critique of variables is discussed to establish the research gaps to be capitalized. The literature on scanners has provided a research gaps which are discussed in this chapter from which this study has capitalized on and aims to bridge.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology refers to the systematic, theoretical analysis of the methods applied to a field of study in collection and analysis of data with the aim of making decisions on a specific study (Goddard & Melville, 2011). This chapter therefore explores the methodology that will be used in this study clearly explaining the research design, the population of interest, data collection and data analysis methods that will be used. It will explain the source of the data that will be used, methods of data collection, and the techniques that will be used to analyze the data collected. It also explains the model used as well as clearly elaborates all the variables of interest.

3.2 Research Design

Research design is an outline on how activities will be coordinated to obtain answers on the research questions in the study (Walliman, 2010). This study will utilize descriptive research design. According to Mugenda & Mugenda (2009) descriptive technique will be utilized in collection of data, testing of hypothesis or to answer questions pertaining the current study. Descriptive research design will be appropriate because it involves collecting data in order to answer questions concerning the current status of subjects under study. The study will therefore be able to generalize the findings on factors affecting the performance of scanner management unit.

3.3 Target Population

McKenney & Reeves (2013) described population universe refers to the total collection of elements about which the researcher intends to make some inferences. A population is also defined as all elements, units, subjects or objects which have alike features and adhere to a set of requirements that are under consideration in a study (Leavy, 2017). Target population refer to a specific number of elements from which the researcher wishes to make a generalized conclusion in a study. The target population will therefore be 265 Customs officers in Nairobi region and 350 Customs clearing agents operating at ICDN. The data will be obtained from East Africa Community data portal (<https://www.eac.int/>), 2022.

Table 3.1 Target Population

Section	Respondents
Customs Officers	265
Clearing Agents	350
TOTAL	615

3.4 Sampling frame

Sampling frame is a complete record listing all the target elements from which a sample is drawn in a study (Bell, 2014). For this study, the sampling frame will be obtained from, East Africa Community data portal (<https://www.eac.int/>), 2022.

3.5 Sample Size and Sampling Technique.

Saunders (2014) refers to sample a representative and finite number of subjects or elements in the study population. It's from the sample that a generalized conclusion can be made on the population of interest. This study will adopt a stratified random sampling technique. This is sampling approach utilized when population divisions differ significantly, therefore sampling each population division (stratum) independently is more advantageous. Stratification is a procedure performed before sampling to reduce the sampling error while enhancing the representativeness of sample by categorizing population subjects into fairly homogenous subgroups (Mugenda & Mugenda, 2012). There are various formulas that have been proposed for sample size determinations. However, in this study a scientific, easy to use and appropriate formula for large population, slovin's formula will be employed in determining the size of the sample.

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

n = sample size,

N is the population size,

e is the level of precision. 95% level of confidence will be used which gives p = 0.05 chance of deviation from the actual. The equation is therefore;

$$n = \frac{615}{1 + 615 (0.05)^2}$$

n = 243

Table 3.2 Sample size

Sample	Respondents	Sample Size
Customs Officers	265	105
Customs Clearing Agents	350	133
Total	615	243

3.6 Research Instrument

Data collection instrument is an equipment or a tool utilized for the purpose of obtaining facts about a subject, views, opinions or feelings required to make a generalized conclusion for a study (Sekaran & Bougie, 2013). This study will utilize questionnaires which will be structured in closed-ended manner. The questionnaire’s quantitative section will utilize ordinal scale format. Questionnaires are appropriate in fact gathering since they allow the interviewee to have a platform where they can express accurately their views or feelings which are free from the researcher’s influence and biasness.

3.7 Data Collection Procedure

Data collection procedure is the approach through which the researcher uses the data collecting tools to obtain views and facts from subjects under study (Kothari, 2011). Since questionnaires will be used in this study, the researcher will utilize drop and pick method, where the researcher drops the questionnaire to the subjects, allows them time to fill and collect them later. This method is appropriate since it gives the subjects humble time to answer the questions without the researcher’s influence. It is also cost and time effective for the researcher (Leavy, 2017). Before data collection, the researcher will seek permission from the Kenya School of Revenue administration and Kenya Revenue Authority, ICDN. The researcher will also give assurance to the respondents that the data will be kept confidential and will only be utilized for the purpose of

this study. Pilot testing will be carried out to determine the reliability and validity of the data collection instrument.

3.8 Pilot Testing

Pilot testing is the method of trial error inspection of fact gathering equipments to ascertain whether they are valid and reliable in collecting the required data in a study. Pilot testing helps in enhancing the equipments and making the collected data more precise, valid and reliable. Pilot testing will be used prior to data collection hence improving the questionnaire's quality. According to Neuman (2014), a 10% sample drawn from the sample size is sufficient for conducting pilot testing. For the purpose of this study 16 respondent will be selected.

3.8.1 Validity

The extent to which results from same data measuring tool varies from expected or true reflection is referred to as validity (Setchi & Jordanov, 2010). Validity determination is dependent on the research questions. It is affected by the number of variables or control the depend variable. This study will check content validity by discussing the questions in the questionnaire with the supervisors and the resulting corrections will be corrected to improve the questionnaires validity. The corrections will be implemented to improve on the content that is being queried by the researcher and make the question more valid.

3.8.2 Reliability

Stenner & Watts (2012) described reliability as the findings consistency of same data collecting tool after issuing it more than one time. A reliable data gathering tools gives stable and consistent results after being issued more than one time. The main goal of a questionnaire in research is to collect relevant data in the most accurate and valid way possible. A reliable questionnaire should not produce results that are erratic and unpredictable. If the research results, tools and procedures cannot produce replicable data, the conclusions made and claims made by the researcher cannot be satisfactory. This study, will examine reliability using SPSS version 25, Cronbach's coefficient alpha. A Cronbach's coefficient alpha of 0.7 and above demonstrates highly reliability (Walliman, 2010).

3.9 Diagnostic Tests

A diagnostic test is a systematic technique that determines a state by identifying specific areas of weakness and strength (McKenney & Reeves, 2013). Diagnostic tests generate different results from different populations, this calls for keenness in choosing the population in the study. In study where random sampling technique is applied, some participant who hold key information in the subject matter could be left out of the study resulting in a weakness. It would be more useful to regard the sampling method and/or reporting as a factor in study efficiency and to base population inclusion criteria on participant characteristics

3.9.1 Normality Test

Normality tests are applied to establish whether a data set is modelled well to fit the description of normal distribution and to evaluate the possibility for a random element underlying the data set to be normally distributed. For this study, normality test will be carried using SPSS to check skewness and kurtosis, Shapiro-Wilk test value of greater than 0.05 indicates that the data set fits within the normal distribution (Leavy, 2017). The results of this test were presented in form of tables.

3.9.2 Multicollinearity Test

This study carried out multicollinearity test using VIF values to determine whether the correlation could be problematic or not. Multicollinearity issues arise when two or more factors under the study are highly correlated. This may result to impact on the regression parameters estimations (Stenner & Watts, 2012). In order to assess the multicollinearity, the analysis of the variance inflated factor (VIF) is carried out for each independent variable. If the VIF results are within the range of 1.5, they indicate some correlation, but not enough to be very concerned about. If the VIF is more than 10 for any independent variable, it indicates that this variable is highly explained by other variables and might be problematic with poorly estimated regression coefficients due to multicollinearity (Neuman, 2014).

3.10 Data Analysis and Presentation

Data analysis is a structured approach through collected data is grouped, coded and compiled to produce useful information to the researcher which is then used in answering the research questions. This study will utilize both descriptive and inferential statistics. Statistical package for social sciences (SPSS) version 25 will be utilized in coding and analysis of the collected data. SPSS will be used since it offers a better platform for compilation and a better output in determining cause-effect relationship between variables (Leavy, 2017). Finding from the data

computations will be presented in frequencies, tables and charts. A regression model will also be used to determine the relationship between the independent and the dependent variables.

The following multiple linear regression model will be used to model the data:

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

Where; Y = Scanner Management Unit

β_0 = Constant term, the intercept shows the scanner management unit operations without other variables in the study.

$\beta_1, \beta_2, \beta_3$ = Coefficients determining the level of effects of regulating factors influencing scanner management unit operations.

X_1 = Infrastructure connectivity

X_2 = Capacity building

X_3 = System integration

ϵ = Error term (factors outside the model that can influence the dependent variable)

3.11 Operationalization of the Study Variables

Operationalization is the procedure through which conceptions are connected to variables. This procedure entails identification of operations that will provide a platform for values of a factors under study. It specifies core expected findings that are assumed to empirically show a concept interacts with the real world (McKenney & Reeves, 2013).

Table 3.3 Operationalization of the Study Variables

Type of Variable	Variable	Indicators
Dependent Variable	Efficiency of scanner management	<ul style="list-style-type: none">• Cargo clearance cost• Cargo clearance time• Compliance levels
Independent Variables	Infrastructure	<ul style="list-style-type: none">• Number of scanners• Network downtimes per month• Scanner availability time
	Capacity building	<ul style="list-style-type: none">• Staff recruitment• Staff training• Benchmarking
	System integration	<ul style="list-style-type: none">• Number of systems integrated• User acceptance• Quality of information shared

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter shows the results of analysis of the study. The presentation is made in forms of tables, descriptive and multivariate results. The evaluation is founded on the research objectives and questionnaires.

4.2 Response Rate

The researcher sought to analyze the response rate from the questionnaires issued to the respondents to establish the reliability of the study. The results as show in the Table 4.1 below revealed that out of 243 distributed questionnaires 173 were filled and returned which was a response rate of 70.8%. According to Stenner & Watts (2012), a response rate of 70% and above was adequate for proper and reliable representation.

Table 4:1 Response Rate

	Response rate	Percentage %
Respondents	172	70.8
Non-respondents	71	29.2
Total	243	100

4.3. Reliability Test Results

The dependability, stability or consistency of data is defined as reliability. In assessment of reliability with Cronbach's alpha, an index of 0.700 and above indicates that the data collection instrument is reliable (Neuman, 2014). In this study, the all the variables were subjected to reliability testing using Cronbach's alpha as show in Table 4.2 below. The finding indicated that infrastructure had an index of 0.786, capacity building had 0.775, system integration 0.758 while efficiency of scanner management was 0.739. This results establishes that the data collection instrument employed was highly reliable.

Table 4:2 Reliability Test Results

Scale	Cronbach's Alpha	Comments
Infrastructure	0.786	Accepted
Capacity building	0.775	Accepted
System integration	0.758	Accepted
Efficiency of scanner management	0.739	Accepted

4.4 Demographic characteristics of the respondents

4.4.1 Level of Education

The study sought to establish the level of education of the respondents. This was important for the researcher to establish the respondent's analysis abilities and the probability of making correct decisions in the normal day to day operations at work. From the results as shown in Table 4.3 below, the findings show that most the respondents had completed college level training with 36.6%. 27.3% of the respondents had attained university level of education. 7.5% were established to post graduates while 4.8% had only attained primary level education. The finding revealed that most of the respondents had adequate and necessary knowledge and skills impacted to make correct decisions.

Table 4:3 Level of Education

Educational Level	Frequency	Percent
Primary	10	4.8
Secondary	39	22.7
College	63	36.6
University	47	27.3
Post graduate	13	7.5
Total	172	100

4.4.2 Role of Respondent

The research wanted to establish the role the respondents play in the cargo clearance chain. This was important to establish the impact of respondent's decisions on the efficiency of scanner management. From the analysis, it was established that customs clearing agents were 59.9% while customs officers formed 40.1% of the respondents. This results reveal that the respondents' decisions were critical in efficiency assessment of scanner management.

Table 4:4 Role of Respondent

Years	Frequency	Percent
Customs officers	69	40.1
Customs clearing agents	103	59.9
Total	172	100.0

4.4.3 Position of the Respondent

The study sought to establish the positions that the respondents held in their organizations. This was important to ascertain the influence of their decisions on the study. From the analysis, most respondents held officer role with 58.7%, 25.6% were found to hold supervisory role, 10.5% were in managerial role while 5.2% were in top management. These results reveal that the respondents held roles which had great impact to the study.

Table 4:5 Position of the Respondent

Years	Frequency	Percent
Officer	101	58.7
Supervisory	44	25.6
Managerial	18	10.5
Top management	9	5.2
Total	172	100

4.4.4 Respondents Work Experience

The study further sought to ascertain the work experience of the respondents in number of years. This was important to ascertain whether the respondents had enough experience to make correct decisions. From the results, it was established that most of respondents possessed an experience

of 6-10 years with 47.1%. It was further ascertained that 28.5% has experience of 2-5 years, 14.5% had experience of above 11 years while 9.9% had experience of less than 2 years. This reveals that the respondents had adequate experience to make correct decisions.

Table 4:6 Work Experience

Years	Frequency	Percent
Less than 2 years	17	9.9
2-5 years	49	28.5
6-10 years	81	47.1
Above 11 years	25	14.5
Total	172	100

4.5 Descriptive analysis

4.5.1 Descriptive analysis for Infrastructure

The researcher wanted to find out how the respondent agreed or disagreed with the statements on infrastructure in relation to efficiency of the scanner management. The study employed likert scale with measurements of 1-5, where strongly disagree = 1, disagree=2, neutral = 3, agree = 4 and strongly agree = 5. From the respondents' views on each statement, a mean and a standard deviation were calculated.

Table 4:7 Descriptive analysis for Infrastructure

Statements	Mean	STD dev
There are enough scanners at ICN to handle scanning of cargo on arrival	4.15	0.741
The scanners are well connected with internet and serves to transmit data for fast analysis	3.92	0.899
There are enough handling equipment at the depot to facilitate scanning of containerized cargo at ICDN	3.72	1.045
Drive through scanner layout at ICDN has improved the time taken to scan per container.	4.09	0.901

From the results most of the respondents agreed with the statement that there are enough scanners at ICDN to handle scanning of cargo on arrival by posting a mean of 4.15 and a standard deviation of 0.741. For the statement that the scanners are well connected with internet and serves to transmit data for fast analysis, the respondents agreed with a mean of 3.92 and standard deviation of 0.899. The respondents were in agreement with a mean of 3.72 to the statement that there is enough handling equipment at the depot to facilitate scanning of containerized cargo at ICDN. The standard deviation posted was 1.045 for the statement. This was in congruence with Philpott (2014) noted that availability of specialised machines to be used in ports or border points determines the speed in handling of the cargo, these handling machines choice depends on their versatility and maneuverability and cost speed in operation. The respondents further agreed with the statement that drive through scanner layout at ICDN has improved the time taken to scan per container by posting a mean of 4.09 and a standard deviation of 0.901.

4.5.2 Descriptive analysis for Capacity building

The researcher also sought to ascertain to what degree the respondents' opinions were in agreement with the statements on capacity building and efficiency of scanner management. The study used a scale of 1-5, where strongly disagree = 1, disagree=2, neutral = 3, agree = 4 and strongly agree = 5. The views and opinions were then computed to post the means and standard deviations for each statement.

Table 4:8 Descriptive analysis for Capacity building

Statements	Mean	STD dev
Scanner operators and scanner analysts are well trained to handle cargo scanning and increase the scanning of cargo	3.99	1.044
KRA scanner management deploys new recruits with required skills to conduct scanning	3.87	0.990
Regular trainings on all scanner operation equips staff with relevant knowledge for quick resolving of machine downtime.	3.96	1.030
Benchmarking on scanner operations has enhanced scanner operations reducing overall costs of clearance.	3.87	1.019

The findings show that the respondents were in agreement with the statement that Scanner operators and scanner analysts are well trained to handle cargo scanning and increase the scanning

of cargo with a mean of 3.99 and a standard deviation of 1.044. For the statement that KRA scanner management deploys new recruits with required skills to conduct scanning, the results show that the respondents were in agreement with the statement with a mean of 3.87 and a standard deviation of 0.990. This was in tandem with Griffin (2016) observed that the competency levels in customs tasks execution offered an important indicator which can be used to evaluate the quality service in port operations. The results further reveal that the respondents agreed with the statement that Regular trainings on all scanner operation equips staff with relevant knowledge for quick resolving of machine downtime. This was evidenced by the mean of 3.96 from the results with a standard deviation of 1.030. The respondents further agreed with the statement that Benchmarking on scanner operations has enhanced scanner operations reducing overall costs of clearance with a mean of 3.87 and a standard deviation 1.019.

4.5.3 Descriptive analysis for system integration

The researcher wanted to find out how the respondent agreed or disagreed with the statements on system integration in relation to efficiency of the scanner management. The study employed likert scale with measurements of 1-5, where strongly disagree = 1, disagree=2, neutral = 3, agree = 4 and strongly agree = 5. From the respondents' opinions on each statement, computations on mean and a standard deviation were done.

Table 4:9 Descriptive analysis for system integration

Statements	Mean	STD dev
Real time image transmission reduces time taken for cargo to be verified	4.05	0.916
Inter-system linkages between iScan and other customs systems has enabled SMU to conduct fast image analysis reducing clearance costs	3.71	0.752
Data accuracy from system integration and image analysis has led to improved clearance time	3.94	0.708
Real time information sharing has enabled fast relay of analyst conclusions to port gates and verification officers for faster clearance	3.79	1.004

From the findings, most of the respondents were in agreement with the statement that real time image transmission reduces time taken for image submission. This evidenced by a mean of 4.05 and a standard deviation of 0.916. For the statement that Inter-system linkages between iScan and other customs systems has enabled SMU to conduct fast image analysis, the respondents' views

concurrent with the it by having a mean of 3.71 and a standard deviation of 0.752. The respondents were further in agreed with a mean of 3.94 to the statement that data accuracy from system integration has led to improved revenue collection in SMU. This was supported by a standard deviation of 0.708. The views and opinions of the respondents further concurred with the statement that real time information sharing has enabled fast relay of analyst conclusions to port gates and verification officers. This was demonstrated by the mean of 3.79 and standard deviation of 1.004. This was in agreement with Smith (2014) that integration of systems lowers turnaround time for clearing of goods

4.5.4 Descriptive analysis for efficiency of scanner management

The researcher also sought to determine to what extent the respondents’ opinions were in agreement with the statements on efficiency of scanner management. The study employed likert scale formatted from 1 to 5, where strongly disagree = 1, disagree=2, neutral = 3, agree = 4 and strongly agree = 5. The views and opinions were then computed to post the means and standard deviations for each statement.

Table 4:10 Descriptive analysis for efficiency of scanner management

Statements	Mean	STD dev
Improvement in number of containers scanned can be attributed to increased training of staff on scanner usage	3.97	0.731
Reduced verification costs in SMU can be attributed to objective analysis form analysis reducing need for physical cargo verification.	3.99	0.906
Fast cargo clearance can be attributed speedy data transmission due system integration.	3.82	0.730
Scanning on arrival of cargo improvement at ICDN can be attributed to number of scanners installed and scanner availability time.	4.03	0.911

From the results in the table above, it was revealed that the respondents agreed with the statement that improvement in number of containers scanned can be attributed to increased training of staff on scanner usage with a mean of 3.97 and a standard deviation of 0.731. It was further established that the respondents’ views coincided with the statement that reduced verification costs in SMU can be attributed to objective analysis form analysis reducing need for physical cargo verification. This was in agreement with Omosa (2020) that the introduction of non-intrusive scanning has

reduced the physical inspections of cargo and raised compliance levels for international traders. This was evidenced by standard deviation of 0.906 to the mean of 3.99. The findings revealed that the respondents had views concurring with the statement that fast cargo clearance can be attributed speedy data transmission due system integration with a mean of 3.82 and a standard deviation 0.730. It was further determined that the respondents also agreed with the statement scanning on arrival of cargo improvement at ICDN can be attributed to number of scanners installed and scanner availability time. This supported by the mean of 4.03 and a standard deviation of 0.911.

4.6 Diagnostic Tests

4.6.1 Normality test results

Normality of the variables was examined for the skewness and kurtosis using Shapiro –Wilk test as show in the table below. Shapiro-Wilk test value of greater than 0.05 indicates that the data set fits within the normal distribution (Leavy, 2017) From the Shapiro-Wilk results, it shows significance level to be above 0.05. According to This indicates that the data falls within normal distribution.

Table 4:11 Shapiro-Wilk test

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Efficiency_of_scanner	.251	172	.201	.885	172	.314

a. Lilliefors Significance Correction

4.6.2 Multicollinearity test results

This study utilized multicollinearity test analysis using efficiency of scanner management as the dependent variables and infrastructure, capacity building and system integration as independent variables. The VIF values were defined to identify whether the correlation could be a problem or not. According to Stenner & Watts (2012), if the VIF is equal to 1, then there is no multicollinearity among variables, but if the VIF is greater than 1, the predictors may be moderately correlated. Outputs of VIF values within the range of 1.5 indicate some correlation, but not enough to be overly concerned about. A VIF between 5 and 10 indicates high correlation that may be problematic. And if the VIF goes above 10, it can be assumed that the regression coefficients are

poorly estimated due to multicollinearity. The results for multicollinearity below for all the variables show to be within the range of 1.5 and less than 2, indicating that the variables were moderately correlated but not enough to be overly concerned about.

Table 4:12 Multicollinearity Test

		Coefficients^a	
		Collinearity Statistics	
Model		Tolerance	VIF
1	Infrastructure	.637	1.569
	Capacity_building	.605	1.654
	System_integration	.582	1.719

4.6 Correlation Analysis

The study pursued at determining the relationship that existed between the independent variables and dependent variable by employing Pearson’s correlation analysis. The results of the analysis are presented in the table below.

Table 4:13 Karl Pearson’s correlation

		Correlations			
		Infrastructu re	Capacity_b uilding	System_inte gration	Efficiency_ of_scanner
Infrastructure	Pearson	1	.522**	.547**	.617**
	Correlation				
	Sig. (2-tailed)		.000	.000	.000
	N	172	172	172	172
Capacity_building	Pearson	.522**	1	.579**	.598**
	Correlation				
	Sig. (2-tailed)	.000		.000	.000
	N	172	172	172	172
System_integratio n	Pearson	.547**	.579**	1	.575**
	Correlation				
	Sig. (2-tailed)	.000	.000		.000
	N	172	172	172	172
Efficiency_of_sca nner	Pearson	.617**	.598**	.575**	1
	Correlation				
	Sig. (2-tailed)	.000	.000	.000	
	N	172	172	172	172

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

From the findings, it was ascertained that all the independent variables in the study were positively correlated to the dependent variable. The analysis revealed a correlation index of 0.617 existed between infrastructure and efficiency of scanner management. The significance obtained against the correlation value was 0.000 which was less than $p=0.01$, indicating that the relationship was statistically significant. This demonstrates that a strong relationship exists between the infrastructure and efficiency of scanner management.

The results also revealed that the correlation between capacity building and efficiency of scanner management was a moderate one with a correlation index of 0.598. The correlation index proved to be significant at with p-value of 0.000 which was less than 0.01 in 2-tailed correlation. The findings further reveals existence of a moderate positive relationship between system integration and efficiency of scanner. This was supported by the correlation index of 0.575 with a significance value of 0.000 in 2-tailed correlation.

4.7 Regression Analysis

The study employed multiple regression analysis to evaluate and determine the effect of the independent variables on the dependent variable, efficiency of scanner management.

4.7.1 Coefficient of Determination

The degree to which independent variables explain a dependent variable is given by coefficient of determination. In this study, it is the percentage of efficiency in scanner management explained by the dependent variables, infrastructure, capacity building and system integration.

Table 4:14 Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.716 ^a	.513	.504	.916

a. Predictors: (Constant), System_integration, Infrastructure, Capacity_building

From the results, the R value was 0.716. R value shows the simple correlation and the obtained value indicates high degree of correlation. R² was established to be 0.513, which is the degree of variation that is caused on depend variable by the independent ones. In this study, the independent variables, infrastructure, capacity building and system integration explained 51.3% of the dependent variable, efficiency of scanner management. The remaining 48.7% of efficiency of scanner management can be explained by other variables that have not been examined in this study.

4.7.2 Analysis of Variance

Analysis of Variance (ANOVA) is a statistical technique employed to determine the significance of the regression model and in evaluating the variances between two or more means. For a model to be considered as significant, the p-value should be equal or less than 0.05. For this study, the findings show that that the p-value was 0.000 indicating that the model was statistically significant in predicting the efficiency of scanner management in ICDN. The findings from the table below show a F=58.910, with p<0.05, indicating the model was significant. The study was significant as justified by high reliability at confidence level of 95%.

Table 4:15 Analysis of Variance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	148.398	3	49.466	58.910	.000 ^b
	Residual	141.067	168	.840		
	Total	289.465	171			

a. Dependent Variable: Efficiency_of_scanner

b. Predictors: (Constant), System_integration, Infrastructure, Capacity_building

4.7.3. Coefficients

The researcher utilized multiple regression analysis to assess the relationship between the dependent variable, efficiency of scanner management and the independent variables as demonstrated in the findings presented in the table below.

Table 4:16 Regression coefficients

Coefficients ^a								
Model		Unstandardized		Standardize	T	Sig.	Collinearity	
		B	Std. Error	d			Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	3.726	.983		3.791	.000		
	Infrastructure	.314	.061	.345	5.116	.000	.637	1.569
	Capacity_building	.275	.065	.293	4.224	.000	.605	1.654
	System_integration	.202	.066	.217	3.073	.002	.582	1.719

a. Dependent Variable: Efficiency_of_scanner

The study employed multiple regression analysis as shown in above table to assess the relationship between independent variables infrastructure, capacity building and system integration and dependent variable, efficiency of scanner management.

The regression model to be used is as follows:

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

Where

Where;

Y = Efficiency of scanner management

β_0 = Constant term, the intercept shows the efficiency of scanner management without other variables in the study.

$\beta_1, \beta_2, \beta_3$ = Coefficients determining the level of effects of regulating factors influencing efficiency scanner management.

X₁ = Infrastructure

X₂ = Capacity building

X₃ = System integration

ϵ = Error term (factors outside the model that can influence the dependent variable)

Therefore;

$$Y = 3.726 + 0.314X_1 + 0.275X_2 + 0.202X_3 + \epsilon$$

From the finding, the y-intercept was found to be 3.726. This was revealed as the efficiency of scanner management when all factors are held at constant or zero. This was established to be the efficiency of scanner management when no other factors were influencing or affecting the dependent variable. The findings as per the table above indicates efficiency of scanner management as 3.726 when no change is caused on the dependent variable by any external factors at significance level of 0.000.

The results also revealed a unit increase in infrastructure will result in 0.314 increase in the dependent variable, efficiency of scanner management. This indicates that a change of 0.314 in efficiency of scanner management when a unit of infrastructure is added in the equation. The results were found to be significant level of 95%, with the attained significance having a p=0.000, which was less than 0.05.

The finding further established that a unit increase in capacity building will result to a positive increase of the efficiency of scanner management. The unit increase of capacity building caused 0.275 increase in efficiency of scanner management. This shows that 0.275 variance in efficiency of scanner management is caused by a unit increase in capacity building. The value obtained had

a significance level of 0.000 as demonstrated in the table above which was less than 0.05, the set significance level.

The results also established the existence of a positive relationship between system integration and efficiency of scanner management. The findings show that a unit increase in system integration will result in 0.202 improvement in efficiency of scanner management. This shows that there will be 0.202 increase in efficiency after increasing system integration. This value was significant with 0.000 at confidence level of 95%.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 introduction

This chapter shows the summary of findings, conclusions and recommendations, recommendations and areas of further study. It outlines the outcomes from collected and analyzed data, makes deductions which completes the topic of research based on the objectives and finally makes required recommendations for further research.

5.2 Summary of the Findings of the Study

5.2.1 Infrastructure

The study pursued to determine to what degree infrastructure influenced scanner efficiency at Inland Container Depot. From the analysis, the researcher determined that there was a positive enhancement in scanner efficiency of 0.314, when infrastructure is increased by a unit. This indicates that when there is a unit increase in infrastructure, scanner efficiency increases by 0.314. It was further established that there existed a strong positive correlation ($r=0.617$) in the Karl Pearson's correlation between infrastructure and scanner efficiency, the dependent variable.

5.2.2 Capacity building

The researcher further sought to ascertain what magnitude of influence that capacity building had on scanner efficiency at Inland Container Depot, Nairobi. The results revealed the existence of a high degree of positive correlation ($r=0.598$) between capacity building and scanner efficiency, the dependent variable. The researcher further ascertained that a unit increase in capacity building resulted in 0.275 scanner efficiency enhancement. This meant 0.275% improvement in scanner efficiency is caused by a unit increase in capacity building.

5.2.3 System integration

The study also sought to determine what extent does integration influence the efficiency of scanner management at Inland Container Depot, Nairobi. From the analysis, findings from Karl Pearson's correlation at 0.09 confidence level show a positive moderate of $r=0.575$ between system integration and efficiency of scanner management. From the regression analysis, a unit increase in systems integration was found to cause 0.202 increase in efficiency of scanner management.

5.3 Conclusions of the Study

5.3.1 Infrastructure

The study concludes that infrastructure has considerable influence on efficiency of scanner management at Inland Container Depot, Nairobi. This was demonstrated by the regression analysis which showed a unit increase in infrastructure will enhance efficiency of scanner management by 0.314. Positive strong relationship was established from Karl Pearson's correlation with $r=0.617$. This indicates that infrastructure is very important in enhancing the efficiency of scanner management.

5.3.2 Capacity building

The researcher further deduced that capacity building is a critical factor in the enhancement of scanner efficiency at the Inland container depot, Nairobi. The findings reveal the existence a positive relationship between the two variables, capacity building and efficiency of scanner management. The Pearson's correlation findings indicate the index of correlation was at 0.598 which was a positive relation. The analysis ascertains that a unit increase in capacity building result in 0.275% increase in efficiency of scanner management. This led to the conclusion that capacity building is a significant element in efficiency of scanner management.

5.3.3 System integration

System integration was ascertained to be one of the critical factors in enhancing efficiency of scanner management at Inland container depot, Nairobi. This was supported by the results specifically from the regression assessment which were significant at level of confidence of $p<0.005$. The findings indicate that system integration affected efficiency of scanner management by 0.202 when a unit change on system integration is done. The conclusion was also supported by Pearson correlation finding of 0.575. This indicates that integration of system plays an important role in enhancing efficiency of scanner management.

5.4 Recommendations of the Study

From the findings, each independent variable particularly, infrastructure, capacity building and system integration have a significant effect on efficiency of scanner management. Therefore, this study recommends that;

Continuous improvement of scanner infrastructure to reduce the scanner downtime, hence improving the number of containers and the efficiency of non-intrusive verification. This will reduce the time and costs incurred in verification and clearance of cargo.

Training of both the scanner operators and image analysts to be done regular basis to boost on image quality, reduce time used in submission and analysis, with objective conclusions. Training increases the staff efficiency in conducting their roles reducing clearance costs due to errors from staff.

Monitoring and continuous maintenance of the integrated scanner management system and the integrated customs management system to reduce system downtimes for faster image analysis. Improvement in system integration will lead to faster information sharing and processing of data increasing the efficiency of managing clearance data.

5.5 Suggestions for Further Research

This study focused on factors influencing efficiency of scanner management at Inland Container Depot, Nairobi. The finding indicates only 51.3% of the dependent variable, efficiency of scanner management was explained by the independent variable under this study. Therefore, further study is recommended to be conducted on other factors like stakeholders' engagement, regulatory policies, change management and other strategic factors that influence efficiency of scanner management.

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APPENDICES

Appendix I: Introduction letter

Dear respondent,

RE: DATA COLLECTION FOR ACADEMIC RESEARCH

I am a student at Kenya School of Revenue Administration pursuing a Post Graduate Diploma in Customs Administration, I am currently doing an academic research on FACTORS INFLUENCING PERFORMANCE OF SCANNER MANAGEMENT UNIT AT THE INLAND CONTAINER DEPOT, NAIROBI. This questionnaire is therefore issued purely for academic purpose and the information provided will be treated confidential.

Moreover, your cooperation in ensuring that the questionnaires are answered will be highly appreciated. I assure you that the information provided will be purely academic and be kept confidential.

Your assistance is highly appreciated

Yours sincerely,

Alice Kitololo

Appendix II: Questionnaire

I am student at Kenya School of Revenue Administration (KESRA) Mombasa campus. I'm carrying out an academic research proposal study for the partial fulfilment of the requirements of the Award of the Post Graduate Diploma in Customs Administration. I kindly request you to accurately fill in the information requested as per instructions given. The information provided will be held in confidence and will be used purely for academic purposes.

SECTION A: DEMOGRAPHIC INFORMATION

1. What is your highest level of education?

- | | | | |
|---------------|-----|------------|-----|
| Primary | [] | Secondary | [] |
| College | [] | University | [] |
| Post graduate | [] | | |

2. What is your role?

- | | |
|------------------------|-----|
| Customs agent | [] |
| Customs clearing agent | [] |

3. What position do you hold in the organisation?

- | | | | |
|------------|-----|----------------|-----|
| Officer | [] | Supervisory | [] |
| Managerial | [] | Top management | [] |

4. For how long have you worked with the organization?

- | | | | |
|-------------------|-----|----------------|-----|
| Less than 2 years | [] | 2-5 years | [] |
| 6-10 years | [] | Above 11 years | [] |

SECTION B: Infrastructure

To what extent do you concur with the following statements about infrastructure on efficiency of scanner management? Use the scale of 5 =strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree.

Statements	1	2	3	4	5
There are enough scanners at ICN to handle scanning of cargo on arrival					
The scanners are well connected with internet and serves to transmit data for fast analysis					
There are enough handling equipment at the depot to facilitate scanning of containerized cargo at ICDN					
Drive through scanner layout at ICDN has improved the time taken to scan per container.					

SECTION C: Capacity building

To what extent do you concur with the following statements about Capacity building on efficiency of scanner management? Use the scale of 5 =strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree.

Statements	1	2	3	4	5
Scanner operators and Scanner analysts are well trained to handle cargo scanning and increase the scanning of cargo					
KRA scanner management deploys new recruits with required skills to conduct scanning					
Regular trainings on all scanner operation equips staff with relevant knowledge for quick resolving of machine downtime.					
Benchmarking on scanner operations has enhanced scanner operations reducing overall costs of clearance.					

SECTION D: System integration

To what extent do you concur with the following statements about System integration on efficiency of scanner management? Use the scale of 5 =strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree.

Statements	1	2	3	4	5
Real time image transmission reduces time taken for cargo to be verified					
Inter-system linkages between iScan and other customs systems has enabled SMU to conduct fast image analysis reducing clearance costs					
Data accuracy from system integration and image analysis has led to improved clearance time					
Real time information sharing has enabled fast relay of analyst conclusions to port gates and verification officers for faster clearance					

SECTION E: Efficiency of scanner management

To what extent do you concur with the following statements on efficiency of scanner management? Use the scale of 5 =strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree.

Statements	1	2	3	4	5
Improvement in number of containers scanned can be attributed to increased training of staff on scanner usage					
Reduced verification costs in SMU can be attributed to objective analysis form analysis reducing need for physical cargo verification.					
Fast cargo clearance can be attributed speedy data transmission due system integration.					
Scanning on arrival of cargo improvement at ICDN can be attributed to number of scanners installed and scanner availability time.					