

UNCTAD Ad Hoc Expert Meeting

(Under the framework of the IAME Conference 2018)
11 September 2018, Mombasa, Kenya

“Maritime Transport In Africa: Challenges, Opportunities, and an Agenda for Future Research”

Opportunity and Growth Diagnostic of Maritime Transportation in the Eastern and Southern Africa

By

Professor Godius Kahyarara
Economics Department

With Assistantship of **Debora Simon**
Geography Department

University of Dar-es-Salaam, United Republic of Tanzania

OPPORTUNITY AND GROWTH DIAGNOSTIC OF MARITIME TRANSPORTATION IN THE EASTERN AND SOUTHERN AFRICA

Professor **Godius Kahyarara**
University of Dar-es-Salaam
Economics Department

With Assistantship of **Debora Simon**
University of Dar-es-Salaam
Geography Department

SUMMARY

This paper examines opportunities and undertakes growth diagnostics of maritime transportation in the Eastern and Southern Africa. To do so it adopts a 'Growth Diagnostic' methodology proposed by Ricardo Hausman, Dani Rodrick and Andres Velasco (HRV) to identify constraints that impede development of the Maritime transport focusing on a wide range of aspects within transportation corridors that are most critical and binding constraints to development of maritime transportation. The paper also assesses existing opportunities for Maritime Transportation and proposes the best approach to rip such opportunities. Paper findings are that port inefficiency depicted by longer container dwell time, delays in vessel traffic clearance, lengthy documentation processing, lesser container per crane hour (with exception of South Africa) as one of the critical binding constraints. Ultimately over 70 percent of delays in cargo delivery compose of time spent within Ports. The other binding constraint of maritime growth is inefficient rail and road networks in the form of low speed and unreliability (Railways), insecurity, congestion, delays in checkpoints, diversions due to frequent maintenance. A third constraint is inadequate volume of cargo to allow full capacity utilization of maritime transportation along with its interlinked modes. Transport cost higher than global average by 40 to 60 percent is another binding constraint. National transportation development plans compatibility with regional agreements on need for harmonization is also a binding constraint. Economic viability and loss making in other modes especially railways is a critical constraint. The last binding constraint is inadequacy in human resource and ICT system to support an efficient and effective integrated Port Management Information System to guarantee globally competitive and high-quality port performance. The economic growth of the region which is higher than the sub Saharan average and drive for industrialization along with ongoing ports improvement and Standard Railway Gauge projects are the greatest opportunities ever for maritime transportation in Eastern and Southern Africa. The study major recommendation is call for holistic and integrated approach, policies and institutional arrangement for effective Maritime Transportation. Countries are encouraged to consider merging ports, railways and freight services under one administration so as to maximize integrated decisions that guarantee connectivity of Railways, Ports, and Financial and telecommunication services for economically viable maritime transportation system. Finally, Maritime Transportation has a big role to play in Global trade and implementation of the *three pillars of Sustainable Development Goals*

Key Words: *Maritime, Trade and Economic Growth, Railways*

TABLE OF CONTENTS

SUMMARY	2
TABLE OF CONTENTS.....	3
LIST OF FIGURES	5
LIST OF TABLES.....	6
INTRODUCTION	7
2 METHODOLOGY AND APPROACH.....	12
2.1 Scope of the Analysis.....	13
2.2 Scope of the Methodology	14
2.3 Approach and Steps	15
2.4 Literature Survey	15
2.5 Assessing and sorting the information obtained under step [1]	15
2.6 Scanning and Documentation [2].....	16
2.7 Stakeholders Survey and Consultations [3]	16
3 GROWTH CONSTRAINTS IN MARITIME TRANSPORTATION OF EASTERN AND SOUTHERN AFRICA.....	16
3.1 Constraints of Maritime Transportation Performance within the Eastern and Southern Africa 18	
3.2 Constraints from Coordination of Maritime Transport Development Projects.....	19
3.3 Constraints from Competition from a well-established Port in the Southern Africa.	20
3.4 Maritime Transportation Cost Differences and Competitiveness	22
4 OPPORTUNITIES FROM MARKET FOR THE EXPANING MARITIME TRANSPORT	23
4.1 East AFRICA Economy Real GDP growth and the key drivers.....	25
4.2 Sectoral GDP growth within the East Africa	26
4.3 Maritime Transportation and Economic Growth –need for Port linked Industrial Parks	27
4.4 Opportunities from China Africa Initiatives in Infrastructure Investment.....	28
4.4.1 Railway Projects in Africa	28
4.4.2 Railway Projects in Eastern and Southern Africa	28
5 CONSTRAINTS OF MARITIME DEVELOPMENT FROM STATE OF RAILWAY SYSTEM OF EASTERN AFRICA.....	29
5.1 Importance of Railways in Maritime Transportation for Eastern and Southern Africa	30
5.2 Opportunities for Maritime Transportation from New Railway Projects	32
5.2.1 Malawi Zambia and Mozambique	33
5.2.2 Ethiopia-Djibouti Railway Line Modernization, Ethiopia.....	33
5.2.3 Mombasa-Nairobi Railway	33
5.2.4 Malawi-Mozambique Nacala Port Railway	34
5.2.5 Dar-es-Salaam –Mwanza Kigali Standard Gauge Railway	34
6 ICT RELATED CONSTRAINTS AND OPPORTUNITIES OF MARITIME TRANSPORTATION EASTERN AFRICA	35
6.1 Need for Comprehensive Maritime Management Information System.....	35
7 REGIONAL AGREEMENTS AND POLICIES ON MARITIME AND THE RELATED DEVELOPMENT.....	38

7.1	Maritime Transportation Agreements in The Treaty for the Establishment of East African Community	38
7.1.1	East African Agreements on Maritime Transport and Ports	39
7.1.2	East African Agreements Inland Waterways Transport.....	40
7.1.3	East African Agreements Multimodal Transport	41
7.1.4	East African Agreements Freight Booking Centers	41
7.1.5	East African Agreements Freight Forwarders, Customs Clearing Agents and Shipping Agents	41
7.2	African Union Maritime Transport Charter	41
7.2.1	African Union Cooperation in Maritime and Inland Waterways Transport.	42
7.2.2	African Union agreements on Cooperation in Transport Auxiliaries	42
7.2.3	African Union Agreement Development of Multimodal Transport and Port Management	43
8	SUMMARY OF FINDINGS CONCLUSIONS AND RECOMMENDATIONS	44
8.1	Summary	44
8.2	Findings of the Study	44
8.3	Conclusion and Recommendations	46
	REFERENCES	48

LIST OF FIGURES

Figure 1: Growth Diagnostic Framework for Maritime Development	14
Figure 2: Maritime Map of Eastern and Southern Africa	17
Figure 3: Performance Indicators of Ports within the Eastern and Southern Africa	19
Figure 4: Durban Dwell Time (2006-2010)	21
Figure 5: Comparison of the South African with the Eastern Africa Ports	21
Figure 6: Region Economic Growth in Africa	25
Figure 7: Eastern Africa Regional Economic Growth 2016-2019	26
Figure 8: Sectoral growth in East Africa	27

LIST OF TABLES

Table 1: Transit time and cost in Africa	29
Table 2: Existing Railway system in Africa	31
Table 3: Status of Existing Railways	32
Table 4: Key transportation Corridors in Africa	36
Table 5: Status of Telecommunication in Eastern Africa	36
TABLE 6: Telephone Cost in Eastern Africa	37

1. INTRODUCTION

1.1 *Background and Study Objectives*

This paper assesses the opportunities and binding constraints to growth of the Maritime industry in Eastern and Southern Africa. Taking advantage of improved and developed maritime transportation of South Africa, the study uses some of the benchmarks from major Ports of South Africa in particular, Durban to provide comparative analysis of Maritime transportation within the study area. The study analysis is justified by the economic importance of maritime transportation and its contribution to overall development within the region. One of the remarkable contributions is in the area of Government Revenue whereby taxes on imports and exports handled through major Ports contribute over 50 percent of total tax revenue in most of the countries within this area. Hence port inefficient can have adverse impact on the entire economy. Furthermore, development of maritime transportation within the region has influenced existence, access and quality of other modes of transportation such as road and road-rail. These modes are pre-requisite links between transportation corridors and ports or gateways of the maritime transportation. In order to provide the envisaged analysis, the study first consider the reality that demand for maritime transportation service is a derived demand implying that it is demanded not for its own sake but for the services it facilitates. For example, an economic expansion or growth calls for need to move more cargo.

This may call for expanding the existing maritime transportation. Also, it is possible that expansion of maritime transportation services may call for increase in other sorts of services such as rail and roads to link maritime transportation points with the rest of the economy. It is also worthwhile noting that transportation services exist in Corridors. These¹Corridors are designed based on geographical location and proximity from a gateway. For the purpose of this study we consider two prominent corridors in the Eastern and Southern Africa. The first corridors we consider is the long-established corridor within the region is the Northern Corridor. This Corridor runs from the port of Mombasa via Nairobi to Kampala, with extensions to the Democratic Republic of Congo, Rwanda, and Burundi. Mombasa, which is the largest port in East Africa. Although intraregional trade in the East African Community (EAC) has been growing fast in recent years, it contributes only 20 percent of the trade volume in the subregion, while more than 80 percent of the trade flows are still going to and coming from outside the region.

The other important area is the North-South Corridor in Southern Africa *that* links Zambia and the southeast Democratic Republic of Congo to the subregion and overseas markets. These are Dar-es-Salaam, Walvis Bay, Beira, and the north-south corridor through Durban. The north-south corridor serves a dual purpose: First, it serves as an intraregional trade route between Zambia (and further southeast, the Democratic Republic of Congo and western Malawi) and its neighbors, Botswana, Zimbabwe, and South Africa, and as a link to the port of Durban for overseas imports and exports. Although the port of Beira in Mozambique is closer than Durban for most Zambian shippers, Durban is more convenient as it can be accessed directly by reliable road infrastructure and with channel-dredging equipment (World Bank 2009).

¹ Details on the CORRIDORS are in Chapter 3 of the World Bank (2009) Report on Transportation and Cost in Africa "A review of International Corridors By; Supee and Gael.

Durban's port equipment and lower maritime transport rates make it also attractive for Zambian shippers. Durban is the largest port in the area, accounting for at least three quarters of the total capacity provided by the various ports serving the corridors in the sub region. The Durban–Lusaka corridor route is then the most utilized corridor for Zambia. In relation to economic importance the study premise rest on the fact that the Maritime industry is a crucial economic factor within the Eastern and Southern region. Recent trends in development within the region have increased need for addressing all development challenges within the Maritime sector and look for solution within other related modes. According to the trade facilitating institutions such as the ²UNCTAD, East African Trademark, WTO have been quoted emphasizing that” *modern era of international trade is one of increasingly complex interactions between people, firms, and organizations. Supply chains cross countries and regions. Trade has become a 24/7 business and good performance in trade requires connectivity along not only roads, rail and sea, but in telecommunications, financial markets and information-processing. Having inefficient or inadequate systems of transportation, logistics and trade-related infrastructure can severely impede a country's ability to compete on a global scale*”. Therefore, identification of binding constraints to growth of maritime transportation need to focus not only on what happens within the ports, but also to the entire circle of the interrelated chain of logistics and transport. Even when we have completed improvement within ports there are all possibilities that inefficient within any given port can be traceable from any of the interlinked and intertwined area such as inadequate telecommunication, or poor financial services or congested roads.

There is another important aspect that we consider within this paper. Maritime transportation and its quality of services plays a key role in the economy in that it supports the movement and flow of many economic transactions. The need for an effective and reliable ICT is also critical. Thus, this study makes a thorough analysis of the extent to which existence and quality of ICT services and infrastructure influence maritime transportation within the region of Eastern and Southern Africa. For Maritime Transportation the is need to ensure attainability of comprehensive Management Information Systems. These include Automatic Identification Systems (AIS), Vessel Traffic Management System (VTMS) and Port Operating Systems (POS). Such systems, when combined with a Port Community System acting as the hub, are able to offer a wide range of advantages to the transport sector in the country and the region by improving the efficiency and productivity of port operations. Many Ports within the study area have made impressive efforts to raise efficiency but still inefficiency of Ports remain as one of the constraints for development of these important economic structures. In this study we combine the total time of waiting or delays that exist from when a customer initiates process of cargo clearance up to when a cargo arrives at the final destination. There are reports that more than half of the time is spent within the port before travelling. Despite the average time reported there exist outliers that range between 14 days to three months.

However, countries are in different stages of development and not all factors are relevant to each country. Therefore, an attempt to identify constraints to growth of maritime industry in eastern Africa shall require a realistic and systematic approach that selects only factors that are critical so that it would be economical to address them. On the other hand there are broad range of opportunities within the East African region that shall necessitate changes in the way Maritime industry has been operating. The East African economies are among the fastest growing in the continent and somewhat globally. A rule of thumb dictates

² For Details see Regional Trade Reports of the TRADEMARK East Africa 2011/15

that a 1 percent increase in GDP demands 12.5 percent improvement in Port efficiency unless we are operating in environment of full capacity and highest efficiency.

1.2 Maritime Transportation and Trade

Maritime transportation plays a very big role in trade and development generally. As the receiving and clearing point of the World largest share of international trade flows, performance of Ports most likely shall have adverse effect on the entire economy by stifling trade and ultimately development. This is why small disruption or congestion in Ports immediately become a Breaking News with greatest national and international dimension. although there are multitude of factors that determine trade facilitation, Port infrastructure along with efficiency of custom procedures stand as a single most critical determining factor of the level of observed trade performance. This is due to that fact that PORTS ARE THE Gateways through which countries access the global trade. UNCTAD projects that over 70-80 percent of global trade passes through Maritime Transportation system generally and PORTS in particular. The international Chamber of Shipping put the estimate of global trade in goods that is carried by the shipping industry as 90 percent. Clarke et al, (2004) revealed that activities taking place at Port level are very crucial for international trade transactions. In sum Ports have been very important in the process of globalization and trade facilitation revolution. The World is increasingly interconnected trade between countries and among set of countries in different regions is conducted in a hub that is fully interlinked using Ports to facilitate contact between buyers and sellers in exchange of documents, information and physical goods. Apart from trade flows, Ports have also been important factors behind degree of openness. Hence facilitation of openness of trade has taken the form of ensuring that Ports are as efficient as possible, improve customer procedures and ensure well functioning Information system that can facilitate storing, processing and sharing information in the quickest possible time. There are also evidences that increase in trade volumes has been directly correlated with rapid growth in maritime transportation. The export led industrialization drive in the Asian tigers was behind trigger in volumes of transportation within Ports of Asian countries.

The other important aspect of maritime transportation and trade is that rapid growth in development of financial market, increased flow of goods and services have further called for need to modernize the maritime transportation. For instance technological advancement has led to reduction in transport cost, revamping of industrialization and increased need to move goods and services as finished products, intermediaries of raw materials. In advanced countries, trade increases has resulted into increased volumes of cargo hence allow reduction in tariffs making transport costs increasingly important in determining trade and economic development. The other related fact on trade and maritime transportation is the fact that introduction of the first internationally standardized container in the 1960s ushered in significant growth in container trade globally. The World seaborne trade rose from 5,134 metric tons (in millions) in 1970 to 17,517 metric tons (in millions) by 2011. With average annual growth of 3.1 percent (UNCTAD, 2013). Africa present somewhat peculiar trend in growth in share of global export trade. For a number of years, the regional share of Africa has stagnated at 3 percent while developing countries in Asia have rose sharply reaching 33 percent. Furthermore, containerization has played a critical role in improving transportation and reducing cost of transportation.

Therefore, given the greater interdependence economic development of modern times have witnessed enormous and simultaneous Port infrastructure development with improvement in maritime transportation as re-requisite for implementing various economic development programs. This is mainly due to the fact that inefficiencies in the entire chain of logistics and major infrastructure such as Ports, will always lead to greater adverse effect on the entire economy. On the other hand, an efficient maritime transportation system plays a significant role on bilateral trade which ultimately support economic development and growth. This is why there have been simultaneous move on growth in GDP, Industrial production especially depicted by total factor productivity, merchandize trade and seaborne shipment. This is why economist insist on the need to improve Port infrastructure and operations to enhance trade, foreign direct investment flows and overall economic growth.

The United Nations Conference on Trade and Development UNCTAD has been providing detailed review on the role of maritime transportation on global trade. In its 2016 review, it indicated how the world gross domestic product expanded by 2.5 per cent. The report further revealed how individual country performances unfolded against the background of lower oil and commodity price levels, weak global demand and a slowdown in China. According to the report estimated world seaborne trade volumes surpassed 10 billion tons – the first time in the records of UNCTAD. Shipments expanded by 2.1 per cent, a pace notably slower than the historical average. The tanker trade segment recorded its best performance since 2008, while growth in the dry cargo sector, including bulk commodities and containerized trade in commodities, fell short of expectations. As far as maritime businesses are concerned the report indicated that the world fleet grew by 3.5 per cent in the 12 months to 1 January 2016 (in terms of dead-weight tons (dwt)). This is the lowest growth rate since 2003, yet still higher than the 2.1 per cent growth in demand, leading to a continued situation of global overcapacity. The major point to note here is the fact that implementation of economic growth and sustainable development goals shall lead to increased volumes of trade, and hence cargo that will put more pressure on demand for maritime transportation. This will in turn necessitate need for improved maritime transportation system.

1.3 Maritime Transportation and Sustainable Development Goals

As we are aware the World Economy currently witnesses rigorous implementation of ***Sustainable Development Goals*** (SDGs). The specific segments of the Sustainable Development Goals are three i) Economic ii) Social and Environmental. These pillars are highly co integrated. One may wonder the linkage between social pillar and maritime transportation. But in reality, there are several labor issues in shipping industry. Besides the shipping industry has been a victim of environmental degradation especially sea pollution in the form of ***Oil Spills, Carbon Dioxide emission, NOx waste dumping*** in the sea. Under pressure to serve the increased global trade due to implementation of SDG, these pollutants are likely to increase. There are new environmental standards adopted by the International Maritime Organization which the shipping industry needs to abide. Furthermore, the maritime transportation and economic pillar links very well. It plays a vital role in transporting over 90 percent of World which is the greatest determinant of the World Economy. Hence given that over 90 percent of the flows of goods in the international trade pass through the Maritime Transportation system there is a dire need for integrating sustainable development goals within all aspects of improvement and planning the Maritime

Transportation in this era of SDGs implementation. The Maritime can be a cure and perhaps in some area a source of problems in implementation of the Sustainable Development Goals.

According to International Chamber of Shipping (ICS), Maritime Transportation shall be very key in Facilitating World Trade and Prosperity in the course of implementing the Global Sustainable Development Goals. It is expected that during the implementation of SDGs the combined Global GDPs from countries all over the World shall increase therefore even World trade seaborne trade will increase enormously. Hence billions of tones of goods shall be handled by Maritime Ports and the related facilities. The international Maritime organization (IMO) has been committed to provide sustainable development goals for the international shipping industry. This is important because during implementation of the Sustainable Development Goals there are other natural changes especially increased Population. This translates into increased demand for more goods and services leave alone implementation of the SDGs. The volumes of maritime trade shall increase significantly as the World economy, trade and population size increases. The ICS has been insisting that without cost efficient maritime transport, the movement of raw materials and energy in bulky wherever they are needed, and the transportation of manufactured goods will not be economically viable. Hence in implementation of Sustainable Development Goals the highest priority of the international shipping industry highest priority is to ensure safety and life of the sea by implementing new requirement such as Seafarer training, navigational safety improvement, and effective safety culture. For the economic sustainability, the shipping industry is set to ensure that it is economically viable, efficient and well interconnected via a comprehensive management information system.

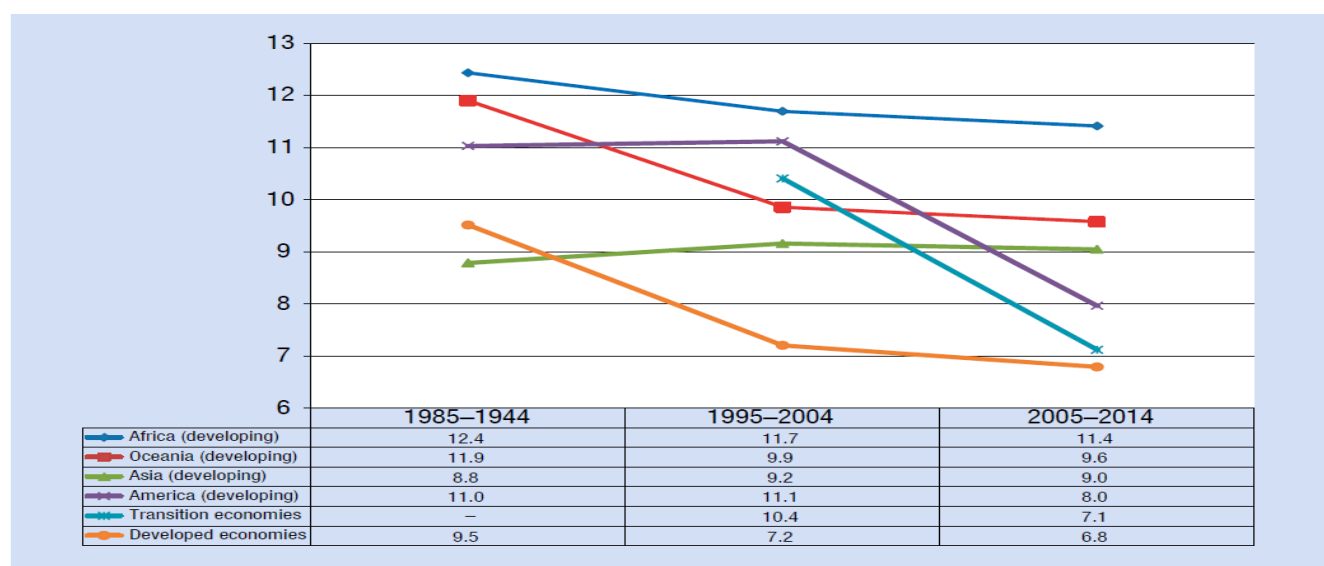
The global fleet of oceangoing vessels numbers over 108,000; of these, ~46,000 are used to move cargo. These ships are responsible for 2-4% of the world's annual fossil fuel consumption [Corbett, 2004]. A profile of the internationally registered fleet of ships greater than 100 gross tons. To reduce operating expenses, marine engines have been designed to burn the least costly of petroleum products. Residual fuels are preferred if ship engines can accommodate its poorer quality, unless there are other reasons (such as environmental compliance) to use more expensive fuels. Of the two-stroke, low-speed engines, 95% use HFO and 5% are powered by MDO [Corbett and Koehler, 2003]. Fuel consumed by 70% of the four-stroke, medium-speed engines is HFO, with the remainder burning either MDO or MGO. Four-stroke, high-speed engines all operate on MDO or MGO. The remaining engine types are small, high-speed diesel engines all operating on MDO or MGO, steam turbines powered by boilers fueled by HFO, or gas turbines powered by MGO.

Nevertheless, a consequence of marine engine technologies is increased air pollution. These HTHP engines oxidize nitrogen effectively (thereby increasing NO_x emissions), and emit many of the impurities of residual fuel (including sulfur, toxics, and heavy metals) out the ship stack. Among freight modes, waterborne transportation has been shown to cause significant air pollution locally in port communities, add to long-range pollution transport in coastal regions of heavy trade, and contribute to climate change on a global scale [Capaldo et al., 1999; Corbett and Fischbeck, 1997; Corbett et al., 1999; Corbett and Koehler, 2003; 2004; Endresen et al., 2003; Kasibhatla et al., 2000; Lawrence and Crutzen, 1999; Skjølsvik et al., 2000]. Oceangoing shipping is also the least regulated freight mode, at least for air pollution.

1.4 Maritime Transportation; Efficiency, Cost and Global Trade flows and facilitation

The volume and type of cargo has a direct bearing on the carrier's costs. The volume of cargo is important as it allows for economies of scale, both on the sea leg as well as in port, although at times the economies of scale achieved on the shipping side may lead to congestion and diseconomies of scale in the port. The extents to which the costs incurred by the carrier are passed on to the client depend on the market structure and also on the trade balance. On many shipping routes, especially for most bulk cargoes, ships sail full in one direction and return almost empty in the other. Having spare capacity, carriers are willing to transport cargo at a much lower freight rate than when the ships are already full. Freight rates are thus far higher from China to North America than for North American exports to China. By the same token, freight rates for containerized imports into Africa are higher than for exports. To some extent the differences in freight rates that depend on the direction of trade may be considered, in order that a market mechanism may help reduce imbalances. Those that have a trade deficit pay less for the transport of their exports.

International transport costs: Freight costs as a percentage of value of imports, ten year average within country groups, 1985-2014



Source: UNCTAD secretariat estimates. Data represent the cost of international transport, excluding insurance costs, as a percentage of the "cost, insurance, freight" value of the imported goods.

Notes: Averages within the country groups are unweighted, that is, each country's freight ratio is assigned the same weight when calculating the average. Data are for all modes of transport.

International transport costs are a key component of trade costs and economic development. Recent research in Asia and the Pacific suggests that tariffs account for only 0–10 per cent of bilateral comprehensive trade costs, while other policy-related trade costs (that is, of a non-tariff nature) account for 60–90 per cent of bilateral trade costs. Put differently, issues such as transport costs, maritime connectivity, and procedures have a stronger bearing on trade costs than customs duties (Economic and Social Commission for Asia and the Pacific, 2015). Based on data from merchandise imports, UNCTAD has estimated the expenditures on international transport (all modes of transport) for country groups. For the average country, international transport costs amounted to approximately 9 per cent of the value of imports during the decade 2005–2014. Among the main regional groupings, African countries paid the most (average of 11.4 per cent) against an average of only 6.8 per cent for the developed countries. Having considered the seven main determinants of maritime transport costs, it is now possible to discuss possible reasons for the overall freight costs estimated for different country groups, and in particular why Africa and Oceania pay more for the transport of their imports than other regions. These points are highlighted in the following paragraphs:

2 METHODOLOGY AND APPROACH

Identification of constraints that are widespread and different from one set of countries in a given transportation corridor or from one country to another faces greatest challenge of observation ability. This is partly due to the multiplicity of divergences and factors that may not be easily accounted for by a single method. This paper therefore adopts a ‘Growth Diagnostic’ also known as ‘Constraint Analysis’ a methodology proposed by Ricardo Hausman, Dani Rodrick and Andres Velasco (HRV) to identify constraints that impede attempts to develop the Maritime transport within the region of Eastern and Southern Africa. The adopted methodology is very robust in sorting out only factors that are considered to be the most critical. This is important because whereas Maritime Transportation in the Eastern and South Africa faces a wide range of challenges not all of them are equally restrictive to growth and development of the sector

This basically follows a Pareto-Principle that identify just 10 percent of the challenges which contribute to 90 percent of the problems. For instance, a review in this study has found out that time more than 80 percent of time spent to deliver cargo to the customer is spent inside the port processing and formality. The remaining 20 percent is the actual time spent moving. Therefore, countries can achieve biggest economic value by cutting drastically the time spent within the proximity of ports at lesser. Hence a small effort to remove 10 percent of the challenges shall very quickly result to a BIG PICTURE of a turnaround with 90 percent. The framework is very helpful because reforms and investment efforts uses resources and efforts which are limited hence need to be deployed strategically and economically. The nature of unlimited challenges is usually confronted with limited resources to alleviate them. But thanks to the HRV model which directs that a successful development strategy is likely to be most successful if it correctly identifies and focuses on addressing constraints with greater direct impacts on efficiency, productivity and performance of the Maritime Transportation.

2.1 *Scope of the Analysis*

In this paper we work out to identify at least five most binding constraints to broad based growth of the maritime transportation. To do so we focus on rigorous analysis of various indicators data and other contextual information and analysis to establish existence of such a constraint and weigh if it is convincingly and significantly constraining development of maritime transportation within the region. It should be noted that the purpose of this growth diagnostic is not to identify all economic, social and institutional problems that the Maritime Industry of the region faces in achieving the development goals of the countries in question. Hausman, Klinger and Balley (2008) suggest four tests for the presence of symptoms of a binding constraint which may be conducted, depending on the growth factor being assessed and the data available. The constraints in question appears more binding if:

- i) The shadow price of the constrained factor is high
- ii) The availability of a constrained factor is correlated with development of a sector and maritime industry in our case
- iii) Economic agents are incurring high costs to circumvent the constraints and
- iv) An assessment of the extent to which firms would rely heavily on the factor are not observed in the economy

Now putting this conceptual framework into our maritime industry perspective we first ***identify the cost of not addressing the*** constraint before concluding whether or not we consider this as a binding constraint to development of maritime industry in East and South Africa. Secondly we make ***a cross examination the causal relationship between a considered constraint*** and the observable performance.. Third ***assess the total cost incurred***

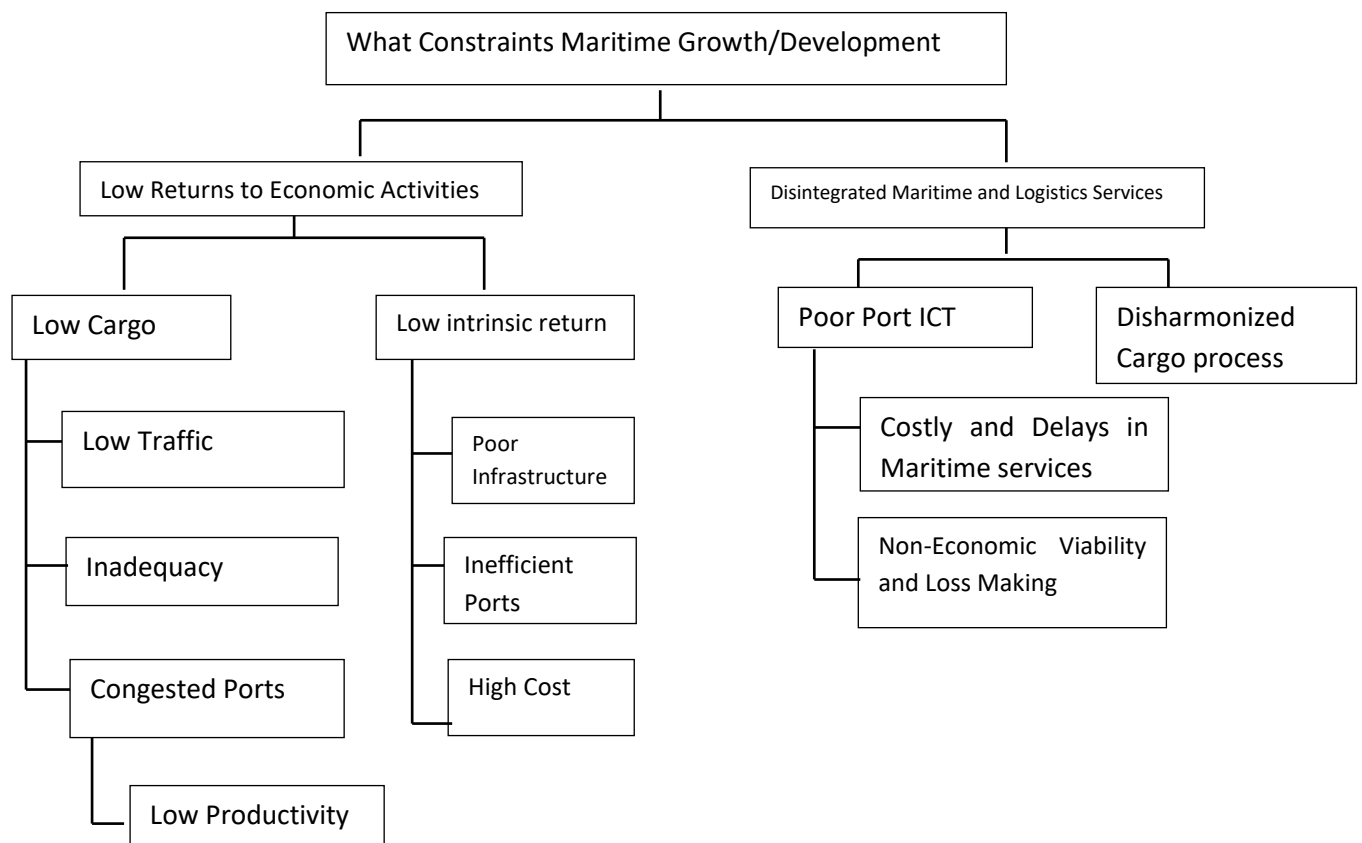
by customers and other users of Maritime services within the East and Southern Africa in attempt to circumvent the selected constraint. Lastly we assess the extent to which maritime is *influenced by some aspects* which are not observable.

The analysis will use the best available benchmarks and we compare them with observable activities of the maritime sector of East and Southern Africa. This in most case shall consider the rule of thumb globally available most developed and efficiency versus the observed regional performance.

2.2 Scope of the Methodology

As pointed out above this Diagnostic approach used here does not aim at a fully provision of an exhaustive analysis or description of all the issues faced by the maritime sector or potential constraints within the economies of the East and South Africa. Therefore, analysis presented in this paper shall provide key information and clues that are relevant to the ranking of constraints, and some indications of the sources of those constraints that appear most binding. Furthermore, HRV presents the framework of the analysis as a ‘tree’ which allows for an assessment at higher nodes of the tree of which factor are major drivers of development, before focusing on the details within a given set of issues, where some lose the broader picture. The diagnostic tree is shown below as follows;

Figure 1: Growth Diagnostic Framework for Maritime Development



Source : Authors

Finally, the assessment shall focus on the Maritime infrastructure, Road and Rail roads that links the gateway ports with the customers along with the related integrated services. The recent trends have seen increased investment in port improvement on one hand and construction of Standard Gauge Railways on the other. Given the economic importance of

these investment and the cost requirement altogether, this study shall assess the fiscal implications as well as the economic viability of the projects. The regional agreements on corridor development projects are also worthwhile assessing inline with national level projects. The combined assessment shall identify and rank the major growth constraints and a set of opportunities that are available to the Maritime Industry of Eastern Africa.

2.3 Approach and Steps

There shall be a number of steps towards implementing the study assessment. The critical ones shall involve;

2.4 Literature Survey

Given the time resources and financial limitation the study heavily rely on literature review. Five major objectives of a literature review will be to:

- (i) Map out the performance of Maritime Transportation in member states, within the Eastern and Southern Africa and the Global at large for a comparison.
- (ii) Establish the comparable information and evidences which exist in the knowledge of the nature and magnitude of performance of maritime transportation in the Eastern and Southern Africa.
- (iii) Identify existing useful lessons of experience in attempts to release reliable and up to date information of the trends in the Maritime Transportation in Eastern and Southern Africa; and
- (iv) Establish the historical trends in demand and supply of the maritime transportation services within the Eastern and Southern Africa.
- (v) Compile social and economic variables that can be used to assess the link between MARITIME Transportation, ECONOMIC development of Eastern and Southern Africa, and consider the relationship between observed maritime development in relation with on going transport projects such as Standard Gauge Railways and Road projects.

The sources of literature include the web search of annual performance of Ports, Maritime and other transportation reports by the World Bank, UNCTAD, African Development Bank, the East African communities, Trade Mark East Africa and national development reports. The study team also made a visit to the documentations in the Bureau of Statistics in Tanzania, Academic institutions such as the National Transport Institute, Sokoine University of Agriculture, and Institute of Resource Assessment of the University of Dar-es-Salaam and other documentation and publication units that appears vital during the process.

2.5 Assessing and sorting the information obtained under step [1]

The team made a considerable effort to thorough assesses and judge quality of information after surveying literature. Relevant information that was confirmed useful for the analysis and mapping was selected for the analysis.

2.6 Scanning and Documentation [2]

The second step of the study was to store information in a way that can be easily accessed for further reference. Where soft copies exist, efforts were taken to obtain the electronic files. In cases where hard copies exist, effort was made to scan the information. Under exceptional circumstances photocopying was undertaken.

2.7 Stakeholders Survey and Consultations [3]

The third step in this assignment was to conduct stakeholder's survey. But due to financial limitation it was not conducted.

3 GROWTH CONSTRAINTS IN MARITIME TRANSPORTATION OF EASTERN AND SOUTHERN AFRICA

The binding constraints within the Maritime Transportation are mostly within the operating environment of the maritime transportation system. In this section we attempt to trace the constraints by characterizing the Maritime Sector of Eastern and Southern Africa. To begin with, the maritime transport system in Eastern and Southern Africa comprises gateways to the major ports of Mombasa, Tanga, Dar-es-Salaam, Maputo, Nacala, Beira, Durban, Cape Town, Port Elizabeth, East London and other ports. These gateways serve the following corridors; The Northern Corridor in East Africa- running from the port of Mombasa via Nairobi to Kampala, with extensions to the Democratic Republic of Congo, Rwanda, and Burundi. Mombasa, the largest port in East Africa, is well endowed with equipment and facilities, has a natural port whose berths do not require constant dredging, and has an adequate dock infrastructure. The other corridor is **the North-South Corridor in Southern Africa**- linking Zambia and the southeast Democratic Republic of Congo to the subregion and overseas markets. These are Dar-es-Salaam, Walvis Bay, Beira, and the north-south corridor through Durban. The north-south corridor serves a dual purpose: First, it serves as an intraregional trade route between Zambia (and further southeast, the Democratic Republic of Congo and western Malawi) and its neighbors, Botswana, Zimbabwe, and South Africa, and as a link to the port of Durban for overseas imports and exports.

Figure 2: Maritime Map of Eastern and Southern Africa



3

Source: Global maritime Transportation Map

³ This map comes from the LLOYD'S Maritime Atlas of the World Shipping places

Port performance is essential for the efficiency and effectiveness of the maritime network. Such efficiency is driven by a wide range of factors including infrastructures within which a Port is operating. Port infrastructure endowment can be described by variables such as number of cranes, maximum draught and storage area at origin and destination ports. The interaction of these variables is decisive. Installing ship-to-shore gantries, for example, may well lead to higher port charges for the shipping line (Clarkson,2015). The line may still achieve an overall saving, because its ships spend less time in the port, or because it can change from geared to gearless vessels. This, in turn, will also lead to lower freight rates. However, development of port infrastructure is only worthwhile if the entire transport system benefits and not if bottlenecks are only shifted to another element within the system. Factors influencing productivity are physical, institutional and organizational. Physical limiting factors include the area, shape and layout of the terminal, the amount and type of equipment available, and the type and characteristics of the vessels using the terminal. Lack of cranes, insufficient land, oddly shaped container yards, inadequate berthage, inadequate gate facilities, and difficult road access are all physical limiting factors (Marquez-Ramos et al 2005). Productivity must be considered in a system perspective for it to be of maximum value to industry. This is important from a policy perspective, thus emphasizing the need for modality and multimodal visions in policy recommendations and guidance.

From south to north, the two main border crossing points are Beit Bridge between South Africa and Zimbabwe, and Groblers Bridge/Martins Drift between South Africa and Botswana. Beit Bridge is the busiest border post in the region, handling as many as 500 trucks per day, whereas volumes through Martins Drift are about half that number. The main exports from Zambia are mineral and agricultural commodities. The main imports, are mineral products, chemicals, heavy mining equipment, and manufactured goods, machinery and mechanical appliances, fuels, electrical machinery, and vehicles.

3.1 Constraints of Maritime Transportation Performance within the Eastern and Southern Africa

The study review suggests that Port efficiency is one of the binding constraints. This partly due to the fact that most of the East African ports generally underperform global competitors across a range of indicators. Two-thirds of the containers shipped from East African ports are empty.⁴Owing to the rapid expansion of traffic, a few of the subregion's ports are experiencing capacity constraints and congestion. The international standard for port dwell time is seven days or less. However, in East Africa, containers routinely spend more than a week in the terminal. The result is congestion and port inefficiency. There is some scope for easing capacity constraints by improving the efficiency of port performance, although ultimately new investments will be required. But the study acknowledges dynamics and different perspectives on dwell time. For instance literature suggest that sometimes high dwell times are no longer indicators of poor terminal performance in general but, in some circumstances, are “perceived as an indicator of a higher level of integration between the port and inland freight distribution brought by supply chain management” (Rodrigue and Notteboom 2009).

⁴ Further discussion and information comes from World Bank (2012) Why Does Cargo Spend Weeks in Sub Saharan Africa Ports? Lesson from six countries. By; Gael Raballand, Salim Refax, Monica Beuran and Gozda Isik

Figure 3: Performance Indicators of Ports within the Eastern and Southern Africa

	Djibouti	Mombasa	Dar es Salaam	East Africa	Southern Africa	West Africa	Global best practice
Container dwell time (days)	8	5	7	5 to 28	4 to 8	11 to 30	<7
Truck processing time (hours)	12	5	5	4 to 24	2 to 12	6 to 24	1
Containers per crane per hour	17	10	20	8 to 20	8 to 22	7 to 20	20 to 30
Container handling charge (\$/TEU)	135	68	275	135 to 275	110 to 243	100 to 320	80 to 150
General cargo handling charge (\$/tonne)	8	7	14	6 to 15	11 to 15	8 to 15	7 to 9

Source: AfDB 2013.
Note: TEU is twenty-foot equivalent unit.

Source: African Development Bank Report

In sum Port efficiency is a major complain from various users of Ports within the Eastern and Southern Africa. Performance of individual ports in East Africa varies. Mombasa and Dar es Salaam exhibit generally good performance that is within global best practices on some indicators. On the other hand, Port Sudan and Djibouti exhibit much lower port efficiency levels.⁵The capacity constraints faced at the ports of Mombasa and Dar es Salaam, coupled with extremely lengthy import and export procedures, add considerably to the time required to clear goods. The long detention of goods in port becomes a major obstacle to distribution and a major contributor to logistics costs, thereby impeding trade. For Dar-es Salaam Port, space limitations within the port, combined with relatively slow pick-up of containers, was a challenge. “Unless they are cleared, containers cannot be transferred outside of the port for storage. To address this issue, there have been efforts to identify new sites to store containers that are awaiting clearance.” The main challenge has been to “expedite clearance of their cargo just after discharge in order that the terminal can be more efficient to handle increasing cargo”. As Tanzania’s main gateway port, Dar es Salaam handles around 90% of the country’s international cargo. It is also the gateway to the landlock countries of Zambia, the Democratic Republic of Congo, Malawi, Rwanda, Burundi and Uganda. An ongoing project is the Dar es Salaam Maritime Gateway Project. Funded by the World Bank, this will include infrastructure upgrades to enable the port to handle post-panamax-plus vessels.

3.2 Constraints from Coordination of Maritime Transport Development Projects

Integration and Coordination of efforts are a paramount factor. A review of the African corridor projects by the World Bank’s Independent Evaluation Group (IEG)¹ found that most projects covered only a single transport mode or agency and focused on the development or rehabilitation of physical facilities. These Bank projects did not establish the prerequisites for future operations, such as regional agreements on corridor operations and streamlining and

⁵ More details are found in the Review of Maritime Transportation (2015) Freight Rates and Maritime Transportation

harmonization of regulation affecting transport. Neither the IEG review nor other studies attempted to explain why the reduction in operating costs did not result in lower transport prices. Adopted in 1993, the African Maritime Transportation charter provides a framework for harmonizing maritime activities, but has not been fully implemented. The 25-year master plan for railway development, adopted at the heads of state and government summit in Liberia in 1978, contains 18 projects to complete the missing links within and between countries and between different regional economic communities.

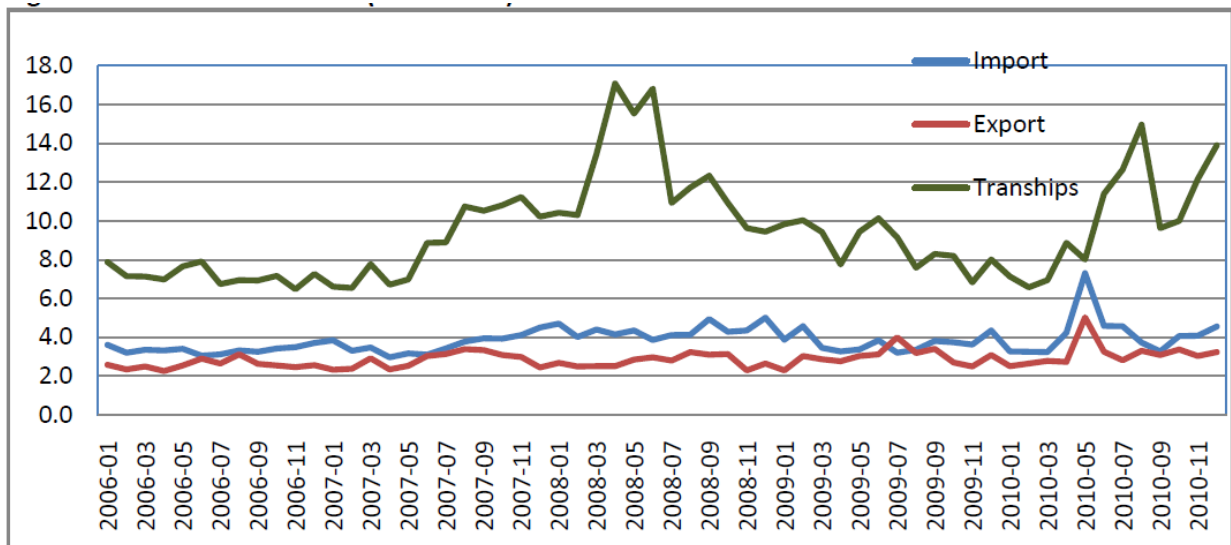
But of the 26,000 kilometres in railway lines proposed in the plan, only 15,000 kilometres were included in the United Nations First Decade for Transport and Communications (1978-88). Despite lacking *hll* implementation, the transport initiatives are actually success stories for the regional economic communities because coordination has moved forward. This is likely to be hastened with the Sub-Saharan Africa Transport Project, which gives the regional economic communities a crucial role in advancing and IRU commissioned a study to analyse the comparative costs of using a national bond, the Common Market for East and Southern Africa (COMESA) Regional Customs Transit Guarantee (RCTG) Carnet where applicable, and the IRU TIR Carnet, for two types of cargo (containerized load and tanker transporting liquid bulk) along four major corridor routes; namely North South Corridor (Durban to Lubumbashi), Walvis Bay-Ndola-Lubumbashi Corridor, Dar Corridor (Dar es Salaam to Lubumbashi) and the Northern Corridor (Mombasa to Kigali). What is important to note here is that incase efforts to harmonize designing and implementation of maritime transportation and the related infrastructure are not realized problems of duplication, un called for competition for a limited sized cargo and in some cases

3.3 Constraints from Competition from a well-established Port in the Southern Africa.

The performance of Maritime Transportation is determined by a wide range of factors but competitiveness and efficiency goes together. The quality of services and convenience of access and reliability are most crucial aspects that can break constraints. At that time, global transport chains were still fragmented, uncoordinated, and inefficient. Literature also suggest that competition is sometimes driven mainly by cost (Magala and Sammons 2008). Prohibitive charges for storage, coupled with strict enforcement, and the possibility to pre-clear with Customs with advantages attached to it and service level agreements binding both parties are critical tools for the reduction of cargo dwell time. Within the study area it is clear that Southern Africa Maritime Transportation is the most competitive and best performer hence attracting more customers and poising competition even among the Eastern African Ports. The critical location of Durban on the North South Freight Corridor, an important route for transit traffic bound for Zambia, Zimbabwe, Malawi and a connection going as far north as Dar es -Salaam, puts it on the spot light and its performance is extremely vital for countries along the corridor. ⁶The Durban Container Terminal (DCT) has benefitted substantially from major infrastructure investments and it now comprises a new terminal known as Pier 1 and the old terminal known as Pier 2. With a capacity of 720,000 TEU's, Pier 1 has 3 berths with a 11,9m draft, 6 ship to shore gantries with 888 reefer points. The terminal operates RTG's. The larger old terminal, Pier 2 is currently designed for a capacity of 2,9 million TEU's and it boasts 6 berths over 14,000 ground slots with an average draft of 11,8m, 19 ship to shore gantries, 1117 reefer points. The terminal operates with straddle carriers.

⁶ Further details are found in the South Africa Global Price Comparator Stidy by the PORT REGULATOR South Africa

Figure 4: Durban Dwell Time (2006-2010)



Source: TRANSNET South Africa

⁷Dwell time for transshipments is around 5 to 10 days with a few irregular peaks at around the 15 days mark, notably between July and September. This is also related to the fact that “free time” for transshipment is set at 7 days (with low charges below 15 days).

Figure 5: Comparison of the South African with the Eastern Africa Ports

Durban	Douala	Lome	Tema	Mombasa	Dar-es-Salaam	Average (Durban excluded)
South Africa	Cameroon	Togo	Ghana	Kenya	Tanzania	
4	19	18	20	9	19	17

Source: Refas et al (2011) for Douala, surveys for the other ports.

⁷ More information and discussion see South Africa Port Regulator (2015) Global Pricing Comparator

3.4 Maritime Transportation Cost Differences and Competitiveness

The other binding constraint that has been influencing maritime performance in Eastern and ⁸Southern Africa is cost that are higher than those found in other countries in other regions. A general rule of thumb is that developing countries, especially in Sub Saharan Africa and Oceania, pay 40 to 70 per cent more on average for the international transport of their imports than developed countries. The main reasons for this situation are to be found in these regions' trade imbalances, pending port and trade facilitation reforms, as well as lower trade volumes and shipping connectivity. There is potential for policymakers to partly remedy the situation through investments and reforms, especially in the regions' seaports, transit systems and customs administrations. Container freight rates remained volatile although with different trends on individual trade lanes. Market fundamentals have not changed significantly despite the expansion in global demand for container shipping. This was mainly due to pressure from the constant supply of vessels that the market rates continued to face, with the introduction of very large units on mainline trades and the cascading effect on non-mainlines trades.

The tanker market, which encompasses the transportation of crude oil, refined petroleum products and chemicals, witnessed an equally volatile freight rate environment in 2014 and early 2015. The dry bulk market freight rates faced another challenging year influenced by the surplus capacity that still exists and the uncertainties in demand projections. Bulk carrier earnings fell 5 per cent from 2013 to reach an average of \$9,881 per day in 2014. The low level of earnings exerted financial pressure on owners and led to several companies filing for bankruptcy.

⁸ Further information and discussion can be obtained from South Africa Port Authority Comparator Global Pricing (2015 and 2016) along with the Review of Maritime Transport (2015).

4 OPPORTUNITIES FROM MARKET FOR THE EXPANING MARITIME TRANSPORT

Demand for maritime transportation service is derived demand. This is so because it is demanded not for its own sake but for other services it provide for proper functioning of the economy. Therefore any change in the size of the economy will translate into increased opportunity via possible cargo increase and hence demand for maritime transportation. Within the Southern and Eastern Africa recent economic growth and development have created positive opportunities for expansion of maritime transportation services. Based on the ⁹World Economic Outlook (WEO), growth in *sub-Saharan Africa* is projected to rise to 3.4 percent in 2018 (from 2.8 percent in 2017) and improve slightly thereafter through the medium term to about 4.0 percent. While the headline numbers suggest a broadly unchanged picture relative to the October WEO, revisions to growth projections for key large economies point to underlying differences in prospects across the region.

Growth in *South Africa* is also expected to strengthen from 1.3 percent in 2017 to 1.5 percent in 2018 and 1.7 percent in 2019, (stronger than in the October WEO by 0.4 and 0.1 percentage point, respectively, for 2018 and 2019). Business confidence is likely to gradually firm up as political uncertainty diminishes, but growth prospects remain weighed down by structural bottlenecks. East Africa's robust 2017 GDP growth is forecast to continue in 2018 and 2019. The main contributors to the region's growth are Ethiopia, Tanzania, Djibouti, Rwanda, Seychelles, and Kenya, in that order. Although growth in Seychelles and Ethiopia is projected to slow in 2018 and 2019, other countries in the region are expected to continue to register strong growth. A combination of factors explains the region's economic performance. For most countries in the region, recovery from drought in 2017 was expected to shore up agriculture.

In Djibouti and Ethiopia, continued investment in public infrastructure will further bolster growth, as will service sector expansion and strong private consumption in Rwanda. In South Sudan, weighed down by conflict, continued economic contraction will counteract the region's overall growth. Since the onset of the current civil war in 2013, South Sudan's economy has contracted by an average 6.8 percent a year, making it the worst performing country in the region. Sudan's economy lost three-quarters of its oil revenues following South Sudan's 2011 independence. Uganda and Kenya, with major trade and investment links in South Sudan, have also faced spillovers from the latter's economic contraction. Although South Sudan accounts for less than 1 percent of the region's GDP, the severity of its economic contraction has reduced regional average economic growth. Burundi, Somalia, and Sudan, despite marginal improvement forecast for 2018–19, will also contribute less to the region's growth. Somalia, in particular, still suffers from fragility. Thus, negative growth in East Africa's fragile states, especially in South Sudan,

Owing to the impressive growth of East African economy where countries like Tanzania and Ethiopia have experienced impressive growth rates that are higher than the regional and continental levels, there is prospect for expansion of cargo traffic, a few of the subregion's ports are experiencing capacity constraints and congestion.

⁹ Further discussion and statistics comes from the International Monetary Fund(2018) WORLD Economic Outlook

The international standard for port dwell time is seven days or less. However, in East Africa, containers routinely spend more than a week in the terminal. The result is congestion and port inefficiency. This is most notable in the case of Mombasa and Dar es Salaam, where the volume of general cargo and container traffic significantly exceeds design capacity. Port Sudan is also experiencing capacity constraints with respect to container traffic. All three of these ports are also reaching their limits with respect to dry-bulk cargo. There is some scope for easing capacity constraints by improving the efficiency of port performance, although ultimately new investments will be required (AICD, 2011: 21).

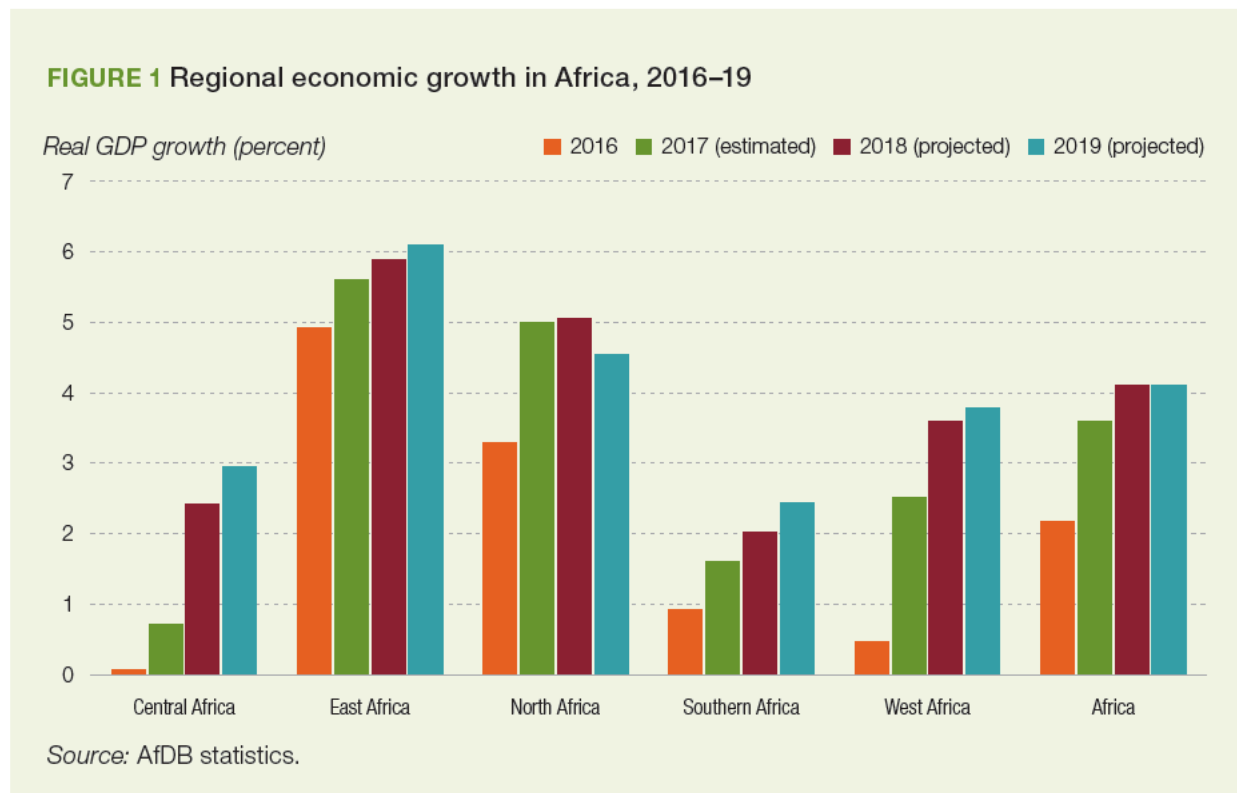
The opportunity of increased growth to the maritime transportation is also in the form of increased volumes that can facilitate cost reduction. This is so because the volume and type of cargo have a direct bearing on the carrier's costs. The volume of cargo is important as it allows for economies of scale, both on the sea leg as well as in port, although at times the economies of scale achieved on the shipping side may lead to congestion and diseconomies of scale in the port.¹⁰ The extent to which the costs incurred by the carrier are passed on to the client depend on the market structure and also on the trade balance. On many shipping routes, especially for most bulk cargoes, ships sail full in one direction and return almost empty in the other. Having spare capacity, carriers are willing to transport cargo at a much lower freight rate than when the ships are already full. Freight rates are thus far higher from China to North America than for North American exports to China. By the same token, freight rates for containerized imports into Africa are higher than for exports. To some extent the differences in freight rates that depend on the direction of trade may be considered, in order that a market mechanism may help reduce imbalances. Those that have a trade deficit pay less for the transport of their exports.

The opportunity of Maritime transportation can also be derived from changes in economies of other regions. For instance the World Economic Outlook has shown that in the *Middle East, North Africa, Afghanistan, and Pakistan* region, growth is projected to increase from 2.6 percent in 2017 to 3.4 percent in 2018 and 3.7 percent in 2019. Growth is expected to stabilize thereafter at about 3.6 percent through the medium term. The need for fiscal consolidation as a result of structurally lower oil revenues, security challenges, and structural impediments weigh on the medium-term prospects for many economies in the region. Relative to the forecasts in the October WEO, with the pickup in oil prices, prospects for oil exporters have improved somewhat (with a small downward revision to 2018 growth and a more-than-offsetting positive revision to 2019 growth), while those of oil importers have softened slightly. In *Saudi Arabia*, growth is projected to resume this year, rising to 1.7 percent from a contraction of 0.7 percent in 2017. Growth in 2019 is expected to rise slightly to 1.9 percent as oil output increases, with the assumed expiration of the Organization of the Petroleum Exporting Countries Plus production cut agreement. The forecast has been revised up from the October WEO by 0.6 and 0.3 percentage point for 2018 and 2019, respectively. Growth in *Egypt* is projected to rise to 5.2 percent in 2018 and 5.5 percent in 2019 (0.7 and 0.2 percentage point higher, respectively, than in the October WEO), reflecting stronger momentum in domestic demand and the effect of structural reforms. *Pakistan's* economy is expected to expand at a robust pace of 5.6 percent this year (up from 5.3 in 2017), before moderating to 4.7 percent in 2019.

¹⁰ Information and full discussion is found in Shipping and the Port Sector in Sub Saharan AFRICA (2010) by Af Brodin

While the forecast for 2018 is unchanged relative to the October WEO, for 2019, it has been revised down by 1.3 percentage points, partly reflecting an increase in macroeconomic vulnerabilities. All these provide opportunities for maritime transportation demand.

Figure 6: Region Economic Growth in Africa



Source: African Development Bank

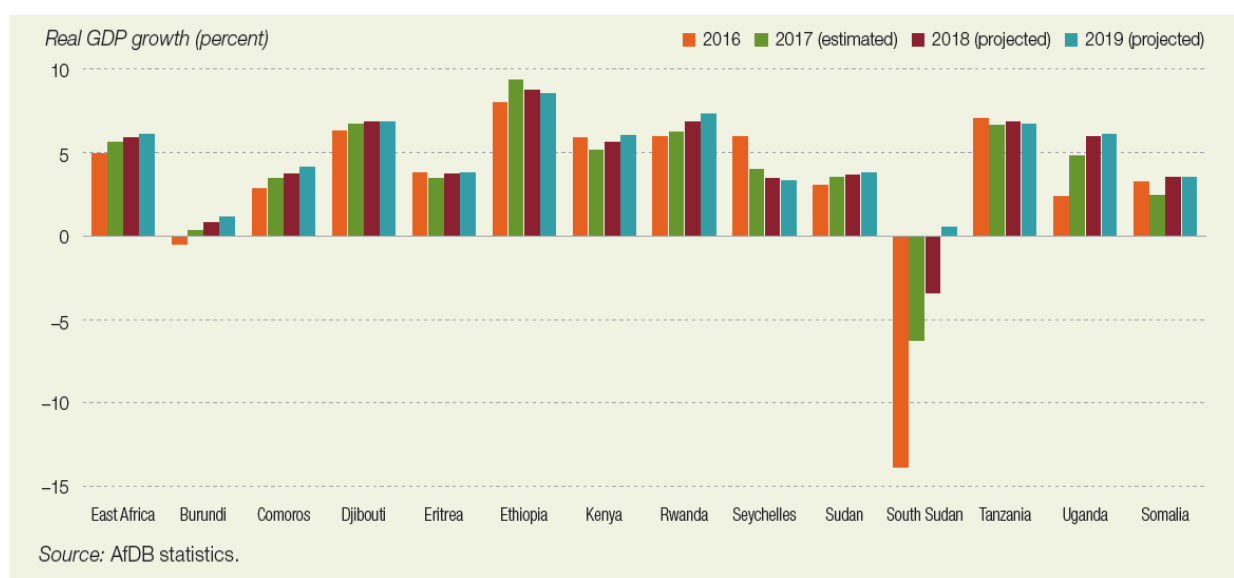
4.1 East AFRICA Economy Real GDP growth and the key drivers

¹¹East Africa’s robust 2017 GDP growth is forecast to continue in 2018 and 2019. The main contributors to the region’s growth are Ethiopia, Tanzania, Djibouti, Rwanda, Seychelles, and Kenya, in that order. Although growth in Seychelles and Ethiopia is projected to slow in 2018 and 2019, other countries in the region are expected to continue to register strong growth. A combination of factors explains the region’s economic performance. For most countries in the region, recovery from drought in 2017 was expected to shore up agriculture. In Djibouti and Ethiopia, continued investment in public infrastructure will further bolster growth, as will service sector expansion and strong private consumption in Rwanda. Sudan’s economy lost three-quarters of its oil revenues following South Sudan’s 2011 independence. Uganda and Kenya, with major trade and investment links in South Sudan, have also faced spillovers from the latter’s economic contraction.

¹¹ Detailed Presentation s found in East Africa Economic Outlook Report (2018) by the African Development Bank

Although South Sudan accounts for less than 1 percent of the region’s GDP, the severity of its economic contraction has reduced regional average economic growth (see figure 2). Burundi, Somalia, and Sudan, despite marginal improvement forecast for 2018–19, will also contribute less to the region’s growth. Somalia, in particular, still suffers from fragility. Thus, negative growth in East Africa’s fragile states, especially in South Sudan, has slowed growth.

Figure 7: Eastern Africa Regional Economic Growth 2016-2019



Source: African Development Bank

4.2 Sectoral GDP growth within the East Africa

Growth in East Africa has historically been driven by growth in agriculture due to its major contribution to GDP and employment in most countries. Agriculture’s leading role has persisted. It contributed 41 percent of East Africa’s average real GDP growth in 2017. However, industry’s importance is picking up as the sector contributed about 39 percent of the region’s average real GDP growth. This is particularly so in Ethiopia, Rwanda, and Tanzania, where the sector contributed remarkably to GDP growth. If that pattern persists, East Africa may experience textbook

Figure 8: Sectoral growth in East Africa

Country	GDP growth rates (%)	Growth in sector value added (%)			Contribution to GDP growth (%)		
		Agriculture	Industry	Services	Agriculture	Industry	Services
Burundi	2.0	1.1	1.5	2.6	0.2	0.3	1.5
Comoros	3.4	2.9	3.2	3.8	1.1	0.5	1.8
Djibouti	6.7	8.4	4.3	2.9	5.5	0.6	0.6
Eritrea	3.4	-1.8	4.6	11.2	-0.9	0.9	3.4
Ethiopia	8.1	1.7	23.8	6.1	0.7	5.1	2.4
Kenya	5.1	3.9	4.8	5.7	0.8	1.1	3.2
Rwanda	6.2	5.9	9.0	5.0	3.0	1.6	1.6
Seychelles	3.5	4.0	-1.6	-0.7	3.7	-0.2	0.0
Sudan	3.4	3.1	5.3	2.2	1.6	1.2	0.6
Tanzania	7.2	8.0	8.9	4.4	3.9	2.1	1.2
Uganda	5.1	5.1	5.5	4.6	2.4	1.5	1.2
East Africa: Average	5.9	5.0	10.5	4.3	2.4	2.3	1.3

Source: African Development Bank

4.3 Maritime Transportation and Economic Growth –need for Port linked Industrial Parks

As argued before development and quality of various modes that link to the Maritime system such as Ports have a direct correlation with the observed performance of Maritime Transportation. Hence availability of such modes will also be crucial factor to demand more from the economy and perhaps the maritime sector as well. That is why the services of maritime transportation or any other mode is *a Derived Demand meaning* that is not demanded by its own but due to the services it provides for. One of the major binding constraints in maritime transportation growth is availability of cargo. That is the only factor that can guarantee economic viability of the projects. Observed impressive economic growth of East and Southern Africa make a strong base or justification for improvement and expansion of transportation services. In countries like Ethiopia and Kenya INDUSTRIAL Parks have played a leading role in assurance of cargo availability once they are completed.

In this paper industrial parks are strongly recommended and the design must take a complete and holistic approach that ensures a systematic linkage between Ports, Industrial Areas and sources of raw materials. Therefore even in the ongoing port improvement and expansion WORLD class Industrial Parks covering major sectors such as Textile, Sugar Production, apparels, leather, pharmaceutical agro-processing such as tea, coffee, sisal need to be developed. Tanzania is currently implementing major drive of industrialization; Kenya as well as Ethiopia have already embarked on this industrialization drive. More efforts are also recommended to improve farming and exportation of major cash crops like sisal, coffee, cotton, tea, tobacco which are voluminous and like to increase demand for transportation services and the economy as well. In this way Maritime Transportation projects will be assured of cargo availability and hence attain pay back period of investment in this area.

The completed Mombasa- Nairobi Standard Gauge Railway is currently struggling to mobilize enough Cargo to attain a profitable operation. Last year they made a loss of 10 billion Kenya shillings. One of the major source of this loss was failure to get enough Cargo as they still compete with Trucks. They managed only 999,488 tons instead of at least 9 million tons. This translates into **Capacity Utilization** and **economic viability** as another binding constraint to maritime transportation.

4.4 Opportunities from China Africa Initiatives in Infrastructure Investment

4.4.1 Railway Projects in Africa

¹²The maritime Transportation stands a better chance to gain from increased interest of China to invest in Railways and Road in Africa via Africa China Infrastructure Initiatives. China has made a major comeback in the African rail sector, with financing commitments on the order of multi billions of US dollars for this sector. They include rehabilitation of more than 1 350 kilometers of existing railway lines and the construction of more than 1 600 kilometers of new railroad. To put this in perspective, the entire African railroad network amounts to around 50 000 kilometers. The largest projects started in Nigeria, Gabon, and Mauritania. In Nigeria, the Chinese have committed to financing a construction of the Abuja Rail Mass Transit System; and to the rehabilitation of 1 315 kilometers of the Lagos-Kano line under the first phase of Nigeria's railway modernization program.

In 2007, work started on the rehabilitation of the 1302 km Benguela Railway line in Central Angola at a cost of US\$300 million. In January 2009, the China Civil Engineering Corporation signed a US\$805 million contract with the Libyan government to build to build 172 kilometres of railway lines in the North African country. The most recent railways project was the commitment to finance a 430-km railroad linking Nouakchott to phosphate-rich Bofal in Mauritania, which was agreed upon in 2007. The project is financed by a US\$ 620 million China Ex-Im Bank loan and will be implemented by Chinese Transtech Engineering Corporation. Sudan has granted China's Sinohydro corporation a US\$300 million contract to construct 486 kilometres of roads in the country. The construction is expected to make a significant contribution to improving Sudan's road transport network in the northern and central parts of the country.\

4.4.2 Railway Projects in Eastern and Southern Africa

Within the Eastern and Southern Africa China support has facilitated brand new Standard Gauge Railways of Mombasa-Nairobi, Addis Ababa Djibouti and others on the pipeline. In summary all these are opportunities for the Maritime transportation within the region that requires strategic positioning for capture. One of the major binding constraint within the sector has been high transportation cost and reliability of other modes of transportation including railways. The presence of these railway lines calls for the maritime transportation to re-think on the best approach to change the attitude of customers and shift from trucks to trains to ferry their cargo. The Mombasa and Addis Railways are already up and running.

¹² The Report on State of Infrastructure in East Africa by the African Development Bank gives a detailed discussion on the status of Railways, Sea Ports and the Related infrastructure in Africa

Most recent development are conclusion of China proposal to construct a Railway Linking Zimbabwe and Zambia to the Ports of Mozambique. In its first phase it will cover 400 kilometer from Shamva in Zimbabwe to Moatize in Mozambique and connect to 900 kilometer portion that goes to Nacala Port. The project links China Soya Beans project in Zimbabwe. The project contribute to the second generation Railway revolution in Africa which considers Mozambique as major connector of Land locked Southern Africa to the Rest of the World. Maritime Transportation has an opportunity for all these projects. There has been a long standing complain about the poor transportation networks in African Railways which increases transportation cost. **The need to coordinate and harmonize these efforts is very critical for viability of these projects**

5 CONSTRAINTS OF MARITIME DEVELOPMENT FROM STATE OF RAILWAY SYSTEM OF EASTERN AFRICA

Maritime Industry without railway or road connection is like a Ship in a Desert. This is partly due to the fact that historically, there has been a greater interdependence between Ports and Railways or Road system to connect the cargo with import and export gateways on the one end and the production or sources of goods and services inland. Therefore a reasonable development of the Maritime Industry requires a simultaneous development of these other modes which are not alternative but rather interdependent. The performance of East African gateways thus is directly correlated with the observed quality, access and availability of other modes of transportation especially Railways. On the main international corridors, an absence of rail services creates opportunities for the trucking industry to inflate its prices. That is why intermodal competition on these corridors is critical. Increased competition from rail services benefits transport users primarily through comparable or lower transport costs.¹ Actual or potential competition from road operators drastically limits the railways' pricing power,² even in the situations where railways enjoy commanding market shares (World Bank 2006). Figure 4.1 compares rail and road prices in East and South Africa. In East Africa, road prices are established by trucking companies and take

Table 1: Transit time and cost in Africa

<i>Gateway</i>	<i>Destination</i>	<i>Distance (km)</i>	<i>Transit time from ship arrival to final destination</i>	<i>Transport price (in US\$ per ton)</i>
West Africa				
Lomé	Ouagadougou	1,050	6–8 days	60–70
Cotonou	Niamey	1,000	6–8 days	65–95
Central Africa				
Douala	N'Djaména	1,830	12–15 days	200–210
Douala	Bangui	1,450	8–10 days	200–210
East Africa				
Mombasa	Kampala	1,145	5–6 days	90
Mombasa	Kigali	1,700	8–10 days	100–110
Southern Africa				
Durban	Lusaka	2,300	8–9 days	90–130
Durban	Ndola	2,700	9–10 days	130–170

Source: Surveys of trucking companies and international logistics operators.

Note: Because of traffic imbalance, export prices are at most equal to import prices. However, in most cases, export prices are lower than import prices because to avoid coming back empty, truckers prefer to give discounts to get backload.

5.1 Importance of Railways in Maritime Transportation for Eastern and Southern Africa

¹³Existence of Railways in Eastern and Southern Africa dates back to the colonial era. Three railway gauges predominate in Africa-1,000 millimetre, 1,067 millimetre, and 1,453 millimetre-which severely limits physical integration of railway networks across regions. There are existing lines which are quite old and mostly out of use. Specific countries and regional integrations within the region have seen the importance of having improved railways and road system to strengthen the maritime transportation within the Eastern and Southern Africa. These are such as the African Maritime Transport Charter and the Union of African Railways Master Plan. Adopted in 1993, the charter provides a framework for harmonizing maritime activities, but has not been fully implemented. The 25-year master plan for railway development, adopted at the heads of state and government summit in Liberia in 1978, contains 18 projects to complete the missing links within and between countries and between different regional economic communities. But of the 26,000 kilometres in railway lines proposed in the plan, only 15,000 kilometres were included in the United Nations First Decade for Transport and Communications (1978-88).

The East African Railway Master Plan is a proposal for rejuvenating the railways serving Tanzania, Kenya, and Uganda and adding railways to serve Rwanda and Burundi. The objective is to further the economic development of eastern Africa by increasing the efficiency and speed, and lowering the cost, of transporting cargo between major ports on the Indian Ocean coast and the interior. All new railways will be standard-gauge, and existing narrow-gauge railways will be rehabilitated. The plan accounts for break of gauge issues and aims for a good interoperability within the resulting hybrid railway network. A later step

¹³ The East African Railway Master plan (2009) provides a detailed description on the status of Railways in the region and future plans.

would expand the eastern Africa railway network to South Sudan, Ethiopia, and the Democratic Republic of the Congo (DR Congo). The plan is managed by infrastructure ministers from participating East African Community countries in association with transport consultation firm CPCS Transcom Limited. There is a serious problem with existing railway lines. Most of them are not functioning for a wide range of reasons stemming from lack of maintenance to inefficiency.

Despite the challenges highlighted the importance of railway in Africa is very high. First is from the sustainability point of view. The modern Railway system is more environmentally friendly than road transportation of trucks. As we know most of the African economies are still rural based where the railway is perhaps the only connection to greater parts of these remote areas. Therefore, railway construction shall open up and unlock greatest potential of the African goods and services. There has been other information on the cost of road transportation. It is estimated that developing countries including Africa spend between 1 and 2 percent of their annual Gross Domestic Product in road maintenance and minor construction. Lastly is the size of African economies. Most of them are large in size. Within a journey of 1000 kilometer in Europe one can connect five countries but for Africa this can be sometime half of the Journey. Therefore, it is more economical to ferry long distance Cargo via effective and efficient Railways. This study thus call for increased interest in investment in Railways, but with a focus and cautious approach.

Table 2: Existing Railway system in Africa

Country	Railway	Gauge	Electrification ^[4]	Signaling ^[4]	Status
Kenya	<u>Mombasa–Nairobi Standard Gauge Railway</u>	1,435 mm (4 ft 8½ in) (Northern Corridor Integration Projects)	Uncertain. ^{[5][6]}	automatic block	Fully operational with diesel haulage.
	<u>Nairobi–Naivasha Standard Gauge Railway</u>		none (25kV 50Hz AC proposed, but no funding yet)		under construction (SGR phase 2A)
	<u>Naivasha–Kisumu Standard Gauge Railway</u>				actively planned (SGR phase 2B)
Kenya Uganda	<u>Kisumu–Kampala Standard Gauge Railway</u>				actively planned (SGR phase 2C)
Tanzania	<u>Tanzania Standard Gauge Railway</u>	1,435 mm (4 ft 8½ in) (Central Corridor / DIKKM projects)	25kV 50Hz AC	automatic block	under construction
Tanzania Rwanda	<u>Isaka–Kigali Standard Gauge Railway</u>				commencement phase
Tanzania Burundi	<u>Keza–Musongati Railway</u>				proposed
Rwanda Uganda	<u>Kigali–Kampala Standard Gauge Railway</u>				actively planned

Source: East Africa Railway Masterplan

Table 3: Status of Existing Railways

Country	Railway	Gauge	Electrification	Status
DR Congo	<u>Vicicongo line</u>	<u>600 mm</u> (1 ft 11 ⁵ / ₈ in)	no	mostly out of use
East Africa	<u>Lake Victoria ferries</u>	<u>1,000 mm</u> (3 ft 3 ³ / ₈ in)	no	<i>out of use</i>
Kenya	<u>Kenya Railways Corporation</u>			lack of maintenance, partially out of use
Uganda	<u>Uganda Railways Corporation</u>			lack of maintenance, partially operational
Tanzania	<u>Tanzania Railways Limited</u>			lack of maintenance, somewhat operational
Tanzania	<u>TAZARA Railway</u>			minimally operational
South Sudan	<u>Babanusa-Wau Railway</u>			not operational
DR Congo	<u>Great Lakes Railway</u>			
Djibouti	<u>Addis Ababa–Djibouti Railway</u>	<u>1,435 mm</u> (4 ft 8 ¹ / ₂ in)	<u>25kV 50Hz AC</u>	partially operational
Ethiopia	<u>Awash–Weldiya Railway</u> <u>Weldiya–Mekelle Railway</u>			under construction
Ethiopia				
Burundi	no railways			
Rwanda	no railways			

Source : East Africa Railway Master plan

As pointed out earlier, the major binding constraint facing maritime transportation in relation to these existing railways is that most of them are currently out of use due to old age, inefficiency and other range of issues. Capacity utilization for most of the existing railway lines is under 20 percent. Ultimately over 90 of huge cargo are ferried by trucks. However recently there has been a boom in Railways project which creates an economic opportunity for the maritime transportation. But the existing opportunities can turnout to be challenges if economic feasibility studies are not elaborative enough. For example, it is important to assess the likelihood and importance of replacement of trucks with trains.

5.2 Opportunities for Maritime Transportation from New Railway Projects

¹⁴There are a good number of railway development projects in the Eastern and Southern Africa. Upon completion they will provide a new dimension of maritime transportation and enable solving major problems that have been affecting the ferrying of huge cargo in a more efficient and economical way. One of the assumption provided for in economic feasibilities is that for the Railways to be economically profitable venture they should get at least 60 percent of all cargo available.

¹⁴ Information and updates of on going Railway Projects in Africa is found in the Railway magazines that are published every month.

This will depend on the ability of the railways system to create confidence to customers in terms of time serving, reliable services that assure quality and safety of the goods and services of the customers. Even in cases where the cost is proven to be lower for the railways customers have been reluctant. Thus improved modern railways are an opportunity worthwhile considering. Some of these projects are outlined below;

5.2.1 Malawi Zambia and Mozambique

This project is meant to enhance regional and international trade through the Nacala Development Corridor with a direct economic stimulus in Zambia, Malawi and Mozambique. The Ministry of Transport & Communications Mozambique has awarded China Civil Engineering Construction Corp a US\$2.26bn four-year contract to design and build the Zambia East Line, which would run for 388.8 km from Serenje on the Zambian Railways network to Petauke and Chipata. Chipata is the terminus of an existing 1067 mm gauge line from Malawi which offers onward links to Mozambique. Construction of the Zambia East Line would create a 1 500 km corridor from Kapiri Mposhi to the Indian Ocean at Nacala, significantly shorter than the current rail routes via Zimbabwe or Tanzania. The single track line would be suitable for passenger trains running at up to 120 km/h and freight trains running at 80 km/h. ‘This project is meant to enhance regional and international trade through the Nacala Development Corridor with a direct economic stimulus in Zambia, Malawi and Mozambique’,

5.2.2 Ethiopia-Djibouti Railway Line Modernization, Ethiopia

Infrastructure in the East of the continent saw the Ethiopia-Djibouti line updated in 2007. The two governments sourced funding from Exim Bank of China. It was agreed that \$3 billion worth of loans would help to build an electrified railway. The new railway connects Ethiopia’s capital Addis Ababa – Djibouti and was built by CCECC and China Railway Group between 2011 and 2016. The modernization upgrade has been designed so that trains will travel at speeds of 120kmh. The railway is the first step in a 5,000km-long network of rail which Ethiopia hopes to build by 2020, connecting it to Kenya, Sudan and South Sudan.

5.2.3 Mombasa-Nairobi Railway

The Mombasa–Nairobi Standard Gauge Railway is a standard-gauge railway (SGR) in Kenya that connects the large Indian Ocean city of Mombasa with Nairobi, the country's capital and largest city. This SGR runs parallel to the defunct, narrow-gauge Uganda Railway that was completed in 1901 under British colonial rule. The East African Railway Master Plan provides for the Mombasa–Nairobi SGR to link with other SGRs being built in the East African Community. At a cost of US\$3.6 billion, the SGR is Kenya's most expensive infrastructure project since independence. Because of the rough and hilly terrain, large portions of the SGR were built on viaducts, embankments, and cuttings. The Uganda Railway tackled the hilly terrain near Mazeras township by using a spiral. In contrast, the SGR passes through this area on two bridges, with the 43.5 metres (143 ft)-high Mazeras-2 bridge being the highest one on the route.

5.2.4 Malawi-Mozambique Nacala Port Railway

The first heavy haul coal trains began operation over the Nacala Corridor in 2015 and the line was formally inaugurated in May this year. Brazilian mining and steel group Vale has signed binding financial contracts which complete the investment structure for the Nacala Logistics Corridor. Announced on November 27, the deal covers US\$1.03bn from Japan Bank for International Co-operation, a US\$1bn loan insured by Nippon Export & Investment Insurance and a US\$400m loan insured by Export Credit Insurance of South Africa Ltd. The Corridor consists of a 906 km rail link from the Moatize coalfield in Mozambique to a deep-water port at Nacala-a-Velha on the Indian Ocean. From Moatize a new link runs to the border with Malawi at Chapananga and then through Malawi to meet the Central East African Railway network at Nkaya. The line from there to the eastern border at Nayuci was rehabilitated and about 600 km of the existing line to Nacala was upgraded. The first heavy haul coal trains began operation over the route in 2015 and the line was inaugurated on May 12 2017 by Mozambique President Filipe Nyusi in a ceremony at Nacala-a-Velha.

5.2.5 Dar-es-Salaam –Mwanza Kigali Standard Gauge Railway

Tanzania Government has embarked on major project to modernize Railway system as part of the Dar-es-Salaam -Kigali Railway. This Railway intend to connect Dar es Salaam Port with Mwanza on Lake Victoria, Kigali in Rwanda and Musongati in Burundi. The first phase of railway construction is being built by a joint venture between Yapı Merkezi and Portugal's Mota-Engil, with opening planned for October 2019. The 1 435 mm gauge single-track electrified line is expected to open in October 2019. Largely following the alignment of the existing metre-gauge route, the new line will be designed for 160 km/h passenger and 120 km/h freight services, with six stations including an inland freight terminal at Ruvu. Freight traffic is estimated at 17 million tonnes/year. State railway infrastructure authority Reli Assets Holding Co has awarded Turkish company Yapı Merkezi contract to build the 336 km Morogoro – Makutupora 1 435 mm gauge line. This is the second phase of a proposed 2 200 km standard gauge network. Future extensions are planned from Dodoma to the Lake Tanganyika port of Kigoma and Lake Victoria port of Mwanza. In the longer term, extensions to Rwanda and Burundi to complete a proposed 2 561 km standard gauge regional network.

In summary existence of these modern and state of the art railways provide for a greatest economic opportunity ever for the Maritime Transportation in particular and the East and Southern Africa economies in General. However member states have to balance between existing alternative railways, availability of cargo which can allow profitable running of these major economic ventures and existing competition from the trucks in the road transportation. The Mombasa-Nairobi Railway is already completed but unfortunately it has begun with a loss of 10 billion Kenya Shillings after failing to get optimal size of cargo. The company got only 999,488 tons instead of 9 million tons which would have enabled a profit of 5.08 billion Kenya shillings. This is not a bad start but it provide lesson that the need for integrated approach is most critical. Ethiopia has embarked on encouraging establishment of industrial parks within the proximity of the lines which assures a future increase in the cargo. The other aspect for electricity run trains there is a need to have prior arrangement and investment in electricity generation. Tanzania and Ethiopia have embarked on large scale investment in electricity to assure smooth running of the railways. The other issue that is worthwhile observing is excess capacity installation. As observed Railways in Africa have suffered low

rate of capacity utilization which render them uneconomical. Efforts to boost economic activities and hence demand for transportation services are encouraged.

6 ICT RELATED CONSTRAINTS AND OPPORTUNITIES OF MARITIME TRANSPORTATION EASTERN AFRICA

A well-functioning maritime transportation system largely require a reliable Information and Communication Technology. As indicated before, the modern economies work with HUBs and for maritime transportation need for a reliable connectivity that will enable tracking of vessels, time when a cargo was loaded from point of origin up to when it will be unloaded at entry port, trucking of its movement and other requirements all need to be well and effectively connected using very reliable information systems. Customers also need to have accessibility to proper information and when effecting payment the transaction should fast enough. Where more clarity is required telephones and internet connectivity should enable quickest possibility of communication. All these are a function of existing supportive ICT to support maritime transportation. Absence of this will amount to a binding growth constraint. logistics and trade-related infrastructure can severely impede a country's ability to compete on a global scale.

6.1 Need for Comprehensive Maritime Management Information System

The economic importance of Maritime Transportation is facilitated by high level efficiency that guarantee timely submission, timely delivery, high quality services which are less bureaucratic. Hence a reliable and well-functioning connectivity platform which enables a "HUB" of high quality, reliable and quick to retrieve information for cargo handling and processing. ¹⁵This calls for a *comprehensive Maritime Management Information Systems*. Some of the important systems here include Automatic Identification Systems (AIS), Vessel Traffic Management System (VTMS) and Port Operating Systems (POS). Such systems, when combined with a Port Community System acting as the hub, are able to offer a wide range of advantages to the transport sector in the country and the region by improving the efficiency and productivity of port operations. Performance of all these shall depend on the quality of ICT. Within the Eastern Africa despite observable progress in specific countries generally East Africa still faces infrastructure related challenges across different subsectors. First we acknowledge that in recent years, improvements have been made in the access to improved internet density and road corridors.

Hence, there are important growth opportunities in productivity-related infrastructure areas – namely, energy production, logistics and ICT. For the purpose of this study we draw information from previous studies that have compiled information of more than one country which can facilitate comparison. Therefore we use such information to provide a comparative assessment of the Ports within the study area. In terms of challenges the East Africa's ICT sector is characterized by high costs and low penetration.

¹⁵ For further information on ICT infrastructure and Maritime see Chapter 4 and Chapter 5 of the Report by African Development Bank "State of Infrastructure in East Africa.

However, a trend of falling prices and higher penetration has been observed in areas that have access to submarine cables. The most pressing issue for the subregion is to complete the fiber-optic backbone, which will provide broader coverage to all of East Africa. Around 3,565 kilometers of fiber-optic cable are needed to complete the network. This represents an investment requirement of US\$96 million. Despite the cost, this would give high rates of return, particularly for Sudan (116%) and Uganda (304%)

Table 4: Key transportation Corridors in Africa

Table 11: Key transportation corridors for international trade in Sub-Saharan Africa

Corridor	Length (km)	Road in good condition (%)	Trade density (US\$ mn per km)	Implicit velocity (km/hr)	Freight tariff (US\$/tonne-km)
Central	3,280	49	4.2	6.1	0.13
Western	2,050	72	8.2	6.0	0.08
Eastern	2,845	82	5.7	8.1	0.07
Southern	5,000	100	27.9	11.6	0.05

Source: Teravaninthorn and Raballand, 2009 in AICD, 2011: 10.

Source AICD

¹⁶A range of reports on ICT suggest that East Africa has the highest costs and lowest penetration of internet services among all the African subregions, while the density of fixed-line telephone users and mobile users is among the lowest in Africa. Per 100 inhabitants, EAC has 0.02 broadband subscribers, 0.05 internet subscribers, and 21 mobile telephone subscribers. However, recent 2011 data from the International Telecommunication Union (ITU) shows that mobile penetration doubled between 2008 and 2011, due to improvements in service provision. Within East Africa there is strong GSM coverage around Lake Victoria – spanning Rwanda, Uganda, and Kenya. Coverage in Burundi, Sudan and Tanzania is less extensive.

Table 5: Status of Telecommunication in Eastern Africa

¹⁶ For further information on ICT infrastructure and Maritime see Chapter 4 and Chapter 5 of the Report by African Development Bank “State of Infrastructure in East Africa.”

	Burundi	Kenya	Rwanda	Tanzania	Uganda	Ethiopia	Sudan
Coverage of mobile network (% of population)	60	92	90	60	97	10	70
Mobile telephone subscribers (per 100 inhabitants)	3.17	30.23	6.98	20.92	18.25	1.64	20.04
Internet subscribers (per 100 inhabitants)	0.01	0.04	0.03	0.09	0.03	0.03	0.11
Broadband subscribers (per 100 inhabitants)	0.00	0.05	0.03	0.00	0.01	0.00	0.11
International Internet bandwidth (Mbps)	4	885	31	200	344	245	705

Source AICD

Prices vary widely among the countries. Telecom services in Ethiopia and Sudan are generally cheaper than the EAC countries. ¹⁷Most recent estimates for mobile prices range from less than US\$3 per month for a standard basket of services in Ethiopia and Sudan to almost US\$18 per month in Kenya. The median price for a standard basket of services in the subregion is around US\$9. The price of dial-up service reveals wide variation (by up to a factor of 10) across countries, ranging from US\$15 per month in Ethiopia to US\$148 per month in Tanzania. There are also substantial differences in call rates between the countries. In the EAC, the cost of international calls to another EAC country substantially exceeds that of international calls to the US. The difference is as much as 14 cents per minute in Kenya and 19 cents in Tanzania. Internet prices also generally remain high in the EAC due to the lack of submarine cables. The most pressing issue for the region is to complete the fiber-optic backbone to improve the GSM coverage and reduce the price discrepancy between EAC and broader East Africa.

TABLE 6: Telephone Cost in Eastern Africa

	Burundi	Kenya	Rwanda	Tanzania	Uganda	Ethiopia	Sudan
Prepaid mobile monthly price basket	11.5	17.8	11.5	9.5	9.2	3.6	3.8
Price of a 3 minute call to USA	2.4	1.8	1.3	0.7	1.4	3.3	1.3
Price of the 20-hour Internet basket	52.0	82.0	85.0	148.0	58.0	15.0	29.0
Price of fixed telephone monthly price basket	2.5	19.4	7.8	11.3	13.2	1.7	4.5

Source AICD

¹⁷ For further discussion is in the Report by African Development Bank “State of Infrastructure in East Africa.”

7 REGIONAL AGREEMENTS AND POLICIES ON MARITIME AND THE RELATED DEVELOPMENT

Maritime transportation requires well coordinated and integrated efforts due to the nature of water bodies that tend to overlap from one country to another. Regional agreements also help to exchange information within blocks of countries and trade flows facilitation. Different trade facilitation measures can be implemented to reduce waiting times and improve the logistics performance of countries in other ways. It has been suggested by UNCTAD (2015) that the transparent publication of trade-related information (such as measures included in article 1 of the WTO TFA) as well as the simplification and reduction of customs formalities. Hence development of maritime transportation needs to consider the fact that there are inland transportation using Rail and Road which display the overlapping nature thus calling for integrated efforts. Therefore, coordination and harmonization is very critical to enable maximum economic benefits. Examples of continental integration initiatives in transport are the African Maritime Transport Charter and the Union of African Railways Master Plan. Specifically, for East African member states they have a Treaty of establishment which categorically stipulate agreement for maximum utilization of maritime resources for the sector development. For instance, adopted in 1993, the charter provides a framework for harmonizing maritime activities, but has not been fully implemented. The 25-year master plan for railway development, adopted at the heads of state and government summit in Liberia in 1978, contains 18 projects to complete the missing links within and between countries and between different regional economic communities. But of the 26,000 kilometres in railway lines proposed in the plan, only 15,000 kilometres were included in the United Nations First Decade for Transport and Communications (1978-88).

7.1 Maritime Transportation Agreements in The Treaty for the Establishment of East African Community

The EAST African community member states of Tanzania Kenya, Uganda, Rwanda, Burundi and now DRC and Southern Sudan has their treaty of establishment which provide adequate agreement on Maritime Transportation. In article 93 through 97 the treaty provides for an integrated system of maritime transportation development. The key statements and agreement on Maritime Transportation and Ports in the treaty are;

- Maritime Transportation and Ports
- Inland Waterways Transport
- Multimodal Transport
- Freight Booking Centers
- Freight Forwarders, Customs Clearing Agents and Shipping Agents

These are discussed below as follows

7.1.1 East African Agreements on Maritime Transport and Ports

The Partner States shall:

- (a) promote the co-ordination and harmonization of their maritime transport policies and establish a common maritime transport policy;
- (b) promote the development of efficient and profitable sea port services through the liberalization and commercialization of port operations;
- (c) make rational use of existing port installations;
- (d) in the case of the coastal Partner States, co-operate with the land-locked Partner States and grant them easy access to port facilities and opportunities to participate in provision of port and maritime services;
- (e) take measures to ratify or accede to international conventions on maritime transport;
- (f) establish a harmonious traffic organization system for the optimal use of maritime transport services;
- (g) co-operate in the elaboration and application of measures to facilitate the arrival, stay and departure of vessels;
- (h) promote co-operation among their port authorities in the management and operations of their ports and maritime transport so as to facilitate the efficient movement of traffic between their territories;
- (i) agree to charge non-discriminatory tariffs in respect of goods from their territories and goods from other Partner States, except where their goods enjoy domestic transport subsidies, and apply the same rules and regulations in respect of maritime transport among themselves without discrimination;
- (j) agree to allocate space on board their ships for goods consigned to or from the territories of other Partner States;
- (k) install and maintain efficient cargo handling equipment, cargo storage facilities and general operations and train related manpower and where feasible shall undertake these jointly;
- (l) agree to allocate adequate space for the storage of goods traded among themselves;
- (m) co-ordinate measures with respect to, and co-operate in the maintenance of, the safety of maritime transport services, including joint search and rescue operations;
- (n) provide adequate facilities with good communication systems that would receive and respond to signals promptly;
- (o) inter-connect their national communication systems so as to identify polluted points in oceans for concerted marine pollution control;
- (p) encourage their respective national shipping lines to form international shipping associations;
- (q) review their national maritime legislation in accordance with the existing international maritime conventions.

7.1.2 East African Agreements Inland Waterways Transport

The Partner States shall:

- (a) harmonize their inland waterways transport policies and shall adopt, harmonize and simplify rules, regulations and administrative procedures governing waterways transport on their common navigable inland waterways;
- (b) install and maintain efficient cargo handling equipment, cargo storage facilities and general operations and train related manpower resources and where possible shall undertake these jointly;
- (c) encourage joint use of maintenance facilities;
- (d) harmonize tariffs structure for waterways transport on their common navigable inland waterways;
- (e) adopt common rules to govern the packaging, marking, loading and other procedures for waterways transport on their common navigable inland waterways;
- (f) agree to charge the same tariffs in respect of goods transported within the Community and apply the same rules and regulations in respect of inland waterways transport among themselves without discrimination;
- (g) agree to provide space without discrimination on board vessels registered in their territories for goods consigned to and from their territories;
- (h) wherever possible, promote co-operation among themselves by undertaking joint ventures in inland waterways transport including the establishment of joint shipping services;
- (i) co-ordinate measures with respect to, and co-operate in the maintenance of, safety in inland waterways transport services including the provision and maintenance of communication equipment to receive distress positions promptly and joint search and rescue operations;
- (j) facilitate the deployment of inland waterways vessels and equipment for efficient conveyance of all classes of traffic to and from each Partner State;
- (k) integrate efforts to control and eradicate the water hyacinth menace and its effects on inland waterways transport;
- (l) facilitate joint studies in the use and management of inland waterways;
- (m) provide regional training and research facilities for the promotion and development of marine operations and meteorology;
- (n) undertake joint surveying, mapping and production of navigational charts and provision of navigational aids;
- (o) facilitate provision of adequate meteorological equipment, communication and safety facilities to vessels plying the lakes within the Partner States;
- (p) jointly tackle issues on inland water pollution with a view to achieving effective monitoring and control thereof;
- (q) jointly explore utilization of unexploited inland waterways transport resources and tackle matters related to shipping and port services; and
- (r) harmonies national policies on inland waterways transport.

7.1.3 East African Agreements Multimodal Transport

The Partner States shall:

- (a) harmonies and simplify regulations, goods classification, procedures and documents required for multimodal transport within the Community;
- (b) apply uniform rules and regulations with respect to the packaging, marking and loading of goods;
- (c) provide where feasible, technical and other facilities for direct transshipment of goods at main trans-shipment points including intermodal cargo exchange points, inland clearance depots, dry ports or inland container depots;
- (d) agree to allocate multimodal transport facilities for goods consigned to or from the Partner States;
- (e) take measures to ratify or accede to international conventions on multimodal transport and containerization and take such steps as may be necessary to implement them; and
- (f) promote communication and information exchange to enhance the efficiency of multimodal transport.

7.1.4 East African Agreements Freight Booking Centers

The Partner States shall encourage the establishment of freight booking centers.

7.1.5 East African Agreements Freight Forwarders, Customs Clearing Agents and Shipping Agents

1. The Partner States shall harmonies the requirements for registration and licensing of freight forwarders, customs clearing agents and shipping agents.
2. The Partner States shall allow any person to register, and be licensed, as a freight forwarder, customs clearing agent and shipping agent, provided that, that person fulfills the legal and customs requirements of that Partner State.
3. The Partner States shall not restrict the commercial activities, rights and obligations of a lawfully registered and licensed freight forwarder or clearing agent.

7.2 African Union Maritime Transport Charter

Heads of State and Government of the Member States of the African Union (AU), Inspired by the objectives stated in the Constitutive Act of the African Union, particularly Article 3; Considering the treaty establishing the African Economic Community, particularly the relevant provisions dealing with maritime transport; Considering the relevant provisions of the Convention relating to Transit Trade of Landlocked States, signed on 8 July 1965 in New York; Recognizing the specific character of maritime transport as a regional, continental and international activity; Recognizing also the role of maritime transport in the facilitation and development of trade between Africa and other parts of the world and the need to implement

an effective maritime transport policy with a view to promoting intra African trade and trade between African States and other continents.

The Charter aims at strengthening cooperation among States Parties in maritime transport, inland waterways navigation, ports and related activities. The Charter further seeks to promote cooperation between States parties, regional and international organizations. States adopt the following fundamental principles: a) Sovereignty, solidarity, cooperation, and interdependence of States; b) Harmonization and coordination of States parties' policies and procedures where practicable in all relevant areas connected with international maritime transport inland waterways and ports; c) Efficiency, safety, security and global competitiveness of maritime, port infrastructure and operations in order to promote economic and social development; d) Safe, secure and efficient shipping on clean oceans and sustainable maritime, port policies and implementation strategies; e) Rights of access to and from the sea and freedom of transit for every landlocked State parties within the framework of international law; f) Transparency and accountability in maritime and port operations.

7.2.1 African Union Cooperation in Maritime and Inland Waterways Transport.

Chapter Five of the Charter categorically addresses Cooperation in Maritime and Inland Waterways Transport. Specifically, it states that;

1. In order to facilitate effective cooperation, States Parties shall endeavour to engage in consultations at regional, continental and international levels and harmonize their policies in the area of maritime, multimodal transport and inland waterways.
2. States Parties agree to cooperate at bilateral, sub regional and regional levels on all matters contained in this Charter to promote safe, secure, clean waters and environmentally sustainable maritime inland waterways transport practices.
3. States Parties agree to cooperate in the field of shipping and ports operations and Search and Rescue on the basis of the principles embodied in this Charter.
4. States Parties agree to cooperate at regional, continental and international levels to prevent and control maritime pollution in order to protect and conserve the marine environment and to suppress all unlawful acts, piracy, terrorism, etc.
5. States Parties commit themselves to cooperate to promote integration conditions and the sectoral development of landlocked and island States. Article 13 Cooperation among African shipping companies In promoting cooperation among African shipping lines.

7.2.2 African Union agreements on Cooperation in Transport Auxiliaries

Article 14 Cooperation in Transport Auxiliaries 1. States Parties agree to structure and organise maritime transport auxiliary services in order to enhance competitiveness and better quality services delivery for the benefit of their economies. 2. In this regard States

Parties shall endeavour to: a) Promote access of African operators to maritime transport auxiliary services or professions; b) Create an enabling environment to foster equity investment by African operators in foreign companies operating in Africa in maritime professions and transport auxiliary; c) Encourage African operators to pool resources including expertise in order to foster the emergence of African maritime transport auxiliary groupings capable of competing

7.2.3 African Union Agreement Development of Multimodal Transport and Port Management

Chapter Six of the Charter stresses on **Development of Multimodal Transport and Port Management Article 21 Promotion of Multimodal Transport**. Specifically it directs that States Parties shall promote multimodal transport at national and regional levels through the: a) Development of an appropriate regulatory framework; b) Improvement of existing facilitation and transit policies; c) Promotion of the development of integrated transport master plan for all modes of transport at national, subregional, regional and continental levels; d) Construction, rehabilitation and modernization of infrastructure, equipment and transport services; e) Training of transport services professionals; f) Establishment of economic community and logistics platforms. Furthermore it inform that States Parties shall work towards the establishment of a harmonized legislative and regulatory framework capable of ensuring the promotion and the guaranteeing of stability of multimodal joint ventures. 3. States Parties shall endeavour to participate in the negotiation, adoption and implementation of regional and international conventions on multimodal transport.

Chapter six of the Charter focuses on human resource advancement. Specifically it emphasizes on Training and Capacity Building and Upgrading of Professionals in the Maritime Sector States Parties shall endeavor to invest in and finance established programs for education and training in relevant maritime skills and for upgrading maritime professionals in all areas of the maritime and ports industry. Article 37 Gender Balance and Participation of Women 20 1. States Parties agree to promote and adopt policies that create opportunities for the advancement of gender equality, and vigorously promote economic opportunities; recruitment, placement, promotion and progression of women in the maritime sector. 2. States Parties shall endeavor to enact relevant legislation to give effect to the acceleration of women empowerment in the maritime sector including encouragement of specific education, mentoring and training of women at all levels.

8 SUMMARY OF FINDINGS CONCLUSIONS AND RECOMMENDATIONS

8.1 Summary

This paper set out to assess constraints and growth of Maritime transportation systems in Africa. In particular it examined maritime transportation in two corridors: i) Northern Corridor which runs from the port of Mombasa via Nairobi to Kampala, with extensions to the Democratic Republic of Congo, Rwanda, and Burundi. Mombasa, which is the largest port in East Africa. And ii) the North-South Corridor in Southern Africa *that* links Zambia and the southeast Democratic Republic of Congo to the subregion and overseas markets. These are Dar-es-Salaam, Walvis Bay, Beira, and the north-south corridor through Durban. The north-south corridor serves a dual purpose: First, it serves as an intraregional trade route between Zambia (and further southeast, the Democratic Republic of Congo and western Malawi) and its neighbors, Botswana, Zimbabwe, and South Africa, and as a link to the port of Durban for overseas imports and exports. The report stresses on the importance of maritime transportation on the economic development especially through *Trade Facilitation*.

A sensible rule of thumb here is thus to attach a direct correlation between investment in Maritime industry with economic trends. African economies including East Africa have recently shown rapid growth rates sometime above the regional average. To a large extent growth in regional and **global trade** will require efficient effective and reliable maritime transportation system. According to the report, sub-Saharan Africa can achieve significant gains by investing in ports because efficient gateways have the ability to reduce the price of imported goods and increase the value of exports. Notably, improving port performance by 25 per cent could reduce the price of imported goods by \$3.2 billion annually and add \$2.6 billion to the value of exports. This would add at least \$510 million per annum to GDP growth, a 2 per cent increase in GDP. Moreover, more than 50 per cent of total land transport time from port to hinterland cities in landlocked countries is spent in ports.

8.2 Findings of the Study

Paper findings are that **port inefficiency** depicted by longer container dwell time, delays in vessel traffic clearance, lengthy documentation processing, lesser container per crane hour (with exception of South Africa) as one of the critical binding constraints. Ultimately over 70 percent of delays in cargo delivery compose of time spent within Ports. The study also confirm inefficiency in railway system as another big challenge facing the maritime transportation. Problems of Railway are in the form of low speed and unreliability (Railways), insecurity, congestion, delays in checkpoints, diversions due to frequent maintenance. There are currently on-going projects to improve railway. But still there is need to strategically change attitudes of customers to make use of Railways. This is due to existing competition between trucks and Railways. Like in other regions of the World trucks still command over 80 percent of the cargo market share in Africa and in some countries up to 95 percent. Even the completed Mombasa-Nairobi Railway is facing Cargo availability problem. The study recommends need to continue supporting Railway development to minimize the social cost of overreliance on Roads which takes between 1 and 2 percent of GDP though maintenance.

The paper also finds inadequacy in human resource and ICT system to support an efficient and effective integrated Port Management Information System for efficient port administration and professional leadership to guarantee globally competitive and high-quality port performance.

The economic growth of the region which is higher than the sub-Saharan average and drive for industrialization along with on going ports improvement and Standard Railway Gauge projects are the greatest opportunities ever for maritime transportation in Eastern and Southern Africa. Currently, it is estimated that high transport costs add 75 per cent to the price of goods in the continent. "It is imperative to note that high port logistics costs, poor reliability and low economies of scale in trade volumes have a negative impact on trade growth in Africa meaning the continent can save an estimated \$2.2 billion annually in logistics costs if the average throughput at the major ports is doubled. "This is because the unit cost of transferring cargo through a port rapidly reduces as the volume of traffic increases," The report shows an estimated 14.5 million containers are handled at sub-Saharan ports each year, with East Africa accounting for 18 per cent of the containers.

Investing in port facilities is critical considering the dwell time in African ports, that is the amount of time from when a container is offloaded until it leaves a port, is up to four times longer than in Asia. Furthermore, the report has highlighted a wide range of constraints and opportunities facing the maritime transportation within the Eastern and Southern Africa and also set up a range of solution to address those challenges. Importance of implementation of regional agreements especially the African Union Maritime Transportation Charter and the Treaty of the East African Community on Maritime Transportation and Ports; Inland Waterways Transport; Multimodal Transport; Freight Booking Centers; Freight Forwarders, Customs Clearing Agents and Shipping Agents.

Surface transportation costs associated with logistics in East Africa have usually been blamed as higher than in any other region in the world. This is mostly attributable to administrative and customs delays at ports and hold-ups at national borders and checkpoints along the road networks. Capacity constraints faced at the ports, coupled with extremely lengthy import and export procedures, add considerably to the time and cost of transporting goods in East Africa. However, in October 2012, the EAC sectoral council cleared the legal content of two bills for tabling to the East African Legislative Assembly. The two bills establish the operation of one-stop border posts and the application of a uniform vehicle weight (axle load) limit for the region (Vehicle Load Control Bill). This shall speed up customs procedures and regularize truck loads to reduce deterioration of the road networks.

Information and Communications Technology East Africa's ICT sector is characterized by high costs and low penetration. However, a trend of falling prices and higher penetration has been observed, particularly where there is access to submarine cables. The most pressing issue for the subregion is to complete the fiber-optic backbone and provide broader coverage to all of East Africa. Around 3,565 kilometers of fiber-optic cable is needed. Almost all of the rail systems in Africa have their origins in the early 20th century when European colonial powers. But of recent the African continent is experiencing important economic, social and institutional developments which are creating a framework in which railways may once again play a major role within the transport system. The growth of large cities, the opening of new mines and the strengthening of interregional corridors are some of the factors that will drive the commitment to rail during the 21st century. This new situation has attracted the interest of most investments in Railways.

Integration between the modes, and the development of a modern logistical chain has not started. The benefits of these improvements pass not only to port operators but also

to port customers including shipping lines, freight forwarders, and shipping agents. At the national level, the entire Port community and those who depend on it can benefit from the provision of an enhanced and economic logistic chain for international shipping. Rail transport's limitations push goods transport onto roads. This compounds the problems of roads, creating congestion and raising the unit cost of transport over longer distances, particularly for landlocked countries.

Maritime Services cost as a binding constraint. Developing countries, especially in Africa and Oceania, pay 40 to 70 per cent more on average for the international transport of their imports than developed countries. The main reasons for this situation are to be found in these regions' trade imbalances, pending port and trade facilitation reforms, as well as lower trade volumes and shipping connectivity. There is potential for policymakers to partly remedy the situation through investments and reforms, especially in the regions' seaports, transit systems and customs administrations. Container freight rates remained volatile throughout 2014 although with different trends on individual trade lanes. Market fundamentals have not changed significantly despite the expansion in global demand for container shipping.

8.3 Conclusion and Recommendations

This paper set out to assess and document the opportunities and identify the critical binding constraints for growth and available opportunities of maritime transport in Eastern and Southern Africa. To do so it examines a wide range of factors that influence the state of maritime transport within the region. One major conclusion from this paper is that the maritime transportation service within the Eastern and Southern Africa are on very high demand amid the growth in Eastern Africa and Southern Africa economies. Nearly all major port of Mombasa, Durban, Dar es Salaam, Beira, Nacala, Maputo, Cape town, Port Elizabeth, Djibouti and East London are undergoing massive construction and improvement for expanding their services. The demand for maritime transportation services is a derived demand -implying that it is not demanded for its own sake but because of its need to facilitate other economic activities. Trade facilitation is one major area that demands Maritime Transportation in East Africa.

The important conclusion of the paper is that the implementation of these maritime transport service are simultaneously moving with such as Railway and Roads, Already all major port linked states are engaged in a multibillion second generation railway evolution in Africa with exception of Tanzania the rest are Chinese funded standard gauge Railway upgrading project, already Addis Ababa to port deli port part railway and Mombasa port to Nairobi Railway have been completed and are up running several more shall be completed by 2020 all these development in the region provide huge opportunities for growth of maritime transportation in Eastern and Southern Africa.

The study of also documented a number of factors that are major constraints to growth of maritime transportation in the region. These constraints require policy intervention within each member state and via the existing regional forums such as African Union, COMESA, East Africa Community and SADC. The maritime transportation and logistics need to be integrated with in countries and among the regional states already the maritime transport charter of Africa Union along with the East Africa community treaty of establishment

provide and call for a well candidate harmonization and integration of maritime transportation and services.

A range of country difference needs to periodically be assessed and addressed. For instance, experience of completed project suggest the danger of capacity utilization and hence unprofitability of new investment if not well calculated. Traditionally there has been competition between trucks and railway transportation. This is partly because of a stigma when it comes to a choice between truck and railway. This observation reminds a famous story where by many African. Finally, member start as are encourage to invest more on economic and market critical country specific constraints as first and pre-requisite step towards improvement of maritime Transportation in the region of Eastern and Southern Africa. Port inefficiency appears to be on of the major challenge such that ports that attains the most efficient levels are likely to take the largest share of customers.

The paper for instance confirms that Durban port which put huge investment effort in removing port related delays and cost is one of the best performing port in the region the port attained to global standard benchmarks in most respect. This has enabled Durban to complete with port that are quite for and attract customer from all over the region. The policy recommendation on this aspect is that most of port inefficiencies can be solved at no cost and result in substantial redrums, the study review for example reveal that up to 80 percent of travel, the cost and complains of customer are matter that can be periodically assessed and addressed by decision at policy make

REFERENCES

- AlixPartners (2015). *Container Shipping Outlook*. Available at <http://www.alixpartners.com/en/LinkClick.aspx?fileticket=WD5LcJeJkhs%3d&tabid=635> (accessed 9 September 2015).
- Angeloudis P, Bichou K, Bell M and Fisk D (2006). Security and reliability of the liner container shipping network: Analysis of robustness using a complex network framework. Presented at the International Association of Maritime Economists conference. Melbourne. 12–14 July.
- Africa Infrastructure Country Diagnostic (AICD) (2011). *East Africa's Infrastructure: A Regional Perspective*. Policy Research Working Paper WPS 5844. Washington, DC: World Bank. Available at: <http://econ.worldbank.org/external/default/main?pagePK=64165259&piPK>
- African Development Bank Group (AfDB) (2011). "African Infrastructure Development Index." Economic Brief, Vol. 1, Issue 1, April 2011. Tunis: AfDB.
- African Development Bank Group (AfDB) (2012a) *AfDB-Funded Thika Superhighway: A Masterpiece for East Africa "A National Pride" - President Mwai Kibaki*. Available at: <http://www.afdb.org/en/news-and-events/>
- African Development Bank. 2012. *Accessing Local Markets for Infrastructure: Lessons for Africa*. Working Paper.
- Association of Train Operating Companies (ATOC). 2011. *Rolling stock and value for money: An ATOC discussion Paper*. United Kingdom.
- Corbett, J. J., and P. S. Fischbeck (1997), Emissions From Ships, *Science*, 278(5339), 823-824.
- Corbett, J. J., et al. (1999), Global Nitrogen and Sulfur Emissions Inventories for Oceangoing Ships, *Journal of Geophysical Research*, 104(D3), 3457-3470.
- Corbett, J. J., and H. W. Koehler (2003), Updated Emissions from Ocean Shipping, *Journal of Geophysical Research - Atmospheres*, 108(D20), 4650-4666.
- Corbett, J. J. (2004), Marine Transportation and Energy Use, in *Encyclopedia of Energy*, edited by C. J. Cleveland, pp. 745-748, Elsevier Science, San Diego, CA.
- Corbett, J. J., and H. W. Koehler (2004), Considering Alternative Input Parameters In An Activity-Based Ship Fuel Consumption And Emissions Model, *Journal of Geophysical Research - Atmospheres*, 109(D23303), 8.
- EAC (2011). *Corridor Diagnostic Study of the Northern and Central Corridors of East Africa*. Available at: <http://www.eastafricancorridors.org/updates/actionplan/CDS%20Action%20Plan%20Vol%201%20ToC%20ExSum.pdf>
- EAPP and EAC (2011). *Regional Power System Master Plan and Grid Code Study*. East African Community Infrastructure (2013). Available at: <http://www.infrastructure.eac.int>
- East African Railways Master Plan Study. Final Report (2009)*.

Endresen, Ø., et al. (2003), Emission from International Sea Transportation and Environmental Impact, *Journal of Geophysical Research*, 108(D17), 4560.

Kasibhatla, P., et al. (2000), Do Emissions from Ships Have a Significant Impact on Concentrations of Nitrogen Oxides in the Marine Boundary Layer?, *Geophysical Research Letters*, 27(15), 2229-2233.

Lawrence, M., and P. Crutzen (1999), Influence of NO_x Emissions from Ships on Tropospheric Photochemistry and Climate, *Nature*, 402(6758), 167-170.

Magala, Mateus, and Adrian Sammons. 2008. "A New Approach to Port Choice Modeling." *Maritime Economics and Logistics* 10 (1–2): 9–34.

Rodrigue, Jean-Paul, and Theo Notteboom. 2009. "The Terminalization of Supply Chains: Reassessing Port-Hinterland Logistical Relationships." *Maritime Policy and Management* 36 (2): 165–83.

Organization for Economic Co-operation and Development (OECD). 2012. *Mapping Support for Africa's Infrastructure Investment*.

Skjølsvik, K. O., et al. (2000), Study of Greenhouse Gas Emissions from Ships (MEPC 45/8 Report to International Maritime Organization on the outcome of the IMO Study on Greenhouse Gas Emissions from Ships), IMO contract report, MARINTEK Sintef Group, Carnegie Mellon University, Center for Economic Analysis, and Det Norske Veritas, Trondheim, Norway.

UNCTAD (2015). The intrinsic relation between logistics performance and trade facilitation measures. *Transport and Trade Facilitation Newsletter*. First quarter. Issue No. 65. Available at http://unctad.org/en/PublicationsLibrary/webdtltlb2015d1_en.pdf (accessed 10 September 2015).

UNCTAD (United Nations Conference on Trade and Development). 1995. *Strategic Port Pricing*. UNCTAD/SDD/PORT2. New York: UNCTAD.

Wood, Donald F., Anthony P. Barone, Paul R. Murphy, and Daniel L. Wardlow.

2002. *International Logistics*, 2d ed. San Francisco: AMACOM Books.

World Bank (2010). *The Logistics Performance Index 2010*. In *Connecting to Compete 2010: Trade Logistics in the Global Economy*. Washington, DC: World Bank.