EFFICIENCY ANALYSIS ON OPERATIONAL PERFORMANCE OF CONTAINER TERMINALS FOR SEAPORTS: A CASE OF DAR ES SALAAM PORT

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CERTIFICATION

I, the undersigned, certify that i have read and here by recommend for acceptance by the Open University of Tanzania entitled **"Efficiency Analysis of Operational Performance of Container Terminals of Sea Port, the Case of Dar es salaam Port"** in partial fulfillment ofthe requirements of the award for the Degree of Masters of Business Administrations in Transport and Logistics Managements of the Open University of Tanzania.

....

Dr.Felician Mutasa

(supervisor)

....

Date

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DECLARATION

I, **ISAAC AGUST MPOGOLO**, confirm that the work presented in this dissertations is my own, where informations has been derived from other sources, I confirm that has been indicated in the dissertation.

....

Signature

....

Date

DEDICATION

I dedicate this reserch to my late mother, Alatuhiga Mkeleja.

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ABSTRACT

The growth of containerization in international trade, has created many problems for ports, i.e. higher requirements on terminals and infrastructure. Many container terminals are reaching their capacity limits and increasingly leading to traffic and port terminals congestion. With this in mind, the efficiency of container ports and terminals has become more ever important worldwide. It has been ascertained that port of Dar es salaam faces several challenges on efficiency and operational performance at its container terminals. Some of the challenges are; queing of ships at outer aunchorage waiting for berthing, congestions at yard storage area, causing delays on ship and slow yard delivering processes. The solution to increase capacity, either physical expansion or better utilization of resources, are often employed to alleviate the congestion and bottleneck problems that constrain the terminals performance. The situation call for alternative methods in solving the problems that weaken container terminals performance that are needed by management to increase capacity in terminals. This study tried to investigate and attempt to solve some of the problems that are leading to inefficiency operations at container terminals. The study was conducted on a sample of two terminals, TPA and TICTS terminal, the information was collected through survey with a broad base of qualitative and little quantative information about various characteristics of ports in terms of port infrastracture, maritime services and operational performance as the key factors for productivity and efficiency measurements. Much of the research has been focused on the marine interface or ship operations side of a container terminals,which leaves room for further research on the land-side interface where yard congestions contribute more to poor ship operations and overall terminal performance.

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ABBREVIATION AND ACRONYMONY

TPA	Tanzania Ports Authority
TICTS	Tanzania International Container Terminla Services.
UNCTAD	United Nations Conference on Trade and Development
THA	Tanzania Harbours Authority
DT	Dwell Time
DCT	Durban Container Terminal
DRC	Democratic Republic of Congo
TRC	Tanzania Railways Authority
TAZARA	Tanzania Zambia Railways Authority
SA	South Africa
TEU	Twenty Foot Equivalent Unit (is the international standard measure used for container;thus adopted TEU as the output measure)
EAC	East Africa Community
EU	European Union
EAHC	East African Harbours Corporation
ICTS	International Container Terminal Services.
SUMATRA	Surface and Maritime Transport Regulatory Authority.
TRA	Tanzania Revenue Authority.
WAN	Wide Area Network
ICD's	Inland Container Depots
SSA	Sub Saharan Africa
LPI	Logistics Performance Indicator
TPT	Transnet Port Terminals

TNPA	Transnet Network Ports Authority
SARS	South Africa Revenue Services
EDI	Electronic Data Interchange
MSC	Mediteranian Shipping Company
NRZ	National Railways of Zimbabwe
CFS	Container Freight Stations
ZR	Zambia Railways
BR	Botswana Railways
HPH	Hutchson Port Holding
DEA	Data Envelopmental Analysis
TRL	Tanzania Railways Limited

CHAPTER ONE

1.0 INTRODUCTION

1.1 Overview of the Study

Maritime transportation plays a major role in the national and international trade and economic growth. The seaports trade reprents more than 90 percent of the international trade in the world, Sayi: 1, (2008). Container terminal performance measurements is not only a powerful management tool for port operations but also an important input for regional and national port planning and operations.Since a public sector is aware of impact of the growing world container traffics and delays at container ports facilities,the port industry is under pressure to deal with the ever increasing freight volumes.The research aim to analyse the efficiency of operational performance of container terminals of Dar es salaam port.

The port of Dar es salaam is the principal port of Tanzania port authority (TPA) which was established in 2006.Before TPA it was Tanzania Harbours Authority (THA) which was established in 1977.The formation of authority came after the collapse of the East African Community (EAC) in the same year.During the British colonial period in East Africa, all common services (i.e, Ports, Railways, Airways, Banking, Customs and Exercise, Pests and Parasites Research) were initially one coorporation under EAC. After collapse in EAC 1977, members of the community established authorities and corporation to manage Ports, Posts and Telecommunications, Railways and Airways.(THA act, 1977).

Tanzania Harbours Authority was established by legstration (THA Act No 12 of 1977) as separate statutory body to develop,improve,maintain,operate and

regulatethe harbours of Tanzania. The authority was responsible for three major ports that's Dar es Salaam,Mtwara,Tanga with other minor ports of Mafia, Kilwa, Lindi, Pangani, Mikindani and Bagamoyo. On 2006, TPA was formed which is now responsible for controlling and supervising all the ports inTanzania,it includes also lakes ports along Tanganyika (Kigoma port), Nyasa (Kyela port), Victoria (Mwanza port). (www.tanzaniaports.com).Morden development of Dar es salaam port started in 1950's,by 1956 constructions of three deepwater berths were completed.

Berths was added by the east african harbours corporation (EAHC) this brought the number of berths to reach eleven (11) up to now,with quay length of about 2,000 meters from berth numbers 1 to 7 used for general cargo and 8 up to 11 for container operations under control of TICTS. Therefore TICTS terminal have got four berths with length of 725 square meters,with 12.2 depth, which is capable for accomodation of three vessels at a time,the terminal also do have container yard stacking area of 18.75 hectares capable to hold 11,500 TEU'S,for annual capacity of 500,000TEU's.The ports also comprises of Kurasini oil Jet (KOJ) for tankers delivery,lighter quay and dhow wharf for ships operation coastwise and for passengers embarking and disembarking to and from zanzibar island.

Dar es salaam port handle about 95 percent of Tanzania international trade,the port serves the landlocked countries of Malawi, Zambia, Democratic Republic of Congo,Burundi,Rwanda,and Uganda.The process of import and export to those countries is facilitated by linkage of two railways systems,Tanzania Railways Limited (TRL) and Tanzania Zambia Railways Authority (TAZARA). TRL cuts 1,225 kilometers across the shore of lake Tanganyika and 1,230 kilometers to the

shore of lake victoria port linking the port of DRC,Burundi,and Uganda respectivelly.TAZARA line is 1,825 kilometers to Kapiri Mposhi in Zambia where it is linked with Zambia railways (ZR). National Railways of Zimbabwe (NRZ) and Botwana Railways (BR). The port is strategically placed to serve as convenient freight not only to and from East and Central Africa countries but also to Middle and far East,Europe,Australia and America   (THA, 2011).

Globally,Ports are the vital interface from sea transport to other–modes (Roadways,Railways,Airways,Pipelines) or again to ships distributing goods along the coasts and inland waterways. Container shipping is the most viable means of goods transportations nowdays used worldwide thats why even in this study the researcher will base in detail on container terminals of port of Dar es salaam. Though there are other goods also operated at thisport that's break bulk,and project cargo,solid and liquid bulk cargo,liquiefied and pressurised gas and specialised transports ranging from cars to cattle (Bassan, S, 2007).

Today the greater part of all liner cargo is handled in containers but it was only in 1965,the first full services operated by purpose built ships commenced trading.This new method of operation replaced the cargo handling system that had seen in place for some 3000years previously.Some of the advantages risen the need of use container as major means of transporting cargo's are: Door to door delivery services,easy handling and cargo security,Damage and pilferage went away down,labour costgone away,turnaround time in port reduced hence maximizing time for container ships, Song et al, (2001).

Since the introduction of container,international trade has grown more than twice as fast as the global economy, so the container revolution transformed shipping because it was simply a better way of doing business,and therefore increasednumber of container imported as resultsmany ports failed to handle containers effectively and hence impacted negatively on ports performance due to**;** Lack of adequate equipment for container handling, space, Global container port throughput growthand others lead to many Ports became congested substantially in the last few years. This all and other lead to poor Ports terminals operational performance worldwide and in Dar es salaam port also especially in container processes leading complaints from Port users and governments. In trying to attack the problems of container congestions and inefficient container terminal perfomance,the Tanzania government decided to privatise container terminal of Dar es salaam port to foreign company.

In 2000, TICTS took the deal as part of ICTS and later on ICTS handled over to Hutchson port Holdings (HPH) of Hongkong one of the world's leading port operators,part of singapores's Hutchson Whapoa limited. TICTS were given 10years contract for operating container terminal at Dar es salaam port (Wood, 2006). In 2004 before the end of previous 10years,with an exclusively clause built in TICTS extended contract for a further 15 years as a result of good performance as per some of reasons mentioned in the due time when signing the new contract,later on risen an complaints of many ships queing at the outer anchorage waiting to be unloaded,congestions on cargo in yards,gates and delivering processes,delays in vessel completion time.*"The evaluation found that the performance of the container terminal of Dar es salaam port with respect to waiting time,turnaroundtime,crane*

productivity and ship productivity was unsatisfactory,both in terms of customers expectations and regulatory benchmarks'' said the letter signed by acting SUMATRA acting director General,Ahmed Kilima,(Daily News July,2006)

TICTS was not capable of handling many ships at a time due to its limited space and adequate equipment. In solving the problem, May,2008,goverment formed a team to negotiate with TICTS on removing the exclusivity clause,one of the option was to terminate the contract entirely,but the government warned that by doing so it would be liable for US $760Mil if they chose this course of action according to *Handy shipping Guide*, instead government entered into a long negotition ending with agreement with TICTS only exclusive right to handle containerised traffic cargo in Dar es salaam port was removed ending TICTS monopoly and opening port up to other investors fostering competition and hopefully improving efficiency at severely congested port (TPA, 2012).

However Delays in cargo handling at the port have been so great that by the start of 2009,it had lost 30 percent of traffic to Kenya's Mombasa Port and Mozambique Beira Ports. TPA made various efforts one of the approach was to secure additional space of 12,000 square meter for container terminal operations capable of handling 8,000 TEU's by moving automotive vehicles cargo outside of the port area to ICD's to get space where by the TPA container terminal is now operational.

Again TPA, is planning an expansion of building a second container terminal at the space strapped dock by 2014 with an annual container handling capacity of 650,000

TEUs, By having two container terminals under TPA and TICTS-container terminal,adding to three container terminals at Dar es salaam port. By doing so it is expected to ease congestion and reduce waiting for cargo handling hence adding business to national economy (TPA Master plan, 2009)

1.2 Statement of the Research Problem

The growth of containerization transporting goods in a container has resulted in the increase of container ports and terminals which in turn increased the number of containers volumes to the terminals, causing higher requirements on productivity performance, terminal capacity and adequate infrastructure.Container Terminals of Dar es salaam port has been operating under customer complaints due to inability to meet operational performance requirements, international standard benchmarks and stakeholders and governments authorities expectations. "Sometimes, the port has been handling containers at between 70 and 80 percentage of its storage capacity, but efficiency declined and caused delays of shipsat the anchorage (TASAA, 2012).

There has been complaints on congestions due to inefficient performance trend on container delivering processes in yards, gates processes, vessel productivity performance, long dwell times, and other delays are said to be the causes of slow operations processes and hence congestions at the terminals.'The evaluation found out that the performance of the container terminal at Dar es salaam port with respect to waiting time, turnaround time, crane productivity, and ship productivity was unsatisfactory, both in terms of customers expectations and regulatory benchmarks', *(*Kilima, 2012).

In efforts to remedy this situations and also to decongest the container port for efficiency,The port sought to relieve the capacity problems in the port by using Inland Container Depots(ICD's) to handle some domestic containers from the terminal for receipts,storage and delivering services directly to customers, this being one of the solution of removing some of the activities from the port container yards to create more operating space. "The formation of the container handling operations to the ICD is a major milestone into making the port one of the most efficient in East African Region'' (TPA Director General, 2012).

The impact of ports performance on container handling capacity is not only to its competitiveness but also goes beyond the industry to effect on country's overall competitiveness.The focus of the research involves the performance from the container terminal managers perspective and how to improve the understanding of the factors of productivity. The research problem here is inefficiency operational performance on landside interface. The need to manage complex situations under Land side, i.e, yard and gate operations requires new ways of finding solutions. By introducing methods and technologies to terminals as per study requirements to port of Dares Salaam container terminals,this will foster the goal of finding good alternatives to increasing capacity rather than physical expansions or acquisitions of additional resources.

Container terminals are proven to be more productive than multiple purpose terminals, Global terminal operators were not proven to out perform local terminal operators as was expected. It was found that container terminal operation industry is

over-scaled.The research findings here can potentially affect decisions made by carriers,terminal operators and policy makers,as it provides an overview of efficiencies for all container ports/terminals in two terminals at Port of Dar es Salaam also examines in detail the sources of inefficiency for individual ports.

1.3   Objective of the Study

1.3.1   General Research Objective

The main research objective was to investigate the efficiency on operational performance of container terminals for seaports a case of Dar es salaam Port.

1.3.2   Specific Research Objectives

(i) To determine factors affecting operational performance at container terminals of Dar es salaam port

(ii) To assess the productivity level for container terminals of Dar es salaam port with comparisons to other major container ports.

(iii)To conduct an analysis on the perceptions to services provided to customers and the efficiency on the operating procedures to the terminals.

1.4 Research Questions

1.4.1 General Research Question

How is the efficiency on operational performance of container terminals for Dar es salaam port?

1.4.2 Specific Research Questions

(i) What are the factors affecting efficiency of operational performance for container terminals at the port.

(ii) How is the productivity of container terminals at Dar es Salaam port in comparison to other major ports.

(iii) How is perceptions to customers on services provided to them and the operating procedures of the container terminals.

1.5 Significance of the Study

This study will be useful to many stakeholders as follows;

To owners TPA, to learn and implement the new ideas in this study so as to improve operation performance of container terminals by:

(i) Implementation on new technological and an adequate equipment to handle the growing big traffic of container cargo.

(ii) Enhancement efficiency port infrastructure and better procedures for container delivering processes.

(iii) To enable them know some suggestions and recommendations which might help to find ways to boast operations to gain required performance to meet international standard.

To ministerial level, to span over a linkages of number of organization via the regulatory bodies and agencies to enable, terminals;

(i) To plan and develop port hindering connections roadways,railways,territorial waterways) that will boast movements of cargos reducing congestions to the port hence speed up terminal operations.

(ii) To plan and develop basic maritime infrastructure,and port entrances that will quick operations at the terminals.

To public and other beneficiaries, to understand that they are part of supply chain so their contiributions of on time submission of required clearing documents,deployment of suitable vessels and proper communications in cargo and vessel coordination will help satisfaction operational performance to the ships and yard delivering procedures.

To employees,will help to gain more efforts and observe more transparency on day-to-day basis in there operations activities and be aware of the areas that need to be improved and as individual to be more committed in their areas of work.

The study will also help marketing managers,business planners, existing investors,potential investors,marketing consultants and researchers in analysing factors contributing inefficiency of operations to the container terminals at port,hence the results as solutions to problem will help them to develop their business plan in contact with ports hoping to gain effective services from the terminal operations also,it will provide inputs to policy makers in order to generate appropriate policies to facilitate good services of ports,coming with a competitive port in regional and globalwise.

1.6 Summary

The study covered a general view of efficiency on operations performance of container terminals at Dar es Salaam port in order to understand the the position of container shipping and handling in the overall shipping industry. It have analysed the dynamics and interactions between container carriers and container ports and terminals.Efficiency has become an increasingly critical issue,as the competition

between ports and between ports and carriers intensifies.Container ports include many different agents with various activities,however,container handling is the most important activity within container port. That is why the efficiency of container handling activity is the focus of this research. The study tried to find ways of improving efficiency on operational performance on the container port terminals to provide the satisfactions services to local, transists and international port users.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview

There are two main concepts related to operational performance: productivity and efficiency. The concept of productivity is commonly defined as a ratio of the volume measure of output to the volume measure of input used,where efficiency is a relative concept,i.e. the performance of a firm is compared to a benchmark.In this chapter we review the literature by studying the structure of the container port/terminal industry and analyse how to improve the efficiency of container port/terminals (Qianwen, 2010).

2.2 Conceptual Definitions

2.2.1 Container

Containers are steel box built to standardized dimensions as cargo carrier,can be loaded and unloaded,stacked,transported efficiently over long distances and transferred from one mode of transport to another-container ships,rail and semi-trailer trucks-without being opened. There are five common standard sizes of containers, 20-ft (6.1m) length x 8ft (width), 40-ft (12.2m), 45-ft (13.7m), 48-ft (14.6m) and 53-ft (16.2m). The common use sizes are 20ft, 40ft and 45ft, while 48ft and 53ft are commonly United States domestic standards.A container capacity is often expressed in twenty-foot equivalent units (Mclean, 2012).

2.2.2 Container Terminal

In a port, a container terminal,is where a number of container vessels are often berthed alongside, and each vessel is served by multiple quay cranes which are

supported by large number of yard cranes in the yard.When a vessel arrives at the terminal,containers are normally discharged from the vessel,mounted onto trucks by quay crane and then unloaded by yard cranes at various locations in the yard for storage.In the loading operation,export containers loaded onto trucks by yard cranes at the yard are off loaded at the quay and loaded onto a vessel by quay cranes (Mark, 2005).

2.2.3 Container Terminal Operations

Container terminal operations,are activities for transferring containers between modes of transport and provide a package of activities/services to handle and control container flows from vessel to landside and vice versa. The main activities that make up the whole container terminal operation can be broken up into the following (Koh and Ng, 1994):

2.2.3.1 Berth Operations

The schedules of arriving vessels and the allocation of wharf space and quay crane resources to service the vessels,the key concerns is the turn-around time of vessels.

2.2.3.2 Ship Operation

ship operation involves the discharging and loading of containers onboard the vessel.This is handled by quay cranes working in sychronization so as to maintain safe separation from each other.To achieve high crane rates (number of containers moved per hour)

2.2.3.3 Yard Operation

The busiest of all activities in the terminal, the operation involves discharging of containers from the vessels,loading of containers onto vessels,shuffling of containers that are out of sequences and yard shifting into the blocks.

2.2.3.4 Gate operation

Deals with external freight forwarders,two activities are involved,namely export delivery where the freight forwarders bring in exportcontainers to the yard to be loaded onto vessels,and import receiving where freight forwarders receive containers from the yard to bring into the country (Sayi, 2008).

2.2.4 Container Terminal Performance Measures

Container terminal productivity/performance measures deals with the efficiency use of Labour,Equipment,and Land.Terminal performance measurement is a means to quantify the efficiency of the use of these three resourses (Dowd and Leschine, 2001).There are many classes of measuringperformance of container terminal. Port performance indicators are divided into four categories namely; Ship Operations,Cargo Handling,Warehousing, and Inland Transportation. This model can be used to evaluate different performance indicators to perform port improvement analysis,to study port expansion possibilities,to estimate future view of the port and economic evalution.

2.2.5 Operational Performance

The operational performance of a port is generally measured in terms of the speed with which the cargo is delivered from the ship, yard up to outgates. The rate at

which cargo is handled and the duration that cargo stays in port prior to shipment or post discharge and other delivering processes. However, Indicators to measure these performances are determined generally in relation to the tonnage of shipping calling at the port and of the volume of cargo handled since port services in the main are rendered to ships and cargo.

Productivity in ports is generally measured in terms of the tonnage of cargo handled per unit of work station per hour. In the case of general cargo, the work station is the gang, with containers, it is the crane (or hook). Thus productivity is measured in terms of (a)tons per gang hour for general cargo and (b) TEUs/per crane (or hook) hour for container cargo (Chung,1993).

2.2.6 Port Efficiency

Often means speed and reliability of port services.UNCTAD (1992) cited 'on-time delivery' as a major concern by most shippers, in fast paced industries where products must be moved to the markets on time. Terminal operators as vital nodes in the logistics chain must be in a position to guarantee shippers a very reliable and quick service,Port efficiency reflect also the turnaround time of ships and cargo dwelling time, (Tongzon, 2002).

2.2.7 The Sea Port

The Port can be a sea or dry ports. Sea ports is the place of contact between land and maritime space,and it provides services to both hinterland and maritime organization,it is therefore,a knot where ocean and inland transport lines meet and intertwine.Its primary function is to transfer goods (and people) from ocean vessels

to land or to inland carriers,and vice versa.Traffic means life and prosperity not only for the port but also for the city and region around it.Thus it is inevitable that a dynamic port will seek to attract as much traffic as possible from wherever it can and will frequently come into competition with other ports, (Weigend, 2001).

2.3 Critical Review of Supporting Theories or Theoretical Analysis

There are many studies which have been made by scholars in the related area of research for efficiency analysis on operational performance of container terminals,in which certain theories have been developed.These studies, a few of which are given below,have beeen reviewed by dissertation writer in arriving at the conclusion and recommendations in this study report.

There are two concepts related to operational performance of container terminals: Productivity and Efficiency. The concept of productivity is commonly defined as a ratio of the volume measure of output to the volume measure of input used, Whereas Efficiency is a relative concept, i.e. the performance of a firm is compared to a benchmark. While there is no disagreement on this general notion,there are many different purpose for,and several distinct measures of,operational performance in the econometrics literature.

In the literature of analysing performance of containers at the terminals; there are two main study to operational performance: gross measures of productivity and shift measures of technical change (Tretheway *et al.* Waters, 1992). Widely used approaches to measure/analyze the efficiency/productivity include, stochastic

frontier analysis (SFA), Data Envelopment analysis (DEA), Vector error model (VEM), Corrected original least squares (COLS), Original least squares (OLS).

2.3.1 Stochastic Frontier Analysis (SFA)

Measuring Efficiency of Container Terminals by Means of Bayesian Stochastic Frontier Analysis is a parametric and stochastic approach to estimate productive efficiency. A terminal is efficient if it produces a maximum output (container traffic in TEU) for given inputs (terminal superstructure). Traditional studies on container terminal efficiency tend to focus on partial productivity measures such as TEU per crane. These instruments do not assess the overall efficiency of terminal operations, as they only look at specific aspects of the terminal operation process. This paper presents an approach for the measurement of container terminal efficiency based on Bayesian Stochastic Frontier modeling. A Bayesian Stochastic Frontier Model is a stochastic and parametric method for analyzing productive efficiency (Culliname & Song, 2003).

The stochastic production function takes into account of statistical noise (composed error) and models the level of inefficiency via a non-negative disturbance. As such, the level of (in) efficiency of different terminals can be compared. The model is tested using a sample of 36 European container terminals, supplemented with four Asian container ports. In general, north European container terminals attain a slightly higher degree of efficiency than southern terminals. Terminals located in hub ports on average are considered as more efficient than those in feeder ports.

The advantages of DEA approach are; it reveals information about the production technique and distinguishes between different variables roles affecting output. It considers statistical noise and hence it is possible to test the validity of certain assumptions and hypothesis. There is great flexibility in specifying the production technology. The draw backs are; need to impose a prior structure when constructing the frontier functional form, the assumptions concerning the distribution of the inefficiency term have to be imposed in order to decompose the error.

2.3.2 Data Envelopment Analysis (DEA)

DEA is a mathematical programming approach to estimate productive efficiency. The approach maps out a production frontier based on information on inputs and outputs. The degree of (in) efficiency is assessed by the distance between the observation and the frontier. The scholars claim that the efficiency of a container port is an important factor for the international competitiveness of the country. For this reason, intensive studies have been carried out in order to determine port performance across all the regions of the world. (Cullinane and Wang, 2006) used the DEA (Data Envelopment Analysis) approach to measure the efficiency of 69 container terminals in Europe with an annual throughput over 10000 TEUs.

The findings of the study include significant inefficiency that generally pervades most of the terminals. Le-Griffin and Murphy (2008) assessed the productivity of Los Angeles and Long Beach ports and compared these measurements with those of other major container ports situated in the U.S. and overseas. The drawn comparisons suggest that the ports of Los Angeles and Long Beach are

underperforming relative to other leading container ports. Turner et al. (2004) used DEA for measuring the growth of seaport infrastructure productivity in North America from 1984 to 1997 and explored several causal relationships between infrastructure productivity and industry structure and conduct.

The authors stated that during the study period gross infrastructure productivity rose on average for North American container ports. By applying the DEA model, so (Cullinane and Wang, 2006) attempted to measure the operational efficiency of 19 major container ports in Northeast Asia. According to the obtained results, the conclusion that 8 container ports were operated efficiently was made; Hong Kong was ranked top as the most efficient port in Northeast Asia.

Liu et al. (2008) used DEA models and Malmquist TFP approach for determining the efficiency of 47 terminals in China with an annual throughput over 10000 Trustee strength of the DEA approach is that no prior structural assumption is places on the production process. The drawbacks of the approach are; it is very sensitive to outline is: it does not take into account the measurement error and statistical noise, and therefore not possible to test the statistical significance of the efficiency index specific observation (Valentine & Gray, 2000).

2.3.3 Vector Error Model (VEM)

The earliest models employed Stochastic Frontier Analysis (SFA) and Data Envelope Analysis (DEA). The model employed here is a Vector Error Correction Model (VECM), which takes into account the long-run and short-run relationships

among several variables: monthly container moves, gross labour hours, crane and straddle carrier operating hours and container yard storage capacity. Impulse response analyses find that a one standard deviation in monthly container moves has a significant effect on equipment efficiency usage and yard storage capacity, important factors that shipping lines are likely to give serious consideration when choosing a trans-shipment terminal. The findings of this model suggest that in order to improve efficiency the time containers remain in-transit on the terminal has to be contained because this affects storage capacity utilization and significantly impacts other variables such as machine hours and labour hours. These models have been used for measuring the efficiency of the berth-side operations of the Kingston Trans-shipment Terminal, Jamaica (KCT).

2.3.4 Corrected Original Least Squares (COLS)

Is a parametric approach to evaluate productive efficiency. It belongs to the regime of regression methods but differs from the original least squares estimation methods, in this approach one calculate an 'average line' that cuts through the observations, and then shifts (corrects) the line to a position such that it encloses all the data. The corrected line can then be measured against this frontier. The strengths of this approach are; it reveal information about the production technique, it distinguishes between different variables roles in affecting output as all parametric methods do, the adjustment from the average line to the frontier allows for the measurement of relative efficiency.

The drawbacks of the approach are; it requires a prior specification of production or cost function, it is not possible to measure error and other statistical noise (Greene,

1993). It is sensitive to outliers, since the best performance along any dimension serves as the anchor for how much the average line needs to be corrected in order to become the frontier.

2.3.5 Original Least Squares (OLS)

Estimation method is a regression methods that fits an average line through the data. This average line is calculated by the production or cost function, which represents the production technique of the considered industry and indicates information such as the degree of returns to scale of the industry and individual firms in the industry. The strength of the approach and of all the statistical methods are; they are consistent with the underlying economic theory that offers a potential explanation for cost or production structures and distinguishes between different variables roles which affects output, there is a ample range of standard statistical tests available to assist the analysis.

2.3.6 Analsysis of DEA

In my study the aim is to better analyze the operational performance of the container terminal and how to improve the efficiency of container terminals/ports. Efficiency here is a relative concept, i.e. the performance of an operational unit must be compared with a standard (Forsund and Hjalmarson (...year?....). As in this research the percentage findings assessed by comparisons of productivity performance level of one terminals to another of either level or major container terminals. DEA is the most important non-parametric techniques to measure the efficiency of Decision making units-DMUs with multiple

outputs and inputs. In this research also the findings reflects directly observations of productions as per inputs used to tackle with the output of operations.

DEA has been widely used because it can be applied in a diverse variety of situations, and has also been the subject of a number of theoretical extensions that have increased its flexibility. ease of use and applicability (Allen et al, 1997). DEA allows to compare the relative efficiency of complex units such as Ports, Schools, Hospitals, Banks, among others.Another reason for using DEA in this study is,DEA can be the best theory to measure the growth of the terminal by using infrastructure production. As per this study one of the factor used for testing the performance of operations of terminals is the (in) efficienct port infrastructure. On top of all as per DEA the findings can be tested by annual throughput of one terminal to other and by directly daily or monthly productivity measures which are the main focus and outcomes of the customer satisfaction.

2.4 Emprical Analysis of Relevant Studies

2.4.1 General Study

The introduction of containerships into major trade routes worldwide, led the port industry to be under pressure to deal with the ever incresing freight volumes globally. Congestions at container terminals is considered a major issue facing truckers coming to the terminals for container pickup and delivery. Containerisation has brought a revolution to maritime transportation by MacLean since 1956. The subsequent proliferation of containerisation has resulted in the standardization of the cargo unit, handling process and mode interchange. This has drastically improved the efficiency of cargo loading and discharging operations (Muller, 1999). Further,it

greatly helped to accelerate the development of intermodalism that integrates ship,rail,and truck together into a very viable alternative for international container shipment.

With globalisation of the economy and trade liberalization,World trade,especially in container traffic,has grown rapidly. According to the annual report 'Review of Maritime Transport,' published by United Nations Conference on Trade and Development (UNCTAD), world-wide port container throughput volume grew from 135 million TEUs in 1995 to 303 million TEUs in 2003. This represents an annual growth of 15.5% on average (UNCTAD,1997-2005).In the U.S,port container traffic grew from 14.9 million TEUs in 1997 to 25.9 million loaded TEUs in 2004 (MARAD,1997-2004), an average 10.6% growth annually. The future outlook also points out that, the international trade volume will double by 2020, according to a freight study conducted by DR-WEFA (currently known as Global insight) for the Federal Highway Administration (FHWA,2002).

The development in container trade and the container shipping industry has a direct impact on port development as well as on the regional transportation network,especially on highways and Intermodal connectors.Freight infrastructure such as access channel,Terminal facilities, container handling capacity, Intermodal network and connectors are under increasing pressure to keep up with ever growing container volume. On the other hand, the supply chain industry requires a high level of service from intermodal carriers in terms of service reliablity and predictability (Chang.Q, 2009)

During the last few years, the freight community has experienced significant delays due to inadequate intermodal transportation infrastructure, either in marine terminals, or highways, or railroads or intermodal facilities (Rooney, 2006). Furthermore, the increase container truck volume has led to serious congestions; truckers have to wait for a long time at port facilities. Congestions reduces travel trime reliability for both commuters and truckers, which is a significant concern for large and small businesses. The delays caused by congestions could increase the costs of freight movements. The extra time spent in congestions causes service providers to make fewer calls per day, resulting in higher prices for consumers. Congestions problems reduce the efficiency of freight flow, worsen environmental quality and eventually increase the costs of doing business worldwide.

2.4.2 Studies in Africans Countries

Ports and cargo dwell time in ports are critical. Arvis et al. (2010) demonstrate that for land transport to land locked countries in sub saharan Africa (SSA) over 50% of total transport time from port to hinderland cities is spent in Ports. South Africa has the largest number on Intra-regional maritime connections with international carriers providing direct acces to 29 other African countries (UNCTAD, 2009). With the rise in maritime traffic volumes, at their peak, South African Ports handled up to 185million

tonnes in 2008 before experiencing a slight drop in 2009/2010 because of the fall out from global financial crisis. The demand at South Africa Ports surpasses all countries in Eastern and Southern Africa, with a network of eight ports, the country

has a critical role to play in the international trade landscape for the region (Chang Q, 2009).

South Africa and its network ports is ranked 28th in logistics performance indicator (LPI) for 2010 followed by senegal at 58th. The global trend of rising popularity of the container means African ports also experienced growth in the containerized cargo market. South Africa handled the highest container volumes reaching a peak of 3.9million TEU's in 2008 with the port of Durban accounting for over 60% in South Africa. All ports, freight rail and pipeline infrastructure are owned by the Transnet Group. The South African government is the unique shareholder through the Department of public enterprise (DPE) which control all parastatals. TNPA is a landlord Port Authority reponsible for all the 8 national ports in the country providing port infrastructure and marine services as well as tariff setting and control of spatial allocation. Port operations are largely run by Transnet Port Terminals (TPT) with some small degree of private sector participation (UNCTAD, 2002).

The critical location of Durban on North south freight corridor, an important route for transit traffic bound for Zambia, Zimbabwe, Malawi, and a connection going as far north as Dar es salaam. This put it on the spot light and its performance is extremely vital for countries along the corridor. In the late 1990's, the port of Durban was notorius for inefficiency and high levels of congestions,it was characterized by long berthing delays for container vessels, long train turnaround times in the port and long queues for road trucks and this resulted in dwell times of around 6-7days, in 1998, shipping lines lost their patience and introduced a vessel delay surcharge (Fourguard, 2001).

A Review study of the Durban inland intermodal terminal and logistics hub conducted in 2008 reveal the turnaround time within the port area was too long and had major implication on efficiency thus dwell time (Arup, 2008). The main lessons which can be drawn from Durban port is the measures were taken to put pressure to change the behaviour of the private sector port users to better comply by cooperating in reducing cargo dwell time, in this regard to; (i) Charges for storage by enforcing terms and conditions related to storage of cargo at ports, which states that within 72 hours of the discharge of each container from the vessel the customer shall provide the terminal operator with a delivery instructions in respect of all container discharged. (ii) The role of public sector in improving efficiency,it was noted that some of the major delays at port and border crossings was because of inefficiencies by the custom agencies. As pointed by Raven, efficiency of ports or even timming of many of its activities is strongly influenced,if not dictated,by customs (Raven, 2000).

So the target for South Africa revenue services (SARS) customs,is to clear within 3hours for declarations processed through Electronic Data Interchange (EDI). (iii) Transnet role and infrastructure investment done on investment in thecontainer terminal adding cranes with twinlift capabilities, widening of harbour channel entrances to 225m and deepening to 19m at the approach (Chung, 1993).

2.4.3 Studies in Tanzania

The study done by UNCTAD Ad Hoc and conferrenced Geneva Switzerland, 2006. Meeting with Port authority on assessing Port of Dar es salaam container terminals opeational performance analysed that, the service level in both general cargo

terminal and the container terminal was relatively low rendering the terminals less competitive in port industry.

The main objective of the study was to assess whether the port terminals provide high quality services to all port users aiming higher efficiency to minimize time spent by vessels in port and hence minimize costs. Bassan (2007) suggests that a methodology for evaluating seaport container terminals operations and capacity analysis to support decision making are berth occupancy, congestion percentage, vessel waiting time-to-service ratio and average actual annual cargo throughput.

The hinterland served by the seaport of Dar es salaam include countries of Tanzania, Kenya, Uganda, Rwanda, Burundi, DRC, Malawi, Zambia, Mozambique. Almost all countries served by East Africa Ports belong to group of developing countries and therefore minimisation of total logistics costs is of importance to economic development of this countries. In the study the researcher aimed to the tools that will help in understanding the right decisions at the time for measuring performance and improving quality of services as well as decisions in investments needs. This tools termed as the Port performance indicators, these are: Operational indicators, Serviceindicators and Port infrastructure. Imperfect information and corruption makes process of moving goods in sub-sahara Africa involve significants costs associated with length and uncertain delivery times (Christ &Ferantino, 2009).

As per researcher study the operational performance indicators are directly related to port activities and facilities and are categorized into service level output (production),utilisation,productivity and customer satisfactions, where by service

indicatorsmeasures the quality of service, provided to customers-ship owners, ship operators, importers, transporters, etc and the common indicators used for measuring were: Ship turnaround time, Truck turnaround time,Container dwell time, Equipment availability and speed of delivering processes (Chung, 1993).

Through these port indicators for measuring port performance the researcher suggested some steps necessarily for resolving inefficiency operational perfomance to container terminals at the Port thats; (i)Transfer of containers to ICD's to reduce port congestions hence easy yard delivering and ships operation processes (ii) Acquisition of quay and yard equipments (iii) Clearance of documentation before ships arrival (iv)Transport infrastructure investment in the hinterland

2.5 Research Gap Identified

Due to changes in port industry,most countries are making great efforts to secure their ports by investing more funds on port facilities and by improving efficiency in port operations and management,to advance their competitiveness and performance. The port authorities have implemented various strategies, such as building logistics centers, expanding container port areas, cooperation between port authorities in the same areas and advancing IT systems.

According to Kotler (2004) the first task of any business is to create customer, customers estimates the quality of service and efficiency to the business (Cullinane et al. 2005). In fact many of the studies tried to address the issue of container port performance by justlooking for new ways to measure and compare ports and ports terminals, but it is not explained the differences and why a container port is more or

less efficient than another, or why it has better or worse performance. In recent years researchers have focused mainly on measuring the efficiency of container ports, and why a container terminal has a higher output for the same amount of input used. Without knowing what are the factors characterizing the terminals on performance that influence inefficiency of container terminals in the port, this is the gap to be identified in this study.

The Studies that have identified the various factors influencing ports performance on container terminals are few. Further more these studies failed to quantify the relative contributions of those factors to overall port performance and efficiency of container terminals. Most of previous research based on efficiency and performance of the shipside interface leaving a room for a landside interface.

This article attempt to fill this gap by establishing a mode of overall container terminal operational performance measurement for both Quayside and landside interface.Focusing on 'Supply chain integaration form of operational' with the orientation of this form, port authority need to have proper coordination with other parts of ports interests to let them know their roles in successful effective performamce of the ports operations. Port users need no know that they are parts of supply chains therefore their effective coorporations will documents the effective changes to take place in relationship between port authority, terminal managements,stakeholders and governments authority (i.e. Ministry of Transportation).

This will be due once port authority have played its roles in having professional recruited management doing efficient provisions and adequate systems of goods delivering processes.In considering strategic issues faced by these groups of port interest, the potential conflicts of interest for port authority in matters related to the level of competition among terminals within a port and the amount of competition amongst port will lead to successful efficiently and effectively port performance.

2.6 Analytical/Conceptual Frame Work (For Studying the Problem and Analysing the Data

It is considered that the performance of the container terminals of the ports is explained largely by the characteristics of ports with which determine its level. The ports with different characteristics will have different operational performance related with this characteristics, in the various variables that can be measured. The performance of the region also influences the performance of container terminal of the port directly or indirectly, through its influence the characteristics of ports,setting variables that act as drivers. Basically, we identify,in the literature review, a set of constructs based on factors that characterize the ports that have emerged as influencing the performance of Ports (Caldeirinha, 2010).

Many port Authorities have tried to improve their facitilies and systems, however, due to the quick increasing container cargoes, they still suffer from diseconomies of scale in the terminals as results of congestions, delays and higher costs of running business. The port authorities have launched various strategies, such as building logistic centres,expanding port,cooperation between port authorities in the same areas and advancing information technology (IT) systems.

Port performance, especially related to container handling capacity is the most important factor to maintain and advance port competitivenes. Analysing port performance is a crucial way in measuring the efficiency of the terminal,in order to analyse the container terminal efficiency there is operational and functional variables that are to be measured,such as depth of berths,stacking areas of container yards,number of container ground slots and the ownership of the terminals. This all and others have been selected within the territory of containerterminals itself until the middle of 1990's (Henesey, 2004).

These days, morden container terminals measurements, the selection of variables depends on the research method,the evaluation techniques, the constraints conditions and the characteristics of the research (Zhu, 2003). In this research the dependent variables (output) on the efficiency analysis of container terminals productivity are container throughputs,service levels and port user satisfactions. There are bunch of independent variables, these are frequency of ship visits as a forward factors like Number of berth,number of tugboats,vessel dwell time,number of direct callings,average anchorage time/vessels. Another is port/terminal efficiency as a Berth factors and Port infrastructure like size of container yard, number of gantry cranes,number of gate lanes, yes or no of train systems and level of computerisation system (Sayi, 2008).

2.7 Theoretical Framework

The study enable to analyse the potential derteminants or factors for container terminals productivity and performances. Qualitative factors are those that can be potentially measured and compared in an objective manner. The factors can be

grouped into three broad categories as postulated to have significant impact on efficiency analysis to container terminal performances and on choices amongst shippers and port users. Among the factors yielding on ports competitiveness,performance or efficiency is considered as one of the most influential elements on terminal operations, (Song *et al*, 2001; Song & Han, 2005)

The selection of variables is the primary step in any econometric analysis, bacause it weighs the precision of the analysis and estimation. We examine in this work container ports and terminals in their basic functions, that is the effectiveness transport of containers from sea to land or back to sea again. To fulfill these functions, a port needs a variety inputs to the container terminals efficiency production, thats allowable situation for frequency of ships vists, adequate infrastructure and port efficiency measures.

The output of container port/terminal is the number of containers handled in that terminal per annum. Twenty-foot equivalent unit (TEU) is the international standard measure used for container ports: thus adopting TEU as the output measure. Container terminal factors for efficiency analysis are only dealing with inner factors and they are divided into three groups, these are Frequency of ships visits, Operational efficiency, and adequate Port infrastructures (Tongzon, 2002).

2.7.1 Frequency of Ships Visits

Greater frequency of ship visits translates into more choices for cargo owners in scheduling their shipments and selecting a shipping service for the transportation of their cargoes,and hence resulting in more competitive carrier costs. Again,greater

frequency of ship calls allows for greater flexibility and lower transit time. Thus the more ship visits a port has the more attractive to shippers. Frequency of ships visits,deals with the forward factors as are those factors that cannot be directly controlled by port or terminal operators but can be treated as same kinds of the results of port performance (ibid).

2.7.2 Productivity Performance (Terminal Efficiency)

These are berth factors which indicate the beth performance in terms of number of Quay cranes (NQC), Net crane productivity (NCP), Rate of Berth Occupany (RBO). Terminal working hours (TWH) and Terminal factors with three variables thats average stacking story (ASS), Terminal ground slots (TGS) and Yes or No of EDI system (song and Han,2004). The indicators for efficiency are operational efficiency measures and customer-oriented measures(UNCTAD, (1992).

2.7.3 Adequate Port Infrastructure

In its widest refers not only to the number of container berths,availability of equipments (cranes), but also the quality of cranes,quality and effectiveness of information system, availabilty of intermodal transport (such as roads and railways). The capacity of the terminal (stacking area of container yard), and geographical location as the distance between terminal and shippers premises has a major impact on inland transportation (Tongzon, 2002)

2.8 Summary

In this chapter we have reviewed the literature on DEA applied to the container ports and terminals industry. The following remarks are highlighted, first, container ports

and terminals are recognised as complex organisations where operators are involved in diverse activities. They have different objectives and are subjected to uneven levels of competition and regulations, hence in the analysis we need to use the most homogenous samples and common measures of variables. Second, inputs, outputs and exogenous variable specifications are very important to the emprical research but they are usually under the restriction of data availability. And finally we can see that most studies examine how certain factors affect efficiency and a few studies on container terminals that analyse scale efficiency and examines this relationship quantitatively. Scale efficiency is an important study since investments decisions are directed related to the input level and input mix which decides the scale efficiency of a container port/terminal.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Overview

A research design represents a sequence of pragmatic aspects of the way the research was conducted in more elaborative way. A research design is a programme that guides the investigator in the process of collecting,analyzing and interpreting observations. It is a logical model that allows the researcher to draw references concering relations among the variables under investigation. The discussion in this section therefore presents the process of how the research was conducted. In this chapter,based on the literature, we establish the methodology developed for this research,the main objectives of this research are to benchmark the scale efficiencies of individual container ports and terminals and to study the elements that influence efficiency.

3.2 Research Design

The nature of the research problem desires to examine container terminals at Dar as salaam port in their basic functions, that is, the transport of container from sea to land or back to sea again. To fulfill these functions, a port needs a variety of facilities, particularly: infrastructure and equipment as an input to the container terminals productions. A case study was considered an appropriate method in analyzing scale efficiency on container terminals performance because it provides an opportunity to study in depth and provide well-ordered information concerning the area of the study. Furthermore, case study strategy was considered appropriate as it allows direct observations of the events at the port terminals being studied and

interviews of the persons involved in the events. Physical working conditions, and facilities and through interviewing terminals administrators, carriers and users enabled to get picture of terminal scale efficiencies. A case study strategy has a unique strength that enables the researcher to use a variety of methods of data collections. The approach was not limited to a single source of evidence since it relies on a variety of sources, in this study documentary evidence, interviews, direct observations as well a survey, was used as methods of collecting data (Fisher, 2010).

3.3   Study Population

The population mainly consisted of shipping lines agents (shippers), Terminal operators (TPA and TICTS staffs), freight forwarders (clearing and forwarding agents),Transporters (drivers and other customers). With regard to demographic details (i.e, age,gender,and population group) as the main source of information in relation for analysing efficiency of operational performance of container terminal at the port.

3.4 Area of the Study

The study was conducted in Dar es salaam city, at container terminals of Dar es salaam Port. Purposely because it is the major port in Tanzania which save a big volume of container cargo's providing port services contributing to international trade to Tanzania economy,Africa and Regional wise.

The selected centres for research was;

(i)   Container Terminal of Dar es salaam port center under TPA

Where both employee, Shipping lines agents, Clearing/forwarding agents and transporters are found.

(i)   Tanzania International Container Terminal Services Ltd center

Where both employee, Shipping lines agents, Clearing/forwarding agents and transporters are found.

The choice of those research centers as a case study was because of the following reasons: First, Each units are independent of each other such that there is no overlapping of information. Second, The units have large number of staffs that most data could be collected and be compiled easily. Third, the areas are easily accesible by roads. Lastly, most of the information needed by the research are available at these units and it was easier to attach targeted interviews of different categories since their daily activities are dealt at that centers.

3.5 Sampling Design and Procedures

In conducting the study the researcher selected representative samples from the entire population. It was not possible to cover the whole population due to time and resources constraints.Iidentifying survey respondents involved going through lists of people who were thought to share certain characteristics or concerns. Acalculated sample size was also done to the locations that the researcher collected data. This population sample was drawn from the number of people currently using container terminals of Dar es salaam port services, the respondents composed of shippers, freight forwaders, staffs and transporters who were targeted for this research.

Collecting information from every individual port user was very difficult thus; the researcher planned to interview respondents through skipping methods. Total number 80 respondents was assumed to be representative of the entire population

that was selected and the collected data from this sample size were manageable by a researcher.

3.6 Methods of Data Collection

A survey was used to collect the qualitative evidence from respondents.However,substantial quantative information was also gathered from respondents using both ''closed'' – ended'' and ''open –ended questions. For the purpose of the research and in order to achieve the objections,data's was collected from the field using both primary and secondary data's. Primary data was collected from respondence by observations,questionnaires, interviews and secondary data's through documentary. These methods guided the researcher to avoid the collection of data in a haphazard way and simplified research questions.

Interviews, involved presentation of oral-verbal stimuli and reply in terms of responses. (ibid;120). Researcher used structured interviews which use of predetermined questions and highly standardized techniques of recording oral inter view were conducted to responded to the question posed to them and by group discussions.

Observations, was performed by personal visting the area of the study and observes the operations of handling containers. Questionnaires, was designed in away that respondents could respond to the questions in a flexible way including either verbal or written. Who were tight schedule interviewed verbally to serve time and those who was free to fill questionnaires were given to do so.

Documentary review, Secondary data were collected by the use of record review from journals, booklets, policy documents, reports of weekly, monthly and annually performance on container productivity also formed as an important source of informations.

3.7 Data Processing and Analysis

Data analysis defined as a way of analyzing informations gathered on focusing on various questions posed in the study (Kothari,2004). Data collected from the field were analysed both qualitatively and quantatively. Qualitative analysis involved analysis of information in the form of logical deductions.In order to be understandable was used the framework of qualitative methods of data analysis and presentations. The raw data collected were edited, coded and captured in Ms-Excel, (Mark et al, 2009), through qualitative analysis which involve one or more of: summarizing data, categorizing data and structuring data using narrative to recognise relationships, to develop and test proportions and produce well grounded conclusions.

The data collected on variableswere used to determine the model, the regarded variables on the study questions was productivity efficiency, frequency of ship visits and port infrastructure. Respondent were asked to tick at appropriate arguments to respond positive or negative depends on the perceptance of services to each variable of container terminal performance. The results were combined from different categories of respondents and calculated manually in percentage to get the degree of importance or arguments in percentage of count. The evaluations was done on the

perceptions on positivity or negativity of services for productivity performance, and high or low arguments of respondents on the importance ofinfrastructure and maritime services to container terminal operational performances.

3.8   Reliability and Validity of Data

3.8.1 Reliability

Reliabilty refers to the extent to which data collection technique or analysis procedures will yield consistent findings (Mark et al., 2007). As Marshall and Rossman (1999) said, one response to the issue of reliability is that the findings derived from using non-standardised research methods are not necessary intended to be repeated since they reflect reality at the time they were collected, in situation which may be subjected to change. Like all research methods, the key to a successful interview is careful preparation, Mark et al. (2009) suggested the five P's as a useful mantra, they were prior planning prevents poor performance when using non structured interviews.

Virtually, the reliabilty of a measure is an indication of the stability and consistency with which the instrument measures the concept and helps to assess the goodness of the measure. To provide a high reliabilty of this study, the semi-structured interview is adopted by the researcher, in a manner the researcher directed the interview and the interviewee responded to the questions of the research. Moreover, the researcher prepared interview questions in advance. Consequently, the reliability of this study was improved because of using prepared questions during the interview.

3.8.2 Validity

Validity is concerned with whether the findings are really about what they appear to be about (Mark et al., 2007). Also in conformity to Babbie (1990), validity refers to the extent to which an empirical measure adequately reflects real meaning of the concept under consideration. For guaranteeing the validity of this study, all the concepts and theories which are used here are referred to relative literature and certain authorities documents in that correlative area. To develop this research much better, the researcher used a case study as research strategy which involve an empirical investigation, and the method of interview has been adopted for collecting both primary and secondary data.

Since the researcher of this study has worked for a long on transportation and logistics industry and still working so he have enough related knowledge background on the study,so the validity of collected data has been guaranteed. Therefore the researcher is familiar with the topic of the study. The data, collected are empirical and applied because of being deep understanding on the relative concepts and abundant working experience. Additionally, the research objective was already decided and investigated in some broad ways during experience. Further more, since this study belongs to causal study, the validity can also become through testing the results of analyzed case study findings.

CHAPTER FOUR

4.0 ANALYSIS OF DATA AND DISCUSSIONS

4.1 Introduction

This chapter presents the summary of findings of the research and analysis of the data and discussions of the findings in order to interpret according to the stated research questions and objectives. The main purpose of the study was the efficiency analysis on operational performance of container terminals for seaports the case of Dar es salaam port.

4.2 Data Analysis

4.2.1Questionnaire results and descriptive analysis

The Sample consisted of employees of TICTS and TPA container terminals, Shipping lines agents,Clearing and Forwarding Agents, and Carriers (Drivers, Transporters). One hundreds questionnaires were distributed that account for about 45.4% of 220 respondents of different category of employees and user of Port Terminals. Where by 80 respondents out of 100 returned filled questionnaires from which 24 were from TICTS employee operation staff, 20 from TPA container terminal, 8 people from shippers, 10 people from clearing and forwarding agents, while 18 from carriers.

This return is 80% of the distributed questionnaires, this was a good return rate indicating good cooperations of the respondents. The remaining 20% non return was due to some of the following reasons; The best centers to find all the respondents of all categories was at the Port Terminals, but, all staff of both terminals works in shift

basis. So attacking them was difficultas the time you find them they might be comming to other shifts. Clearing agents usually go to the port terminal whenever having documents for lodgingor processing for container delivery only otherwise they are not found into the terminals. Shippers also go to port wherever there was a vessels berthed to any terminal which belongs to own lines of agency,otherwise it was not possible to find them as they usually be out of terminals for other documentaions and TRA processes. Carriers they usually very busy when they inter the terminals for picking up container so most of them they were not able to respondent in receiving questionnaires as for them it was wastage of time .

Regarding the study results,a combined gender and age and respondents were among the data obtained as indicated in the Table 4.1.

4.2.2 Classification by Category of Respondents and Gender

The research findings for Dar es salaam port container terminals users,has five categories of respondents. TICTS employed staff (24 respondents-30%), TPA container staff (20 respondents-25%), Shippers (8 respondents-10%), C/Agents (10 respondents-12.5%),Carriers (18 respondents-22.5%). These suggest that of all the respondents,TICTS terminal have a big number of employee because is the big container terminal compare to TPA terminal. Another group of respondents which follow after TPA terminal is the carriers these are respondents which are frequently use both terminals as they go for carrying containers in/out for transportations. C/agents and shippers have low percentage as they visit the terminals whenever they have task belongs to there company with coordinations to the terminals.

Table 4.1: Classification of Gender, Age and Category of respondents interviewed,

Category of respondents	Gender	Age of respondent							
		18-35		35-45		45 and above		Total	
		count	%	Count	%	count	%	count	%
TICTS	Female	1	1.25	3	3.75	0	0	4	5
	Male	6	7.5	8	10	6	7.5	20	25
	Total	7	8.75	11	13.75	6	7.5	24	30
TPA	Female	2	2.5	3	3.75	1	1.25	6	7.5
	Male	4	5	7	8.75	3	3.75	14	17.5
	Total	6	7.5	10	12.5	4	5	20	25
CARRIERS	Female	0	0	0	0	0	O	O	0
	Male	6	7.5	8	10	4	5	18	22.5
	Total	6	7.5	8	10	4	5	18	22.5
SHIPPERS	Female	0	0	0	0	0	0	0	0
	Male	1	1.25	1	1.25	6	7.5	8	10
	Total	1	1.25	1	1.25	6	7.5	8	10
C/AGENTS	Female	0	0	1	1.25	2	2.5	3	3.75
	Male	2	2.5	2	2.5	3	3.75	7	8.75
	Total	2	2.5	3	3.75	5	6.25	10	12.5
Sub Total	Female	3	3.75	7	8.75	3	3.75	13	16.25
	Male	19	23.75	26	32.5	22	27.5	67	83.75
TOTAL		22	27.5	33	41.25	25	31.25	80	100%

Source: Field work survey, 2013

The distribution of Gender, shows that the number of female respondents is 13 respondents (16.25%), while Male was 67 respondents (83.75%).The female have

low percentage compare to male this is because there is no female respondents in carriers. Since carriers usually are big truck drivers entering terminal for carrying containers, so no female driver found for container carriers trucks. Also there is zero female respondents to shipping lines agents because shippers sometimes need to stay into the terminal day and night. By staying onboard whenever their vessels are berthed in case the vessel have operational problems, and as long almost all the vessel have no female workers, hence female shippers to stay onboard day and night with shipcrue males only is not possible. Also the majority of TICTS and TPA Staff are operators of cranes and other equipments so female operators are few and most are not working in night shifts so the companies usually employ them into other derpatment.

4.2.3 Classification of Repondents by Age

Referring the Table 4.1: The study observed that, of all respondents interviewed 16.25% were female, where by under age category 18-35 was 3.75%, under age 35-45 was 8.75%,Age category 45 and above counted 3.75% female. The male pattern as appear in the table above indicates that, of all respondents interviewed male under age category 18-35 was 23.75%, Age category 35-45 was 32.5%, and 45 and above counted 27.5%.Basing on the analysis from the table 4.1 above,it further indicate that, out of all respondents the research observed that dominant age group lies between 35-45 for both female and male making a total of 33 (41.25%). This means that, among the majority of male and female who interviewed, the age group 35-45 had the highest rate of using container terminals of Dar es salaam port as compared to other groups of age.

Table 4.2: Distribution of Respondents by Education Level

Category/education level	Respondents	Frequency	Percentage
High level	30	30	37.5
College/university	15	15	18.75
Graduate	10	10	12.5
Other	25	25	31.25
Total	80	80	100%

Source: Field work survey,2013

Table 4.2, shows distributions of respondents based on education level,where 37.7% have high level education, 31.25% have other level and knowlegde of education, 18.75 % have college/university education,while 12.5% are garaduate respondents. This implies that the majority of port users/staffs have high level of education enable them understand the importance and the characterizing factors on efficiency of operational performance for both container terminals of the port they use.

4.2.4 Results on Efficiency of Operational performance of container terminals

(i) Question,Do the operational performance of container terminals for Dar es salaam port efficient? This was the question responsible for the objective of the research,the perceptions was as follows;

From the Table 4.3:, respondents, (51.25%),shows that operational performance of container terminals of Dar es salaam port is inefficently,only 40% said yes,the big number who responded positive to the question are the staff on both terminals.

Other respondents who are the terminals user responded negative because are those who meet inconviniencies of delays,queuing,loss of time and corruptions issues when they seek services into both terminals. The data above contribute to The Tanzania Economic Update (TEU) research, a biannual series on the country's economy, which highlighted the costs to both domestic and international level stakeholders as a result of the port's container terminals performance inefficiency

(i) 37 % of the equivalent tarrif on total energy imports which constitute 35.5 % of total imports, as a results of long delays at the container terminals

(ii) US $ 252 million losses incurred by shippers and shipping companies in total annual anchorage costs, as a result of delays at the terminal.

(iii) US $ 17.4 per ton cost that importers of merchandise worth US $ 1,358 willing to pay in bribes to speed up process of operations and documentations.

(iv) US $ 1,759 million, the total welfare loss to the Tanzania economy as a result of the ports inefficiency on operations performance.

(Tanzania Economic update unit, 2009)

Table 4.3: Results for Interview on Whether the Operational Performance Container Terminals Are Efficient

Answer	Respondents					Total	%
	Carriers	Shippers	C/Agents	TICTS	TPA	Total	%
Yes	3	3	1	14	11	32	40
No	14	4	8	8	7	41	51.25
Do Not Know	1	1	1	2	2	7	8.75
Total	18	8	10	24	20	80	100

Source: Field work survey,2013

Table 4.4: Interview for Frequency of Ship Visists And Port Infrastructure

	Frequency of ships vists				
	Very high	Likely	moderate	low	
Count	35	26	17	2	
Percentage	43.75	32.5	21.25	2.5	
	Port infrastructure				
	Enough and reliable	Not enough but reliable	Not reliable but enough	Neither enough no reliable	Do not know
Count	4	28	12	26	10
Percentage	5	35	15	32.5	12.5

Source: Field work survey,2013

4.2.5 Do the Factor of Frequency of Ship Visits Add/Speed up the Value of Operational Performance

The frequency of vessels calls gives shippers more options and greater flexibility for the factor of choice and lead to improved terminal performance (Tongzon, 2002).

From Table 4.4; 35 (43.75%) respondents supported the question above that frequency of ship visits added speed very high the value of operational performance. The effectiveness evaluations on maritime operations performance depend on availability of maritime equipment, efficient of fractions of time berthed per ship per shift, efficient coordinations between ship agents, Harbour master, Pilots and

terminal operators upon request (Brooks & Pallis, 2008). The study shows that port of Dar es salaam have the following marine crafts, (6) berthing tugs,(16) Lighter Tower Tugs, (4) Lighters, (2) Labour Launches, (2) Pilots Boats, (2) Patrol Boats, and (13) Mooring Boats. (TPA, 2013). Since there is no frequently many vessels berthing at atime this equipment can afford to fullfil the requirements of the Port. The researcher observed that the problem with maritime service at Dar es salaam port, is the effecient of coordination between the part concerned in berthing and unberthing the vessels.

Also there is problem on quickness of marine personnel upon request,usually marine pilotage and mooring gangs respond very slow from the time for call until when they took operations for ship pilotages. This research data coordinate with The Tanzania Economic Update (TEU) findings, a biannual series on the country's economy, shows that container vessels transporting imported merchandise were on average queuing for 10 days to be able to berth at the Dar es Salaam Port. It could also take up to an additional 10 days to unload the merchandise, clear it and transport it. By comparison, container vessels at the Port of Mombasa, the largest in East Africa, took less than a day to berth in 2012, and three-to-four days to unload, clear and transport merchandise. The international standard is two days. (TEU, 2013)

4.2.6 Whether the Port Infrastructure are Reliable to Help Speed Up Operations Delivering Processes and Enhance the Level of Productivity

In considerations of other physical informations on the maximum berth depth, quay length,yard space, crane spacing and number of gantry cranes as an inputs. Reliability and Adequate container handling equipments (as port infrastructure) is

one of the main factor which contribute on efficiency operational performance of container terminals of most ports. From the Table 4.4; 35% of respondents comments that port infrastructure are not enough but in some due point are reliable, but the nearest 32.5% of respondents comments that the port infrastructure are not enough and not reliable also. This means that the performance of the container terminals of the port is affected very much by inefficient terminal and port infrastructure. The study shows that port infrastructure like adequate handling equipments,adequate inlandways, Terminal locations, Terminal capacity, IT systems, Transport port mode have positive effect if are effectively and operational. In my questionnaires, 52 count (65%)respondents of Question 9 (appendix 1) agreed of the positive effect for the positive result of functionality.Port infrastructure investments help to reduce operational costs, improve service quality, which are important factors that influence terminal performance (Cullinane & Wang, 2009)

4.3 The Results are Presented on Sub Heading as Follows

Results from interviews conducted to all respondents as DEA theories,Results from group discussions conducted with different discussant group during the research period, Results from detailed view of the actual operational performance of terminal operations on container handling, Results from documented records.

4.3.1   Results from Interviews Conducted Concerning the Negative Effect Of Operational Performance

The interviewed respondents were, TICTS and TPA container terminal staff, Carries, Shippers, C/agents,as per classified percentage into the Table:4.1, the interviews were done using unplanned questions. Their answers were almost matching as those

findings from observations.Most of them mentioned about the inefficiency of container terminals operations is being affected by the ability of equipment operator especially those of Ship cranes and Mobile harbour cranes.

Slow speed for SSG/QC's operators TICTS terminal,compare to other port/terminal was one cause of inefficiet performance as per interview conducted. One QC was able to load/unload 25 moves per hour as the standard measure in other world container terminals, as per international Port Handbook, while in TICTS terminal operator can afford 15 to 20 containers per hour.Like wise in other container port one shipcrane/mobile harbour crane can work 20moves per hour but in TPA terminal operator can have 8 to 12 moves per hour.

On their side carriers depicted that frequently breakdowns of cranes and slow speed of maintanance personnel to solve problems was one of the key issue contributing to inefficiency operations performance of both terminals.In getting performance of the port by combining the moves in both terminals at the port for which we can have the picture of the overall port performance in comparison to other ports as per tables below;

4.3.2   Results from Discussions

Most of the discussant said that the performance of handling container is poor and effort is needed to boost it up the mentioned problems affecting efficiency of operational performance of container terminals on:

Poor performance of equipment operators (Quay cranes operators and yard cranes operators) as they lack speed and accuracy leading to whole process of loading and

unloading container from /to ships versus yard to take longer time to complete. Insufficient and Unreliable container handling equipments to both terminals.Lack of space to accomodate the requirements of containers for pick up during peak days.

4.3.3 Results from Observations

The researcher visited container terminals personally and passes over Container yard, Quay side,Gate processes and observe the following: Low quayside space for loading and discharging containers which lead delays in the whole process of handling containers as there isn't enough space for Mobile cranes to allow move freely for case of TPA terminal and No enough space for putting hatch covers and some time TT's to have good turnaround to TICTS terminal.

Low yard space for RTG'c to receive containers from ship effectively for the same time the same points delivering the containers from yard to customers for transportations to ICD's or near countries. Sometimes yard become congestions per big volume of containers or number of town trucks comming for pick up making the vessel operations stack same time slow yard delivering.

4.3.4 The Observations at Gates Processes

Observations shows that their is big delays in gates processes in both In-gates and Out-gates in TICTS terminal even though the systems are computerised. There are several points for check up and inspections causing big delays,for trucks intering the terminal. First check up point,the main gate which controlled by both TPA and TICTS security personnel. Second,TICTS security gate with also several

complications for check up. Later on the carrier meet another queue at the blocks to reach the picking point where again the operator need to confirm the document versas the truck through his machine mounted with computer system making the whole process of getting in have delays sometimes hours.

Again in the process of gate-out,the truck loaded for going out meet at least four points for queueing and inspections. First when already loaded the truck follow the outside queu within the blocks, then allowed to next queu where there is two lanes,one for local container cargo,other for Transist container cargo's. At this point also there is security personnel for document and container inspections also driversare to be taken photopicture with his truck at this point,most of the time is wasted here also.

The third point,is for out-gate official and document clearance in the system, again here there is TICTS security inspections also. The fourth queu lineis the Out-gate to main gates for custom clearance, TPA security check up and TICTS security confirmations again here is the disaster delays but is the last gate to out. The researcher observed that only the outgate process can took up to 2-3hours accounting to 1 or 2 hours for ingate and other for delivering processes. This is the big delays and inefficiency services to customers and to business also as well to the overall performance of terminal and port as whole under competition envronment.

4.4 Information on the Actual Performance Of Container Handling Equipments

There are several equipments used for handling containers in the Port of Dar es salaam to each terminal as follows:

4.4.1   At Tanzania International Container Terminal-TICTS

(a) Ship to Shore Gantry Cranes /Quay Cranes (SSG'C /QC's);

These are Quayside cranes, there are five in the terminal with the ability of lifting forty five tonnes of container under hook and thirty five to forty tonnes under spreader attachment, these are cranes for operations of loading and discharging containers on vessels /ships only.

(b) Rubber Tyred Gantry Cranes (RTG'C)

These are yard cranes for receiving containers discharged by SSG from ship and delivering to customers out of the Terminal. There are twelve RTG'C in the terminal while only eleven are operational and three among them have a very low productivity having a frequently breakdowns and shutdowns wasting time waiting Engineering for restarting and breakdown resolutions. Hence in real case the terminl remain with only eight effectively and efficientlyRTG'C while international standard measure require   one SSG to be saved with two RTG'C in case of discharging vessels, by having five operational SSG'C it was suppose to have ten RTG'C for vessel operations only and at least ten more for yard delivering operations as per ratio of two cranes to each blocks.

Procter H and Warren, explain that, the distance to the stack affects the number of tractor trailer units rather than RTGs. You need more TT units to deal with additional travel distance/time to save time. Where you have an off shore berth approached by bridges is a good example. Transshipments versus import/export flows mean having additional equipment available to service the landside/gate.

Truckers may have to wait but if you are servicing a railhead it tends to have the same imperatives as the vessel operation.

The earlier calculation giving 2.6 RTGs per crane would be for a transshipment terminal. For exclusively import/export you might be up to 4 depending on how competitive you need to be on the landside. A big variable in all of this is housekeeping moves. For the cases where back-to-back RTG setup is chosen (i.e. to increase stacking density or another reason), RTG deployment should also consider some limitation for RTG's block shifting (i.e. shifting between adjacent blocks would require 180 degrees RTG turn - consequently more "disruption" and potential productivity loss), Figure 4.1 show how RTG stacking is done.
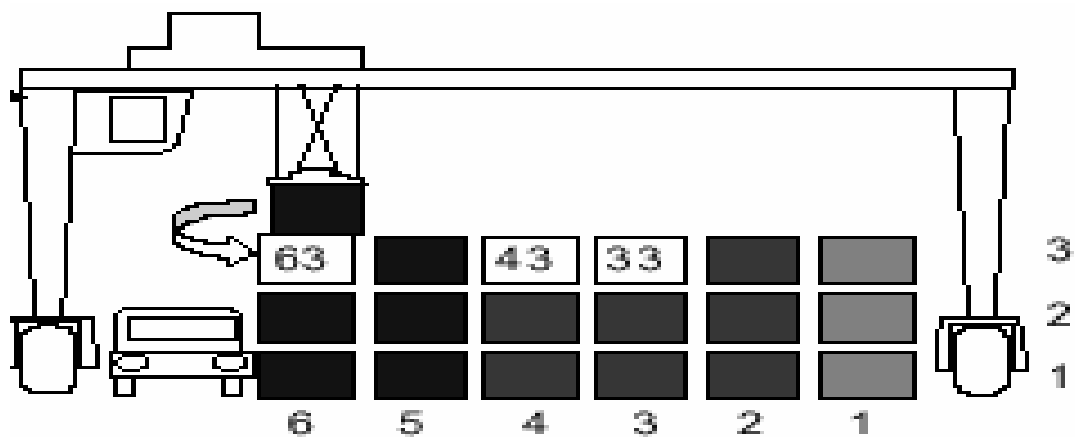
Figure 4.1: Yard crane, Rubber Tired Gantry Type of Crane Stacking At The Yard Storage Area
Source:UNCTAD (2005)

(c) Reach Stackers

These are equipment used to stack full container in yard,vessel container consolidations and delivering, terminal have five but one is not operational for a year

now waiting for a spare,Again Empty Container Handlers,These are equipments for empty recieving from transporters and loading to TT's sending to vessels,the terminal have five ECH'swhich are all operational though still not sufficient to cover up the requirement of receiving and loading of containers to ship due to sometimes frequently breakdowns.

(d) Terminal Tractors (TT's),

Are used for carrying containers from ship to yard and viceversa as well as other container movements from yard to verifications area,scanning area,and to Rail mounted gantry cranes for loading on Locomotives. The terminal have forty TT's but only thirty which are operational and among ten some are accidented and other long stay breakdowns. The operational TT's again are not sufficient to cover the needs of the terminal as five QC's require twenty five TT'S for vessel operations as per ratio of five TT's to each QC, while there other several points which needs TT's for internaltransfers like RMG operations,Scanner operations,House keeping into the yard,ICD's and vessel container Consolidations.

(e) Rail Mounted Gantry crane (RMG),

TICTS also have one RMG for loading and discharging containers to/from TAZARA and RAILWAYS locomotive trucks to nearby countries of Zambia, Rwanda, Malawi, DRC and Uganda.But nowadays crane stay idle for longtime as very litle containers are picked by rails in both TAZARA and RAILWAYS as per infrastructure problems this also carry back the port from competition as only one road mode of container transfer is preferable.

4.4.2 At Tanzania Ports Authority (TPA Container Terminal)

TPA terminal do have the following equipments with several characteristics:

(a) Mobile harbour cranes (Gottawald)

There are six, with the ability of lifting sixty three tonnes,these are general purpose cranes (for Quay and yard operations) as they are used to ships for container operations when attached spreader and yard for delivering, also handle other loose cargoes, but the equipments themselves are not efficiently and no speed as are not morden as far as the SSG's as the special and morden container handling equipments and this make even difficulties to some operators to work on it hence lead poor performance in vessel operations.

(b)   Rubber Tyred Gantry Cranes (RTG)

There are two at the container yard with the same purpose as those at TICTS,but non of them are operational,making delivering operations become very difficulties as rely onone type of equipment, Reach stackers only though some time Gottawald work on behalf but it depend on the density of the yard as gottawald itself it took a big space to move and the working area.in this case the operations at the yard become difficult and very inefficient.

(c)   Reach Stackers/Empty Container

The terminal do have six RS, where all are operational and are those which save the yard delivering activities as far per bad situations of RTG'c this is a very minimum requirement as long as, also terminal have ECH's which is a very low number as this equipment save other activies in general cargo

4.5   Information from Documented Records

The information from records for container traffics, shipping traffics and container throughput at Dar es salaam port with reference to near Mombasa port,and top Africans ports to world top ten ports is one way of investigating the level of performance of TPA container terminals. The Results shows that among the two container terminals at Dar es salaam port, TICTS terminal is the big and leads in performance of container activities operations lather than TPA terminal which do also recieve other vessels of different cargo's.

From the Table 4.5; the Total containers productivity for TICTS terminal was 306,159 TEU's for year 2008/2009, which is 89.67% of the total port TEU's. While TPA container terminal earned 35,235TEU's only for the same year,this is only 10.3% of the total productivity of the container per year for the container terminals of Dar es salaam port. But still yet the total productivity performance of 341,394 TEU'S for Dar es salaam port, is very low by 41.26% compare to the near port of Mombasa Kenya which achieved productivity performance of total 581,278 TEU's for the same year 2008/2009. This means that the big volume of container cargo pass through KPA to near African countries lather that Dar essalaam port, this shows the negative achievements of customers in using the port of Dar es salaam.

Again the performance for the same terminals in year 2009/10 shows that TICTS terminal achieved 293,262 TEU's decrease of 4.2% compare to previous year. While TPA Terminals acquired 65,748 TEU's, though there was a slight rise of productivity compare to year 2008/9,but still yet the performance of TICTS terminal

is higher by 77.6% compare to TPA container terminal. Though there is slight increase of overall productivity of port terminals from 341,394 TEU's for 2008/9 to 359,010 TEU's for 2009/10,still is low productivity when compare to the nearport of Mombasa who achieved 609,300 TEU's which is 41% productivity more than that of Container terminals for Dar es Salaam port.

Table 4.5: Container Traffics (Teus), Performance/Productivity Level for 2008/9 and 2009/10 Dar es salaam Port, Mombasa Port and Other Top Ten World Container Ports

Name of container terminal	Type container er	Containerized cargo-Dar es salaam port					
		2008/2009			2009/2010		
		TEU's	TON's	%	TEU's	TON's	%
TICTS Terminal	Imports	150,718	1,792,853	100.0	149,023	1,789,610	100.0
	Exports	155,441	928,543	100.0	144,239	844,053	100.0
Total		306,159	2,721,396		293,262	2,633,663	
TPA Terminal	Imports	15,569	318,898	15.7	32,086	450,982	19.1
	Exports	19,666	173,342	61.5	33,662	303,470	70.5
Total		35,235	492,240		65,748	754,452	
Grand Total		341,394	3,213,636		359,010	3,388,115	
		Containerized cargo-Mombasa port/other top world terminals					
		2008/9			2009/10		
		TEU's	TONS	%	TEUS	TONS	%
Mombasa port							
Imports		297,388	3,959,000	51.2	307,847	4,086	50.5
Exports		283,890	1,996,000	48.8	301,453	1,952	49.5
Total		581,278			609,300		
Shanghai-china		27,980,000			25,002,000		
Singapore		29,918,000			25,866,000		
Hongkong		24,494,000			21,040,000		
Shenzhen-china		21,414,000			18,250,000		
Busan-Korea		13,452,000			11,980,000		
Ningbo		11,226,000			10,502,000		
Guangzhou-china		11,001,000			11,190,000		
Qingdao-china		10,320,000			10,260,000		
Dubai-UAE		11,827,000			11,100,000		
Rotterdam-netherlands		10,800,000			9,743,000		

Source: Containerisation international yearbook (2004-2012)

However the performance of Mombasa port is also very low when compare to Durban port-South Africa, the first top African port in productivity. Table 4.6, shows that, in year 2009/10 Durban port achieved 2,523,000 TEU's which is 75.8% higher than Mombasa port and 85.7 % higher than Dar es salaam port. While when we compare the first top African port, Durban port, to the top world container ports Shanghai port,it is seen in the Table 4.5: that in year 2009/10 Shanghai port-China achieved 25,002,000 TEU's which is 89.9% higher productivity performance to the top African Container ports. This performance of African top port contribute only 1% world share of productivity .

The data from Table 4.5 was used for world top ten ports and (TPA Statistics, 2011) for Dar es salaam port and (KPA statistics, 2010) for mombasa port.

Table 4.6: Perfomance of two African Top ports (TEU's) for year 2008/9 and 2009/10

Rank	port	2009	2010	Country
		TEU'S	TEU'S	
1	Durban	2,523,000	2,529,000	South Africa
2	Tangier	1,222,000	2,058,000	Morocco
Sub total		3,745,000	4,587,000	
Share among world total		1%	1%	
World total		443,953,000	503,512,000	

Source: For 2007-2010 data, "containerisation international Yearbook 2012"

4.6 Summary of Findings

In summarizing the findings, the research found that, container-only terminal are more productive than mult-purpose terminals with regard to handling containers.

However operator type have an impact on the productivity and efficiency of container terminals and therefore the global container terminal operators is preferable to local operators as in case of TICTS versas TPA terminal.Again the annual percentage change in output due to technological change overtime has also an impact to effectiveness efficiency and is a signal of its reliability.

In findings it was seen that the main causes of inefficiency in container terminals in African and all over the world is due to overcapacity and the effect of trade fluctuations. The impact of trade fluctuations is a difficult problem to solve at the port terminal levels,on the other hand,the inefficiency related to overcapacity can be ascribed to the port management. The level of automations of gantry cranes: one of the limiting phases of the handling cycle is the time spent positioning accurately the spreader on a container (loading),or the container on a trailer (specialised equipment used to shift containers within port limits). Most morden gantries are automated and equipped with anti-sway devices, and now the problem is more on the capacity to deliver or remove containers without delaying ship-to-shore operations.

Also the researcher found other factors that contribute to inefficiency operations in container terminals that are: growth of economies in Tanzania and neighbours countries and poor port terminal management causing;- delays in processing additional equipments, containers stacked higher, container stacked closer which make slow and tough to access them.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter deals with the conclusion of the study,and recommendations based on the findings obtained from the study. The main objective of the study was to analyze the scale efficiency on operational performance of container terminals for seaports the case of Dar es salaam port.

5.2Conclusions

The findings on chapter four raise important issuesthat are discussed below and recommendations are made from those findingsanalysed as per DEA methodological. The research study show that the container terminal performance is strongly influenced by port and terminal characteristics. It is studied from the findings above,that there are three key factors to measure efficiency of operational performance of container terminal of the port; The first one is customer satisfaction, this is reflected to shipping agents and freight forwarders satisfaction,shipowners and shippers satisfactions. The second one is efficiency and productivity, and the third one is terminal activity which reflect on container flows to/from the hinderland and transhipment container traffic.

Terminal activity refer to large consuptions and productions which inturn affect the terminal level by triggering cargo flow with resulting effects on efficiency,which in turn attract more shipping lines with global coverage thereby influencing customer satisfaction.This study brings its findings a series of new implifications for the managements of port terminals,including the coordination role of the port

authorities,of governments and port terminal operators.

First it is important to the decision maker to accurately define what accurately define what exactly is the main objective of the port or terminal. If it is to have more cargo's, whether it is to have greater efficiency and thus lower costs,making the port an element of support to the competitiveness of companies in the region or whether wants to increase revenue per tonne. The location of the port is a basic element to its performance, But in most cases it is a fact that already exists and not easy to change,in this case only the ruler who can decide to create new terminals can take these variables into account.

The size of the terminal is essential aspect of its operational performance, which is obvious to any manager.Without a quay there is no cargo and usually without cargo will not created any quay. The intensity of use of the quay,with the largest number of cranes,is a decisive factor for the performance of the terminal at the operational level and contribute to lower costs per employee,Depth of the port access allow the port to receive larger vessels, is a key variable for the performance of ports.

5.3 Recommendations

Some of the recommendations for the existing and future situations on the performance of the container terminals of Dar es salaam port have been put forward. Those recommendations need time, money and priority. If they are being carefully worked on they will help to improve performance of operational performance of container terminals of the port thus raise the productivity level of the port of Dar es salaam.

This study proposes a wider, more research model about container terminal performance regarding customer satisfactions,productivity, efficiency and activity based on port and terminal characteristics. The research enable to understand why some container terminals are more successful in performance than others and also recommend how to build a new successfully container terminal. Some of the reasons for successful performance are; Specialisation in container cargo is an important issue for port that want to have higher performance,attracting more regular lines for the terminals require the establishment of management conditions and appropriate infrastructure, but to get good performance in containers requires the port to adjust the degree of relative efficiency in order to have lower costs.

The study also suggest the importance of the privitization of the port managements of the port terminals, since such a measure contributes significantly to the improvement of port efficiency system and organization structrure and services oriented to meet the needs of logistic supply chains.Geographic location, maritime access and port dynamics are considered the most important factors dertermining the terminal performanceand thus competitiveness. And some of the suggestions of how to build a new container terminal are; the successful container terminal need to be build near important markets and producers, have good rail and road accesses,be located inside a dynamic port, have deep maritime access and important maritime line services, have a customer focus management, have intergrated management.

5.4 Further Research

Finally,several issues may still be investigated and further developed, such as the type of management, the terminal characteristics that determine the performance of

the port and the level of service to ships and waiting times.Also in the present study, may also be asked several questions such as,for example: The largest container terminal with more private management have better performance? The ports with large container terminals and larger depths have better performance? The relationship between port interest example; shippers, shipowners, clearing agents,carriers,port management,characterize the operational performance of the terminal operators?.

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APPENDICES

Appendix i: Questionnaire for Container Terminals Users

The purpose of these questionnaires is to get information on container terminals; the information answered will be used as a data only for statistical analysis and will be kept strictly confidential.

A.**GENERAL INFORMATION** (*Fill or Tick whichever applicable*)

(i)**Gender**…………., (ii) **Age:**☐ above 18 below 35, ☐ above 35 below 45,☐ More than 45

(iii)**Title**…… (iv)**Education level**: ☐ high

level☐college/university,☐Graduate,☐Other

(v) **Name of container terminal working on/imports or exports you're containers/delivery/picking/shipping done;**

☐ TPA-Container terminal, ☐ TICTS-terminal, ☐ both (if both applicable then your judgments should base to one terminal or one can fill two separate forms

(vi)**Category of respondents**

☐TPA employee, ☐Shippers, company name……………………………………….

☐ TICTS employee, ☐Freight forwarders/agents, Company

name…………………

☐Transporters (drivers, **Owners), Company nam……………….……..…………**

☐ **Others**

(specify)…………………………….……………………………………………

………………………………………………………………………………………

B. Do the operational performance of container terminals for Dar as salaam port efficient?

At TPA-container terminal

☐ YES   ☐ NO   ☐ DO NOT KNOW

At TICTS terminal☐ YES   ☐ NO   ☐ DO NOT KNOW

C. Interview

1. Do the container terminals you are dealing with encounter any congestion problem during the past 3-10 years? If YES then;

    (i) What was the causes…………………………………………………………

    (ii) Countermeasures taken……………………………………………………

2. Does the exits inland transport network and infrastructure linkage connecting the container terminals help to achieve efficient on operational performance…………………………

3. How is the frequency of ship visits add or speed up the efficiency of operational performance of the container terminals?

☐   Very high   ☐ likely   ☐ moderate   ☐ low

4. Do the supervisions on yard, gates, vessels, and terminal operations help to meet the target level of productivity to achieve efficiency on the operational performance? How if Yes or No……………………………………

5. Do the container terminals have enough and reliable Quay and yard handling equipment's to speed up operations on quay and yard delivery processes to enhance effectively the level of productivity?

☐   Not   enough   but   reliable   ☐   not   reliable   but   enough

☐ neither enough nor reliable   ☐ enough and reliable

6. What are the factors affecting the level of productivity on the matter of timelines of maritime services?...

7. What are other problem rather than congestion which currently hinders terminal from achieving the best operational performance efficiency resulting in delays on services to customers?

8. Does the terminal have a container location system? (Container yard management system-computer network), it is accessible, acceptable, andhelpful to customers coming for pick up of containers?

9. Infrastructure such as port terminal location, terminal capacity, berth length, IT system, transport mode like rail, road, have either positive or negative effect to customers satisfactions on operational performance of container terminal activities, Say if positive or negative effect and how

10. How are the maritime services contribute on the terminal container performance throughout the efficiency,productivity and activity level to customer satisfactions?

Appendix 2:Interview Guide For Container Terminals Officials

Interview guide for terminals staff,Shippers,Carriers,Clearing Agents

1. What is the nature of your business as a company?

2. What do you do with container teminals of Dar es salaam port in relation to your business

3. What is the importance of efficient for container terminals operational performance?

4. What should the terminal operator do torwards efficient performance to enhance less cost to transporters?

5. What is the role of infrastructure (rail and road) in port performance?

6. What is the role of the government to port performance on terminal operations?

7. What is the current situations of the Dar es salaam port container terminal operational performance?

8. What is the current situations of workers accountabilities to their duties?

9. How is supervisions in yards,gate,vessels and cranes performances in the terminal?

10. What kind of logistics operations affect efficient performance of the port operations?

11. What are the challenges facing the container terminals of Dar es salaam?

12. How is the efficient to container terminals at receiptse and delivering points

of operations?

13. How faster are operators on loading and discharging of containers on the ships operations?

14. How is the reliability of cargo handling equipments at quayside and yard delivering processes?

15. What are the factors affecting timelines of maritimes services?

16. How is the provision of adequate,on time information of terminal operations on operational schedules?