

**FACTORS INFLUENCING CONTAINER DWELL TIME IN KENYA: A CASE OF
INLAND CONTAINER DEPOT EMBAKASI, NAIROBI**

NYABUTO ACHUKA DENIS

**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF ECONOMICS,
FINANCE AND ACCOUNTS IN THE SCHOOL OF BUSINESS IN JOMO KENYATTA
UNIVERSITY OF AGRICULTURE AND TECHNOLOGY IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE POST
GRADUATE DIPLOMA IN CUSTOMS ADMINISTRATION**

2018

DECLARATION

This project is my original work and has not been presented for a post graduate diploma in any other academic institution

.....

Signature

.....

Date

NYABUTO ACHUKA DENIS

HDB-C016-6646/2016

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

.....

Signature

.....

Date

MR. OWUOR OMINDE

SENIOR LECTURER

KENYA SCHOOL OF REVENUE AND ADMINISTRATION (KESRA)

NAIROBI CAMPUS

DEDICATION

I dedicate this research work to my father (Mr. Joseph Nyabuto) and my mother (Mrs. Margret Kemunto); indeed you really inspired me to have a reason to study and consistently stood by me.

ACKNOWLEDGEMENT

First and foremost I would like to thank our Almighty God for the far he has brought me. My special appreciation also goes to Mr. Owuor Ominde, my supervisor for all his support, patience and motivation and especially for his encouragement throughout the duration of the course and most particularly during the time of writing this project. I could not have asked for any better supervisor!

In a very special way, I would like to thank my family; my dear wife, Purity Kinya, for taking care of our baby for the time I was away from home carrying out research and for always giving me the moral support that I needed to complete this course, you are my rock, you are my star. To the rest of my family, thank you all for your spiritual and moral support. I could never have asked for a better back up force.

To my daughter Megan Kemunto, you are always my reason to get up with renewed strength every morning every day. For you, I will not even allow the sky to limit me.

TABLE OF CONTENT

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENT	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS AND ACRONYMS	x
DEFINITION OF TERMS	xi
ABSTRACT	xii
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the Study.....	1
1.1.1 Global Perspective on Container Dwell Time.....	3
1.1.2 Regional Perspective on Container Dwell Time.....	3
1.1.3 National Perspective on Container Dwell Time.....	4
1.1.4 Container Dwell Time.....	5
1.2 Statement of the Problem.....	6
1.3 Research Objectives.....	8
1.3.1 General Objective.....	8
1.3.2 Specific Objectives.....	8
1.4 Research Questions.....	9
1.5 Significance of the Study.....	9
1.5.1 Government.....	10
1.5.2 Kenya Revenue Authority.....	10
1.5.3 Kenya Ports Authority.....	11
1.5.4 Scholars and Academicians.....	12
1.6 Scope of the Study.....	12
1.7 Limitations of the Study.....	13
1.8 Organization of the Study.....	13
CHAPTER TWO	15
LITERATURE REVIEW	15
2.1 Introduction.....	15
2.2 Theoretical Review.....	15
2.2.1 Queuing Theory.....	16

2.2.2 Modern Theory	17
2.2.3 Theory of Constraints	17
2.2.4 Transactional Cost Economic Theory	18
2.3 Conceptual Framework	19
2.3.1 Port Infrastructure.....	20
2.3.2 Customs Clearance Procedures	20
2.3.3 Cargo Handling Equipment	21
2.3.4 Container Dwell Time	21
2.4 Empirical Review	22
2.4.1 Port Infrastructure.....	23
2.4.2 Customs Clearance Procedures	24
2.4.3 Cargo Handling Equipment	25
2.4.4 Container Dwell Time	25
2.5 Critique of the Literature Review.....	26
2.6 Summary of the Literature Review	27
2.7 Research Gaps	28
CHAPTER THREE	29
RESEARCH METHODOLOGY	29
3.1 Introduction	29
3.2 Research Design	29
3.3 Target Population	30
3.4 Sampling and Sample size.....	31
3.5 Data Collection Instrument	31
3.6 Data Collection Procedure	32
3.7 Pilot Testing	32
3.7.1 Reliability Test	33
3.7.2 Validity Test	33
3.8 Data Analysis and Presentation.....	33
CHAPTER FOUR.....	35
RESEARCH FINDINGS AND DISCUSSIONS	35
4.1 Introduction	35
4.1.1 Response Rate.....	35
4.1.2 Pilot Study Results.....	36
4.2 Demographics Characteristics of Respondents	36
4.2.1 Gender Distribution	37

4.2.2 Age of the Respondents	37
4.2.3 Level of Education.....	38
4.2.4 Type of Organization.....	39
4.2.5 Current Position in the Organization	39
4.2.6 Number of Years Worked in Organization.....	40
4.3 Descriptive Analysis	40
4.3.1 Port Infrastructure.....	41
4.3.2 Customs Clearance Procedures	44
4.3.3 Cargo Handling Equipment	48
4.3.4 Container Dwell Time	52
4.4 Inferential Analysis	53
4.4.1 Multiple Regression Analysis.....	54
4.4.2 Correlation	55
4.4.3 Analysis of Variance	57
CHAPTER FIVE	60
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	60
5.1 Introduction	60
5.2 Summary of the Study.....	60
5.2.1 Port Infrastructure.....	60
5.2.2 Customs Clearance Procedures	61
5.2.3 Cargo Handling Equipment	61
5.3 Conclusion of the Study	61
5.4 Recommendations	62
5.5 Areas for Further Research	62
REFERENCES.....	64
APPENDICES	66
Appendix i: Introductory Letter to Respondents.....	66
Appendix ii: Questionnaire	67
Appendix iii:Work Plan	74
Appendix iv:Budget Plan	75

LIST OF TABLES

Table 3.1 Target Population.....	30
Table 3.2 Sample size.....	31
Table 4.1 Response Rate.....	35
Table 4.2 Realiability Test Results.....	36
Table 4.3 Gender of the Respondents.....	37
Table 4.4 Age of the Respondents.....	37
Table 4.5 Level of Education.....	38
Table 4.6 Type of Organization.....	39
Table 4.7 Respondent Position.....	39
Table 4.8 Number of Years Worked in the Organization.....	40
Table 4.9 Mean, Standard Deviation and Coefficient of Variation of Transport Infrastructure...41	
Table 4.10 Mean, Standard Deviation and Coefficient of Variation of Space Capacity.....42	
Table 4.11 Mean, Standard Deviation and Coefficient of Variation of ICT Systems.....43	
Table 4.12 Mean, Standard Deviation and Coefficient of Variation of Declaration Process.....45	
Table 4.13 Mean, Standard Deviation and Coefficient of Variation of Verification Process.....46	
Table 4.14 Mean, Standard Deviation and Coefficient of Variation of Releasing Process.....47	
Table 4.15 Mean, Standard Deviation and Coefficient of Variation of Unloading and Loading..48	
Table 4.16 Mean, Standard Deviation and Coefficient of Variation of Automation Machines...49	
Table 4.17 Mean, Standard Deviation and Coefficient of Variation of Modern Equipment.....50	
Table 4.18 Mean, Standard Deviation and Coefficient of Variation of Container Dwell Time...52	
Table 4.19 Regression Model Summary.....54	
Table 4.20 Correlation Analysis.....56	
Table 4.21 Analysis of Variance.....57	
Table 4.22 Regression Coefficient Container Dwell Time.....58	

LIST OF FIGURES

Figure 2.1 Conceptual Framework.....	19
---	----

LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
CAF	Clearing and Forwarding
CFS	Container Freight Stations
DPC	Document Processing Centre
EAC	East Africa Community
GOI	Government of India
GOK	Government of Kenya
ICD	Inland Container Depot
KAM	Kenya Association of Manufactures
KEBS	Kenya Bureau of Standards
KEPHIS	Kenya Plant Health Inspectorate Services
KESRA	Kenya School of Revenue Administration
KIFWA	Kenya International Freight and Warehousing Association
KPA	Kenya Ports Authority
KRA	Kenya Revenue Authority
KRC	Kenya Railways Corporation
KTA	Kenya Transporter Association
SGR	Standard Gauge Railway
GDA	Government Departments and Agencies
TBL	Through Bill of lading
TEUs	Twenty Foot Equivalent Units

DEFINITION OF TERMS

Cargo Handling Equipment: Used for loading/discharging operations: e.g. cargo cranes, side-loading system with conveyors, side shifters, elevators, belt conveyors, cargo handling gear and cargo pumping systems (Levinson, 2016).

Container Dwell Time: Duration of stay of containers in the port from the time of discharge from the ship up to the time of delivery to the owner in the case of import cargo and vice versa for export. Simply it is the time taken between the arrival of cargo and their release from the ports custody (Levinson, 2016).

Custom Clearance Procedure: Involves preparation and submission of documents required for facilitate exports or imports into the country, customs examination, assessment and payment of duty (Saaty, 2013).

Free storage time: Time from when the vessel completes discharge and the container is stored in the port area until collection for a specified period without incurring any port storage charges (Kgare et al, 2013).

Port Infrastructures: Port facilities, services and installation needed for the functioning of the port (Martinez et al, 2013).

Twenty-foot Equivalent Unit (TEU): represents a twenty-foot container. A forty-foot equivalent unit (FEU) represents a forty-foot container and is equivalent to two TEUs. (Cullinane, 2014).

ABSTRACT

Congestion has become a major problem at Inland Container Depot (ICD) Nairobi since the government issued a directive that 40 per cent of cargo handled at the port of Mombasa be transported by the standard gauge railway (SGR) to ICD Nairobi for clearance and discharge, and this led to high container dwell time at the ICD Nairobi. Containers overstay at the ICD for more than two weeks. The delay in clearing containers at the ICD is made worse by poor infrastructural facilities, long customs clearance procedures and inadequate cargo handling equipment. The objective of this study was to determine factors influencing container dwell time in Kenya with the case of Inland Container Depot Embakasi, Nairobi. The study was guided by three specific objectives which include: To determine the effect of port infrastructure on the container dwell time in Kenya; to find out the effects of customs clearance procedures on the container dwell time in Kenya; to examine the effect of cargo handling equipment on container dwell time in Kenya. This study was based on four theories: queuing theory, modern theory, theory of constraints and transactional economic theory. The research evaluated the factors influencing container dwell time and identified both the problem areas, potential corrective actions and the impact of the dwell time on trade facilitation. It also examined and addressed the factors that present the most immediate obstacles which leads to high container dwell time at ICD Nairobi. The target population of the study was 1150 people which included Kenya Revenue Authority, Kenya Port Authority, shipping lines and clearing and forwarding agents. Questionnaire was the major instrument to obtain primary data from the respondents while the secondary data was obtained from existing empirical literature relevant to the study. The study employed an exploratory approach using a descriptive survey design. The questionnaire was designed using Likert scale type. A sample of 112 respondents was obtained through a stratified sampling technique. Quantitative data was analyzed using inferential and descriptive statistics. Descriptive statistics such as mean, standard deviation, coefficient of variation and percentages were used in this study. In relation to inferential statistics, the study used correlation analysis to establish the relationship between the independent and the dependent variables. The findings revealed 86.7% of the respondents believe that by improving the port infrastructures at the ICD Nairobi will minimize the congestion problems. Findings from the survey also revealed that 83.3% of the respondents agree that the clearance procedures pose substantial delays in custom clearance procedures. The findings further revealed 88.7% of the respondents believe that by modernizing cargo handling equipment at the ICD Nairobi will improve the management of trucks unloading and loading of goods. The study recommended that ICD Nairobi management should continuously invest in modern equipment to supplement the current ones in order to continuously enhance productivity of port operations. The study also recommends that the government has to expand to dual carriageways both the eastern and northern bypasses which are critical for ICD operations. More efforts have to be put in creating more space in the dry ports. This study further recommends that more efforts have to be put in creating more space in the dry ports. In addition the government should speed up the construction of Naivasha dry port to ease congestion at ICD Nairobi

CHAPTER ONE

INTRODUCTION

Levinson (2016) defined container dwell time as the duration of stay of containers in the port from the time of discharge from the ship up to the time of delivery to the owner in the case of import cargo and vice versa for export. Simply it is the time taken between the arrival of cargo and their release from the ports custody. Steenken & Stahlbock, (2014) defined import container dwell time as the total period that a container stays in port, which is from the time it is discharged from the ship to the time it is delivered or the measure of the time elapsed from the time the container arrives in port to the time the container leave the port premises, after all permits and clearances have been obtained. It is usually measured in days/ hours. Murty & Notteboom, (2013) note that container dwell time is one of the many performance indicators to assess port performance. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes.

1.1 Background of the Study

Congestion has become a major problem at Inland Container Depot (ICD) Nairobi since the government issued a directive that 40 per cent of cargo handled at the port of Mombasa be transported by the standard gauge railway (SGR) to ICD Nairobi for clearance and discharge (KPA, 2018). The containers being railed to ICD Nairobi are being discharged directly from the ship and onto the train for Nairobi. KPA is loading all cargo designated for upcountry onto the SGR without verification and this has further led to increased congestion at ICD Nairobi (KIFWA, 2018). The world's largest container shipping company Maersk is ferrying cargoes from the Port of Mombasa by the SGR to the ICD Nairobi and this led to rapid growth in cargo

volumes at ICD Nairobi (KPA, 2018). The depot has now become a congestion hub as the government directs cargo owners to use SGR for cargo destined upcountry from the port of Mombasa (KIFWA, 2018).

Due to high volumes experienced at ICD Nairobi, KPA advertised in the local dailies requesting importers to clear their cargoes from ICD Nairobi to decongest it. It further warned the importers that the uncollected cargoes will be transferred to nominated warehouses outside the ICD for storage at the cost of the importers (KPA, 2018). The congestion at the ICD Nairobi is due of slow evacuation of cargoes and the rising number of empty containers (KIFWA, 2018). The government gave a directive that all the government departments and agencies (GDAs) to transport cargo on the SGR, this includes cargo for projects undertaken by third parties. The ministry of transport gave a directive that the government will not allow any cargo destined for Nairobi to be stored in CFSs in Mombasa (MOT, 2018).

The World Bank, in its annual business reports 2016, that ranks economies based on the ease of doing business, rated Kenya low at 113 among 183 economies in the world due to congestion at the ports waiting clearance. With ever growing international trade in the cargo shipping industry, dry ports are coping with mounting pressures due to congestion of containers at seaports and this is because of inadequate storage facilities (UNCTAD, 2017). Container imports at the port have risen on average 10 percent each year since 2009. Some key problems associated to the inefficiency of the port are: dwell time issue, management of trucks loading and unloading goods, slow collection of custom duties, delayed inspections, etc (KPA, 2016). There are mainly three areas which influence container dwell time; port infrastructure, custom clearance procedures and cargo handling equipment. These issues have therefore prompted this study to

find out the factors influencing the container dwell time in Kenya: A case of Inland Container Depot (ICD) Embakasi, Nairobi.

1.1.1 Global Perspective on Container Dwell Time

Containerization of ship cargo was first introduced in 1956 (Levinson, 2016), aiming to cut down the costs of maritime transport by reducing cargo handling costs. Instead of loading or unloading each piece of transport item to or from a ship in a labor-intensive manner, containerization increases the efficiency and speed of transport by reducing the packing requirements and handling processes at all transfer points. That is between port, rail and road (Levinson, 2016). At the end of 2020, container growth in Kenya is expected to have increased to 50.6 million TEUs (UNCTAD, 2015). Thus, any countries without adequately unitized transport facilities will be disadvantage in their international trade (Castro, 2013).

Most ports have reduced storage space with the stacking yard and occasioned serious operational inefficiency, congestions, low productivity at the container terminal, poor off take of containers and high cost of doing business, incessant complaints from industry stakeholders. In case of perishable containerized goods, the prolonged dwell time may result in total loss in business hence loss in revenue collection. Raw materials and industrial products do not access the market in time (Steenken & Stahlbock, 2014). The prolonged dwell time may also lead to diversion of cargo to neighbouring ports, thereby ruining the reputation and image of Kenyan ports. Dwell time study is then one of the key indicators of port performance according to UNCTAD, (2015).

1.1.2 Regional Perspective on Container Dwell Time

For containerized imports, cargo dwell time is defined as the time between vessel arrival and container exist from the port facilities exceeds 20 days in average for most ports in developing

countries which makes them the most time-inefficient ports in the world (UNCTAD, 2017). Cargo dwell times in African ports are unusually long; more than two weeks on average, compared to under a week in large ports in Asia, Europe and Latin America. Very long dwell times in African ports hurt the efficiency of port operations and the economy in general. Most delays are due to transaction and storage time, resulting from controlling agencies' performance and, more importantly, the strategies of importers and customs brokers (UNCTAD, 2017). In Africa, importers often have strong incentives to use ports as storage areas.

Steenken & Stahlbock (2014) found out that, today over 60 per cent of world's general cargo are transported in containers, whereas some routes are even containerized up to 100 per cent. International containerization market analysis still shows high increasing rates for container freight transportation in the future. This leads to higher demands on port container terminals, container logistic and management. With ever increasing containerization, the number of port container terminals and the competition among them has become quite remarkable (Murty & Notteboom, 2013).

1.1.3 National Perspective on Container Dwell Time

From a national perspective, the issue of dwell time has been specifically identified as a hindrance to economic development for a long time (KPA, 2016). Ports play the significant role as a major facilitator of legitimate international trade. Ports traffic is steadily increasing; ships are getting larger and types of goods being transported are ever increasing. As larger ships are built and more means of transportation join terminals, more and more their times of arrival coincide. As we gear towards Vision 2030, ICD Nairobi is expected to play a key role in the envisaged transformation of Kenya to a prosperous middle income country (KMA, 2015). In a fast changing world, it is very crucial in measuring its level of efficiency and thereby

competitiveness in terms of international trade (KMA, 2015). KPA (2016) reports that the ICDs will provide a more efficient and cost-effective transport solution for importers and exporters as well as relieving some of the serious congestion at the Port of Mombasa by enhancing throughput capacity via the quicker and easier clearance of cargo and container handling destined for ICDs.

1.1.4 Container Dwell Time

Container dwell time is one of the many performance indicators to assess port performance. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes (Murty & Notteboom, 2013). High cargo dwell times have serious time and cost implications on revenue collection. Several reasons have been given as to why the incidence of dwell times in Sub Saharan Africa is high (Steenken & Stahlbock, 2014). The study in 2012 finds that the usual assumption that the private sector is interested in reducing cargo dwell time is mostly not the case in Sub-Saharan Africa. Most delays are due to transaction and storage time. According to the report, importers within Sub-Saharan Africa have very strong incentives to use the port as a storage area (Murty & Notteboom, 2013).

Custom clearance processes in most developing countries are critical function as duties and taxes collected in ports are a very important contributor to state revenues. The efficiency of customs clearance in ports is then closely monitored with a focus mostly on revenue collection performance (Lee & Miao, 2014). There is need for creating awareness of the importance of customs clearance and timely efficiency to facilitate international trade. In theory the time to perform import clearance formalities starts much before containers arrive and is not therefore strictly related to cargo dwell time (KPA, 2016). Truck turnaround time is one of the many

performance indicators to find out the factors influencing of container dwell time. As compared to standard indicators such as truck turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes. It is therefore challenging to define standard limits above which dwell time would be considered too long in any given port. Maritime industry sector experts tend to agree however on a 3 to 4 days representative mean value (Goardon et al., 2013).

1.2 Statement of the Problem

Congestion is a major problem at the ICD Nairobi. The ICD Nairobi has now become a congestion hub as the government has directed cargo owners to use the standard gauge railway (SGR) for cargo destined upcountry from the port of Mombasa (KPA, 2018). The government issued a directive that 40 per cent of cargo handled at the port of Mombasa be transported by the SGR to the ICD Nairobi for discharge (KPA, 2018). KPA is loading all cargo designated for upcountry and export onto the SGR without verification and this has further led to increased congestion at ICD Nairobi. KPA advertised in local dailies informing importers to clear cargo at the ICD Nairobi to decongest it. It warned that uncollected cargo will be transferred to nominated warehouses outside the ICD for storage at the cost of the importers (KPA, 2018). The pileup at the ICD Nairobi it is because of slow evacuation of cargo and the rising number of empty containers (KIFWA, 2018). The government gave a directive that all the government departments and agencies to transport cargo on the SGR, this includes cargo for projects undertaken by third parties (KPA, 2018). The ministry of transport gave a directive that the government will not allow any cargo destined for Nairobi to be stored in CFSs in Mombasa (MOT, 2018).

GOI (2013) studied container dwell time by comparing two major international ports - Rotterdam and Singapore. It was found out that for containers the average dwell time at Rotterdam container terminal was 18.8 days for imports and 3.78 days for exports. But for Singapore container dwell time for both imports and exports was 0.6 days. The study identified the obstacles of achieving the international standards. Vast differences were observed in the availability of infrastructure, connectivity and electronic information exchange. Thus the evacuation of cargo in international port is very quick. The study identified a number of factors responsible for high dwell time and this has contributed to the low efficiency of Indian ports. These included; infrastructure constraints such as inadequate port capacity, poor road network and limited cargo handling facilities, high downtime of equipment, low labour productivity and shortage of storage space. Also there was regulatory restriction on operation time, low IT application, including partial implementation due to too much manual documentation, archaic systems and procedures. Other factors were limited time for payment and documentation, delay in mobilization of equipment, trucks and shortage of rail wagon.

Martinez et al., (2015) explains that the cause for cargo delay can be due to the poor performance of the administrative services such as customs and sanitary inspections, or they could originate from poor coordination between ships and land modes of transport. Barros et al., (2014) identifies the factors influencing container dwell time at the port as being the time it takes documents to be linked with customs, time for import licenses to be issued, time for documents to be processed by customs, time for customs to inspect the contents of containers, time for the consignee to be contacted, time for consignee to organize transport and time spent awaiting arrival of transport for the imports. For export he identified consolidation, marshalling and time awaiting document clearance.

Container dwell time is one of the many performance indicators to assess port performance. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes. The World Bank, in its annual business reports 2016, that ranks economies based on the ease of doing business, rated Kenya low at 113 among 183 economies in the world due to congestion at the port waiting clearance. With ever growing international trade in the cargo shipping industry, dry ports are coping with mounting pressures due congestion of containers at seaports; this is because of inadequate storage facilities (UNCTAD, 2015). Container imports at the port have risen on average 10 percent each year since 2009. Some key problems associated to the inefficiency of the port are: dwell time issue, management of trucks loading and unloading goods, collection of custom duties, inspections, etc. (KPA, 2016). There are mainly three areas which influence container dwell time in Kenya: port infrastructure, custom clearance procedures and cargo handling equipment. These issues have therefore prompted the study to find out the factors influencing the container dwell time in Kenya: A case of Inland Container Depot (ICD) Embakasi, Nairobi.

1.3 Research Objectives

1.3.1 General Objective

The general objective of this study was to determine factors influencing container dwell time in Kenya: A case of Inland Container Depot Embakasi, Nairobi.

1.3.2 Specific Objectives

- i. To determine the effect of port infrastructure on the container dwell time in Kenya with a case of Inland Container Depot Embakasi, Nairobi.

- ii. To find out the effect of customs clearance procedures on the container dwell time in Kenya with a case of Inland Container Depot Embakasi, Nairobi.
- iii. To find out the effect of cargo handling equipment on container dwell time in Kenya with a case of Inland Container Depot Embakasi, Nairobi.

1.4 Research Questions

In order to address the objectives outlined above, this research paper focussed on answering the following questions:

- i. How does port infrastructure influence container dwell time in Kenya with a case of Inland Container Depot Embakasi, Nairobi?
- ii. How do customs clearance procedures influence container dwell time in Kenya with a case of Inland Container Depot Embakasi, Nairobi?
- iii. How does cargo handling equipment influence container dwell time in Kenya with a case of Inland Container Depot Embakasi, Nairobi?

1.5 Significance of the Study

Practical methods that deal specifically with the factors influencing container dwell time on productivity on inland container depots are limited in literature; hence the motivation for this work. This study sought to benefit all stakeholders and players within the ICDs (dry port) because the findings from the research have provided an in-depth knowledge on practical implications on factors influencing container dwell time in Kenya. Until the time of this study, there was limited literatures on how much time each work process takes to clear a container has been kept at the ICD Embakasi, Nairobi. This study on the factors influencing container dwell

time in Kenya with a case of Inland Container Depot Embakasi, Nairobi would be beneficial to several stakeholders:

1.5.1 Government

The government would benefit from the study on formulation of policies and regulations on imports, exports and transit goods on dry ports. The imports and exports that pass through ICD Nairobi are critical to Kenya's economic growth and to the economic well-being of its neighbors as well. Any delays in the importation or exportation sector, the government stands to lose substantial revenue collection. The government of Indian (GOI, 2013) studied container dwell time by comparing two major international ports - Rotterdam and Singapore. It was found out that for containers the average dwell time at Rotterdam container dwell time was 18.8 days for imports and 3.78 days for exports. But for Singapore container dwell time for both imports and exports was 0.6 days. This study helped GOI to identify the obstacles of achieving the international standards by improving on infrastructure, better connectivity and use of electronic information exchange. Thus the evacuation of cargo in international port is very quick. Saaty (2013) on his study, he identified a number of factors responsible for high container dwell time which contributed to the low port efficiency. These included; inadequate port capacity, low labour productivity and shortage of storage space.

1.5.2 Kenya Revenue Authority

Customs administration is also concerned by container dwell time because of important tax avoidance or cargo abandonment risks associated to long container dwell times. As the custodians of customs procedures, customs officers must ensure efficient and effectiveness in clearance of goods. They must promote simplification, standardization and harmonization of

international trade (Murty & Notteboom, 2013). Martinez et al., (2015) explains that the cause for delay can be due to the poor performance of the administrative services such as custom and sanitary inspections this means that customs officers are critical to timely clearance of goods. Barros et al., (2014) identifies the factors influencing container dwell time at the port as being the time it takes documents to be linked with customs, time for import licenses to be issued, time for documents to be processed by customs, time for customs to inspect the contents of containers, time for the consignee to be contacted, time for consignee to organize transport and time spent awaiting arrival of transport for the imports.

1.5.3 Kenya Ports Authority

The study findings will be useful to the port Authority and its stakeholders, in finding out the main reasons why there is a long stay of containers at ICD Nairobi. It will also guide to the possible solutions to avert the situation. The study will identify a number of factors responsible for high container dwell time contributing to the low efficiency of ICD Nairobi. Cargo handling equipment are one of the important operations for the container terminal logistics, which carries out loading a container from a truck to a vessel or unloading a container from a vessel to a truck (Saaty, 2013). Several major container terminal operations influence the efficiency of container terminal which include the vessel berthing operation, the crane unloading/loading operation, the container delivery operation by trucks, the inspection operation and the container storage operation. Of those operations the crane operation is the key factor that determines the efficiency and effectiveness of a container dwell time (Lee & Miao, 2014). Therefore KPA will be benefit from the study in that they will be able to adopt and implement proper ways of improving containers clearance and reducing container dwell time so that they can attract more stakeholders

hence generating revenues and finally the stakeholders will benefit by not having to incur extra storage costs on their containers that take long before they are cleared.

1.5.4 Scholars and Academicians

To researchers, this study would obtain deep knowledge on the factors influencing container dwell time. The findings of the study will give an insight into the current problem to improve on container dwell time at ICD Nairobi. This study will help researchers to come up with means to lower the container dwell time. This will help to improve on the efficiency and effectiveness of cargo clearance and ultimately this will reduce time to transport cargo from one point to another. The findings will also be a direction for future research and practical implications as well, especially to those who want to do similar research by assessing factors influencing container dwell time within the maritime industry. Also the findings of the study would be useful in building up ground work for further research on the same area or related fields.

1.6 Scope of the Study

The scope of the study explains the boundaries of the research and this is based on the fact that the researcher cannot study everything and everywhere as stated by Kothari (2014). This helps the researcher to keep focused on the task in order to make decisions about the changes required during the research process that contribute to obtaining of both valid and reliable information (Murty & Notteboom, 2013). The study was limited to Inland Container Depots (ICD) Embakasi, Nairobi. The target population included; KPA officers, customs officers, shipping lines and clearing and forwarding agents this study targeted 1150 people. Questionnaire was used as the major instrument to obtain primary data from the respondents while the secondary data was

obtained from existing empirical literature relevant to the study. A sample of 112 respondents was obtained through a stratified sampling technique.

1.7 Limitations of the Study

The study was confined to ICD Nairobi and it investigated the time it takes to clear a container at different processing stages. It was not able to quantify the other factors which may cause delays like breakdown of machines, scanner failures, shortage of man power and sometimes network failure which directly prolong the container dwell time. Because of the limited time and finances, the study only focused on three main factors influencing container dwell time at ICD Nairobi namely; port infrastructure, customs clearances procedures and cargo handling equipment used. Because of limitation of time, the data set was collected in a period of one month this was to allow for more time in depth analysis of these variables. The collection of data proved to be hard since the stakeholders of the ICD Nairobi were adamant to give information on the container dwell time. However, by simple and well structured of the questionnaires and assurance of confidentiality of the information actually helped the research to be successful.

1.8 Organization of the Study

Chapter one presents the background of the study, statement of the problem, research objectives and research questions. It has also stated the significance the study, the scope of the study, limitations of the study and the organization of the study. Chapter two of this project gives an outline of the literature review in relation to factors influencing container dwell time at ICD Nairobi. They include port infrastructure, customs clearance procedures and cargo handling equipment. The chapter also has theoretical review of the study, conceptual framework, empirical review, critique of the literature review, summary of the literature review and research

gaps. Chapter three gives the research design which was employed, target population, sampling and sample size, data collection, data collection procedure and pilot testing. The methods of data collection are also explained which are mainly questionnaire, observation and data analysis. Chapter four presents how data is presented, analyzed, and interpreted. Finally chapter five presents the summary of research findings, discussion of the findings, conclusion, and recommendations. The study proposed for further studies on other ICDs in Kenya should improve on performance.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents a review of some of the existing literature on the studies on factors influencing container dwell time at ports by critically examining their objectives, methodology applied and the findings. The review is meant to exemplify the key concepts of the topic of discussion. It provides the basis of critical review and a clear understanding of the problem. The main sections included therein are; theoretical literature, conceptual framework, empirical literature, critique of existing literature relevant to the study, summary and research gaps.

2.1 Introduction

Literature review basically involves identification, location reading and evaluation of various relevant documents related to the problem or issue under investigation. The term is also used to refer to the works the researcher has consulted in order to understand and investigate the research problem. In other words literature review consists of an account of what has been published on a topic by accredited scholars and researchers (Kothari, 2014). It gives a review of the existing literature on the factors influencing container dwell time at various ports. The literature review is meant to exemplify the key concepts of the topic of discussion. It provides the basis of critical review and a clear understanding of the problem (Mugenda & Mugenda, 2013).

2.2 Theoretical Review

A theory is an explanation which helps to understand and make predictions about a given situation (Creswell & Daly, 2015). Containerization and intermodality have undergone rapid growth in recent decades. Container traffic growth has led to high demand for container terminals, resulting in port congestions, a need for investment in new terminals and greater

competition between terminals within and between ports (Cullinane, 2014).. Container terminals are competing to become transshipment hubs as part of major shipping lines and feeder networks, while greater inland transport accessibility has allowed ports to spread further inland (Roso & Lumsden, 2015).The study stands basically on the following theories:

2.2.1 Queuing Theory

The researcher used the queuing theory which focuses on the port infrastructure where one needs to queue in order to be served. Queuing theory is used to study the phenomenon of waiting in lines. Some people use the information gathered from queuing theory in order to determine how to best serve customers and so prevent them from waiting in line longer than they have to (Adedayo et al. 2013). Kasumu (2013) applied queuing network theory to analyze container handling operations at the container terminal. He examined the effects of the variations in handling times at each station, on port dwell time and the turnaround times for ships. He also identified the bottlenecks of each station and computed many useful performance measures accurately.

There are several queuing disciplines that have been developed because of queuing theory as explained by Sanish (2013) and four of which are First in First Out (FIFO), Last In First Out (LIFO), Processor Sharing, and Priority. Under FIFO describes the practice of serving customers in the order they arrive in so that the person waiting longest is served first. Just like in port operations, ships that arrive in time at the port are cleared earlier before those that arrive later. LIFO describes the practice of serving customers so that the person who comes in last leaves first. Processor sharing serves customers at the same time to that the average waiting time for all customers is about the same. The Priority discipline serves the customer with the highest priority first. In line with the study some ships may arrive last but cleared first before those that appeared

first because of different reasons such as corruption, immanency cases, order from the government among other reasons.

2.2.2 Modern Theory

Modern theory links customs clearance procedures therefore the researcher used the modern theory which focuses on the customs reforms and modernization (CRM) systems. Under these, systems interact with other systems or the outside environment in order to curb the problems and difficulties in container clearance. Some of the CRM is single electronic window system which includes: receiving data from other sources, input data converted into output data and the owner of the cargoes does not need to use the clearing and forwarding agents to clear the goods but ought to clear all the payments online then the cargoes are delivered to the owner (Murty & Notteboom, 2013).

The single electronic window system has help in ensuring fast and reliable information to the owner of the cargoes, government being in the position to get the taxes and revenues through the system thus increasing efficiency and effectiveness of all the activities carried out during the clearance of containers. As a growing and leading port in east and central Africa Kenya port authority must continue embracing the use of modern technology systems in streamlining their efficiency and supply chain in order to add value and be ahead of its competitors. The researcher analyzed the variables and seeing how they are interacted in order to improve and eradicate the cargoes delays in the port of Mombasa (De Wulfluc & Jose, 2013).

2.2.3 Theory of Constraints

The research links theory of constraints with cargo handling equipment which focuses on the operations of machines especially for cranes which are used for loading and unloading. The

container terminal is a warehousing option for cargo owners and is used to meet some of their temporary or long term storage needs (Martinez et al 2015). These needs derive from a set of constraints such as availability of cash flow, warehousing capacity outside the port, current inventory levels or cargo time sensitivity as well as from strategic choices on risk exposure or inventory coverage that we will refer to as inventory management decisions. For example a shipper may leave his cargo in the yard because he has got no other warehousing possibility outside the port or he may leave it there because this would delay the payment of charges and duties and reduce hence temporarily the pressure on his cash flow. For the purpose of the study we will then define a discretionary dwell time as the sum of all idle times between vessel arrival and exit from container yard that are strictly storage times no clearance process or handling operation is performed (Roso & Lumsden, 2015).

2.2.4 Transactional Cost Economic Theory

This theory links with container dwell time which is the dependent variable of this study, this theory considers both the demand and cost incurred when cargo stays at the port. The most well-known translation of the Coasian theory of the revenue authorities is that by Olivier Williamson and his transaction cost economics (TCE). Transaction cost economic theory of the port considers both the demand for and cost incurred for the two cargoes; bulk and container throughput of the port (Tongzon, 2015). The theoretical port time, resource and cost functions may be used in empirical port studies to investigate determinants of and their effects on dwell times in port The means by which a port can differentiate its service (or operating options) include ship and vehicle loading/unloading service rates, channel and berth accessibility and reliability, entrance and departure gate reliability, and damage and property losses to ships, vehicles and cargoes in port (Veal et al, 2016).

2.3 Conceptual Framework

The conceptual framework is a diagrammatic presentation of the relationship between independent and dependent variables of the study (Kasumu, 2013). In this study the dependent variable was container dwell time and it was called dependent because any successful port depended on many different factors which were termed as independent variables. The independent variables in this case were the core factors that led to study of container dwell time and they included: port infrastructure, customs clearance procedures and cargo handling equipment. The research was guided by a Conceptual Framework that is indicated by the independent and dependent variables.

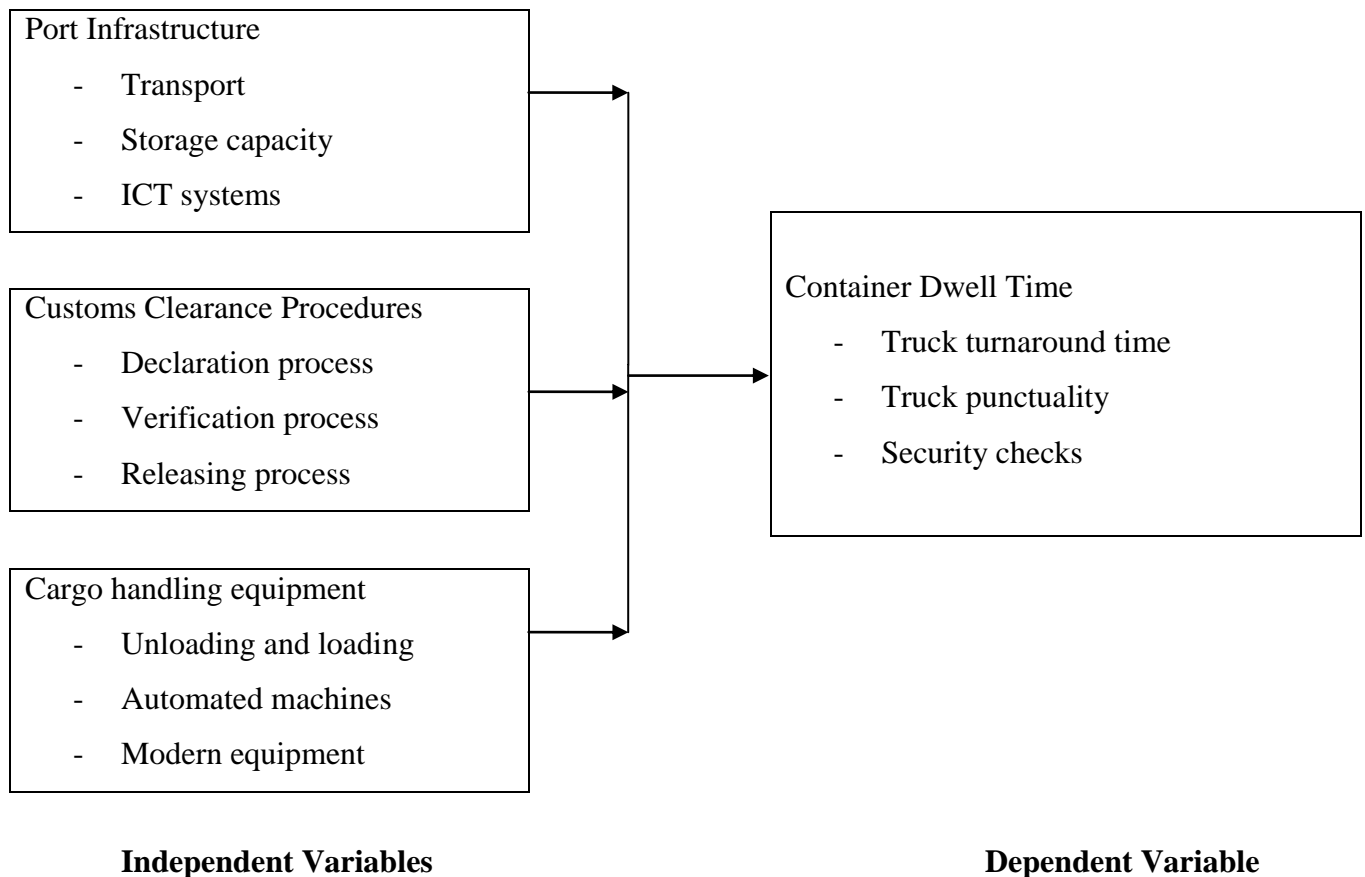


Figure 2.1: Conceptual Framework

2.3.1 Port Infrastructure

Generally, port infrastructure is divided into physical and soft elements. Physical infrastructure includes not only the operational facilities such as the number of berths, the number of cranes, yards and tugs and the area of storage space, but also transport such as roads and railways. Whereas, the soft infrastructure refers to the manpower employed (Cullinane, 2014). Maximum deployment of both types will assist in reducing truck turnaround, thereby increasing the terminal capacity to accommodate more containers. Ships are continually increasing their carrying capacity and container made for large transport units in overseas container transport are under consideration (Martinez et al 2015). This scale enlargement requires new and capital-intensive transshipment facilities in gateway ports. Particularly, inter-modality is essential for the speedy transport of cargoes into and out of a gateway port. Without proper linkages, the efficiency of container terminal operation may decline due to congestion and delays (Tongzon, 2015).

2.3.2 Customs Clearance Procedures

Customs clearance and cargo dwell time are closely related. Customs take a large share of the blame for long delays, but they are not alone. Clearing agents at times delay the clearance process because of missing documents, errors in the declaration (Levinson, 2016). Nevertheless, in terms of dwell time, customs processes are the beginning and the end of most of the processes. The impact on operations of custom clearance procedures at ports are very crucial as far as dwell time is concerned. Inland Container Depots (UNECE, 2016) are defined as dry ports used in handling and storage of goods under custom transit. The operations performed in dry ports differ globally but typically include good clearance for temporary storage for transit, export, warehousing or import (Saaty, 2013). The provision of clearance procedure and quarantine

services imposes high security procedures for accessing the dry port, similarly to seaports, and depending on the country may include high fencing, cameras and guards (Roso & Lumsden, 2015).

2.3.3 Cargo Handling Equipment

Cargo handling equipment are one of the important operations for the container terminal logistics, which carries out loading a container from a truck to a vessel or unloading a container from a vessel to a truck (Saaty, 2013). Several major container terminal operations influence the efficiency of container terminal, which include the vessel berthing operation, the crane unloading/loading operation, the container delivery operation by trucks, the inspection operation, and the container storage operation. Of those operations, the crane operation is the key factor that determines the efficiency and effectiveness of a container terminal (Lee and Miao, 2014). When a container vessel is moored at berth, several cranes are arranged to load or unload containers for that vessel. Unloaded containers are transported by trucks and then go through other terminal operations. After finishing all unloading jobs, cranes will start load containers from land side on to the container vessel (Lee & Miao, 2014).

2.3.4 Container Dwell Time

Container dwell time constituents of: operational dwell time, transactional dwell time and discretionary dwell time which are actually intertwined and overlaid. Analysis of total dwell time by taking two complementary approaches: The independent analysis of each of the three components defined here before is to identify the structural bottlenecks and improvement prospects (Levinson, 2016). As for shippers (importers or exporters) dwell time in ports can be assimilated to a temporary storage period which is justified either by the time necessary to

complete cargo clearance formalities (transactional dwell time) or by a decision to leave cargo in the port for a defined number of days superior to that clearance delay (discretionary dwell time) (Roso & Lumsden, 2015). Field investigations have revealed that the latter case is frequent and that inventory management strategies coupled to negotiations of demurrage costs with shipping carriers cause shippers to use the port as a relatively cheap long term warehouse. The desired cargo dwell time for most shippers would range today from 5 to 30 days for imports (KPA, 2016).

Martinez et al., (2015) defines the container dwell time as the average time a container remains stacked on the terminal and during which it waits for some activity to occur. According to this definition, dwell time also refers to the efficiency of terminal operations. The shorter the dwell time the more efficient. Dwell times can be influenced by many factors, some of which are unrelated to the service quality. For instance, commercial customers often use the storage yard as an overflow node in their supply chain creating an intentional delay. This situation distorts dwell time data since some of the commercial customers place their export cargo on the terminal well before the time required to catch the intended vessel and may leave their import cargo on the terminal yard for an extended time after arrival.

2.4 Empirical Review

The word empirical describes any information gained by experience, observation, or experiment. One of the central tenets of the scientific method is that evidence must be empirical, i.e. based on evidence observable to the senses (Kothari, 2014). Empirical review is based on observed and measured phenomena and derives knowledge from actual experience rather than from theory or belief. Empirical review is the collection and analysis of primary data based on direct observation or experiences in the field (Mugenda & Mugenda, 2013). Philosophically,

empiricism defines a way of gathering knowledge by direct observation and experience rather than through logic or reason alone (in other words, by rationality). In the scientific paradigm the term refers to the use of hypotheses that can be tested using observation and experiment. In other words, it is the practical application of experience via formalized experiments. Empirical data is produced by experiment and observation, and can be either quantitative or qualitative (Creswell & Daly, 2015). Objectives of Empirical Research Empirical research is informed by observation, but goes far beyond it. Observations alone are merely observations.

2.4.1 Port Infrastructure

GOI (2013) studied the comparison of two major international ports - Rotterdam and Singapore. It was found out that for containers the average dwell time at Rotterdam container terminal was 18.8 days for imports and 3.78 days for exports. But for Singapore container dwell time (both imports and exports) was 0.6 days. The study identified the obstacles of achieving the international standards. Vast differences were observed in the availability of infrastructure, connectivity and electronic information exchange. Thus the evacuation of cargo in international port is very quick. The study identified a number of factors responsible for high dwell time, contributing to the low efficiency of Indian ports. These included, infrastructure constraints, such as inadequate port capacity, poor road network, and limited cargo handling facilities, high downtime of equipment, low labour productivity and shortage of storage space. Also there was regulatory restriction on operation time, low IT application, including partial implementation due to too much manual documentation, archaic systems and procedures. Other factors were limited time for payment and documentation, delay in mobilization of equipment, trucks and shortage of rail wagon.

2.4.2 Customs Clearance Procedures

Martinez et al., (2015) explains that the cause for delay can be due to the poor performance of the administrative services, such as custom and sanitary inspections, or they could originate from poor coordination between ships and land modes of transport. Barros et al., (2014) identifies the factors influencing container dwell time at the port as being the time it takes documents to be linked with customs, time for import licenses to be issued, time for documents to be processed by customs, time for customs to inspect the contents of containers, time for the consignee to be contacted, time for consignee to organize transport and time spent awaiting arrival of transport for the imports. For export he identified consolidation, marshalling and time awaiting document clearance.

In 2013, KRA conducted Time Release Study (TRS). They identified that modern customs administrations have recognized that streamlining, standardization, harmonizing and simplifying clearance procedures is beneficial to the importer, the exporters and the national economics. This study helped them identify both the problem areas and potential corrective actions to increase their efficiency thus reducing their cargo dwell time. The study was carried out at seaports, land border posts, an Inland Container Depots (ICDs) and international airports. The findings of the study were the time taken to clear goods has to be improved to meet the highest international standards. The time taken in Kenya was 20 hours 18 minutes at land border posts, 10 days 7 hours and 53 minutes at seaports and 5 days, 11 hours and 26 minutes at airports. Their principal recommendation was there was need to introduce an electronic declaration system and bureaucratic procedures should be reviewed with a view to reduction or elimination as appropriate. The study however was more descriptive statistic by using mean and standard

deviation to give their findings and conclusion. Also, the duration of study was too short (just a week) per section i.e. at airport, port and land borders.

2.4.3 Cargo Handling Equipment

Most investigations in literature are concerned with effectively allocating and scheduling key resources, such as berths, yard, quay cranes, yard cranes and container transport. In fact, the focus is currently not on optimizing the transport chain as a whole. The container terminal is here considered as a global system: instead of single optimization problems (Steenken & Stahlbock, 2014). According to Tongzon, (2015) one of the most basic requirements of any organization is to be able to transport or move materials, equipment's and spare parts from one point to another. Material handling is of vital importance and is indicated by the range and high cost of the equipment that each organization have. Handling materials, which is a major activity in storehouse and stockyard is a costly operation and therefore the methods and equipments should be efficient. Poor handling equipment's leads to Shorty work making an organization not to handle the required load on time, causing delays, congestions and inefficiencies along the supply chains.

2.4.4 Container Dwell Time

Container dwell time is one of the many performance indicators to assess port performance. Levinson (2016) also assessed port performance from the point of view of exporters/importers cargo dwell time. He said that, a high dwell time was generally an indication that all was not well with the port; he did not however identify areas where improvement may be sought. His study did not give the breakdown of the various procedures that had to be carried out before the cargo can be shipped or delivered to the owner. Container dwell time constituents of: operational dwell

time, transactional dwell time and discretionary dwell time – which are actually intertwined and overlaid. Analysis of total dwell time by taking two complementary approaches: The independent analysis of each of the three components defined here before is to identify the structural bottlenecks and improvement prospects (Levinson, 2016). As for shippers (importers or exporters) dwell time in ports can be assimilated to a temporary storage period which is justified either by the time necessary to complete cargo clearance formalities (transactional dwell time) or by a decision to leave cargo in the port for a defined number of days superior to that clearance delay (discretionary dwell time) (Roso & Lumsden, 2015)

2.5 Critique of the Literature Review

GOI (2013) on their study on factors affecting container dwell time they found out the following factors: regulatory restriction on operation time, low IT application, too much manual documentation, archaic systems and procedures. They never looked at infrastructural facilities which are the main cause of congestion due to inadequate storage facilities. Martinez et al., (2015) found out the causes for high container dwell time as poor performance of the administrative services, such as custom and sanitary inspections but they never gave solutions to these problems. Barros et al., (2014) identifies the factors influencing container dwell time at the port as being the time it takes documents to be linked with customs, time for import licenses to be issued, time for documents to be processed by customs and time for customs to inspect the contents of containers. They only focused on customs clearance and forgot to give solutions to these problems.

KRA conducted Time Release Study (TRS) in 2013, their findings of the study was that the time taken to clear goods has to be improved to meet the highest international standards. They further observed that there was need to introduce an electronic declaration system and bureaucratic

procedures should be reviewed with a view to reduction or elimination as appropriate. The study however was more descriptive statistic by using mean and standard deviation to give their findings and conclusion. Also, the duration of study was too short (just a week) per section i.e. at airport, port and land borders

2.6 Summary of the Literature Review

The new trend of container transportation emphasizes the greater integration and coordination of various components of the transport system and supply chain (Tongzon, 2015). Port efficiency is derived from the port performance indicators and the commonly used are truck turnaround time, waiting rate, berth occupancy rate, container dwell time. Lee and Miao (2014) identified the factors influencing container dwell time at the port. Roll & Nayuth (2013) observed that, the shorter the dwell time, the higher the throughput density for a given terminal. Sekaran (2015) established that high dwell time was generally an indication that all was not well with the port. There is no consensus on standard methods and terminology that are accepted as applicable to every port for measurement of port performance and production. Murty & Notteboom (2013) argued that analytical models, especially queuing models, cannot be used to analyze terminal operations in the estimation of port performance indicators.

Saaty (2013) did a dwell time model and it showed enough variation to allow him to use an ordinary least squares regression on his data. The model fitted 90 percent of the data. Robinson (2014) observed that, the calculation of dwell lime was necessary in modeling transit assignment because an accurate estimation of dwell time will lead to more precise transit assignment results. The dwell time model output was shown to be statistically significant. Calculations were found to be valid when compared with observed data. The literature review, show that there is a need to

conduct this study because no academic study has been done for the Inland Container Depot Embakasi, Nairobi. This study would add value, as it will provide at least a dwell time ICD Nairobi, which can be used by the managers in making well informed decisions. Secondly, this study establishes the determinants of container dwell time and existing direction of relationship between container dwell time and its determinants.

2.7 Research Gaps

Based on the theoretical and empirical literature reviewed in this chapter, it can be seen that since the emergence of containerization, researchers have been researching to find out the causes of high container dwell times at seaports. Some have concentrated on physical indicators on the seaport such as ship turnaround time, waiting rate, berth occupancy rate, working time over time at berth, and port throughput. Some have been able to point out the root cause of the high container dwell time as being poor performance by the port management and they are developing mathematical models to solve it (Lee & Miao, 2014). Martinez et al. (2015) were able to empirically show discretionary behaviour by importers willingly leaving their containers at the port as cheap warehouse option. Most of container dwell time studies have been done at seaports, most local studies conducted have failed to discuss container dwell time at dry ports, and thus this forms the research gap that is the basis of this study. From the literature reviewed, there was limited studies on factors influencing container dwell time in Kenya at Inland Container Depot Embakasi, Nairobi since the SGR started transporting cargo directly to ICD Nairobi from Mombasa port.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter presents the research methodology of the study. It describes the methods and procedures that were used to collect data that answers the research questions. The chapter was presented under the following sections namely: research design, study population, sampling procedures, sample size, data collection instruments, data collection procedures, pilot testing and data analysis.

3.1 Introduction

Research methodology refers to the way how a research problem can be solved in logical manner (Kothari, 2014). Research methodology is the process that was used to collect information and data for the purpose of solving a research problem (Mugenda & Mugenda, 2013). The methodology may include publication research, interviews, surveys and other research techniques (Creswell & Daly, 2015). This chapter involved presenting the choice of method of collecting and analyzing data, from practical point of view, comparing relative advantages and disadvantages of other alternative method that may be more or less appropriate to the context of this study with the aim of finding answers to the research questions.

3.2 Research Design

According to Kothari (2014) research design is a plan and structural of investigation so concessive to obtain answers to research questions. It's an outline of what an investigator or researcher will do from writing hypothesis or objectives to the found data analysis. A research design constitutes the blueprint for collection, measurement and analysis of data (Creswell & Daly, 2015). It's the measurement of condition for collection and analysis of data in a manner

that aims to combine relevance with the following in procedure (Mugenda & Mugenda, 2013). Therefore, research design provided answers to the research questions that the researcher was able to investigate. The researcher used a descriptive research design which included collecting information by administering questionnaires to KPA officers, customs officers, shipping lines, clearing and forwarding agents to be able to compile data analyzed and interpret the data from the contents and measuring tools to authenticate the research study. The study under this research was to find out factors influencing the container dwell time in Kenya at Inland Container Depot Embakasi, Nairobi.

3.3 Target Population

Creswell and Daly (2015) refer to population as the entire group of people or things of interest that the researcher aims to assess. Population as defined by Mugenda & Mugenda (2013) is an entire group of individual or objects having common observable characteristic. The study took all the stakeholders who are involved in the port operations at the Inland Container Depot (ICD) Embakasi, Nairobi. The target population was KPA officers, customs officers, shipping lines, clearing and forwarding agents. The target population was organized as shown in table 3.1:

Table 3.1: Target Population

Stakeholders	Target Population	Percentage
KPA Officers	415	36.1
Customs Officers	106	9.2
Clearing and forwarding Agents	504	43.8
Shipping Lines/Agents	125	10.9
Total	1150	100

3.4 Sampling and Sample size

A sample is defined as subject of a population that has been selected to represent characteristics of a population. Mugenda & Mugenda, (2013) indicate that a sample is a set drawn from the entire population. A stratified random sampling was employed to obtain a suitable unit representative of analysis. A stratified sampling technique was stratified into four (4) units at the ICD Nairobi, this will include: KPA with 40 officers, customs with 10 officers, shipping lines/agents with 12 and clearing and forwarding agents with 50. This is because of the heterogeneity of the population and all respondents had equal opportunity of participation. As Kothari (2013) expresses, a sample size between 10% and 20% is considered adequate for in-depth studies. The sample size for this study was 10%. The sample size was organized as shown in table 3.2:

Table 3.2: Sample size

Stakeholders	Target Population	Percentage of Sample	Sample Size
KPA Officers	415	10	40
Customs Officers	106	10	10
Clearing and forwarding Agents	504	10	50
Shipping Lines/Agents	125	10	12
Total	1150	10	112

3.5 Data Collection Instrument

The instrument was employed for data collection in this research was questionnaire. Kothari, (2013) defined a questionnaire as a research instrument consisting of a series of questions for the purpose of gathering information from respondents. Mugenda & Mugenda, (2013) also defined

questionnaire as a list of research or survey questions asked to respondents and designed to extract specific information. Creswell & Daly (2015) note that a questionnaire serves four basic purposes to: collect the appropriate data, make data comparable and amenable to analysis, minimize bias in formulating and asking question and make questions engaging and varied. Likert scale questionnaire was administered to the respondents.

3.6 Data Collection Procedure

According to Creswell & Daly (2015), there are many methods of data collection. The choice of a tool and instrument depends mainly on the attributes of the subjects, research topic, problem question, objectives, design, expected data and results. Kothari (2014) notes that there are two major sources of data collection; primary and secondary data. Primary data was collected by using interviews and the secondary data was collected from existing literature relating to the study topic. According to Creswell & Daly (2015), a self-administered questionnaire is the only way to elicit self-report on people's opinion, attitudes, beliefs and values.

3.7 Pilot Testing

It is important that all surveys are tested before the actual survey is conducted (Kothari, 2013). This is done to ensure that the questionnaire is clear to respondents and can be completed in the way the researcher wishes (Creswell & Daly, 2015). Pilot testing is an activity that will help this study in determining whether there are errors, limitations, or other weaknesses within the design and will allow the researcher to make necessary adjustments and corrections before embarking on the survey (Mugenda & Mugenda, 2013). A pilot study was undertaken on approximately 10 customs officers, KPA officers, clearing and forwarding agents and shipping lines/agents since

they are directly involved with operations of the port to test the reliability and validity of the questionnaire.

3.7.1 Reliability Test

Kothari (2014) reliability is defined as a measure of how consistent a research method is. Pre-testing the questionnaire would also help in gaining the reliability of the test instrument the questionnaire. The pre-test will test the clarity of the questions and any ambiguity will be removed and corrected (Creswell & Daly, 2015). A measure is said to have a high reliability if it produces similar results under consistent conditions. In research, the term reliability means repeatability or consistency (Mugenda & Mugenda, 2013). A measure is reliable if it would give the same result over and over again. In this study the test and retest technique was used in order to test for reliability at the pre-testing point

3.7.2 Validity Test

Kothari (2014) states that validity indicates the degree to which an instrument measures what it is supposed to measure. Validity ensures accuracy and meaningfulness of inferences based on the research results and makes sure that analysis of the data actually represents the phenomenon under study (Creswell & Daly, 2015). Validity refers to the degree in which a test is truly measuring what it purports to measure (Mugenda & Mugenda, 2013). In this study the test and retest technique was used in order to test for validity at the pre-testing point

3.8 Data Analysis and Presentation

Data was analyzed using Analysis of variance (ANOVA). Both quantitative analysis and regression analysis were used as data analysis technique. The data collected was run through various models so as to clearly determine the factors influencing container dwell time at ICD

Nairobi. The researcher also used a multivariate regression analysis to determine the relationship between the independent variables and the dependent variable. The regression equation used was:

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

Where; Y = Dependent variable (Container Dwell Time)

β_0 = constant

β_1 , β_2 and β_3 = the regression co-efficient

X = Independent variable

X_1 = Port Infrastructure

X_2 = Customs Clearance Procedures

X_3 = Cargo Handling Equipment

ε = **Stochastic term or error term**

An **error term** is a variable in a statistical or mathematical model, which is created when the model does not fully represent the actual relationship between the independent variables and the dependent variables. The error term is also known as the residual, disturbance or remainder term (Sekaran, 2015).

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

The chapter represents the empirical findings and results of the research. The data presented includes response rate, background information of the respondents and the presentation of research findings against each individual specific objective. The study sought to establish the background information of the respondents by using the following parameters: gender, age, level of education, type of organization, position held by the respondents and number of years respondents have been working with the organization. Descriptive statistics and ANOVA were employed in analyzing the findings.

4.1.1 Response Rate

Table 4.1: Response Rate

Questionnaire	Frequency	Percentage
Filled	72	70.6
Not Filled	30	29.4
Total	100	100

From the data collected, out of 100 questionnaires administered, 72 were filled and returned which represents 70.6% response rate. Such a response rate is considered adequate according to Mugenda & Mugenda (2013) who mentioned that a 50% response rate is adequate, 60% good and above, while 70% is rated very good. This also collaborates with Bailey (2014) assertion that

a response rate of 50% is adequate, while a response rate greater than 70% is very good. This infers that the response rate in this case of 70.6% was a very good representation of the entire targeted population.

4.1.2 Pilot Study Results

The study conducted pilot study to test the reliability and validity of the research instrument. The study used 10 percent of the sampled population for pilot testing. Consequently, 10 percent of 112 translated into approximately 12 respondents. The study used random sampling to select 12 respondents who were not included in the main survey. The result shows that the Cronbach's alpha for container dwell time constructs is 0.827 with a total of 9 items. This implies that the items included in measuring container dwell time constructs are indicative of the same underlying disposition. The Cronbach's alpha for port infrastructure, customs clearance procedures and cargo handling equipment were 0.872, 0.886 and 0.787 respectively implying that the items in the construct are indicative of the same underlying disposition. Nunnally (2015) recommends that instruments used in research should have reliability of at 0.70 or above. The results are as shown in table 4.2;

Table 4.2: Reliability Test Results

Variable	Number of Items	Cronbach's Alpha
Port Infrastructure	9	0.872
Customs Clearance Procedures	9	0.886
Cargo Handling Equipment	9	0.787
Container Dwell Time	9	0.827

Further the study tested for construct validity through in-depth interviews with key informants

(Retired customs officers) prior to the construction of the questionnaire so as to solicit valid concepts and to modify the questionnaire thereby coming up with constructs that were valid.

4.2 Demographics Characteristics of Respondents

4.2.1 Gender Distribution

Table 4.3: Gender of the Respondents

Gender	Frequency	Percentage
Male	53	73.6
Female	19	26.4
Total	72	100

The descriptive statistics of the study indicates that 53 (73.6%) of the respondents were male, while the remaining 19 (26.4%) were female as shown in table 4.3. This implies that male respondents participated more in answering the questionnaires.

4.2.2 Age of the Respondents

Table 4.4: Age of the Respondents

Age	Frequency	Percentage
Less than 24 years	07	9.7
25 – 35 years	13	18.1
36 – 45 years	32	44.4
46 – 55 years	13	18.1
Above 55 years	07	9.7
Total	72	100

The finding shows that 9.7% of the respondents are aged less than 24 years and between 30 – 45 years, 18.1% of the respondents are aged between 25 – 35 years and 46 – 55 years. The highest percentage was 44.4%, this implies that majority of the respondents were aged between 36 – 45 years.

4.2.3 Level of Education

Table 4.5: Level of Education

Level of Education	Frequency	Percentage
Post Graduate degree	05	6.9
First degree	11	15.3
Diploma	19	26.4
Certificate	18	25.0
O Level	12	16.7
CPA	07	9.7
Total	72	100

From the descriptive statistics shown in table 4.5, 19 (26.4%) of the respondents were reported to be diploma holders, 11 (15.3%) of the were holders of first degree, 05 (6.9%) of them were holders of Post Graduate degree, 18 (25%) of the respondents were holders of certificate, 12 (16.7%) were reported to be holders of O Level, while the remaining 7 (9.7%) respondent had CPA.

4.2.4 Type of Organization

Table 4.6: Type of Organization

Organization Type	Frequency	Percentage
KPA	15	20.8
KRA	17	23.6
Clearing and Forwarding Firms	30	41.7
Shipping Lines Firms	10	13.9
Total	72	100

The finding reveals that 15 (20.8%) of the respondents came from KPA, 17 (23.6%) of the respondents came from KRA, while 30 (41.7%) were the clearing and forwarding firms and finally 10 (13.9) were the shipping lines firms. This implies that majority of the responses clearing and forwarding agents.

4.2.5 Current Position in the Organization

Table 4.7: Respondent Position

Position	Frequency	Percentage
Senior Managers	08	11.1
Middle Managers	24	33.3
Junior Managers	40	55.6
Total	72	100

The finding from table 4.7 depicts that 11.1% of the respondents hold the position of Senior Manager, 33.3% of the respondents hold the position of Middle Manager and 55.6% of the respondents hold the position/status of Junior Manager.

4.2.6 Number of Years Worked in Organization

Table 4.8: Number of Years worked in the organization

Year	Frequency	Percentage
Over 15 years	22	30.6
11 – 15 years	20	27.8
6 – 10 years	16	22.2
Less than 5 years	14	19.4
Total	72	100

The finding from table 4.8 shows that 30.6% of the respondents have worked in their respective department/section for over 15 years, 27.8% of the respondents have worked between the periods of 11 – 15 years. While 22.2% of the respondents worked between a period of 6 – 10 years and 19.4% have worked for less the 5 years. This shows that majority of the respondents have worked with their respective departments/sections at ICD Nairobi for over 15 years.

4.3 Descriptive Analysis

In the research analysis the researcher used a tool rating scale of 5 to 1; where 5 was the highest and 1 the lowest. Opinions given by the respondents were rated as follows, 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree and 1= Strongly Disagree. The analysis for mean, standard deviation and coefficient of variation were based on this rating scale.

4.3.1 Port Infrastructure

The study sought to determine factors influencing container dwell time at ICD Nairobi. The first objective was to determine the effects of port infrastructure on container dwell time at ICD Nairobi. In carrying out this task the study used table of means, standard deviations and coefficient of variation to help interpret the results. A 5-point Likert Scale was used to determine the effects of port infrastructure on container dwell time at ICD Nairobi.

4.3.1.1 Transport Infrastructure

Table 4.9 Mean, Standard deviation and Coefficient of Variation of Transport Infrastructure

Statements	Mean	Standard Deviation	Coefficient of Variation
Effective transport infrastructure decreases truck turnaround time	4.1758	0.7149	0.1712
Effective transport infrastructure improves truck punctuality	4.3722	0.5829	0.1333
Effective transport infrastructure enhances security checks	4.5833	1.0522	0.2296

Respondents were required to respond to set questions related to transport infrastructure and give their opinions. The respondents were in agreement that effective transport infrastructure can decrease truck turnaround time had a mean of 4.1758, standard deviation of 0.7149 and a low

dispersion of 17.12% signifying a high level of agreement. The finding also indicates that effective transport infrastructure can improve truck punctuality with a mean of 4.3722, standard deviation of 0.5829 and a dispersion of 13.33% signifying a high level of agreement. Opinion on whether effective transport infrastructure can enhance security checks was positive with a mean of 4.5833, standard deviation of 1.0522 and a dispersion of 22.964% signifying a high level of agreement. This concurs with Roso & Lumsden (2015) that poor transportation caused delays in delivery since at ICD Nairobi there are no Marshalling yards where trucks or rail wagons can await for unloading and loading.

4.3.1.2 Space Capacity

Table 4.10 Mean, Standard deviation and Coefficient of Variation of Space Capacity

Statements	Mean	Standard Deviation	Coefficient of Variation
Adequate space capacity decreases truck turnaround time	4.5278	0.5623	0.1242
Adequate space capacity improves truck punctuality	4.2222	0.8140	0.1928
Adequate space capacity enhances security checks	4.1756	0.7656	0.1833

Respondents were required to respond to set questions related to space capacity and give their opinions. The opinion in agreement that adequate space capacity can decrease truck turnaround

time had a mean of 4.5278, standard deviation of 0.5623 and a low dispersion of 12.42% signifying a high level of agreement. The finding also indicates that adequate space capacity can improve truck punctuality with a mean of 4.2222, standard deviation of 0.8140 and a dispersion of 19.28% signifying a high level of agreement. The opinion whether adequate space capacity enhances security checks was positive with a mean of 4.1756, standard deviation of 0.7656 and a dispersion of 18.33% signifying a high level of agreement. This is in agreement with Gubbins (2014) who asserts that space is paramount to avoid congestion, mix up and enhance ease of movement of containers. The issue of space capacity is in agreement with Kenya International Freight and Warehousing Association, KIFWA (2018) report which saw urging the government to haste the construction of Naivasha dry port to ease congestion at ICD Nairobi which is overstretched and under intense pressure leading to lose in revenue collection.

4.3.1.3 ICT Systems

Table 4.11 Mean, Standard deviation and Coefficient of Variation of ICT Systems

Statements	Mean	Standard Deviation	Coefficient of Variation
Installation of ICT systems decreases truck turnaround time	4.2175	1.0384	0.2462
Installation of ICT systems improves truck punctuality	4.1667	1.4446	0.3467
Installation of ICT systems enhances security checks	4.17221	0.6941	0.1664

Respondents were required to respond to set questions related to ICT systems and give their opinions. The opinion in agreement that installation of ICT systems can decrease truck turnaround time had a mean of 4.2175, standard deviation of 1.0384 and a high dispersion of 24.62% signifying a high level of agreement. The finding also indicates that installation of ICT systems can improve truck punctuality with a mean of 4.1667, standard deviation of 1.4446 and a dispersion of 34.67% signifying a high level of agreement. The opinion whether installation of ICT systems can enhance security checks was positive with a mean of 4.1722, standard deviation of 0.6941 and a dispersion of 16.64% signifying a high level of agreement. This is supported by Government of India, GOI, (2013) that suggested that use of ICT for scanning and improving security can enhance efficient clearance of goods thus lowering container dwell time. It further said that there is need to use ICT to share information and trade policies between government agencies and relevant stakeholders to improve on container dwell time.

4.3.2 Customs Clearance Procedure

The second objective was to determine the effects of customs clearance procedures on container dwell time at ICD Nairobi. Customs clearance and cargo dwell time closely related. In carrying out this task the study used table of means, standard deviations and coefficient of variation to help interpret the results. A 5-point Likert Scale was used to determine the effects of customs clearance procedures on container dwell time at ICD Nairobi.

4.3.2.1 Declaration Process

Table 4.12 Mean, Standard deviation and Coefficient of Variation of Declaration Process

Statements	Mean	Standard Deviation	Coefficient of Variation
Timely declaration process decreases truck turnaround time	4.5000	0.6969	0.1549
Timely declaration process improves truck punctuality	4.3056	0.7077	0.1644
Timely declaration process enhances security checks	4.0566	0.7538	0.1858

Respondents were required to respond to set questions related to customs clearance process and give their opinions. The opinion in agreement that timely declaration process decreases truck turnaround time had a mean of 4.500, standard deviation of 0.6969 and a dispersion of 15.49% signifying a high level of agreement. The finding also indicates that timely declaration process improves truck punctuality with a mean of 4.3056, standard deviation of 0.7077 and a dispersion of 16.44% signifying a high level of agreement. The opinion whether timely declaration process enhances security checks was positive with a mean of 4.0566, standard deviation of 0.7538 and a dispersion of 18.58% signifying a high level of agreement. The issue of customs clearance procedure especially on declaration process is in agreement with World Customs, WCO (2016)

that trade facilitation is enhanced by efficient declaration processing on a single platform. Therefore, a single portal shortens the container dwell time.

4.3.2.2 Verification Process

Table 4.13 Mean, Standard deviation and Coefficient of Variation of Verification Process

Statements	Mean	Standard Deviation	Coefficient of Variation
Timely verification process decreases truck turnaround time	3.8611	1.0731	0.2779
Timely verification process improves truck punctuality	4.2778	1.0032	0.2345
Timely verification process enhances security checks	4.4722	0.9706	0.2170

Respondents were required to respond to set questions related to customs clearance process and give their opinions. The opinion in agreement that timely verification process decreases truck turnaround time had a mean of 3.8611, standard deviation of 1.0731 and a dispersion of 27.79% signifying a high level of agreement. The finding also indicates that timely verification process improves truck punctuality with a mean of 4.2778, standard deviation of 1.0032 and a dispersion of 23.45% signifying a high level of agreement. The opinion whether timely verification process enhances security checks was positive with a mean of 4.4722, standard deviation of 0.9706 and a dispersion of 21.70% signifying a high level of agreement. Customs clearance procedure on

verification process of goods is in agreement with Saaty (2013) who notes that to ensure faster clearance of cargo during verification process lowers container dwell time. He also notes that efficiency on verification improves truck turnaround time

4.3.2.3 Releasing Process

Table 4.14 Mean, Standard deviation and Coefficient of Variation of Releasing Process

Statements	Mean	Standard Deviation	Coefficient of Variation
Efficient releasing process decreases truck turnaround time	3.6389	1.3555	0.3725
Efficient releasing process improves truck punctuality	4.1389	1.1012	0.2661
Efficient releasing process enhances security checks	3.7500	1.0522	0.2806

Respondents were required to respond to set questions related to customs clearance process and give their opinions. The opinion in agreement that efficient releasing process decreases truck turnaround time had a mean of 3.6389, standard deviation of 1.355 and a dispersion of 37.25% signifying a high level of agreement. The finding also indicates that efficient releasing process improves truck punctuality with a mean of 4.1389, standard deviation of 1.1012 and a dispersion of 26.61% signifying a high level of agreement. The opinion whether efficient releasing process enhances security checks was positive with a mean of 3.7500, standard deviation of 1.0522 and a

dispersion of 28.06% signifying a high level of agreement. This study agrees with WCO (2015) which has developed a methodology to measure the average time taken to release goods that are being imported or exported and to review border clearance procedures used in the process.

4.3.3 Cargo Handling Equipment

4.3.3.1 Unloading and Loading

Table 4.15 Mean, Standard deviation and Coefficient of Variation of Unloading and Loading

Statements	Mean	Standard Deviation	Coefficient of Variation
Timely unloading and loading process decreases truck turnaround time	3.9801	0.5656	0.1421
Timely unloading and loading process improves truck punctuality	3.8461	0.9088	0.2363
Timely unloading and loading process enhances security checks	4.3451	0.9755	0.2245

Respondents were required to respond to set questions related to cargo handling equipment and give their opinions. The opinion in agreement that timely unloading and loading process decreases truck turnaround time had a mean of 3.9801, standard deviation of 0.5656 and a dispersion of 14.21% signifying a high level of agreement. The finding also indicates timely unloading and loading process improves truck punctuality with a mean of 3.8461, standard

deviation of 0.9088 and a dispersion of 23.63% signifying a high level of agreement. The opinion whether timely unloading and loading process enhances security checks was positive with a mean of 4.3451, standard deviation of 0.9755 and a dispersion of 22.45% signifying a high level of agreement. This study is in agreement with Robin (2014) who notes that that increase in congestion associated with larger vessel size, is likely to influence the container dwell time forcing them to handle higher volumes in the same period of time, but also to reduce the variability of their operations in order to guarantee seamless flows of cargo at the ports.

4.3.3.2 Automation Machines

Table 4.16 Mean, Standard deviation and Coefficient of Variation of Automation Machines

Statements	Mean	Standard Deviation	Coefficient of Variation
Use of automation machines decreases truck turnaround time	4.1348	0.5900	0.1427
Use of automation machines improves truck punctuality	4.0161	0.5088	0.1262
Use of automation machines enhances security checks	4.1463	0.6336	0.1528

Respondents were required to respond to set questions related to cargo handling equipment and give their opinions. The opinion in agreement that use of automation machines decreases truck turnaround time had a mean of 4.1348, standard deviation of 0.5900 and a dispersion of 14.27%

signifying a high level of agreement. The finding also indicates use of automation machines improves truck punctuality with a mean of 4.0161, standard deviation of 0.5068 and a dispersion of 12.62% signifying a high level of agreement. The opinion whether use of automation machines enhances security checks was positive with a mean of 4.1463, standard deviation of 0.6336 and a dispersion of 15.28% signifying a high level of agreement. The study concurs with WTO (2016) secretariat that produced a checklist of the main issues and solutions of the symposium into five broad areas namely: documentation requirements; official procedures; automation and use of information technology; transparency, predictability and consistency; and modernization of border crossing administration.

4.3.3.3 Modern Equipment

Table 4.2 Mean, Standard deviation and Coefficient of Variation of Modern Equipment

Statements	Mean	Standard Deviation	Coefficient of Variation
Use of modern equipment decreases truck turnaround time	4.0247	0.5240	0.1302
Use of modern equipment improves truck punctuality	4.1672	0.9053	0.2174
Use of modern equipment enhances security checks	3.9407	0.6672	0.1693

Respondents were required to respond to set questions related to cargo handling equipment and give their opinions. The opinion in agreement that Use of modern equipment decreases truck turnaround time a mean of 4.0247, standard deviation of 0.5240 and a dispersion of 13.02% signifying a high level of agreement. The finding also indicates use of modern equipment improves truck punctuality with a mean of 4.1672, standard deviation of 0.9053 and a dispersion of 21.74% signifying a high level of agreement. The opinion whether use of modern equipment enhances security checks was positive with a mean of 3.9407, standard deviation of 0.6672 and a dispersion of 16.93% signifying a high level of agreement. This study agrees with Steenken et al (2014) that increased demand and limited storage space in most modern ports, nowadays stacking on the ground is the most commonly used storage approach, and for this stacking methods to apply one needs modern equipment.

4.3.4 Container Dwell Time

Table 4.38 Mean, Standard deviation and Coefficient of Variation of Container Dwell Time

Statements	Mean	Standard Deviation	Coefficient of Variation
Decrease in truck turnaround lowers container dwell time	3.8643	0.5360	0.1387
Improved truck punctuality lowers container dwell time	4.2014	1.0301	0.2453
Enhanced security checks lowers container dwell time	4.1271	0.5539	0.1342
Traffic congestion increases container dwell time	3.9013	0.6437	0.1650
Slow customs clearance process increases container dwell time	4.0833	1.0788	0.2642
Adequate cargo handling equipment lowers container dwell time	4.3512	0.8185	0.1881

On container dwell time at ICD Nairobi respondents were required to respond to some items related to the same. Respondents' opinions on decrease in truck turnaround lowers container dwell time as indicated by a mean of 3.8643, standard deviation of 0.5360 and a dispersion of 13.87%. Improved truck punctuality lowers container dwell as indicated by a mean of 4.2014, standard deviation of 1.0301 and a dispersion of 24.53%. Respondent's opinions indicate Enhanced security checks lowers container dwell time as indicated by a mean of 4.1271, standard deviation of 0.5539 and a dispersion of 13.42%. In addition building and setting up of Traffic congestion increases container dwell time as indicated by a mean of 3.9013, standard deviation of 0.6437 and a dispersion of 16.50%. The opinion in agreement slow customs clearance process increases container dwell time had a mean of 4.0833, standard deviation of 1.0788 and a dispersion of 26.42% signifying a high level of agreement. The finding also indicates adequate cargo handling equipment lowers container dwell time with a mean of 4.3512, standard deviation of 0.8185 and a dispersion of 18.81% signifying a high level of agreement. This study agrees with GOI (2013) that aimed at reducing container dwell time at the ports to a maximum three days, and maximum dwell time of one day at airport and one hour at the border points. This was to be achieved through the elimination of inefficiencies identified such as space utilization at port as a result of long cargo dwell time which resulted in port congestion.

4.4 Inferential Analysis

Inferential statistics involves making prediction or inferences about a given population. The study conducted inferential statistics. The study also conducted correlational analysis, regression analysis and ANOVA to make inferences on the factors influencing container dwell time in Kenya with the case of ICD Nairobi. Pearson correlation analysis was used to assess the relationship between the variables while multiple regressions was used to determine the

predictive power of factors (port infrastructure, customs clearance procedure and cargo handling equipment) and container dwell time.

4.4.1 Multiple Regression Analysis

In this study, a multiple regression analysis was conducted to test the influence among predictor variables. The research used Analysis of Variance (ANOVA) to code, enter and compute the measurements of the multiple regressions. The model summary able provides information about the regression line’s ability to account for the total variation in the dependent variable. The results are displayed in the table below.

Table 4.19: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	.779	.773	.770	16.15625

- a. Predictors: (Constant), port infrastructure, customs clearance procedures, cargo handling equipment

Table 4.19 provides the R and R² values. The R value represents the simple correlation and is 0.879 which indicates a high degree of correlation. The R² indicates how much of the total variation in the dependent variable, container dwell time, can be explained by the independent variables, (port infrastructure, customs clearance procedures, cargo handling equipment). In this case, 77.3% can be explained, which is relatively large. Table 4.19 shows the regression model summary indicating the coefficient of determination R Square as 0.770. This means that 77.0% of the relationship is explained by the identified three factors namely port infrastructure, customs

clearance procedures and cargo handling equipment. The rest 23.0% is explained by other factors in ICD Nairobi not studied in this research. In summary the three factors studied namely; port infrastructure, customs clearance procedures and cargo handling equipment explain or determine 77.0% of the relationship while the rest 23.0% is explained or determined by other factors such as slow collection of duties and taxes, delayed inspection, delayed transaction, low IT applications and archaic systems and procedures.

4.4.2 Correlation

A correlation is a number between -1 and +1 that measures the degree of association between two variables. A positive value for the correlation implies a positive. A negative value for the correlation implies a negative or inverse association. After the descriptive analysis, the study conducted Pearson correlation analysis to assess the strength of the association between the predicted and explanatory variables or among the latter. It thus helps in determining the strengths of association in the model, that is, which variable best explained the relationship between the container dwell time at ICD Nairobi.

Table 4.20: Correlation Analysis

		Container Dwell time at ICD Nairobi	Port Infrastructure	Customs Clearance Procedures	Cargo Handling Equipment
Container Dwell Time at ICD Nairobi	Pearson Correlation	1	.216*	.346	.657**
	Sig. (2-tailed)		.042	.017	.000
	N	72	72	72	72
Port Infrastructure	Pearson Correlation	.216*	1	.451**	.229*
	Sig. (2-tailed)	.042		.000	.008
	N	72	72	72	72
Customs Clearance Procedures	Pearson Correlation	.657**	.208		.383**
	Sig. (2-tailed)	.717	.000		.008
	N	72	72	72	72
Cargo Handling Equipment	Pearson Correlation	.433**	.229*	.398*	1
	Sig. (2-tailed)	.000	.031	.000	
	N	72	72	72	72

*. Correlation is significant at the 0.05 level (2-tailed).

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

From the correlation analysis in the table 4.20, the study found that there is a positive relationship between port infrastructure and container dwell time at ICD Nairobi, where the correlation coefficients was 0.216 and a p-value of 0.042. The study also found that customs

clearance procedures and the container dwell time at ICD Nairobi correlate positively with correlation coefficients of 0.346. However, the relationship is significant as the p-value (0.017) is less than the significance level (0.05). The study further established that there is a positive significant relationship between Cargo handling equipment and container dwell time at ICD Nairobi with a correlation coefficient of 0.657 and p-value of 0.000. This infers that cargo handling equipment were influencing container dwell time at ICD Nairobi most, followed by customs clearance procedures and port infrastructure.

4.4.3 Analysis of Variance

Table 4.21: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	34.909	4	8.7272	10.909	.000
	Residual	44.763	68	.658		
	Total	79.672	72			

- a. Dependent Variable : Container Dwell Time at ICD Nairobi
- b. Predictors: (Constant), Port Infrastructure, Customs Clearance Procedure, Cargo Handling Equipment

As illustrated in table 4.21 above, the significance value in testing the reliability of the model for the relationship between port infrastructure, customs clearance procedures and cargo handling equipment with container dwell time at ICD Nairobi was obtained as 0.000 which is less than 0.05 the critical value at 95% significance level. Therefore the model is statistically significant in predicting the relationship between dependent (container dwell time) and independent variables of the study (port infrastructure, customs clearance procedures and cargo handling

equipment).The F value from the table is 10.909 indicating a significant model for the relationship as given by the regression coefficients. This shows that the overall model was statistically significant and reliable in explaining the influence of the predictor variables to the container dwell time at ICD Nairobi.

The unstandardized coefficients indicate how much the dependent variable (container dwell time) varies with an independent variable when all other independent variables (port infrastructure, customs clearance procedures and cargo handling equipment) are held constant.

Table 4.4: Regression Coefficient container dwell time

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig
1	(Constant)	19.658	6.136		3.204	.007
	Port Infrastructure	.768	.177	.282	4.339	.010
	Customs Clearance Procedures	.746	.215	.159	3.470	.040
	Cargo Handling Equipment	.776	.321	.485	2.417	.000

Dependent Variable: Container Dwell Time

The findings shown in table 4.22 indicate that all the variables had a positive and significant influence on container dwell time at ICD Nairobi, since all the predictors were significant

predictors of container dwell time at ICD Nairobi because their P-values were less than 0.05. According to the results, port infrastructure had a significant influence on container dwell time as shown by the coefficient (B = 0.768, t = 3.194, p > 0.007). Customs clearance procedures also showed a significant influence on container dwell time with the coefficients (B=0.746, t = 2.950, p > 0.010) indicating a positive effect on container dwell time. Similarly, cargo handling equipment indicated a significant positive influence on container dwell time with coefficients (B = 0.776, t = 4.111, p > 0.000).

The study used the following regression model:

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

Where:

Y = Dependent variable (Container Dwell Time)

β_0 = constant

β_1, β_2 and β_3 = the regression co-efficient

X = Independent variable

X_1 - Port Infrastructure

X_2 - Customs Clearance Procedures

X_3 - Cargo Handling Equipment

ε = Stochastic term or error term

Therefore;

Container Dwell Time = 19.658 + 0.768 Port Infrastructure + 0.746 Customs Clearance Procedures + 0.776 Cargo Handling Equipment

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter deals with the summary of the findings and provides conclusions of the findings in relation to the study. It also highlights recommendations and suggestions for further study.

5.2 Summary of the Study

From the findings in chapter four, the study was able to determine the factors influencing container dwell time in Kenya with a case of ICD Nairobi on the three variables of port infrastructure, customs clearance procedures and cargo handling equipment. These variables have a direct effect on the level of container dwell time in Kenya with a case of ICD Nairobi. The correlation analysis indicates the coefficient of correlation, r equal to 0.768, 0.646 and 0.776 port infrastructure, customs clearance procedures and cargo handling equipment. This indicates a very strong positive relationship between the dependent variables, port infrastructure, customs clearance procedures and cargo handling equipment and the dependent variable container dwell time at ICD Nairobi. This implies that the studied independent variables namely port infrastructure, customs clearance procedures and cargo handling equipment have significant effect on container dwell time at ICD Nairobi.

5.2.1 Port Infrastructure

The study established that port infrastructure directly influences container dwell time especially on transport infrastructure (i.e. roads and rails), space capacity and ICT systems. This study therefore recommends that the improved road networks should be increased and this will reduce

the trucks turnaround and punctuality. The study further established that ICD Nairobi should be expanded to allow adequate space capacity. This study therefore recommends more creation of spaces to avert congestion at the ICD Nairobi. The study further established ICT systems should be installed in strategic places especially at the gates to check on the entry and exit of trucks.

5.2.2 Customs Clearance Procedures

The study established that customs clearance procedures affect container dwell time at ICD Nairobi. Modernization of Customs procedures so as to expedite the declaration, verification and release of goods and this will act as trade facilitation tools as they positively influence container dwell time by lowering the container dwell time. The study also found that timely declaration, verification and release of goods will enable importers to clear their goods within a short period of time thus saving time, facilitating trade and leads to a high revenue collection. This will help to identify high risk cargo through efficient verification process. The study also found that timely release of goods lowers container dwell time.

5.2.3 Cargo Handling Equipment

The study established that cargo handling equipment influence container dwell time directly through three major factors: performance in terms of loading and unloading of vessels/trucks, operational effectiveness and operational efficiency. This study established that ICD Nairobi is using unsophisticated equipment especially the cranes, stacking machines, weighbridge, climbing lanes and car carriers.

5.3 Conclusion of the Study

From the research findings, the study concluded all the independent variables studied have significant influence on container dwell time as indicated by the strong coefficient of correlation

and a p-value which is less than 0.05. The overall influence of the analyzed factors was very high as indicated by the coefficient of determination. The overall P-value of 0.00 which is less than 0.05 (5%) is an indication of relevance of the studied variables, significant at the calculated 95% level of significance. This implies that the studied independent variables namely port infrastructure, customs clearance procedures and cargo handling equipment have significant influence on container dwell time at ICD Nairobi.

5.4 Recommendations

The three factors influencing container dwell time at ICD Nairobi are port infrastructure, customs clearance procedures and cargo handling equipment among others. The study therefore recommends more improvements and use of ICT supported systems to support the customs clearance process. The study identifies port infrastructure as essential for decongesting the ICD Nairobi and enhancing efficiency. The government has to expand to dual carriageways both the eastern and northern bypasses which are critical for ICD operations. More efforts have to be put in creating more space in the dry ports. Thus KPA has to invest in cargo handling equipment and machinery. In addition, the government should speed up the construction of Naivasha dry port to ease congestion at ICD Nairobi. The government has a major responsibility in collaboration with private partners and investors to see the realization of the Naivasha dry port.

5.5 Areas for Further Research

The study indicates port infrastructure, customs clearance procedures and cargo handling equipment have significant effect on container dwell time which is a public entity. The researcher further recommends research in related areas in the private. The study could be extended to other Eldoret and Kisumu ICDs over time, because it was based only on ICD

Nairobi for the period of the study. More studies can also be conducted on dwell time to capture the time for breakdown of machines, slow collection of duties and taxes, delayed inspection, delayed transaction, low IT applications and archaic systems and procedures which leads to congestion at the port. The study recommends further research to find out the reason abnormal delays of containers in the port and get the remedies to control them. As the trends of container dwell time as per seasons can be researched and even further classify containers in terms of local containers and transit container dwell time. Labour efficiency can also analyze on how it influences the container dwell time at the ICD Nairobi. Lastly a similar research can carried out on transit containers.

REFERENCES

- Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research (2nd Ed.)*. Upper Saddle River, NJ: Pearson.
- Cronbach, L. (2013). Coefficient alpha and internal structure of tests: *Psychometrika*, 16, 297-334.
- Cullinane, K.. (2014). *A Stochastic Frontier Model of the Efficiency of Major Container Terminals in Asia: Assessing the Influence of Administrative and Ownership Structures*.
- De Wulfluc, S. and Jose, B. S, (2013). *Customs Modernization Initiatives*.
- Fogarty, D. E. (2013). *Integration of trade: an international study of supply chain strategics*.
- GOI, (2013). *Position paper on The Port Sectors in India. Ministry of Finance*.
- GOK. (2015) *.Economic Survey on National Industrial Policy*.
- GOK/KPA (2014). Performance Contract Between the Government of Kenya and The Kenya Ports Authority.
- Jacobs, W. (2015). *The Role of port Infrastructure and logistics in Global Networks*, Harvard University
- Kasumu, H. I. (2013). *New indicators to measure port using Queuing Theory*.
- Kenya International Freight and Warehousing Association (2018): *Supply Chain due to SGR*.
- Kenya Ports Authority (2018), *quarterly management report*.
- Kenya Ports Authority (KPA, 2013). *Container Dwell Time Study for the Port of Mombasa*, March (2013).
- Kenya ports Authority, Handbook 2013-2017.
- Kenya Revenue Authority (KRA, 2013). *Time Release Study*, Kenya. Kenya Revenue Authority, Nairobi. Kenya.
- Keller S.B., Savitskie K., Theodore P.S., Lynch D.F. & Elligner A.E. (2002). A summery and Analysis of multi-item scales used in Logistics Research: *Journal of Business Logistics* 23, (2) 83-281.
- Kothari, C. R. (2014). *Research methodology: Methods and techniques (2nd edition)*. New Delhi, New Age International (P) Limited, Publishers.

- Lee, L. H. and Miao, Y.L. (2014). *An optimization model for storage yard management in transshipment hubs*.
- Levinson, M. (2016). *How the Shipping Container Made the World Smaller light of Global Supply Chain: European Challenge*.
- Martinez, B. E., Navarro, I. H. and Ravelo, M. T. (2015). *A study of the Efficiency of Spanish port authorities using Data Envelopment Analysis*.
- Ministry of Transport (MOT, 2018). *Quarterly Port Community Charter Report*
- Mugenda, A. and Mugenda, O. (2013). *Research methods; Quantitative and Qualitative. Approches*. Nairobi, Kenya: ACTS Press.
- Nunnally, C. (2013). *Psychometric theory* (2nd.). New York: McGraw-Hill.
- Murty, N. D. and Notteboom, T. S. (2013). *The Relationship between Seaports and the Inter-modal Hinterland*.
- Robinson, R.E. (2014). *Ports as elements in value-driven chain systems: the new paradigm*.
- Roll, Y. and Nayuth, Y. (2013). *Port Performance Comparison Applying Data Envelopment*.
- Roso, V. H. and Lumsden, K. E.(2015). *Factors influencing implementation of a dry port*.
- Saaty, F. G. (2013). *Port efficiency and international trade: Port efficiency as a determinant of maritime transport costs*
- Sekaran, U. (2015). *Research Methods for business: A skill Building Approach* (5th Edition).
- Tongzon, J. (2015). *Efficiency measurement of selected Australian and other international ports using data envelopment analysis (DEA)*.
- UNECE (2016). *UN/LOCODE Code for ports and other locations, Regulation 16*, UN.
- United Nations Conference on Trade and Development (2017). *Review of Maritime Transport*.
- Veal, S. K., Jayaram, J. D., Droge, C. E. and Calantone, R. H. (2016). *The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships*.
- World Bank (2016). *World bank Port Reform Toolkit Modules 1-8*. Washington DC.
- World Bank, (2013), Kenya economic update: —Accelerating growth and poverty reduction in the Kenya.

APPENDICES

Appendix i: Introductory Letter to Respondents

RE: DATA COLLECTION

Dear Respondent,

I am a student pursuing Post Graduate Diploma (PGD) in Customs administration at the Kenya School of Revenue Administration (KESRA). Currently, I am undertaking a research study on **“FACTORS DETERMINING CONTAINER DWELL TIME; A CASE OF ICD EMBAKASI, NAIROBI**, in partial fulfillment of the requirements for the award of Post Graduate Diploma (PGD) in Customs administration. You have been selected to participate in the survey and the researcher would highly appreciate if you assist him by responding to all questions as completely, correctly and honestly as possible. It is solely for academic purposes. Your opinions, responses and views are very important to this study and will be completely confidential. No respondent will be identified.

Thank you very much for your participation, cooperation and understanding.

Yours Sincerely,

Nyabuto Achuka Denis

Appendix ii: Questionnaire

This research questionnaire is specifically prepared to assist in data collection relating to establishing the determinants of container dwell time in Kenya: A case of Inland Container Depot Embakasi, Nairobi. As a respondent in relation to the study you are kindly requested to fill in appropriate responses at the best of your knowledge. The researcher assures you that all responses will be treated with confidentiality and will only be used for academic purpose.

SECTION A: BACKGROUND INFORMATION OF RESPONDENTS

1. Sex of Respondent: (A) Male { } (B) Female { }
2. Age of Respondent: (A) Less than 24 years { }
(B) 25- 35 years { }
(C) 36-45 years { }
(D) 46- 55 years { }
(E) Above 55 years { }
3. Level of education attained
(A) Certificate { } (B) Diploma { }
(C) First Degree { } (D) Post Graduate Degree { }
(E) Other (specify).....
4. Name Section/Department/Unit.....
5. What is your position/status in the organization?
(A) Senior Manager { }
(B) Middle Manager { }
(C) Junior Manager { }
(D) Other (Specify).....

6. How many years have you worked with this organization?

(A) Over 15 years { }

(B) 11 – 15 years { }

(C) 6 – 10 years { }

(D) Less than 5 years { }

SECTION B: PORT INFRASTRUCTURE

(a) Transport Infrastructure

What is your level of agreement with the following statements that relate to the influence of port infrastructure on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree,

3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Effective transport infrastructure decreases truck turnaround time					
II	Effective transport infrastructure improves truck punctuality					
III	Effective transport infrastructure enhances security checks					

(b) Space Capacity

What is your level of agreement with the following statements that relate to the influence of port infrastructure on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Adequate space capacity decreases truck turnaround time					
II	Adequate space capacity improves truck punctuality					
III	Adequate space capacity enhances security checks					

(c) ICT systems

What is your level of agreement with the following statements that relate to the influence of port infrastructure on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Installation of ICT systems decreases truck turnaround time					
II	Installation of ICT systems improves truck punctuality					
III	Installation of ICT systems enhances security checks					

SECTION C: CUSTOMS CLEARANCE PROCEDURE

(a) Declaration process

What is your level of agreement with the following statements that relate to the influence of customs clearance procedures on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Timely declaration process decreases truck turnaround time					
II	Timely declaration process improves truck punctuality					
III	Timely declaration process enhances security checks					

(b) Verification Process

What is your level of agreement with the following statements that relate to the influence of customs clearance procedures on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Timely verification process decreases truck turnaround time					
II	Timely verification process improves truck punctuality					
III	Timely verification process enhances security checks					

(c) Releasing Process

What is your level of agreement with the following statements that relate to the influence of customs clearance procedures on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Efficient releasing process decreases truck turnaround time					
II	Efficient releasing process improves truck punctuality					
III	Efficient releasing process enhances security checks					

SECTION D: CARGO HANDLING EQUIPMENT

(a) Unloading and Loading

What is your level of agreement with the following statements that relate to the influence of cargo handling equipment on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Timely unloading and loading process decreases truck turnaround time					
II	Timely unloading and loading process improves truck punctuality					
III	Timely unloading and loading process enhances security checks					

(b) Automation Machines

What is your level of agreement with the following statements that relate to the influence of cargo handling equipment on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree.

	Parameters	5	4	3	2	1
I	Use of automation machines decreases truck turnaround time					
II	Use of automation machines improves truck punctuality					
III	Use of automation machines enhances security checks					

(c) Modern Equipment

What is your level of agreement with the following statements that relate to the influence of cargo handling equipment on container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Use of modern equipment decreases truck turnaround time					
II	Use of modern equipment improves truck punctuality					
III	Use of modern equipment enhances security checks					

SECTION E: CONTAINER DWELL TIME

What is your level of agreement with the following statements that relate to container dwell time? Use a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree

	Parameters	5	4	3	2	1
I	Decrease in truck turnaround lowers container dwell time					
II	Improved truck punctuality lowers container dwell time					
III	Enhanced security checks lowers container dwell time					
IV	Traffic congestion increases container dwell time					
V	Slow customs clearance process increases container dwell time					
VI	Adequate cargo handling equipment lowers container dwell time					

END OF QUESTIONARE

Thank you very much for your cooperation

Appendix iii: Work Plan

	FEBRUARY- JULY 2018	AUGUST 2018	SEPTEMBER 2018	OCTOBER 2018	NOVEMBER 2018
Research proposal topic presentation					
Proposal development					
Proposal submission					
Proposal presentation					
Data collection and analysis					
Submission of final project					
Presentation of final project					
Final project approval correction and supervisor approval					
Submission of golden copies					

Appendix iv: Budget Plan

ITEM	ACTIVITY	AMOUNT (Khs.)
1	TYPE SETTING	5, 000.00
2	PHOTOCOPYING	3, 000.00
3	BINDING	3, 000.00
4	PRINTING	5, 000.00
5	TRANSPORT	45,000.00
5	MISCELLENOUS	25, 000.00
	TOTAL	86, 000.00