EXAMINING FACTORS INFLUENCING THE PERFORMANCE OF PORT RAIL INTERFACE: A CASE STUDY OF DAR ES SALAAM PORT

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION IN TRANSPORT AND LOGISTICS MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA

2015

CERTIFICATION

This is to certify that I have read and hereby recommend for acceptance by the Open University of Tanzania a dissertation entitled "Examining Factors Influencing The Performance Of Port / Rail Interface: Case Study of Dar Es Salaam Port" in partial fulfilment of the requirements for the degree of Masters of Business Administration in Transport and Logistics Management of the Open University of Tanzania.

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Dr. Raphael Gwahula

(Supervisor)

……..

Date

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DECLARATION

I, Shekidele Elisante P, do hereby declare that this dissertation is my own work and that; it has not been presented and will not be presented to any other University for a similar or any other degree award.

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Signature

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Date

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DEDICATION

To my family and my children, all of you I say thank you

ABSTRACT

This study assessed examines factors influencing the performance of port/rail interface. More specifically, the study sought to assess the volume of cargo traffic handled by port/rail interface, identifying the factors affecting the performance of port/rail interface and also examining the efficiency of port/rail interface. The study adopted Descriptive research design where by a case study was selected Data were collected using interview, observations, questionnaire and documentary review. Both random and none-random Sampling procedures were used. A sample of 108 respondents was used. Data especially in quantitative were analyzed though Statistical Package for Social Scientist while in qualitative, the data were analyzed through the method of content analysis. The validity and reliability of data were tested through Cronbach's test. Findings revealed that currently the condition of the cargo handling in the port is good and the main means of the transportation used to transport the cargo is road compared to other means as railway and air the finding also reveal that the currently port and railways interface is worse and unsatisfactory/ the main reasons for the poor performance of the port were found to be Poor emphasis in intermodal transport , Inefficiency of rail infrastructure, Economic policy, Financial resources and low technology used to handle cargo. It is recommended that there is need to improve total transportation system to improve supply chain, total transportation system to improve supply chain, investing in high technology in the port and also even revising the existing laws and regulations guiding ports and railways authorities

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LIST OF ABBREVIATION

TPA	Tanzania Port Authority
TICTS	Tanzania International Container Terminal Services
TRL	Tanzania Railways Limited
TAZARA	Tanzania – Zambia Railways Authority
Tan Zam	Tanzania Zambia Highway
SBM	Single Buoy Mooring
SUMATRA	Surface and Marine Transport Regulatory Authority
MOS4MOS	Monitor and Operation Services for Motorways of the Sea
TEUs	Twenty foot Equivalent Units
ACL	Amber Coast Logistic
KRIs	Key Result Indicator's
PIs	Performance Indicators
KPIs	Key Performance Indicators
TEN-T	Trans – European Transport Network
RVR	Rift Valley Railways (RVR)
DSM	Dar es Salaam

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

The continued growth in world trade and the globalization of production and markets has created intense rivalry amongst ports and countries. This intense rivalry is causing governments to enhance the efficiency of their ports. In so doing, William Burgel and Nichole Andersen, (2010) Paris, (2007) suggested that this enhanced efficiency must be integrated with the total transportation system to improve supply chain performance to provide comparative advantage against other supply chain systems. Government needs to focus on providing a seamless logistics system that ensures the efficient flow of freight which helps to promote the economy's competitiveness.

In a similar manner, it is noted that globalization has had a major impact on the World economy William Burgel and Nichole Andersen (20102. It would appear that, for countries to be competitive in this world economy, it necessitates adopting high quality standards and lowering logistics costs. The latter is even more relevant to developing countries because of the great distances to Europe and other Asian countries (Paris, 2007). It is important to note that to ensure these standards are reached out by the countries the transport system in world's port must be highly reliable and services must be provided at a low system costs.

The historical evidence suggests that, separating the intersection of a highway and a set of railroad tracks dates to the early 1900's. Time and again, steam locomotives would frighten horse-drawn carriages. When the use of the automobile became

prevalent in the 1920's, the shower of sparks from the passing train would create considerable annoyance to motorists waiting at a crossing. Consequently, major urban areas launched campaigns to eliminate at-grade crossings within city limits.

This trend is more common in urban areas east of the Mississippi River where population densities warranted grade separations. It fatherly shown that, the burgeoning demand for consumer goods in the world is placing an unprecedented strain on our nation's transportation infrastructure. For instance, U.S. ports, particularly those on the West Coast, are grappling with how to handle the surge of imports and exports. This implies that the dramatic increase in freight activity in recent years has resulted in rail lines and port facilities operating at or near capacity.

Drawing from the literature by Johan, (2004) it is also revealed that since in the 1960's, the container shipping industry has improved its performance at an impressive pace an in large scale. Similar to that, Cullinane and Khanna, (2000) argued that this improvement is considered today as the backbone of globalization. On the other hand, Rodrigue, (1999) added that its importance for the ongoing space/time collapse is less referred to achievements in the speed dimension than in the cost ditto. Because of this Cullinane and Khanna, (2000) observed that the maritime part of the intermodal transport chains has employed ever larger ships to cope with increasing transport demand and for facilitating potentially lower unit costs.

Additional to that, Mourão *et al.*, (2002) argued that larger ships and larger flows of containers severely strain seaport operations. As an example, the container

throughput in the ports of the Chinese special economic zone Shenzhen are estimated to rise by 2-3 million TEU/year the coming years (World Cargo News, 2004/a and Woodbridge, 2004/a). Port capacity can be increased by physically expanding existing ones or establishing new ports (McCalla, 1999), but this is in the long run and at considerable costs and endeavours (Pellegram, 2001 and The TT Club, 1996).

Other options include adding conventional equipment or improving the productivity by new forms of technology as analysed by Ballis et al. (1997), work organization as suggested by Paixão and Marlow (2003) or by information systems such as elaborated by Henesey (2004). Evidence from the literature by Berg (1998) the transport services to the ports' hinterland, are strained by the increasing flows. This flow according to him necessitates the improvement in port/rail model in order to increase efficiency in port performance. In fact, the assumption of this study is the problems related to increased container flows are best approached in strengthening the port/rail interface.

Likewise, Tanzania likes many other countries is also facing similar problem which associated to poor linkage between port/rail interface especially at the Dar es Salaam port. Dar es Salaam Port is the fourth largest port in Africa in terms of the value of cargo handled as well as the number of vessels handled. It also has the largest container terminal. The problem is critical due to the fact that, the port serves the landlocked countries of east and central Africa like Uganda, Rwanda and Burundi, Malawi, Zambia and the Democratic Republic of Congo (DRC), as well as Zimbabwe (TPA, 2013). It would appear that, the importance of linking these

Nations to the international business of importing and exports goods, was recognized early the years of 1890's when the Germany government administration ruling Tanganyika as its colonial, by building a railways linking Dar es salaam to Kigoma which then completed by British government once after took over the colonial administration at the late years of 1919s (TPA, 2013). As documented by TPA (2013), the main objective was to support import and export business toward and from Rwanda, Burundi and Zaire (now DRC).

It is noted that, soon after independence in 1961 and other political problems with the unilateral declaration of independence in southern Rhodesia (now Zimbabwe), which affected smooth transportation of export and imports from and towards Zambia, the Chinese government assisted the construction of the Tanzania-Zambia railway line (TAZARA) as well as the road network from Dar es salaam to Zambia as another effort of linking and facilitate smooth movement of business across these nations.

Yet, despite of having these railway companies still Dar es Salaam port suffered from congestion that seems to affect the port performance (Jacques 2012; TPA, 2013). Some of the highlighted impacts include decline in port revenue collection due to divergence of some customer and shipping lines company alternative port of Mombasa Kenya. Despite of all these mentioned problems, few studies have documented about the importance of improving transport interface especially between port and railways. Therefore, this study aimed to fill this gap through examining the factors influencing the performance of port/rail interface.

1.2 Statement of the Problems

Dar es Salaam Ports plays a significant role in enhancing both economic growth and social welfare. As noted in TPA Handbook (2013), cargo passing through the port includes import and export. Despite of the locational advantage Dar es Salaam port is enjoying and serving the landlocked countries such as Rwanda, Burundi, Congo (DRC), still the SUMATRA Report (2011/2012) show that there is the decrease in number of passengers and cargo transport (traffic). The highlighted causes for this problem are because of insufficient number of cabins, poor infrastructure, inadequate supply of rolling stock, resulting from lack of investment in the TRL and TAZARA.

It is expected that, since nearly 75% of the trade between the developed countries the rest of the world including Tanzania is handled in ports, TPA and the government would have ensured the efficiency in port/rail interface is improved, hoping that this improvement is related to port performance and the ability of Tanzania to be competitive at international level. However, however, this has not been the case, as indicated in Global competitiveness report (2014/2015), it is revealed that, transport integration are in poor condition and worse especially at the port of Dar es Salaam. This implies that country economic growth, efficiency and competitiveness are being hampered by inadequate and poor integrated transport infrastructure.

Nonetheless, the study by African Development Bank (2014) advised on the use of Public Private Partnerships (PPP) in port/rail interface especially Dar es Salaam port with Railways Companies (TRL and TAZARA). As far as ADB (2014) concern, this integration will increase the performance of Dar es Salaam port. On the other hand, it is reported that due to poor integration of port/rail interface the port is congested

(The Citizen 25, 2015). Similar to that, the congestion leads to delay in cargo clearance the situation which unnecessary additional costs to exporters, importers and port authority. Although all these are happening, yet, few studies have documented about the problems. Therefore, this study intends to examine the factors influencing the performance of port/rai interface.

1.3 Objective of the Study

1.3.1 General objective

The general objective of this study is to examine factors influencing the performance of port/rail interface

1.3.2 The Specific Objective

1. To assess the volume of cargo traffic handled by port/rail interface
2. To identify the factors affecting the performance of port/rail interface
3. To examine the efficiency of port/rail interface

1.4 Research Questions

1. To what extent the volume and cargo traffic is handled by port/rail interface?
2. What are the factors affecting the performance of port/rail interfaces?
3. What is the efficiency of port/rail interface?

1.5 Significance of the Study

The purpose of this study is to generate additional knowledge on factors influencing the performance of port/rail interface. The information obtained from the study used as an inputs in research and baseline information for future development planning

and projection by all institutional and stakeholders to enhance efficiency in port/rail interface at Dar es Salaam port.

The findings of this study will also be used to contribute the knowledge to ports and railways institutional as well as port stakeholder, society and academicians. It serve as primary data for port and railways for increasing efficiency as well as performance, while secondary data for anyone who will be interested to carry out research on analysis of efficiency of the port/rail interface. And also this research will be as section of the required course in completion for the master degree of Business Administration (Transport and Logistics) of Open University of Tanzania.

1.6 Scope of the Study

The study had been conducted in Dar es Salaam port which representing one of the large port in Tanzania having high vessels traffic hence centre of the Tanzania economy growth. The research based on the analysis efficiency of the port/rail interface in Dar es Salaam port, TRL and TAZARA is the stakeholder in Dar es Salaam port performance.

1.7 Organization of the Study

The study is organized along three chapters. Chapter one has presented introduction of the study, background to the study, statement of the problem, objective of the research, main research questions, other more are significant of the study and high light on the scope of the study, organization of the study as well as study limitation. Chapter two represented study overview, conceptual definitions, the theoretical literature reviews, empirical literature review, research identified, and conceptual

framework. Chapter three including, study overview, research design, research area and population, data analysis methods, data collection methods and overview of the study.

1.9 Limitation of the study

This study faced a number of limitations among them are related to questionnaire, people are struggling with real time constrains therefore, were less likely to respond (participate) because they feel overworked, they just do not have time to complete the questionnaire. On the other hand, respondents sought that questionnaire was limiting them in terms of their range of responses. This implies that with questionnaire more relevant information left to the respondent because of the limiting nature

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Chapter Overview

This chapter presents a literature review related to the research topics. The review is organized according to the research objectives in order to ensure relevance to the research problem. The review is undertaken in order to eliminate duplication of what has been done and provide a clear understanding of existing knowledge base in the problem area. The literature review is based on authoritative, recent, and original sources such as journals, books, thesis and dissertations.

Nonetheless, the review will take some examples from other part of the world, Africa, East Africa and Tanzania. However, the literature review will also clarify the variables, gives insights on how they have been studied previously, the methodologies used, and it leads to the knowledge gap and enables a conceptual framework to be developed. It also provides the theoretical underpinnings of the study.

2.2 Conceptual and Definitions

2.2.1 Efficiency

Efficiency can be defined as the state or quality of being efficient, or able to accomplish something with the least waste of time and effort; competency in performance. Similar to that the American Heritage Stedman's Medical Dictionary 2002, 2001, 1995 by Houghton Mifflin Company defines efficiency as a measure of effectiveness; specifically, the useful work output divided by the energy input in any system.

2.2.2 Port/Rail Interface

As used in this study port/rail interface refers to a primarily of an intermodal facility where the modes of rail, road and shipping converge to facilitate the loading and unloading of cargo from ships onto and from road and rail trucks (Paris, 2007). The roadways, rail tracks and terminal facilities which include the quay wall, warehousing and stacking areas are the fixed components of the intermodal facility. The efficiency of operations determines the adequacy of infrastructure that is provided. The technological improvement in shipping especially through containerization, revolutionized ship design, cargo handling equipment, intermodal facilities, road and rail transport, port design, port investments and inland transportation. Efficient intermodal facilities mean that larger vessels can call only at a few ports known as hub ports where large volumes of containers would be consolidated by land transport, barges and small feeder vessels. Dedicated rail and road terminal facilities in the vicinity of the quayside are required to facilitate the efficient transfer of goods to and from ships.

2.2.3 Containerization

As used in this study containerization[1] refers to a system of intermodal freight transport using intermodal containers. They can be loaded and unloaded, stacked, transported efficiently over long distances, and transferred from one mode of transport to another container ships, rail transport flatcars, and semi-trailer trucks without being opened. The handling system is completely mechanized so that all handling is done with cranes and special forklift trucks. All containers are numbered

[1]https://en.wikipedia.org/?title=Containerization: Retrieved on Saturday 21st June, 2015

and tracked using computerized systems. The system, developed after World War II, dramatically reduced transport costs, supported the post-war boom in international trade, and was a major element in globalization.

2.3 Theoretical Literature Review

2.3.1 Queuing Theory

It is common knowledge that poor transport infrastructure affect port performance, but also resulting to port congestion. Essentially, the congestion is also leads to queue and waiting lines when one need service. This implies that introducing or improving port rail interface is subsequently reducing the problem of port congestion which also improves port performance. In so doing, poor emphasis in port rail interface can also be explained by queuing theory and predict the port performance, country economic growth and development. The more the length of waiting lines, the more the additional costs to various port users and customer satisfaction which leads to divergence to other port.

Queuing theory is the mathematical study of waiting lines, or queues. In queuing theory a model is constructed so that queue lengths and waiting time can be predicted. The Theory has its origins in research by Agner Krarup Erlang in 1909 when he created models to describe the Copenhagen telephone exchange. János (2012) explain that Queuing theory deals with one of the most unpleasant experiences of life, waiting and queuing is quite common in many fields. According to him queuing theory were raised by calls and Erlang who was the first who treated congestion problems in the beginning of 20th century by using queuing theory.

The theory also can be used performance measurements. To characterize a queuing system we have to identify the probabilistic properties of the incoming flow of requests, service times and service disciplines (János, 2012). The arrival process can be characterized by the distribution of the interarrival times of the customers, denoted by A (t), that is;

A (t) = P (interarrival time < t).

In queueing theory these interarrival times are usually assumed to be independent and identically distributed random variables. The other random variable is the service time, sometimes it is called service request, work. Its distribution function is denoted by B(x), that is;

B(x) = P (service time < x).

The theory shows that the service times, and interarrival times are commonly supposed to be independent random variables. The theory continue to explain that the structure of service and service discipline tell us the number of servers, the capacity of the system, that is the maximum number of customers staying in the system including the ones being under service (János, 2012). The service discipline determines the rule according to the next customer is selected. The most commonly used laws are FIFO - First in First Out: who comes earlier leaves earlier; LIFO - Last Come First Out: who comes later leaves earlier; RS - Random Service: the customer is selected randomly and Priority.

It is important to note here that, the aim of all investigations in queuing theory is to get the main performance measures of the system which are the probabilistic properties that is distribution function, density function, mean, variance of the

following random variables: number of customers in the system, number of waiting customers, utilization of the server/s, response time of a customer, waiting time of a customer, idle time of the server, busy time of a server (János, 2012). Of course, the answers heavily depend on the assumptions concerning the distribution of interarrival times, service times, and number of servers, capacity and service discipline.

2.3.2 The Theory of Production and Marginal Production

According to Clark the theory of production and marginal products Knowledge is the only instrument of production that is not subject to diminishing return". The theory of production begins with specific engineering or technological Information. If you have a certain amount of labour, a certain amount of other inputs such as machines or raw materials, how much output of a particular good can you get? The answer depends upon the state of technology, if someone makes a new invention or discovers a new industrial process, the obtainable output you can get from given factor inputs will go up. But at any one times, there will always be a maximum obtainable amount of product for any given amounts of factor inputs.

"The technical relationship telling the amount of output capable of being produced by each and every set of specified inputs (or factor of production). It is defined for a given state of technical knowledge (Samuelson and Nordhaus, 1992).The theory of production and marginal – products also state that the firm is poised between two kinds of market such as the commodity market in which it appears as supplier, selling its wares along the demand and the markets for factors of production in which it appears as a demander buying inputs soas to minimize its total maximum

profit output. It is the letter market which put price upon the various productive factors of the community and thus determine the distribution of income i.e. wages-rent, interest and so forth.

The marginal product of a productive factor is the extra product or output added by one extra unit of that factor, while other factors are being held constant. Labour's Marginal product is the extra output you get when you add one unit of labour, holding all other inputs constant. Similar land's Marginal – Product is the change in total product resulting from one additional unit of land, with all other inputs held constant and so forth for any factor.

2.4 Empirical Literature Review

Over the years the traffic through the Dar es Salaam port are increasing along with the economic development of the country. It follows that the queue of arriving ships is formed and sometimes ships have to wait for a longer time before berthing. This can be attributed firstly, to the mobility of the existing port facilities to match the ever increasing global trade and secondly, some obnoxious government policies and regulations. Critical to this is the development of transport infrastructures at Dar es Salaam port.

The assumption of this study was the intermodal transport facility needs to be developed in order minimize the queue of arriving ships, time used in waiting and cargo congestion. The study sought that this could be minimized by improving the port/rail interface. Therefore, this section attempted understands how other researchers have documented about the importance of port/rail interface to port

performance. The reviewed documents were those related to the topic understudy, research objective and key research questions the study sought to answer.

2.4.1 Empirical Literature Review Worldwide

According to, Johan W, (2004) have studied about the importance of port rail interfaces. The purpose of their study is to identify factors affecting the performance of port rail interface. The findings of the study revealed that increasing flow of containerization shipping is adding pressure in transport infrastructures. Similar to that, the factors identified is globalization. It is noted that globalization have triggered the development of international trade. This has increased the flows of shipping line all over the world (Jie, 2011). However, the findings of this study cannot be generalized in other context outside developing countries. This is due to the fact that it represents the context of Sweden. Still there is a need to undertake a study of this kind in the context of developing countries and Tanzania in particular. It is common knowledge that the economic growth of European countries is quite different with that of Africa and Tanzania in particular. This implies that there is greater improvement of transport infrastructure in developed nations compared to developing countries due to the different level of industrialization.

Contrary to Johan (2004), William (2010) have also studied about the port/rail interface in an urban setting. In fact this study agrees with his observation that the dramatic increase in freight activity in recent years has resulted in rail lines and port facilities operating at or near capacity. This implies that this dramatic increase in freight activity added value in the performance of port rail interface especially in urban setting. The study continues to note that urban setting is suffered from traffic

congestion. Hence, depending only in urban road for cargo or container transit will increases more road congestion. Therefore, this is a reason why U.S ports have increased the performance of port rail interface.

Likewise, it is noted that the burgeoning demand for consumer goods is placing an unprecedented strain on our nation's transportation infrastructure. In so doing, ports authority worldwide, are grappling with how to handle the surge of imports and exports. This is due to the fact that goods movement is essential to our national economy. At the same time it is estimated that freight volumes is expected to double by 2015 and triple by the year 2020 (Washington Public Ports Association Rail Status Report, 2004). It this case the study is suggesting for development of intermodal transport in order to accommodate such increased goods movement.

According to EU, (2011), it is observed that, the traditional view of transportation has been modified by its subordination to the integrated logistics chain and the economic globalization. European efforts to develop a sustainable transport system are fostering new integrated transport solutions in which rail, inland waterways and maritime transport are becoming increasingly more important. Ports, shipping companies and terminal operators are also becoming more interested in rail and barge solutions for seaport-hinterland connection. Competition is not more between ports but between complete door-to-door chains Rationality: Port to Hinterland Initiatives Rail-Port Interfaces. In this context, maritime-rail integration is these days a key issue, and innovative solutions are required to reinforce rail transport in port-hinterland connections. Maritime-rail integration is required at physical, operational and information level. The Rail-Port Interfaces initiative aims to analyse the role of

port terminals for railway transport in order to standardize and simplify their relation with different railway actors and improve their efficiency in relation to MoS door-to-door transport solutions.

The forgoing shows that, freight rail transport share is generally quite low in Mediterranean countries. This can generate higher logistics costs and reduce the competitiveness of the productive sector. Additionally, this increase external costs and has a negative environmental impact with a higher dependence on fossil fuels derived of the low use of rail driving to a low sustainability (not just environmental but also social and economic).Similar situation found in Spain, Miguel, (2011) reported that port terminals are strategic points for freight railway transport, since they play the role of main key nodes for the rail routing of transport flows that are generated or attracted by port activity. In this sense, the greatest potential for increasing the railway transport share arises from gaining traffics which currently are being routed to/from ports hinterland by road mode.

2.4.2 Empirical Literature Review in Africa

African countries are also experiencing the problems related to poor intermodal in transport sector. Noticeably, the problem affects the performance of other sectors especially those involves in transportation of goods and services. It is noted that among the important areas which affected very much is seaports. Therefore, the forgoing has necessitated African countries to look for alternative means to the problem. In so doing, the interface between port and rail have been documented as an efficient way in port performance. Several studies noted that this modal reduces port congestion, increases port revenue, increase customer satisfaction and improves

internal trade. However, the condition and status of port rail interface differs from one country over the other, between developed and developing countries. This is due to financial ability of the country and the level of industrialization between countries.

Paris, (2007) is one among researcher who has investigated into the efficiency of the port / rail interface at the port. He provides this particular experience in the context of Durban port in South Africa. The study used a mixed approach to come with factors affecting the efficiency of the port/rail interface. Nonetheless, the findings of his study cannot be generalized in other African countries outside South Africa because it preceded the analysis from the economic policy of South Africa. For instance, he explained that, currently South African economic policy is placing increasing emphasis on export-led economic growth with an increase in value-added manufactured goods and this will continue to affect the technology required by transport operators. South Africa is an industrialized country that cannot be compared with other African countries economically and technologically as well.

Additional to that Paris (2007) noted other factor that affects the performance of port/rail interface. He noted that international transport trends are having an influence on the manner in which African countries operates their transport sector. Hence the transport sector needs to be shaped in order to compare favourably with international standards. A critical area of focus for government is a seamless logistics system characterized by an efficient flow of freight that promotes the African economy's competitiveness. In so doing, the study comes up with the importance of port / rail interface as he noted that, the port/rail interface is primarily an intermodal facility where the modes of rail, road and shipping converge to

facilitate the loading and unloading of cargo from ships onto and from road and rail trucks. The roadways, rail tracks and terminal facilities which include the quay wall, warehousing and stacking areas are the fixed components of the intermodal facility. The efficiency of operations determines the adequacy of infrastructure that is provided. The technological improvement in shipping especially through containerization, revolutionized ship design, cargo handling equipment, intermodal facilities, road and rail transport, port design, port investments and inland transportation.

It is important to note that, efficient intermodal facilities mean that larger vessels can call only at a few ports known as hub ports where large volumes of containers would be consolidated by land transport, barges and small feeder vessels. Dedicated rail and road terminal facilities in the vicinity of the quayside are required to facilitate the efficient transfer of goods to and from ships (Paris, 2007).

2.4.3 Empirical Literature Review in Tanzania

Empirical studies from Tanzania show that, the demand for transport in Tanzania is driven by both internal and external factors, and faces its own set of unpredictability, both in the short term and in the long term. The last comprehensive set of forecasts for demand, for example, dating back to 2001, significantly underestimated Tanzania's economic growth rates. During the economic slowdown that affected most of the world, Tanzania has actually grown vigorously except for a dip at the onset of the global recession in 2008/9

TPA (2005) conducted a study on the factors improving port performance. The study used quantitative methodology to assess the factors could contribute to port performance. The variable tested by their study includes port/rail intermodal, cargo throughput, cargo handling, terminal layout and Reliable services. However, the findings of their study noted that port rail/rail interfaces have positive contribution to the port performance. It is noted that the intermodal, increase cargo throughput, helps the port to handle larger vessels, increase efficient of cargo handling, efficient terminal layout, and leads to reliable services.

However, their study comes about because of inefficiency faces the Dar es Salaam port (TPA, 2005). In so doing, it is noted that reducing these inefficiencies has been a priority in recent national strategies. However, the implementation of necessary policy reforms and investments has been slow. The lack of enthusiasm for reforms is explained by the asymmetric distribution of benefits and costs associated with the current inefficiency of the port, which is exploited by a handful while costing multiple consumers. The assumption is, if the current situation is not remedied, the port of Dar es Salaam might lose its existing market share in regional trade, particularly when other ports and railways become operational in neighbouring countries.

However, the information provided by TPA (2005) is inadequacy to understand the problem understudy. They have not shown the factor influences the performance of port/rail interfaced, they only managed to explain the advantage of port/rail intermodal in improving port performance. In so doing, the assumption of this study is, the performance of port/rail intermodal is determined by financial resources of a

country, availability of rail infrastructures, geographical location of a port, economic policy and political will.

Contrary to TPA, EU, AfDB and TMEA (2012) conducted a study jointly on Tanzania pots, logistics and trade. The overall objective of the study was to critically examine the key challenges facing Tanzania ports and logistics infrastructure and the collection implication of these for trade in the East African regions served by those ports. The approach and methodology used consist of field survey and interviews. The finding of their study shows that globally, maritime is growing at high pace since transport users understand the laws of the economy of scale that favours maritime transport above other transport modes.

The study continue to note that ocean cargo vessels becoming more fuel and capacity efficient, shipping is an industry in which supply and demand are more harmonized in sub-markets to reduce empty legs on maritime routes as much as possible. It is noted that this is particular the case in container shipping which has developed the structure of main ports and feeder ports based on respectively global and regional routes. Because of this, transport service industry has developed into new business concepts in which multi-modal transport has grown to an independent service industry equally important individual transport modes. The operators (integrators) offer door-to-door services that enable suppliers and traders that align better with the principles of Just-in-time or other product delivery models.

It is noted that, logistics services nowadays include all types of transport and handling and storage of goods and may include value added services such as

stuffing and stripping, warehousing, packaging, labelling customs clearance and physical distribution. However, the analysis provided by EU (202) is insufficient to understand the factors influencing the performance of port/rail interface. Their findings have discussed more about rail and roads networks. Therefore, this observation necessitates the need to undertake the study of this kind in order to fill the gap.

2.5 Research Gap

From the reviewed literature it would appear that intermodal transport such as port/ rail interface is critical in port performance, economic growth and development. Although in Western countries the status and condition of this modal has improved, the situation is not the case in some developing countries and Tanzania in Particular. At the same time the in international trade have increased the movement of shipping line because ocean transport has noted to be reliably over the other means of transport. Studies in Tanzania have successful acknowledge the problem facing Tanzania ports especially Dar es Salaam port such as port congestion, shortage of cargo handling equipment's and bureaucracy. Though railway infrastructures are found in Tanzania, but few studies have documented on the importance of port/rail interface. Therefore, this study intends to examine factors influencing the performance of port/rail interface.

2.6 Theoretical framework

This study used queuing theory in examining factors influencing the performance of port/rail interface. As indicated in the conceptual framework (figure 2) it implies that the efficiency of cargo handling and the increase in cargo throughput determined by

the reliability of port service delivery especially the mode of transport used for cargo transit and storage space of general cargoes. On the other hand, shortage of storage space influences ship waiting lines which in turn leads to port congestion. The more the waiting line or queue in cargo clearance leads to poor performance of a port.

Figure 2.1: Summary of Reviewed Literature

variables	country	Methodology	findings	Author
Intermodal transport	Tanzania	Quantitative	• Serve large vessels • Efficiency in cargo handling • Port conge stion • efficient terminal layout • reliable services	TPA (2005)
Intermodal Transport	Tanzania	• Quantitative and Qualitative	• Favours economy of scale • Harmonize supply and demand in the market • Improve port efficiency	Jointly by EU, AfDB and TMEA (2012)
Factors affecting Port/rail interface	-	• Quantitative	• Containerization • Globalization • International trade	Johan W, (2004)
Port/rail interface	US	• Quantitative	• Increase in freight activity necessitate the port/rail interface • Solution to port congestion • Increased in goods movements	William B, (2010)
Port/Rail interface	European Union	• Quantitative	• Economic globalization • Sustainable transport • Increasing importance in marine transport • Seaport hinterland connection	EU, (2011),
Port/Rail interface	South Africa	• Mixed approach	• economic policy is placing increasing emphasis on export-led economic growth • an increase in value-added manufactured goods and this will continue to affect the technology required by transport operators • transport sector needs to be shaped in order to compare favourably with international standards	Paris Foolchand (2007)

The rationale of using this theory is that Dar es Salaam port is characterized with incessant congestion problem. This has resulted in diversion of ships scheduled for Dar es Salaam port to other neighbouring country (Mombasa ports) which has caused the country to lose a lot of revenue.

The other reason to use this theory was influenced by the work of other researcher who have used similar theoretical framework to studying the problem of port congestion. For instance, Oyatoye (2011) have used similar theoretical framework when was researching about the problem of port congestions in Nigerian ports. The study observed that the ever growing international trade has made demand on quick turnaround time of ships a paramount problem in today's shipping business. These ships waiting for berth space incurs extra cost of operation, thus increasing cost of doing business for the importers. In a similar manner, (Kalavaty, 2007) added that the random arrival of the ships makes the predictability of the system and managerial decision difficult. Queuing theory model could provide Managers/Port operators with a useful set of decision making formulas and algorithms for designing Port systems and services. Therefore, this study sought to examine factors influencing the performance of port/rail interface with the aid of Queuing Theory. The assumption is improving port/rail interface is essential to port performance, effective revenue collection, frequent ship turnaround. All of this influences efficiency in cargo handling, increase cargo throughput, efficient terminal layout and reliable services.

2.7 Conceptual Framework

According to Mugenda and Mugenda (2003) a conceptual frame work is a graphical or diagrammatic representation of the relations between independent and dependent

variables in a study. It helps the researcher see the proposed relationship between the variables easily and quickly. In this study, the conceptual framework is based on the efficiency of the port and rail interface at Dar es Salaam port. The figures below show the relationship between such a variable.

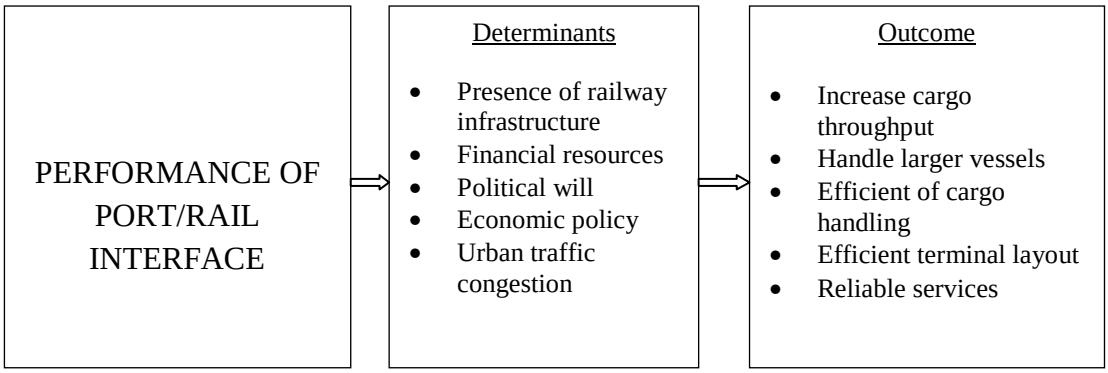

Figure 2.2: Conceptual framework

Source: Researcher, 2015

In the above conceptual framework factors that influence the performance of port/rail interface are independent variables while the performance of the port/rail interface is dependent variables. This implies that the availability of railway infrastructure, financial resources, political wills economic policy and urban traffic congestion influence the performance of port/rail interface. However, the outcome to that influence leads to port performance, economic growth and development, customer satisfaction, growth in internal trade.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

As it is indicated in the title, this chapter includes the research methodology of the dissertation. In more details, in this part the study outlined the research strategy, the research method, the research approach, the methods of data collection, the selection of the sample, the research process, the methods of data analysis, the ethical considerations and the research limitations of the study.

3.2 Research Paradigm

This study is built in positivist research paradigm. As a philosophy positivism adheres to the view that only "factual" knowledge gained through observation (the senses), including measurement, is trustworthy. In positivism studies the role of the researcher is limited to data collection and interpretation through objective approach and the research findings are usually observable and quantifiable. According to the principles of positivism, it depends on quantifiable observations that lead themselves to statistical analysis. It has been noted that "as a philosophy, positivism is in accordance with the empiricist view that knowledge stems from human experience. In other words, studies with positivist paradigm are based purely on facts and consider the world to be external and objective (Collins, 2010; Wilson, 2010)

3.3 Research Design

This study conducted descriptive research in examining factors influencing the performance of port/rail interface with particular reference to Dar es Salaam Port. As noted by Saunders *et al.,* (2007) research is broadly divided into exploratory and

descriptive. For exploratory the study was conducted in order to find out what is happening, to establish relationships that existed between variables, to seek new vision; to ask questions and to assess several things related to the topic under discussion. This helped researcher to understand more through researching document materials, asking for opinions and conducting interviews.

Descriptive research design was used to describe the characteristics of a port/rail interface at Dar es Salaam port. The purpose was to answer some questions related to how/when/why the port/rail interface is the way it is. It common knowledge that descriptive research design addresses the "what" question (what are the characteristics of the population or situation being studied? The characteristics used to describe the situation or population is usually some kind of categorical scheme also known as descriptive categories.

3.4 Research Area and Population

The research area for this study was Dar es Salaam city. The intended organization was Tanzania port Authority. This organization (TPA) was established by the Government under the Ports Act of 2004. The underlying objective of the Tanzania Ports Authority in carrying out its functions and exercising its powers to enhance the advantages of geographical position of Tanzania as a maritime nation by promoting effective management and operations of sea and inland waterways ports; securing the provision of or to provide services in relation to loading and unloading of cargo and passenger services; developing, promoting and managing port infrastructure and superstructure; maintaining port safety and security; and entering into contractual obligations with other persons or body of persons. Dar es Salaam port was used as a

case study. The total population from which study sample were drawn is 2500. The rationale of selecting Dar es Salaam port, this port is the principal port serving Tanzania and landlocked countries. According to the International Association of ports and Harbour it is the fourth largest port on the African Continents Indian Ocean Coast line after Durban, Mombasa and Maputo. A total of 108 respondents participated such as 45 DSM Port staffs, 15 TRL staffs, 15 TAZARA staffs, 12 importers, 11 exporters and 10 stakeholders which are interconnection with port.

3.5 Sampling Procedures

One potential area of General Cargo and another in Tanzania International Container Terminal Services (TICTS) in DSM Port were sampled. At least 28 staffs from General Cargo operations and 27 staffs from TICTS were randomly selected to form a total of 45, their selection was based on odd number arrangement of their port performance duties every year during their operations, including 5 principles officers and 10 seniors officer from TRL and TAZARA respectively was selected based on their working experiences to make the total of 30. Potential 12 cargo importers in DSM port base on their importers permits documents and 11 cargo exporters find at commercial department at DSM port. 10 potential stakeholders were randomly selected. This random sampling procedure of odd number arrangement criteria was used purposely to enable researcher to face and explore information from group of different understanding, experience and vision in port operations.

3.6 The Sample Size and Its Selection

The formula developed by Krejcie and Morgan (1970) will be used in this study for sample size determination. The formula contains a built correction for taking

samples from a small population like that of Dar es Salaam port; the formula is as follows;

Sample size = X^2NP (1-P)/ C2 (N-1) + X^2P (1-P)

Where *X2*is the Chi-square value for 1 degree of freedom at some desired probability level (3.841), *N* = is the population size, that is the total number of staff at Dar es Salaam port, which is 2500, *P* is the population proportion (assumed to be .50 since this would provide the maximum sample size), and C2 is the confidence interval (0.01). From the above formula the calculated sample size is an approximate of 100 sample size;

Sample calculation;

3.841 x 2500 x 0.5 (1-0.5) / (0.01(2500-1) + (3.841 x 0.5 (1-0.5))

= 92.50978

= Approximately 93

The sample size calculated was randomly selected; this procedure increased the likelihood that the data to be collected was representative of the whole population of interests.

Table 3.1: Sample Size

Organization	**Sample**
TPA	45
TRL	15
TAZARA	15
Exporters	12
Importers	11
Stakeholders	10
TOTAL	**108**

3.7 Methods of Data Collection

Data collection is the process of selecting participants and gathering data from these participants (Burns & Grove 2001:460). In this study both secondary and primary sources of data were involved. On the other hands, secondary data was used as a foundation of this study from which research gap for this study was developed.

3.7.1 Structured Interviews

Structured interviews were carried out because of its ability to collect a considerable amount of information within a short time and at low costs. This interview was guided by pre-set questionnaire with open and closed ended questions. The open ended questions allowed the respondents to give their ideas while closed ended question limited respondents to option given. The respondents were asked questions on socio-economic, demographic characteristics and health problems associated to living conditions for under-five children.

3.7.2 Documentary Review (secondary data)

This study employed relevant documents so as to generate knowledge about the research phenomenon. Mason; (1996) involves Acts of Parliament, Congressional papers, minutes of meetings, books, manuals, newspaper, diaries, letters, internet, documentary review base on housing policy and other publications. Written sources were used in this study to verify, contextualize or clarify the information derived from various studies. This method was used because different issues concerning the performance of port/rail interface determined by so many factors which varies across country, with the level of industrialization. On the other hand, the state has been the

main agent in implementing different Acts and Policies. In addition, this method was used to cover whatever the researcher is not been captured from the respondents.

3.8 Methods of Data Analysis

The analysis of data was processed using SPSS software version 16.0. The statistical analyses that have been conducted include tabulation, frequency, percentage and graphs. Several procedures followed while analysing the collected data, among them were coding, data entry, and data cleaning. The rationale of using statistical package for social scientist was to determine the proportion of respondents choosing the various responses. On the other hand, content analysis was used in analysing qualitative data.

3.9 Ethical consideration

Several research ethics considered in this study. Ethics refers to the quality of research procedures, with regard to their adherence to professional, legal, and social obligations to the research participants. It is the branch of philosophy that deals with morality (Polit & Beck 2004:717). As this research involves human participants, it was therefore necessary that the following ethical principles be adhered to right to self-determination, right to confidentiality, anonymity and the right to privacy.

CHAPTER FOUR

4.0 STUDY FINDINGS, ANALYSIS AND DISCUSSIONS

4.1 Introduction

The chapter presents the findings of the study; the findings are analyzed in relation to the objectives of the study and formulated research questions which guided the study. Data presented in this study were analyzed so as to examine factors influencing performance of port/rail interface. More specifically it aimed at examining the volumes of cargo traffic handled by port/rail interface, the factor affecting port/rail interfaces and also evaluating how can we measure the performance of port/rail interface. The chapter comes up with the observation and findings which had been grouped into three sections; the first section provides characteristics of respondents. The second sections measure reliability and validity of the data and the third section dwells a specific findings as related to the study objectives.

4.2 Reliability and Validity

4.2.1 Data Reliability

Data reliability refers to the data collected by independent collector and if the same questionnaire is administered by another person will yield the same results. In this study the reliability test was used to determine which factor or item to be analyzed, discussed and used for chi square test. To increase reliability, each respondent was given preamble sample describing the objective of the study and its implications. Respondents were asked to be free and anonymity was preserved. Furthermore, the study calculated the Cronbanch's Alpha to test the reliability of the data. In this

research Cronbanch's Alpha test was used to assess the reliability of the scale where a cut-off point of 0.70 was adopted so that the corrections between items of particular scale were improved. The following test was used to check the Alpha degree:

Table 4.2: Reliability test

Cronbanch's Alpher	**N of Items**
854	30

Source; Field Data analysis (2015)

According to this study, the reliability co efficiency using Cronbanch's Alpha is 0.854 as shown in table above. According to George and Miller, this Alpha shows accepted level of reliability. So this ensures confident on the data collected.

4.2.2 Data Validity

Data validity refers to correctness and reasonableness of Data. The stakeholders' responses were verified for correctness and reasonability. Each questionnaire obtained was checked for validity and if necessary those unfilled questions or invalid selection respondents were asked to specify what actually was the intention. The verified questionnaire responses were then entered in window SPSS in coded form. This statistical/software package was set with some validation rules for some fields. The entries were printed and verified to ensure that only reasonable and correct entries are captured. All errors were corrected before data analysis.

4.3 Demographic Profile of Respondents

4.3.1 Respondents Gender

Gender is an important variable in a given Tanzania social situation which is variably affected by any social or economic phenomenon and globalization is not an exception to it. Hence the variable gender was investigated for this study. Data related to gender of the respondents is presented in the Table 4.2.

Table 4.3: Percentage Distribution of respondents by Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	96	88.9	88.9	88.9
Female	12	11.1	11.1	100.0
Total	108	100.0	100.0	

Source: Data Analysis (2015)

As indicated in table 2, almost 88.9 percent of participants of this study were male and the rest percent remains (11.1%) were female respondents. The reason for higher percent of male compared to female is that traditionally it has been constructed that manual related activities is the work of men. Therefore, since the study was interested with respondents who involved in port operation and cargoes female workers are very few in these categories. However, there is a growing social transformations in the country of which these social constructed traditions are eliminated especially by the growing level of modernity and civilization as well as changing nature of the economy where both male and female are required to play similar role in families, and at work place in general.

4.3.2 Education Level of Respondents

Education provides people with knowledge and skills which help them to participate in their social transformation of their society. In order to develop and survive in this world growing competitive economy investment in human resources is essential in ensuring organization and institutions both public and private achieve their goals. With this similar perspective the study categorized respondent's education in several categories. However, from all the categories the study revealed that 46.3 percent of all respondents had the level of Diploma while 42.6 percent of them constitute a Bachelor degree and at least 11.1 percent were respondent with certificate level of education. Hence, only 1.9 percent of them had Master's degree

Table 4.4: Percentage Distribution of Respondents by Education

	Frequency	Percent	Valid Percent	Cumulative Percent
Certificate	12	11.1	11.1	11.1
Diploma	50	46.3	46.3	57.4
Bachelor Degree	44	40.7	40.7	98.1
Masters degree	2	1.9	1.9	100.0
Total	108	100.0	100.0	

Source: Data Analysis (2015)

The forgoing Table 4.3 shows that people are now aware about the importance of education and that in order to participate in macro-economic production they need to have education. It is common knowledge that business environments now need people formal knowledge and skills that have been tested by educational institutions.

Therefore, it is imperative to argue that Dar es Salaam port have at least educated human resources of which they are able to transform the general objective of the port into the reality. This is not to say that the level of education noted are enough, rather the port need to encourage its human resource to acquire more education and training since large percent of them have certificate level

4.4 Findings as per Objects

4.4.1 Condition of Cargo Handling at Dar es Salaam Port

As indicated in table 5, the findings of the study revealed that 55.6 percent of respondents explain that the condition of cargo handling is good while 22.2 percent of them said that the condition is satisfactory. On the other hand, about 12.0 percent of them explained that the condition of cargo handling at the port is worse and they mentioned the problem associated to this condition which was delay in cargo clearance, shortage of storage facilities, and lack of technology and port congestion that impact the ship waiting time. Moreover, at least 10.2 percent of them have answered that the condition is better (Table 4.4).

Table 4.5:Percentage Distribution in Condition of cargo handling at Dar es Salaam port

	Frequency	Percent	Valid Percent	Cumulative Percent
Better	11	10.2	10.2	10.2
Good	60	55.6	55.6	65.7
Satisfactory	24	22.2	22.2	88.0
Worse	13	12.0	12.0	100.0
Total	108	100.0	100.0	

Source: Field research (2015)

Basing on the respondents contribution, opinion and answers it implies that there are some improvement taking place at Dar es Salaam port especially that related to cargo handling. It follows that the port authority has been responding positively to the requirements and demand of domestic and international trade. In this era of globalization world trade to both internal and international are characterized by intense competitions and freedom of choices over the means of transport to be served by and at which country to be served by. However, this is not to say that there are no challenges facing Dar es Salaam port. Despite this improvement still there are some challenges that need to be addressed such as delay in cargo clearance, improve inland container deport, shortage of storage facilities and road traffic congestion.

4.4.2 The Volume of Cargo traffic at Dar es Salaam Port

Ports have always had an important role in the development of national and international trade of countries particularly, with the implications for sustained economic growth and development in various regions. With this importance this study was interested to understand the status of Dar es Salaam port it terms of cargo traffic taking place. The assumption of the study is volume of cargo traffic (handling) at given port is one among the determinant of port performance. On the other hands, with the growing in globalization business environments are characterized by intense competitions, freedom of choices and varieties of preferences over the kind of transport one is preferred.

However, among the many types means of transport shipping have been noted to be the best mode of transport and cost effective compared to other means of transport.

Therefore, one of the questions put forward to the respondents was, what is the status of cargo traffic at Dar es Salaam port? The findings of the study revealed that 66.7 percent of them said there is an increases in volume of cargo traffic while 22.2 percent of them see the status cargo traffic are constant and only 11.1 percent of them constitute decreasing (table 3)

Table 4.6: Percentage Distribution in the Volume of Cargo Traffic at Dar es Salaam port

	Frequency	Percent	Valid Percent	Cumulative Percent
Increasing	72	66.7	66.7	66.7
Decreasing	12	11.1	11.1	77.8
Constant	24	22.2	22.2	100.0
Total	108	100.0	100.0	

Source: Data Analysis (2015)

As noted by Gaur, (2005) of which this study concur, noted that globalization, emerged from trade growth between continents, regions and countries, has led to an expansion of global sea trade with huge impacts for ports. Increasing competition between transport modes and growing capacity per unit of transport demand for higher performance level in ports, which largely depend on their characteristics, such as infrastructure, equipment, governance structure and integration in logistic networks. In particularly, this implies that Dar es Salaam ports have become an intersection node in logistic chains, in which goods engage. Similar to that Cullinane et al. (2005) containerization and the effect of globalization of services have involved changes in ports due to the possibility of offering integrated logistic services in transport chains involving the industry of regular lines.

In fact, the findings of the study was supported by TPA (2012/13) annual report which noted that, at this period the total cargo traffic handled at the ports reached 13.713 million tons equivalent to an13.4% increase from the preceding year. Imports were 10.944 million tons; exports were 2.282 million tons, outwards were 0.271 million tons, inwards were 0.127 million tons and transhipment was 0.086 million tons. The report continues to note that Dar es Salaam port continued to dominate the market share by handling 12.530 million tons or 91.3% of the total cargo. Moreover, it was noted that this increases in cargo traffic has an implication to financial performance of a port. For instance, the study noted that in this particular period overall revenue increased by 10.4% and surplus before tax by 32.8% as compared to the previous year. The operating revenue earned was TZS, 417,316 million and surplus before tax wasTZS, 128,281.9 million.

4.4.3 Dominant Mode of Transport at Dar es Salaam Port

Another area, in which this study wanted to understand, was the dominant mode of transport used at Dar es Salaam port. This was due to the fact that increasing in cargo traffic needs also improvement in the intermodal transport in order to facilitate the movement of goods from port to other regions or countries. However, the findings of the study noted that 87.0 percent dominated by road transport and only 13.0 percent constitute the port/road intermodal (see Table 4.6).

Table 4.7: Percentage Distribution of the Dominant Mode of Transport at Dar es Salaam Port

	Frequency	Percent	Valid Percent	Cumulative Percent
Road	96	88.9	88.9	88.9
Port/road intermodal	12	11.1	11.1	100.0
Total	108	100.0	100.0	

Source: field research (2015)

The forgoing Table 4.7 shows that though the volume of cargo traffic is increasing but, there is a problem of road transport in the city. This is due to the fact that road transports in the city are featured with traffic congestion. This also has noted to be the causes of port congestion at Dar es Salaam port. As noted by Paul (2014) of which this study agrees with, revealed that traffic congestion poses a challenge for both large and growing cities. The study continues to note that the increase in population as result of rural-urban migration, imbalance of traffic volume to paved roads, poor road network, lack of institutional capacity and bureaucracy are the phenomenon linked with traffic congestion.

It was noted with concern that the congestion in Dar es Salaam is horrendous characterized by poor management of traffic flow as a result of inadequate parking, weak enforcement of rules and regulation to the road users which incurs a daily loss of 4 billion (Tanzanian shillings), 120 billion (Tanzanian shilling) in a month that adds up to around Sh1.44 trillion which is about the size of some government ministries yearly budget. Likewise, because of limited infrastructure, the average vehicular travel speed was at 25.6 kilometres per hour some two years ago and projected to decrease to 10 kilometres per hour in 2030, if there is no improvement

to the available road network as road transport system is the dominant mode of transport for both passengers and goods.

It is obvious that road traffic congestion have direct impacts to port performance because the dominant mode used by port is road transport of which various sector depends on it. It was revealed that The volume of traffic available in the city is approximately 400,000; 6,000 being commuter busses that carry only 43 per cent of the city's daily travellers, this reflects the increased number of private owned cars. Inadequate road capacity in relation to the traffic volume; the number of traffic increase daily while the road network is the same, in some cases the increase in traffic replace the additional capacity of paved or improved roads.

4.4.4 The Current State of Port/Rail Interface at Dar Es Salaam Port

The global trend of urbanization is evident and also valid in Tanzania and for the Dar es Salaam region also experiencing such phenomenon. In this context, efficient urban transportation has emerged as essential for sustainable development of urban areas. The findings of the study revealed that geographic regions are being expanded due to the fact that rapid transport options have expanded the range of action of people and businesses. Within urban areas there are ports, terminals and storage facilities that require incoming and outgoing transport. Altogether, these shipments have led to increased congestion on the road network within urban areas, which is a contributing factor to why a shift to intermodal land transports have been advocated both in Tanzania and Dar es Salaam in particular. Thus encouraging more freight to be moved from port to rail (port/rail interface).

While other countries are insisting in the port/rail intermodal in order to improve port performance, the situation is different at Dar es Salaam port. The findings of the study revealed that more than 46.3 percent of respondents explained that current state of port/rail interface is worse while 23.1 percent of them constitute unsatisfactory. Therefore, it implies that more than 69.4 percent of the total respondents are unsatisfactory with the state of port/rail interface. On the other hand, the findings of the study revealed that 19.4 percent of total respondents they were satisfied by the state of port/rail interface and only 11.1 percent of them they answered that the status is good.

Table 4.8: Percentage Distribution in Current state of Port/rail Interface at Dar es Salaam port by Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Good	12	11.1	11.1	11.1
Satisfactory	22	20.4	20.4	31.5
Unsatisfactory	25	23.1	23.1	54.6
Worse	49	45.4	45.4	100.0
Total	108	100.0	100.0	

Source: field research (2015)

It should be noted that globalisation has had a major impact on the Tanzanian economy. For countries to be competitive it necessitates adopting high quality standards and lowering logistics costs. The latter is even more relevant to Tanzania because of the great distances to Europe and Tanzania. The transport system in Tanzania must be highly reliable and services must be provided at a low system costs. Therefore, this encourages the need for port/rail interface in order to facilitate

the movement of good in an effective ways and cost effective. It is important to note that Dar es Salaam port is among the largest port in Africa in terms of the value of cargo handled as well as the number of vessels handled.

In doing so, the port efficiency must be integrated with the total transportation system to improve supply chain performance to provide comparative advantage against other supply chain systems. Government needs to focus on providing a seamless logistics system that ensures the efficient flow of freight which helps to promote the economy's competitiveness.

As noted by Foolchand, (2005) of which this study concur, it is revealed that an intermodal facility where the modes of rail, road and shipping converge to facilitate the loading and unloading of cargo from ships onto and from road and rail trucks is essential towards capacity growth of a port as well as business development. The study continues to note that roadways, rail tracks and terminal facilities which include the quaywall, warehousing and stacking areas are the fixed components of the intermodal facility. The efficiency of operations determines the adequacy of infrastructure that is provided. It is revealed fatherly that, the technological improvement in shipping especially through containerization, revolutionized ship design, cargo handling equipment, intermodal facilities, road and rail transport, port design, port investments and inland transportation.

Efficient intermodal facilities mean that larger vessels can call only at a few ports known as hub ports where large volumes of containers would be consolidated by

land transport, barges and small feeder vessels. Dedicated rail and road terminal facilities in the vicinity of the quayside are required to facilitate the efficient transfer of goods to and from ships. Therefore, this shows that rail transport is an extremely capital-intensive business with a high percentage of fixed to total costs. Furthermore, it is noted that overconcentration in road transport leads to the decline tonnages transported which resulting in loss of revenue, poor asset utilization and inadequate funding to maintain infrastructure and rolling stock.

4.4.5 Factor Affecting the Performance of Port/Rail Interfaces

The primary function of a seaport is to transfer cargo between maritime and inland transport, quickly, efficiently and at a reasonable cost. For this to happen, it means the port has to improve the intermodal transport facilities. In order to appreciate the first statement fully, one has to examine factors affecting the performance of intermodal transport such as port/rail interface. It should be noted that the arrival pattern of ships determined by the ability of a port in cargo handling in which the available transport models have capacity to move smoothly the cargo from the port to other places. The less capacity of port cargo handling implies the waiting life of ship under the assumption of first-in-first-out. The findings of the study noted that road/port interface are inadequately managed the cargo handling. Table 8 indicates the factors affecting the port/rail interface

Table 4. 9: Percentage Distribution of Factor affecting the performance of Port/Rail Interfaces in Tanzania

Factors	Distribution of Respondents	
	Frequency	Percent
Availability of rail infrastructure	40	37.0
Transport policy	70	64.8
Inefficiency of rail infrastructure	96	88.9
Poor emphasis in intermodal transport	84	77.8
Economic policy	81	75.0
Time factor	44	40.7
Reliability of other means of transport	43	39.8
Customer preferences	40	37.0
Financial resources	86	79.6

Total N=108

As indicated in table 8, it is revealed that first and foremost, the performance of port/rail interface at Dar es Salaam port affected with insufficient rail infrastructures by more than 88.9 percent. This is by no means the arrival pattern of ship, ship turnaround; waiting lines and queue are the characteristics of Dar es Salaam port. Therefore, this also affects the collection of revue because with queue some ships divert to other neighbouring countries such Mombasa Port in Kenya. Second, the findings of the study revealed that lack financial resources affect the performance of port/rail interface by 79.6 percent. This implies that government financial constraints affect its ability to improve rail infrastructure especially in building new rail while maintaining the old one. This has resulted to poor emphasis by the government in intermodal transport by which account for 77.8 percent on the factors affecting the performance of port/rail interface.

It appears that inefficiency of rail transport is influenced by capacity constraints due to delayed in concessioning process and resulting lack of investments in both infrastructures and rolling stock. The assumption of this study is railway transport

needs to be improved and in order to accomplish that it requires public support in framework of private partnership. It should be noted that the economics importance of a given port is directly proportional to the amount of inward and outward traffic in the ports hinterland, minus the cargo that could pass through the port, but which is attracted to another port.

As noted by SUMATRA (2011) of which this study shared the findings, revealed that railway transport in Tanzania is challenged by a number of factors among them are old age of the infrastructure, low availability and reliability of mainline locomotives, wagons and passenger coaches. This has been caused by non-recapitalization which could allow new procurements and deferred maintenance of the old equipment. On the other hand, other factors include high running cost contributed by high fuel prices. TRL purchase fuel with the added road toll for road maintenance used by road haulers the railway transport competitor.

It should be noted that Tanzania and other African countries are fighting against poverty alleviation. In this case transport sector is essential in ensuring such goal is achieved. As noted by UN (2009) of which this study agrees, revealed that Transport is one of the key sectors that play crucial roles in achieving the goals of poverty eradication and sustainable development. The study continues to note that transport sector is very much linked and influences developments in other sectors of the economy. On the other hand, it is revealed that Maritime transport is the most dominant mode of transport for moving freight from and to Africa. It accounts for over 92 per cent of Africa’s external trade. With a total coastline of 30,725 km, Africa has 90 major ports and a number of other ports providing services for fishing

and tourism. African ports handle only 6 per cent of global traffic, of which about 6 ports, three each in Egypt and South Africa, handle about 50 per cent of Africa's container traffic (United Nations, 2009)

Furthermore, the findings of the study revealed that financial resources also affect the performance of port/rail interface. This factor provides constrains in terms establishing new infrastructure and maintenance of the old ones. As identified by UN (2009) it is revealed that in order to achieve its goals of poverty reduction and sustainable development, Africa needs to invest about US$ 40 billion annually in building new infrastructure and another $40 billion for maintenance and operation of existing infrastructure. For instance, the investment requirements for new transport infrastructure and maintenance in Africa are conservatively estimated to be $14.2 billion annually. The 2007 financing requirements for transport infrastructure for 13 sub-Saharan Africa (SSA) countries alone was estimated to be $6.4 billion.

4.4.6 Measuring the Efficiency Of Port/Rail Interface in Tanzania

The port/rail intermodal is primarily an intermodal facility where the modes of rail, road and shipping converge to facilitate the loading and unloading of cargo from ships onto and from road and rail trucks. On the other hand, the efficiency of operations determines the adequacy of infrastructure that is provided. However, the efficiency of port/rail interface explored by this study Table 4.9,

Table 4.10: Percentage Distribution in Measuring the Performance of Port/Rail Interface by Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	97	89.8	89.8	89.8
Somehow good	4	3.7	3.7	93.5
No response	7	6.5	6.5	100.0
Total	108	100.0	100.0	

Source: field research (2015)

It is quite clear that out of the total respondents investigated for this study, overwhelming majority 89.8 per cent explained that the efficiency of port/rail interface at Dar es Salaam port is poor. The first measure identified by the study is the volume of cargo traffic managed by port/rail interface. The findings of the study revealed that in 2007 and 2010 the freight traffic was 479,995 tonnes per annum while by the year 2013 Dar es Salaam port handled more than 12.530 million tons or 91.3% of the total cargo. Second measured is the design capacity of port/rail interface. Despite the high volume of cargo traffic handled by Dar es Salaam port, the study revealed that the capacity of port/rail interface is only 5 million tonnes per year compared to the volume of cargo handled by the port.

Table 4.11: Difficulties in measuring the port/rail performance in Tanzania

	Strongly agree	**Agree**	**Somehow agree**	**Disagree**	**Strongly disagree**	**Total**
Lack of an efficient railway system affects the performance of port/rail interface	88.9%	11.1 %	-	-	-	100.0 %
The current rail capacity is subject to delay, breakdowns, low speed and service disruption which result to high inefficiencies for the cargo owner who incurs cost due to delay shipment	87.0%	13.0 %	-	-	-	100.0 %
Poor emphasis on port railway interface	44.4%	55.6 %	-	-	-	100.0 %

Rail network has been in a state of neglect and dilapidated	33.3%	55.6 %	-	11.1%	-	100.0 %
Little or no improvement upgrading for the railway line since construction	38.9%	61.1 %	-	-	-	100.0 %
Limited financial resources to get the infrastructure up and running and hence governments would opt for a much cheaper option of road development	78.8%	22.2 %	-	-	-	100.0 %
Railways requires sufficient and constant funding to maintain the infrastructure as it requires highly qualified personnel, rolling stock and replacement of spare parts	55.6%	44.4 %	-	-	-	100.0 %
The low uptake of rail transport by shippers who opt to transport their cargo via road than use railway terming	22.2%	33.3 %	22.2%	22.2%	-	100.0 %

Source: Data Analysis (2015)

Additional to that, the findings of the study noted that port congestion is one among the measure for the efficiency of port/rail interface. The findings of the study revealed that because of poor efficiency of port/rail intermodal the other means of transport especially road are overwhelmed. Therefore, this problem influences the problem of port congestion. It should be noted that port congestion has economic implication since the lengths and waiting time at berth can be predicted some ship diverts to other countries of which the country lose the revenue. On the other hand, measuring the performance of port/rail interface is determined by the investments in railway infrastructure, its capacity, and frequent upgrading its infrastructure. However, this has not been the case in Tanzania where railway transport for some years has been in state of neglect compared to other mode of transport such as roads. However, the following table (10) illustrates more on this theme

The forgoing implies that port/rail interface should need to have some indicators through which its development especially in the railway subsector could be objectively measured, monitored, evaluated and eventually suggest a plan for future development. Without these objective conditions it is impossible to measure the performance. For instance, the peak performance of TRL was in the year 2002 when it moved 1.446 million tons of freight. The performance of TRC started to deteriorate from that time after the donors stopped supporting TRC. In the year 2007 TRC transported 570,000 million tons of freight. After concession the performance of TRL continued to deteriorate. In the year 2010 TRL performed 256, 000 tonnes of freight.

The anticipated objective of improving TRL performance after concessioning was not achieved. The Government of Tanzania decided to buy back the 51% shares from RITES India and invest in the railways to improve performance. The RITES India handed over TRL management to Tanzania Government TRL interim Management in 2011. In fact, this deterioration is supported by the findings of this study as indicated in the Table 4.11.

Table 4.12: Respondents Opinion on the Performance of Port/Rail Interface in Tanzania

Statements	1 SA	2 A	3 SHA	4 D	5 SD	Total
The volumes of the different cargoes reflect a declining trend.	17.6%	13.9%	11.1%	46.3%	11.1%	100.0%
The present condition of the rail lines in the yard makes operations unsafe.	55.6%	22.2%	-	12.0%	1.2%	100.0%
The rail layout is optimal for current operations within the Port.	11.1%	46.3%	-	42.6%	-	100.0%

The capital expenditure programme for the development of the Port/Rail interface is adequate.	10.2%	12.0%	9.3%	24.1%	44.4%	100.0%
The operations strategy for the interface is reviewed regularly.	11.1%	8.3%	13.9%	55.6%	11.1%	100.0%
Management reports on finance and operations are reviewed monthly to review the performance of the terminal and intermodal interface.	11.1%	32.4%	-	56.5%	-	100.0%
A perception survey is conducted on a regular basis to gauge Client's satisfaction.	22.2%	11.1%	8.3%	58.3%	-	100.0%
The intermodal interface has measurable standards for all key processes.	11.1%	22.2%	22.2%	44.4%	%	100.0%
Employees have a good understanding of the Port/Rail Interface.	.9%	43.5%	22.2%	25.0%	8.3%	100.0%
There is a decline in tonnages transported by rail from the quayside.	55.6%	25.0%	19.4%	-	-	100.0%
That a Rail Terminal is the most effective manner of transferring goods from rail to and from ships.	55.6%	11.1%	33.3%	-	-	100.0%

Source: Data Analysis (2015)

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Overview

After the presentation of data, its interpretation and discussion of research findings as indicated in chapter four of this study, the following chapter is about to provide a conclusion and recommend the areas for further studies. At the first place, this study intended to examine the factors influencing the performance of port/rail interface in Tanzania with particular reference to Dar es Salaam port. In this case, three research questions were raised; *first* what is volume of cargo traffic handled by port/rail interface? *Second*, what are the factor affecting port/rail interfaces? And *third*, how

can we measure the performance of port/rail interface? In order to generate answers and information related to the raised research questions questionnaire was used as an instrument in all process of data collection. In particular, this section is arranged under the following themes;

5.2 Conclusion

In examining the factors influencing the performance of port/rail interface, it can be concluded that; port/rail interface in Tanzania is in a state of neglect. Therefore, this neglect creates problems in terms of port congestion and in cargo handling whereby they cannot be explained only with the inadequate berthing space but majorly by the operational inefficiency of the Port Managers and Operators coupled with long years of railway infrastructural development neglect. In this case, the study found that queue exists at Dar es Salaam port. The probability of having queue in any of the months is insignificant because of the present operational inefficiency, which shows that Queue exist in the Port thus creating congestion. It should be noted that, Queue theory is a viable tool for solving congestion problems and its application in this study has helped to identify the role of port/rail interface in reducing congestion in the ports at the same time provided the Port Managers with useful set of decision making formulas with algorithm for designing Port systems and services.

Additional to that, it important also to note that globalization has a major impact on the Tanzania economy. In this case, for countries to be competitive it necessitates adopting high quality standards and lowering logistics costs. The latter is even more relevant to Tanzania and Dar es Salaam port because of the great distances to Europe

and Asia from majority of ships coming from with goods and products. This implies that, the intermodal transport system in Tanzania must be highly reliable and services must be provided at a low system costs from which port/rail interface is capable. This enhanced efficiency must be integrated with the total transportation system to improve supply chain performance to provide comparative advantage against other supply chain systems. Government needs to focus on providing a seamless logistics system that ensures the efficient flow of freight which helps to promote the economy's competitiveness.

Moreover, the performance of the intermodal facilities mean those larger vessels can call only at a few ports known as hub ports where large volumes of containers would be consolidated by land transport, barges and small feeder vessels. Dedicated rail and road terminal facilities in the vicinity of the quayside are required to facilitate the efficient transfer of goods to and from ships. The developed nations are doing a similar thing.

In assessing the volumes of cargo traffic handled over by port/rail interface, it can be concluded that; there is a declining trend of the tonnage transported by port/rail interface compared to the raising tonnage transported through road transport. This implies that the volume of cargo traffic transported by road transport is higher than the tonnages transported by port/rail interface. It is also implies that rail transport have given little attention compared to other means. It is the assumption of this study that if the intermodal between the two would be improved the amount of cargo traffic is going to improve where would also effect the port performance.

In identifying the factors affecting the performance of port/rail interface, it can be concluded that; Despite the essentiality of port/rail interface in logistic management and supply chain, but rail transport is an extremely capital-intensive business with a high percentage of fixed to total costs. Therefore, the study revealed that the factors affecting the performance of port/rail interface are inefficiency of rail infrastructures which resulting to poor emphasis in intermodal transport. Second, the performance is affected by lack financial resources. It is revealed that the availability of financial resources influence's investments in rail infrastructure by constructing the new railway and improving the old ones.

In measuring the efficiency of port/rail interface, it can be concluded that; The efficiency of port/rail interface at Dar es Salaam port is poor. The factors used to measure the efficiency were the volume of cargo traffic handled by port/rail interface. The study revealed that port/rail interface handled small volume of cargo per annum compared to the volume of cargo traffic generated by the port per annum. The second, measure was the capacity design, it was revealed that the capacity of cargo traffic through port/rail interface is 5 million tonnes per annum while the total tonnes handled by Dar Salaam port as by the year 2013 was more than 12 million tonnes.

Finally, the other measure was the rail infrastructural investment; it was revealed that the infrastructures are in the state of neglect. Development and investments of transport infrastructures in Tanzania and African countries in general are primarily determined by donor funders (developed nations and international agencies).

Therefore, the sector is shaped and reshaped by donor interests over a particular time. It is noted that the performance of port/rail interface is poor, the reasons behind this conditions derived from shortage of financial resources, inefficiency of rail transport, lack of maintenance and little emphasis in the intermodal transport.

5.3 Recommendations

This study recommends the following;

i. The transport system in Tanzania must be highly reliable and services must be provided at a low system costs.

ii. Improving port performance must be integrated with the total transportation system to improve supply chain performance to provide comparative advantage against other supply chain systems.

iii. Port/rail interface should be improved in order to increase the volume of cargo traffic at the port of Dar es Salaam. This will also minimize the problem of port congestion and then reduces the road traffic congestion in the city

iv. Country economic policy should also focus in improving transport infrastructure including railway transport. It is clear that transport sector has a great contribution towards poverty alleviation strategies.

v. There is a need to improve countries financial resources in order to invest in new rail infrastructure and maintaining the old one

vi. Partnership with private/foreign investment is essential towards improving railway system in the country

5.4 Area for further

This study suggests more research should concentrate on how the government can partner with other stakeholders to improve the port/rail intermodal. This is due to the fact that the amount of cargo transported by rail is too small compared to that transported by the road.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

INTERVIEWER CODE_____

TITLE: EXAMINING FACTORS INFLUENCING THE PERFORMANCE OF PORT / RAIL INTERFACE

1. Respondents Name _____

2. Respondent Gender

i) Male

ii) Female

3. Education level of Respondents

i) Have not gone to school

ii) Primary school

iii) Secondary school

iv) Certificate

v) Diploma

vi) Bachelor Degree

vii) Others specify (_____)

4. Position

a) Management level

b) Middle level / line manager

c) Operational level

d) None of the above

e) Other specify _____

5. Types of Employment

i) Full time

ii) Temporarily

iii) Other (specify) _____

6. What is the condition of cargo handling at Dar es Salaam port?

a) Better

b) Good

c) Satisfactory

d) Unsatisfactory

e) Bad

f) Worse

7. How do you explain the volume of cargo traffic at the port of Dar es Salaam? Would you say has been……

a) Increasing

b) Decreasing

c) Constant

d) Other (specify)_____

8. What is the dominant transport model in cargo traffic in general cargo and container terminals?

a) Roads

b) Rail

c) Port/roads intermodal

d) Port/rail intermodal

e) Other (specify)_____

9. What are factors influences the increase in volume of cargo traffic at the port of Dar es Salaam

a) Locational advantage of a port

b) Port/rail intermodal

c) Growth in international trade

d) Safety and reliability of shipping transport

e) Others (specify)

10. **What is the current status of port/rail interface at Dar es Salaam port**?

a) Better

b) Good

c) Satisfactory

d) Unsatisfactory

e) Worse

f) Other

(specify)_____

11. **Could you explain the volume of cargo traffic handled over through port/rail interface in Tanzania**?

_____

_____

_____

12. To identify the factors affecting port/rail interface

a) Availability of rail infrastructures

b) Transportation policy

c) Inefficiency of rail infrastructure

d) Poor emphasis in intermodal transport

e) Economic policy

f) Time factor

g) Reliability of other means of transport such as road transport

h) Customer preferences

i) Financial resources

j) Other

(specify)_____

13. **In a scale of 1, 2,3,4,5 how do you agree or disagree of the following statements?** Where SA=strong agree, A=Agree, SHA=somehow agree, D=disagree, SD=strongly disagree

	1 SA	2 A	3 SHA	4 D	5 SD
Availability of rail infrastructures affects the port/rail interface					
Road traffic congestion affects the port/rail interface					
Transportation policy affects the port/rail interface					
Inefficiency of rail infrastructure affects the port/rail interface					
Poor emphasis in intermodal transport affects the port/rail interface					
Economic policy affects the port/rail interface					
Time factor affects the port/rail interface					
Reliability of other means of transport such as road transport affects the port/rail interface					
Customer preferences affects the port/rail interface					
Other (specify)					

14. Factors hindering effective use of port/rail intermodal in general cargoes and container terminals in Tanzanian port

	1 SA	2 A	3 SHA	4 D	5 SD
The lack of an efficient railway system					
The current rail capacity is subject to delays, breakdowns, low speeds and service disruption which result to high inefficiencies for the cargo owner who incurs costs due to delayed shipment.					
Poor emphasis on port/rail intermodal					
Rail network has been in a state of neglect and dilapidated.					
Little or no improvement upgrading of the railway line since construction					
Limited financial resources to get the infrastructure up and running and hence governments would opt for a much cheaper option of road development.					
Railway requires sufficient and constant funding to maintain the infrastructure as it requires highly qualified personnel, rolling stock and replacement of spare parts.					
The low uptake of rail transport by shippers who opt to transport their cargo via road than use the railway terming					

15. In your opinion how do you explain the performance of port/rail interface in Tanzania?

a) Better

b) Good

c) Poor

d) Other (specify)_____

16. In a scale of 1, 2,3,4,5 how do you agree or disagree of the following statements? Where SA=strong agree, A=Agree, SHA=somehow agree, D=disagree, SD=strongly disagree

	1 SA	2 A	3 SHA	4 D	5 SD
The volumes of the different cargoes reflect a declining trend.					
The present condition of the rail lines in the yard makes operations unsafe.					
The rail layout is optimal for current operations within the Port.					
The capital expenditure programme for the development of the Port/Rail interface is adequate.					
The operations strategy for the interface is reviewed regularly.					
Management reports on finance and operations are reviewed monthly to review the performance of the					

	1 SA	2 A	3 SHA	4 D	5 SD
terminal and intermodal interface.					
A perception survey is conducted on a regular basis to gauge Client's satisfaction.					
The intermodal interface has measurable standards for all key processes.					
Employees have a good understanding of the Port/Rail Interface.					
There is a decline in tonnages transported by rail from the quayside.					
Rail will be able to cope with the increase in Port tonnages.					
That a Rail Terminal is the most effective manner of transferring goods from rail to and from ships.					

17. What needs to be done in order to improve port/rail intermodal in Tanzania

_____

_____

_____

_____

_____