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East Africa Waterway Transport, Coastal Ports Growth, Opportunity and Challenges.

Nyamatari Anselem Tengecha[1], Xinyu Zhang[2], Msabaha Juma Mwendapole[3], Tafuteni Nicholaus Chusi[4]

[1]*Dalian Maritime University, Dalian 116026, China, Maritime Intelligent Transportation Group.*
[2]*Dalian Maritime University, Dalian 116026, China, Maritime Intelligent Transportation Group.*
[3]*Dar es Salaam Maritime Institute, Dar es Salaam, Tanzania*
[4]*Institute of Rural Development Planning, Dodoma, Tanzania.*
Corresponding Author: Xinyu Zhang (zhangxy@dlmu.edu.cn)

ABSTRACT: *Over several decades, waterway transport persists as the most used mode for commodities transport globally, coastal ports facilitate business amalgamation, and for Eat Africa (EA countries mainly Tanzania and Kenya principally depend on ports for their nation GDP. Desperately EA coastal ports often fail to meet world standards, enthusiastically affect the sector growth locally and globally. Recently, the average EA ports volume growth is nearly 9.0 % annually, though these huge cargo volume annual growths, there is invisible serious ports investment measures taken by authorities to encounter the feasible challenges. Several constraints are facing this industry resulting to meagre services delivered. Fewer researches have been done in regarding to EA coastal ports, hence this research was conducted to pattern ports development, opportunities and related challenges. Mombasa and Dar es Salaam as representative area, and mixed method were adopted. The finding depict, sustainable measures are required for ports development to meet global maritime standard, they are highly affected by high service waiting time, vessels congestion, lack of expertise, berths limitation, lack of strong institution framework, rail and road connectivity constraints. However, the ports apart from contributing to nation economy but also create opportunities to residents surrounding areas.*

KEYWORDS: *Port performance, coastal ports, port infrastructure, maritime transport, international maritime trade.*

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I. INTRODUCTION

East Africa coastal ports for a period of time have been identified to contribute small share to global maritime trade, and are categorized to be poorly performing compared to others global ports (Mlambo, 2021). Most of East Africa countries by 2017, demonstrated durable and steady economic growth, averaging GDP (gross- domestic - product) growth of 5.4 % annually, although there is worldwide economic trembling since end of 2019 to date caused by COVID-19 pandemic, the regions economic is slowly improving (R. M. Humphreys, Dumitrescu, Biju, & Lam, 2020). The cargo traffic flow has exponentially increased by 9.0 % a year in fewer vital coastal ports, with transit shipments to near countries (landlocked) averaging increased at 17 % annually. Steady growth was more experienced in Tanzania, Kenya and Rwanda (M. Humphreys, Stokenberga, Herrera Dappe, Hartmann, & Iimi, 2019). For example, 2019, port of Mombasa handled 34 million tons of cargo, it was 12% volume increase compared to preceding year, with 10 % transit to neighbour countries, Uganda dominating the portion of transit. For the case of Tanzania, the cargo transit to near countries such as Zambia, DR- Congo etc is approximately to 34 %. Although there is leisurely improvement of port performance, still there are several challenges emerging in daily port operations, various ports have thrashed to chance the recent current growing obstacles, through several ways such as port dredging and expansion, introduction of port information management system etc., many ports have different long, medium and short project planning aiming for enhancing productivity by reducing vessel berth or anchorage waiting time, optimizing vessel scheduling time, reducing congestion, and increasing service at berth (Mwendapole & Zhihong, 2021). All these measures are taken to meet tremendous complexity of current built vessels in market. According Sirimanne et al. (2019), 80% global commodities are transported through waterway.

East Africa countries ports development are done through capacity building and port expansion, all these developments depend on countries fund which are more influenced by political desire, lacking professionalism (Mlambo, 2021). Recently, Kenya have opened a new port, Lamu with capacity handling massive vessels of 12,000 twenty-foot equivalent units to 18,000 TEUs and Tanzania is planning to construct

new port at Bagamoyo and economic zone, but this project is still delaying, all these strategies are aiming to increase region coastal ports competitiveness for better country economy growth (Gamassa & Chen, 2017).

A more plausible scenario for EA countries is for Mombasa to emerge as the regional port hub, grounded on the analysis conducted in this research and the current coastal-ports investment carried by Kenya government. Any port's development as a regional hub port confronts a number of obstacles such as port-investment seems to be unfocussed to a lesser-viable port facility, limited fund to some extent slower in EA and many ports serve solitary one corridor (example central corridor for Tanzania and northern corridor for Kenya), making diverting traffic from other corridors difficult (Zhao, 2018).

Generally, EA coastal ports performance improvement is mandatory. In the defined example of matching similar ports, the minimum terminal operational efficiency of container in the two coastal ports (Dar es Salaam, Tanzania and Mombasa, Kenya) range between 48.5 % for the 2010 report worldwide data (Sirimanne et al., 2019). The most efficient in terms of container handling is Mombasa, Kenya followed by Dar es Salaam, Tanzania. Mombasa ports is the most technically-efficient in the EA, and ranking forty-three (43rd) as among competent container ports worldwide. In terms of container operations, Dar es Salaam is ranking sixty-four (64th) (M. Humphreys et al., 2019), this is for ports of their category.

Currently, the link between ports and landlocked destinations is primarily dependent on a road network of varying coverage and quality. Road mode transport more than seventy (70%) of all cargo to and from the ports (Hanaoka, Sota, Kawasaki, & Thompson, 2019). A large portion of railway and road network are in bad situation, with most lines of railways being non-electrified and single-track, however, Tanzania is currently constructing a standard gauge railways which initially will connect fewer central corridor countries (J. Wang, Sekei, Ganiyu, & Makwetta, 2021).

Uses of IT, is necessary to implement and practice information communication systems. The current modus operand in a number of coastal ports ' terminals is branded by administrative and operational procedures for which works are conducted on paper bases, posing additional data and information safety and security threats. These together impedes the port competence. Finally, all ports' institutional frameworks must be improved to enable quality port performance (M. Humphreys et al., 2019). The deficiency of a self, regulator with resources and capacity to provide effective audits, monitoring, and tariff regulation in the port sector are the fundamental shortcoming in all EA coastal ports.

Normally, coastal ports trade in developing countries still not well organized, although play as among major sectors contributing to nations GDP. East Africa have participated in tandem with the landlocked communities they services, and have contributed a significant part in their economic success (Hidalgo & Ducruet, 2020). The development of urban populations, the growth of local markets for goods and services were all aided by coastal ports and maritime trade and most of the ports are surrounded by local venders involving in selling diverse products (C. Wang & Ducruet, 2013).

	Dar es Salaam, Tanzania	Mombasa, Kenya
Depth of port channel (m)	12.0	14,0
Depth of Container- Quay (m)	10.5	11.0
Length of Container- Quay (m)	720.0	964.0

Table 1: East Africa coastal ports status (Ports website, 2021).

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II. RELATED PREVIOUS STUDIES

This part reviews the other studies related to this topic, coastal port growth opportunity and limitation, the main concern is to have a general clear understanding facts on regional ports operational and international wise, this will help readers and other researchers to have a deep knowledge on the EA countries principal ports mainly Dar es Salaam and Mombasa. Global connectivity and productivity are the basic measures for the quality of the port, developing countries ports are categorized as poorly operating and lower connectivity in the world maritime (Trujillo, Pérez, & Manrique-de-Lara-Peñate, 2020). According to Gamassa and Chen (2017), commodities international trades are mainly transported through ports gateway, because of lower connectivity to rail and road, EA ports performance is displeased but they remain as a region hub for maritime business and serve near noncoastal countries compared to South Africa and Djibouti ports which are more connected to other transportation modes (road, pipeline and rail), these factors state why these ports are better performing in Africa region.

The report (Katasonov, 2019), elaborate that poor container handling technique is likely to be caused by uses of lower quality handling port equipment and infrastructure, lack of use port management information system for daily coastal ports terminal operational. Generally, many developing share same challenges which limit performance standard. The study (Masih, 2013), introduced model which beheld technological aspects as

the main factor for port performance, the trade integration, shipping line are more likely to connect to ports with good country technological infrastructures, this will result in reduction of port business expenses. Infrastructure investment create market opportunity, developing countries have a duty to allocate more resources for ports expansion and institution strengthening for firm marketing (Quadri, 2019). Also, big economy countries should invest more to support emerging small countries for seaport trade development.

There is a relationship between port performance and operational infrastructure, jointly will result to higher growth of maritime sector. A study conducted in West -Europe revealed, maritime growth must be observed through community employment opportunities, port productivity and throughput, also good port performance result to country and near countries economic progress, furthermore it must be seen in freight shipment charges (Bottasso, Conti, Ferrari, Merk, & Tei, 2013; Clark, Dollar, & Micco, 2004; Sánchez et al., 2003). It was been observed coastal ports bad performance in South Africa contributed to economy predicament (Sánchez et al., 2003).

The study done in Caribbean (Wilmsmeier & Hoffmann, 2008), revealed, availability of port productivity tools and shipping lines connection determine shipping cost rate, uses of modern infrastructure remain the best way to lower shipping charges. Little shipping cost attract more shipping trade, increase production and GDP growth. Lower shipping payment rate, countryside connectivity though road, rail and adequate port performance tools, all together adds port competition. Vehicle congestion at port area, berth allocation long waiting time contribute to higher maritime trade payment (Abe & Wilson, 2008). The researcher done by (Mwendapole & Zhihong, 2021) using SERVQUAL- model to assess the Dar es Salaam, Tanzania coastal port performance standards (service quality:- Tangibility, assurances, responsiveness's, empathies and reliability) as measurements of port clients qualifications were observed. The author noticed there is a gap in port service standards, port users demand better services; reliability-responsiveness's should be more improved.

III. FINDINGS AND DISCUSSION

3.1. The Mombasa and Lamu coastal-port, Kenya

Mombasa port is Kenya's largest deep-port and the main entrance and exit for cargo from various parts of the world, and link to landlocked countries of Rwanda, South Sudan, Uganda, Burundi, and the DR of Congo's. The port is connected to Dar es Salaam by a frequent feeder network. Mombasa is a major regional coastal port as well as a feeder port. Table 2 shows the cargo throughput handled at the port for four consecutive years ended 2017-18. The port of Mombasa is connected to its hinterland markets via the "Northern Corridor" road network, albeit existing road conditions indicate the need for quality improvements. The recently opened standard gauge railway (SGR) connects Mombasa's ports to Nairobi by rail, with intentions to continue via Kisumu and Malaba, and then to Kampala.

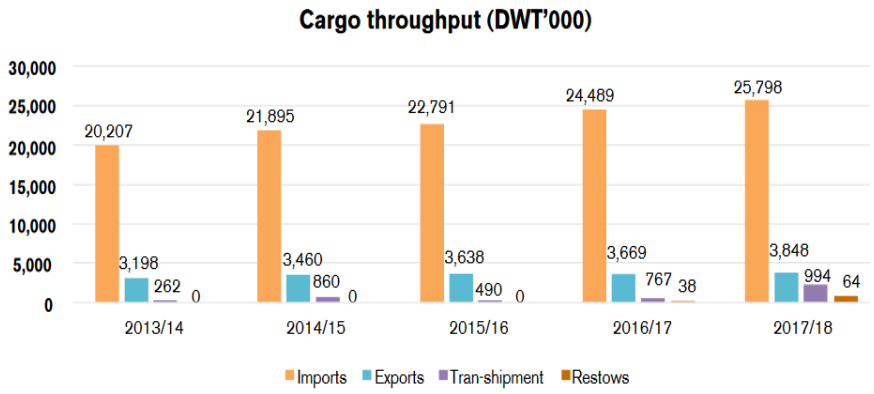
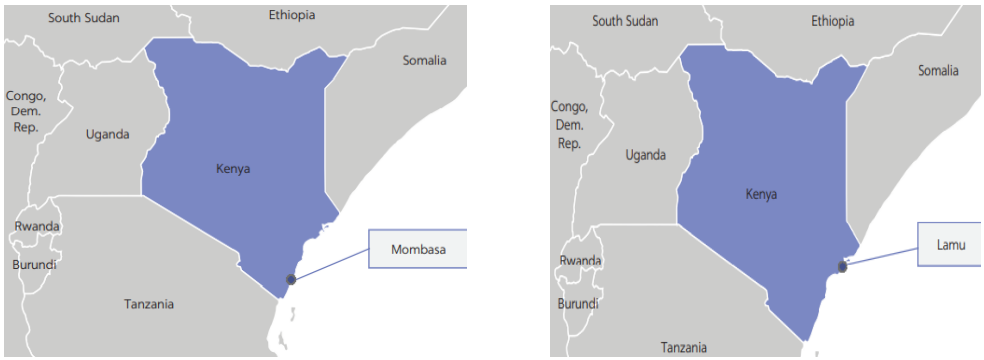


Table 2: Cargo throughput handled at the Mombasa port 2017-18. (Source: Mombasa port website).

The port of Lamu is a novel Kenya coastal port, improving maritime transport at north of Mombasa. the construction of the (LAPSSET) Lamu Port, –South Sudan, – Ethiopia Transport Corridor, has intention to improve Kenya's maritime and rank as an East African transport hub and gateway, enable trade and regional economic integration over Rwanda, South Sudan, Ethiopia, and DR- of Congo. The Kenya Port Authority, KPA is in charge of management and operations (Omondi, 2019).

The Northern Corridor, Kenya's largest trade corridor, connects the port of Mombasa to the city of Nairobi, Kisumu, and Kampala city in Uganda by road and train. Roads and railways are not in good conditions, there is high congestion which need government intervention for upgrading. There is ongoing upgrading the Nadapal -Lesseru road, and construction of Kundu Bypass-Dongo–Highway with intention to connect Mombasa

city. The currently project, Mariakani- Mombasa Road, a dual-carriageway highway will be constructed to minimize traffic jam around Mombasa and its near areas (Auma, 2018).



(a) ***(b)***

Figure 1: (a) Mombasa, (b) Lamu port's location.

3.2. The Dar es Salaam coastal-port, Tanzania

Dar es Salaam is Tanzania's most important port, processing over 95.0 percent of the country's international trade. It is located in Dar es Salaam city, on the Indian Ocean's coast. (Rwanda, Burundi, Zambia, Malawi and DR of Congo) are among the landlocked countries depends at Dar es Salaam for import and export activities via central corridor. As a result, transit volumes account for roughly 34% of total cargo throughput in the Dar es Salaam port. Table 3 shows the progress of goods capacities at the Dar es Salaam. Cargo volume handling has increased to 23 tones by 2019 compared to 13.6 tones in 2015-16, this performance increase is a result of investment carried out at the port including dredging of port vehicle channel, construction of new berth, uses of port's information system, rail and road construction, modern ports tools and lower service time (Mwendapole & Zhihong, 2021).

UNIT (thousands)	2012	2013	2014	2015	2016
Containers (TEU)	562	601	665	659	622
Containers (tons)	5,594	5,995	6,715	6,333	6,019
General cargo (tons)	291	492	425	377	328
Dry bulk (tons)	2,024	2,460	2,425	2,153	1,875
Liquid bulk (tons)	3,984	4,789	4,730	5,322	5,289
Vehicles (tons)	172	217	248	241	146
Total (tons)	**12,065**	**13,954**	**14,542**	**14,426**	**13,658**

Table 3: Cargo volume at the Dar es Salaam port for 2012-16 (Dar es Salaam port website).

Dar es Salaam coastal port, is classified as a major regional port, managed by TPA-Tanzania Ports Authority in cooperate with TICT'S-Services for International Container Terminals for cargo processing.

Figure 2: Dar es Salaam port geographical location.

The recently prediction, Dar es Salaam port by 2030, expecting to attain 9.0 percent cargo volume growth, this will result to 38.0 mil. of tone's cargo volumes (Bank, 2020) as shown Figure 3 below. The same growth is expected to Mombasa.

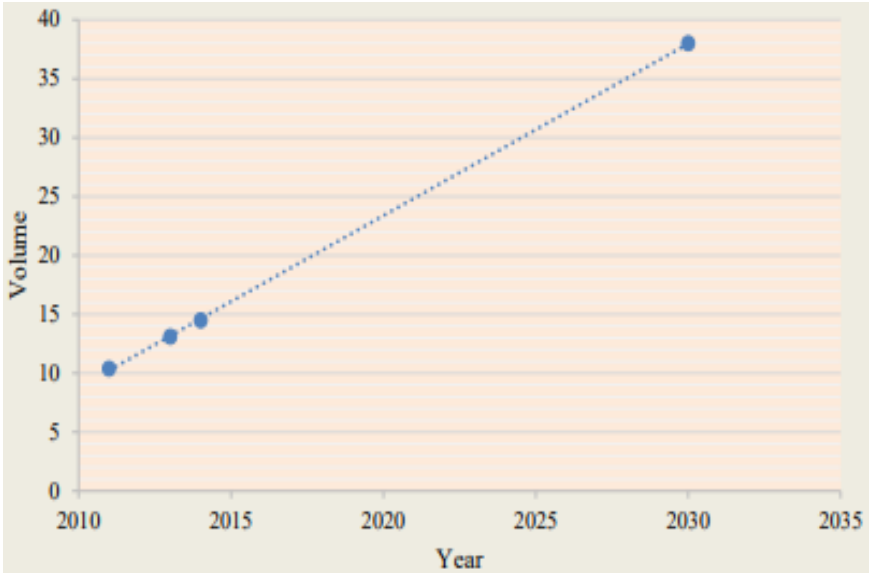


Figure 3: Predicted Dar es Salaam port cargo volume (World Bank, 2020).

3.3. The East Africa (EA) coastal ports performance

Generally, Mombasa is well performing averaging as very effective port with ninety-nine (99) % score while Dar es Salaam score thirty-three (33) %. Port productivity can be determined through number and size vessel docked at port, berth capacity, global maritime vessels connectivity, capacity of anchorages, connecting shipping lines, vessel average turn-around time (per days), quay-berth capacity, ports dwell time, management system, number of trucks visiting the port gate and port channel traffic flow rate (Jiaxin, 2019).

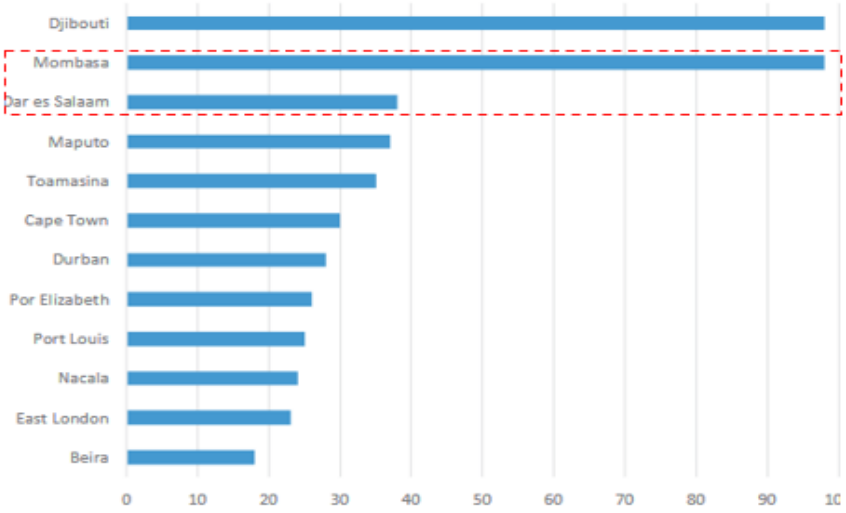


Figure 4: East Africa port average performance in percentages (source: World Bank 2019).

Dar es Salaam and Mombasa coastal ports are virtuous in uses of available port space; they are good in quay performance for general cargo. Figure 5 below show ports average guay productivity, terminal specialization for both port (Mombasa and Dar es Salaam). For containers handling at space available, port of Dar es Salaam is the most effective than Mombasa. Mombasa is best performing in cases of minimum-average trucks turn-around times compared to Dar es Salaam (Ruan, Bandara, Lee, Lee, & Chhetri, 2019).

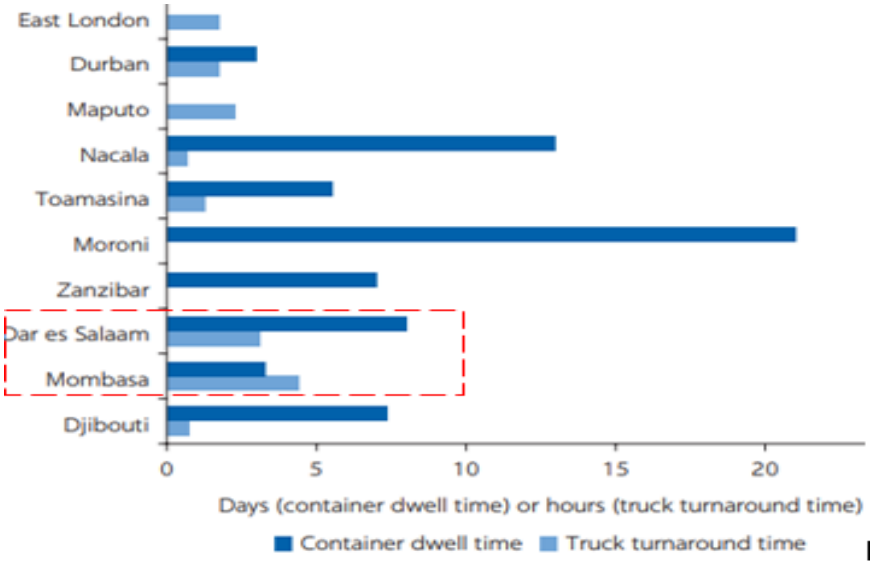


Figure 5: Dar es Salaam and Mombasa coastal ports average guay productivity (source: World Bank 2019).

Figure 6 reflect anchorage vessels waiting time (vessels idle time) before sailing to port for berthing process, Dar es Salaam showed maximum vessels waiting times compared to Mombasa, the average idle time at Dar es Salaam anchorages mainly for container was twenty-four (24) hours approximately. Mombasa reflect very lower probability vessels waiting time which can be abided by ports stakeholders.

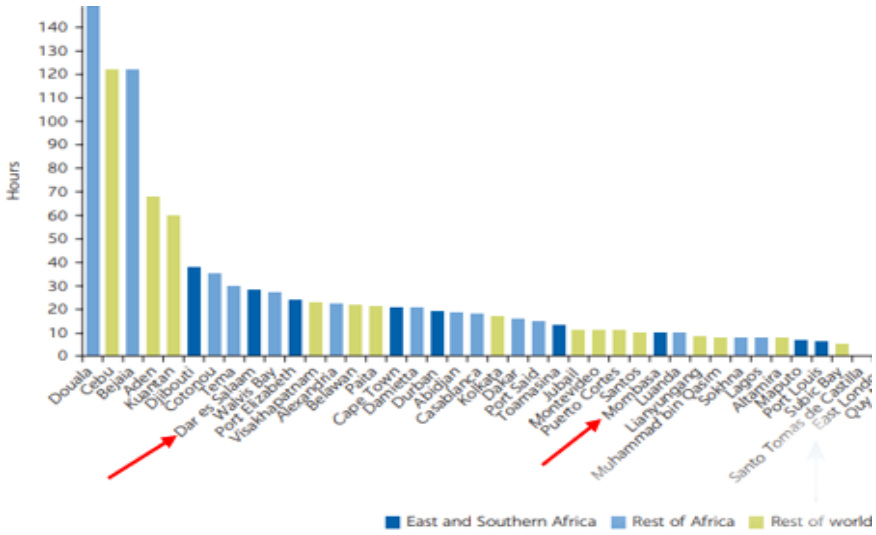


Figure 6: Dar es Salaam and Mombasa coastal ports berths waiting time, (source: World Bank 2019).

Generally, average berthing times is exceeding thirty (30 hours) for both coastal ports. Total average waiting time at anchorage and during coastal ports service (berthing) are higher too at Dar es Salaam and Mombasa.

3.4. The East Africa coastal port's challenges

East Africa coastal ports are highly stagnant in global maritime connectivity and congested, restricting their maritime linking, although they are very vital to foreign business (Sirimanne et al., 2019). Huge port's investment is required to meet international standard, improving performance operational and cut shipping expenses to attain countries objectives and stakeholders' expectation (Kahyarara, 2018). Furthermore, researchers must develop scientific scheduling mode which is reliable and convenient for sophisticating passage of vessels and by promoting safety. Apart from mentioned challenges, waterway transport cause environment pollution such as water pollution, soil destruction, air emission and truck congestion around coastal ports area sometime resulting to unsafety in EA (M. Humphreys et al., 2019). Coastal ports have caused vehicle congestion to many cities like Dar es Salaam and Mombasa.

There is a weakness in ports organization framework, maritime transport objectives and goal for many EA transport policy (Sirimanne et al., 2019). Ports are not working effectively because of institution framework challenges, there is disorganization of various sectors, this resulting to poor performance. There are challenges in regulatory and legal, the legal system is not operating properly as required to safeguards ports and its stakeholders. Most of directives and orders are made by politicians, they are lacking legal insights, there is no clear coordination in legal system. Example, Tanzania has a regulator authority, (TASAC) Tanzania Shipping Agencies Corporation with mandate to regulate marine transportation related issue in Tanzania. In Kenya there is (KMA), Kenya Maritime Authority Regulation, which monitor related marine matters. However, these authorities have no full power, mostly receives orders from politician which are glued by political vision, lacking required maritime knowledge (Christensen).

Ratification of international conventions under International Maritime Organization (IMO) guidance's. Member countries has responsibilities to ratify international agreement on marine safety and environment conservation aiming to have common international understanding about marine transportation and its related. Tanzania have ratified fewer convention compared to Kenya. World maritime connectivity is more effective to countries abiding IMO directions and guidelines, diverting from this may affect country maritime industry (Mboya, 2021). Although there are challenges related to waterway transport in EA region, but ports creates jobs and other opportunities to dwellers, significantly it remains as vital source of employment to many local people whom mainly perform manual work because of lacking required skills (Kahyarara, 2018; Zhao, 2018). Many dwellers are doing small business around the port's areas. Furthermore, ports activities contributed to family developments through employment and business opportunity offered (Ma & Ma, 2019).

3.5. The East Africa countries coastal ports prospects

East Africa inhabitants is growing exponentially, this growth will affect the performance of the ports in near future, more commodities will be exported and imported to satisfy basic human beings needs (Gekara & Nguyen, 2020). So, the necessarily uses of ports is unavoidable and it need more expansion to sustain the people demands. It is a serious alarm to ports stakeholders, government and ports authority on setting sustainable strategies for attempting expected changes.

Historically, the Mombasa is competing with the Dar es Salaam port, there is big different in (TEU) Container Throughput, Mombasa is always performing ahead, although this gap in recent years is diminishing, due to continuing investments at Dar es Salaam port. This Inter- EA countries competition is for shipment cargo to Rwanda, DR-Congo, Uganda and Burundi. The Lamu Port South - Sudan - Ethiopia -Transport (LAPSSET) Corridor, which connects the port of Lamu to Ethiopia and South Sudan, is expected to increase competition among EA countries ports (Gekara & Nguyen, 2020). Limited of spare capacity for trans-shipment affect the Mombasa ports performance resulted to comparatively higher shipping costs. The KPA introduced a task force aiming on rising trans-shipment coastal ports capacities, this includes the introduction of container terminal, Kipevu at Mombasa (Christensen). However, in order for trans-shipment volumes to increase, coastal port channel draft constraints must be improved to allow in-navigation and out-navigation of different sized vessel. The coastal port competitive traffic transit is severe, the countries such as Zambia, Rwanda, Burundi, Malawi, the DR of Congo (landlocked countries) are mostly served by Dar es Salaam through central corridors. Mombasa serves some northern area of Tanzania, Uganda, Burundi and Rwanda. Durable measures are required by these ports for competition purpose and serving the near landlocked countries.

Dar es Salaam, handle almost 95.0% of Tanzania international shipment business, there is less competition for local port, the other ports, Mtwara and Tanga handled only 15% of the cargo (Mlimbila, Mbamba, & Trade, 2018). Currently there is huge development projects on expansion and construction of port channel, turning basin, berths and others organizational strengthening for the purpose of increasing performance. The Bagamoyo proposed project, aim to expand Tanzania maritime transport competition. There is also construction of industrial zone (Bagamoyo Special Economic Zone), the port plan development will involve dredging of sailing channel, building of logistics system park (Hanaoka et al., 2019). The first stage will involve the construction of 4- berths (2-berths for container's, 1- for multipurpose and 1-for support services). Though, to date the implementation of this project is still uncertain. The port of Dar es Salaam is facing serious constraints such as narrow channel access for large vessel i.e., the channel is a single-traffic navigation channel, channel interaction with Kigamboni and Kivukoni ferries, channel depth limitation, unsatisfactory service quality, poor and old road and railways linking the port to others areas including the non coastal countries, insufficiency berths, management issues, old technology, old infrastructure, lower anchorage capacity and port space capacity (Anselem Tengecha & Zhang, 2020). Furthermore, Tanzanian government has agreed and signed fewer IMO conventions, this affects issues of global port linking.

For enhancing performance, the Tanzania port authority (TPA) has legally permitted TICTS-Tanzania International Container Terminal Services, on behalf to process (receive and clear) cargo. There is ongoing port development to maximize performance and competition position. According Authority (2019), the port efficiency and effectiveness has increased by 9 percent annually and expected to grow more by 2030. Shortly, the port performance is facing a tremendous threat.

Number	Coastal port	Major Corridor	Hinterland countries	International trade volumes %	Transit volumes %
1.	Mombasa	Northern	Ethiopia, Uganda, Rwanda, South Sudan, Burundi, DR of Congo,	80	10
2.	Dar es Salaam	Central	Uganda, Rwanda, Burundi, D Rep. of Congo, Zambia Malawi	95	35.1

Table 4: East Africa, current serving corridor to hinterland-countries.

Geographically, Tanzania is strategically located compared to Kenya, it can be a center for the region maritime business. Both countries are investing for competition purpose, there are various masters-plan carried out in terms of rail, road construction and ports expansion and developments. The region competition will be higher in completion of the ongoing project, Table 5 below summarize corridors effect for import and export for Rwanda, Burundi and Uganda.

Hinterland-countries	Shipment	Current corridor rate (%)		Future master-plan rate (%)	
		Dar es Salaam	Mombasa	Dar es Salaam	Mombasa
	Import rate	57.0	43.0	59.0	41.0
Rwanda	Export rate	19.8	80.2	31.0	68.1
	Import rate	90.2	8.8	91.2	10.2
Burundi	Export rate	36.2	63.8	49.1	50.9
	Import rate	2.6	97.4	4.7	95.3
Uganda	Export rate	0.0	100.0	14.1	85.9

Table 5: Central corridor cargo shipment growth.

Based on the Table 5 above, completion of ongoing coastal ports master plan development projects, Dar es Salaam will experience cargo growth share advantages compared to Mombasa. There will be cargo volume trans-shipment increase, 83 % for Tanzania and 81.8% for Kenya by 2030 through northern and central corridors. Sustainable ports development plans are required for upsurge East Africa maritime standards. Upgrading operational productivity to all EA ports is a demand. The ports are corresponding aren't globally among the highest performing. This mean, EA need to undergo a serious investment to match with the world waterway transport standard. The presence of trans-shipment traffic flow, the availability of expert private terminal operator's and less vessel time spent at port channel all these factors contribute to port performance at the region (M. Humphreys et al., 2019; Sirimanne et al., 2019).

Globally coastal ports sector has packed by horizontal and vertical incorporation between ports operator's and management (ports authorities), shipping lines, land transport and terminal operators. Container alliances, at which shipping operation lines cooperate regarding fleets, coordinating together to ensure high services and terrestrial coverage make a horizontal integration (Gevaers, Van de Voorde, & Vanelslander, 2009). The horizontal integration is at lower level in EA countries, Kenya coastal ports authority (KPA) is only authority which is accountable for the progress of Kenyan ports, the same in Tanzania, Tanzania port authority (TPA) is a countrywide authority accountable for the port developments. There is little specialization seen in both ports for horizontal incorporation. For vertical incorporation (integration) in public sectors relates to the roles of port authority in facilitating the growth and operational of roadway and railway connectivity to landlocked countries, transportation-logistics for ports terminal's to ensure reliable and competent maritime transport services for port maximum performance (Baccelli, Percoco, & Tedeschi, 2008). The degree of this integration is visible for the Kenyan ports, it is stronger to Mombasa compared to Dar es Salaam. The operation connectivity at Tanzania, Dar es Salaam in terms of terminal operation and land (ICDs and container freight stations CFSs) connectivity is small.

Land transportation accessibility improvement. The growth of maritime sector is very connected to the availability of other factors such as pipeline, rail and road, the reliability of these variables ensures the performance of waterway transport. Most of EA countries share same challenges such lower-quality road and rail connection, long waiting at the border areas, traffic jam both at port and countryside, are main challenges for ports growth (Hidalgo & Ducruet, 2020).

Improvement stakeholder participation. Improvement stakeholder participation. The association amongst the ports and its stakeholder's, is an important aspect which add port administration. In comparison to Dar es Salaam, the collaboration between the ports and stakeholders in Mombasa is rather good—and the most official. Obviously in Mombasa via the (MPC) Mombasa port community charter, despite the fact that the municipality of Mombasa is non included in the coastal port charter(Bank, 2018). The port of Dar es Salaam has a relatively partial engagement with stakeholders, there is little organized interaction or coordinated planning between the PA's (port authority) and the city authorities. Surprisingly, there is no regular discussion between representatives of stakeholders such as (trucking businesses, shipping lines, rail operators, forwarders and cargo owners).

Uses of modernized port information systems. Despite the significant of uses of information management systems to accelerate port performance, but most of EA ports daily terminal operations are based on paper work and poor working environment. Kenya port authority (KPA) and its KENTRADE partners have invested heavily in information technology (IT). Private operators have made investments in gate management systems and terminal operating systems in some circumstances (Ncube, Roberts, & Vilakazi, 2015). Other coastal ports, such as the Dar es Salaam port, are still using paper-based methods.

The dependability on public fund for ports development. For coastal ports better performance and successfully operations, it needs a massive investment in terms of infrastructure, human resources and information system management. The need of use modern infrastructures, technology at port is necessary for increasing performance and reducing running cost. EA countries ports expansion and development has mostly

relied on public fund, little private investment is introduced for equipment's and IT (Auma, 2018). Private investment is more recently used for financing coastal ports dredging, land reclamation, building of terminals, quay in other parts of the world side, started from the 1980s. EA port authority and government should learn the best way for ports developments (ResearchAndMarkets.com, 2021).

Improvement ports institutional framework. The general basic weakness of EA countries ports institutional framework including legal sector, is deficiency of a self-regulation and lack of enough resources (operations resources), finance, technologies and human capital (Kahyarara, 2018). Mostly, EA countries are not well performed on policy framework, as evidenced resulted to (i) coastal ports unsatisfactory consideration to monitoring and evaluation (M&E) (ii) policies data, documents and information are not frequently upgraded (iii) lack of transparency in various matter such as finance.

IV. CONCLUSION AND RECOMMENDATION

The current railways link from Mombasa plays a great role in terms of cargo shift flow, it facilitates cargo exchange from rail to road. Railways is the more stable and preferred mode; Kenya government should invest, develop and expand more its rail and road connectivity. (i) available roadway system at Mombasa is affected by extensive trucks subjects to traffic jam, this situation should be solved in order to enhance the connectivity. (ii) country must strengthen institutional framework by maintaining a clear policy on its maritime transport industry objectives, goals, mission and vision. (iii) There is no clear KPA mandate on regulatory and legal regarding to the Lamu port, regarding to the KPA (Kenya port authority) Act, this authority has fully accountability to all coastal ports for maintaining, operation, improvement and regulating, however, the LAPSSET (Lamu Port is allocated to the Lamu Port–South Sudan–Ethiopia Transport) is under the authority of No. 51, Legal Notice No. 58, 2003 Gazette Supplement. This must be clear definite for minimizing bureaucracy and misunderstanding between the Kenyan port authority. (iv) KP authority should outsource other of its duties to private sectors. (v) maritime transport sector should be well invested, cooperation between private sector and government be encouraged.

For better coastal port and country objectives, (TPA) Tanzania port authority should solve the unclear irregularities in the coastal port institutional framework. Furthermore, Tanzania has ratified few IMO conventions, this is not advisable for the growth of maritime business. (ii) control port congestion around the city area, port authority is advanced to give transportation information to truck driver in advance prior gate entrance, terminal allocation system, introduction of effective coastal port management system (IT). (iii) the introduction of one stop center for information and documents verification and check in the Dar es Salaam City, apart as been done at TICTS outside the main gates. (iv) introduction of good designed traffic control management system in side the port sides, mainly connected to exports and imports. (vi) strengthen maritime transport policy, goal, mission and objectives. (v) rail and road connectivity toward hinterland, currently there is higher congestion along passage to port, it requires a immediate measures to control the effects.

This research was conducted purposely to have deep understanding on East Africa Maritime sector, its challenges, opportunity and development. As mentioned above, although the sector is contributing little to countries economy but remain essential area for the region development. Apart from promoting the economic growth of cited countries, also serve non-coastal countries. In order to meet international standard and deliver valuable services, vast investment on equipment, increase channel width and depth, new berths construction, rail and road construction, congestion management, capacity building through institution strengthening should be done as part of enhancing performance.

4.1. Proposed future research

Because most East Africa coastal ports channel are congested and there is lack of literature review on vessel scheduling optimization model, the most recently used methods are first come first attended (FCFA) and first pay, first served (FPFS). The scheduling styles used have several weaknesses, negatively affect the flow of vessels at the channel. Scientific research should be done to propose effective scheduling models by considering the features of the channel such as tide effect etc.

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