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FORECASTING SEABORNE TRADE BY CARGO TYPE IN SUB-SAHARAN AFRICAN REGIONS (2006-2021): A TREND ANALYSIS APPROACH

By

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ABSTRACT

Limited empirical forecasting at regional level hinders policy planning and port development. The study carried out an estimation of seaborne trade by cargo types in selected sub-Saharan African regions between 2006 and 2021. The study utilized linear time series with moving average (order 4) to explain performance of each region against predicted performance and also forecast throughput for upward of 5years between 2022 and 2026. Annual data of crude oil, dry cargo and other tanker throughputs from United Nations Conference on Trade and Development (UNCTAD) were used for the study. Results showed variations in performance for all the regions in terms of throughput recorded for all the cargo types. Predicted values were shown to be surpassed by some of the regions while others were swinging between predicted values and their actual performance. Also, forecast results for the following five years revealed three regions (Middle Africa,South Africa,West Africa) likely to have decreasing record of crude oil, only one region having declining record of dry cargo (East Africa) while SA only is likely to have declining record for other tanker. The observed results were adduced to be caused by prevailing challenges weighing on the maritime sector in most of the countries within the regions. Regional governments must seek collaborative investment in resiquite port infrastructure to harness the potential of their various rich maritime resources for trade expansion and regional development.

Keywords: Maritime trade, Cargo type, Trend analysis, African regions, Throughput

1.0 Introduction

Maritime trade is the transport of goods overseas between two countries. It is a low-cost, efficient method of transporting items manufactured, grown, or mined from one country to another and is an essential ingredient in the growth of the world's economy, both the developed and developing nations. In today's global economy, 80 percent of trade travels via sea and seaports. According to Notteboom et al., (2021), increasing development in economic globalization has increased the significance of ports in the promotion of international cooperation among countries of the world. As such, maritime nations across the globe are experiencing increasing rate of cargo passing through their ports both as imports and exports.

Maritime transport in Africa has received considerable attention from scholars especially in transport geography because, Africa relies heavily on ships and ports to service its intercontinental trade. Specifically, while it accounts for approximately 2.7% of global trade by value, the continent contributes higher shares to global seaborne trade – 7% and 5% of maritime exports and imports by volume, respectively. While one-third of African countries are landlocked, maritime transport remains the main gateway to the global marketplace. African continent boasts of an abundance of natural resources, including but not limited to aquatic and marine resources, with a potential that has not yet been fully tapped in the context of economic growth and sustainable development, yet maritime trade in Africa is shaped by the continent's trade concentration and limited diversification. Accordingly, 40% of goods exported by sea in 2017 comprised of crude oil, while over two-thirds of imports were accounted for by dry cargoes (dry bulks and containerized goods) and close to 20% of imports were made up of petroleum products and gas. Though regional maritime transport in Africa has received considerable attention in research in recent years especially with the consideration of freight transport as a significant engine of growth in Africa (Martinez, et al., 2021; Konstantinus, et al., 2019), studies have underscored the need for African countries to become competitive in international trade and enhance their trade balance position, by improving the efficiency of their

seaports and their freight transport networks in order to achieve economies of scale and become highly competitive (African Development Bank, 2015; International Monetary Fund, 2020). To achieve this, port authorities, terminal operators, investors and other stakeholders need to plan the development, operations, and construction of infrastructure according to the throughput development and as such have increasingly relied on traffic demand forecasts of this nature to rationalize decisions related to operations and investment (Chen, et al., 2016; Munim, 2020).

Various studies have been carried out on port throughput forecast across the globe using various models to arrive at both short term and long term forecast of port cargo throughput—all with a purpose of providing policy instrument for improvement in port performance. One of the most frequently used models is time series. Though with various variants (ARIMA, SARIMA etc.), time series generate accurate performances especially in case of linear or near linear cargo flow time series and have been used extensively as benchmarks models in a number of studies using historical trends (Grubb and Mason, 2001; Shu et al 2014; Geng et al., 2015). Some studies have also employed some exogenous macroeconomic indicators and demographic explanatory variables through the use of neural network models to forecast cargo throughput (Lam, et al., 2004; Luiz, et al. 2007; Xiao, et al. 2009; Zhang and Cui, 2011) applying a grey prediction model and a cubic polynomial curve prediction model combined with radial basis neural network to predict the port container throughput. In another vein, Chou, et al., (2008) proposed a modified regression model for forecasting the volumes of Taiwan's import containers. by comparing developed model with the traditional regression model and found out that the modified regression model exhibits higher prediction accuracy. Empirical results show that the combination method had high forecast accuracy. For example, Xie, et al., (2013) proposed three hybrid approaches based on a least-squares support vector regression (LSSVR) model for container throughput forecasting. This method divided the data into linear and nonlinear parts, and can thus take the advantage of linear

and nonlinear modelling simultaneously with a view to overcoming the inability of traditional models of capturing non-linearity. Shu, et al. (2014), also verifying hybrid models, exploit the capacities of multiple models and give a performance boost to forecasting accuracy. They presented the Fourier modified SARIMA models and comprehensively compared with the prediction performance of traditional ARIMA, Grey, and Fourier modified models to arrive at a significantly better result. However, this study utilizes linear time series to generate a short-term forecast of total throughput for selected cargo types in the four sub-regions of Africa. Time-series forecasting methods extrapolate the behavior of data from the past into the future, and thus, these methods are useful for short-term forecasting. Though similar techniques have been used elsewhere by scholars across the globe, there is no known study which had undertaken the consideration of combined cargo types at sub-regional levels. Rather, known studies have mostly focused on throughput forecast at port levels without any empirical forecasting studies at regional level which can promote port planning and development. This study whose focus is extended to regional perspective is highly significant to African leaders, planners, port operators and other stakeholders in African continent as policy instrument especially in optimization of cargo flow both among the regional partner countries and between the regions and the rest of the world. It will also provide fundamental requirement for promoting trade cooperation among countries within the region.

The study set out to examine the performance of selected cargo types in sub-Saharan African regions with the purpose of providing informed policy instruments for enhanced trade performance in the regions by: analyzing trends in crude oil, dry cargo, and other tanker throughput across four sub-Saharan African regions between 2006–2021; forecasting cargo throughput for each region for 2022–2026 using linear time series models; and comparing actual performance with predicted values to identify regional deviations. The study is divided into five sections. Section one provides

a background information to the study. Section two presents the study methods. Sections three and four provide results and discussion respectively while section five represents the conclusion.

2.0 Materials and Methods

The study observed economic regions in the sub-Saharan Africa. These regions are East Africa, Middle Africa, South Africa and West Africa. Data used included annual sub regional seaborne trade statistics of crude oil, dry cargo and other tankers. Statistics of types of trade for sixteen (16) years were gathered between 2006 and 2021. The data were obtained from the official site of the United Nations Conference on Trade and Development (UNCTAD). In this study, focus was given to only the loaded (outbound) trade only. Comparative descriptive analysis was used to show patterns of trade among the regions for each category of trade. Time series linear analysis was used to describe the dynamics of seaborne trade in the regions. Linear time series with moving average (MA) with a length of order 4 was used to forecast seaborne trades in the region. The essence of using this method was not to determine the capability or otherwise of the technique but for the purpose of examining the actual cargo performance of the regions side by side the predicted values and to be able to forecast future performance so as to provide informed policy brief to decision makers on how to improve trade performance in the regions.

2.1 Trend Analysis Model Summary

The study explored linear time series model suitable for describing the characteristics of the throughput of cargo types selected for 16 years (between 2006 and 2021).

2.2 Model Specification

To evaluate temporal variations in the observed categories, a linear trend regression model was employed. The model expresses each category as a function of time and was estimated using the Ordinary Least Squares (OLS) technique. The general form of the model is:

$$Yt = \beta 0 + \beta 1 T + \varepsilon t$$

where Yt represents the value of the variable in year t, β0 is the intercept, β1 is the trend coefficient indicating the average annual rate of change, T denotes time measured in years, and εt is the random error term. A positive value of β1 indicates an upward trend, while a negative value indicates a downward trend. The estimated models were subsequently used to generate forecasts for the period 2022–2026 and to assess model performance using the coefficient of determination (R^2), Mean Absolute Percentage Error (MAPE).

For Mean Absolute Percentage Error (MAPE), which was used to assess the predictive accuracy of the fitted trend models.

MAPE is gives as: $$MAPE = 100/N \sum \frac{(A_t - F_t)}{A_t}$$

Where, N is number of observation;

A_t is actyual value at time t;

F_t is forecast value at time t; and

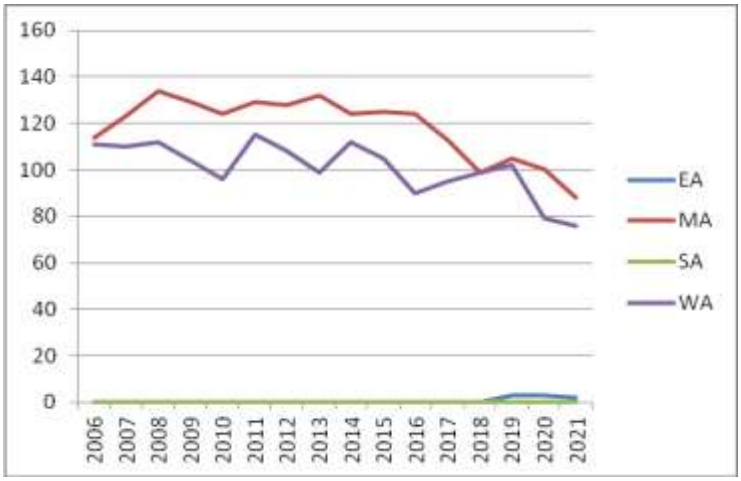
$\frac{(A_t - F_t)}{A_t}$ is absolute forecast error.

3.0 Results and discussion

3.1 Descriptive statistics of the seaborne trade by cargo

From Fig. 1, crude oil loaded by the four African sub regions showed that Middle and West Africa sub regions recorded highest volume of crude oil loaded from 2006 through to 2021. While East

Africa had record only between 2019 and 2021, South African sub region had no record of crude oil transaction for the year due to reliance on importation and limited domestic extraction. The impact of economic recession of 2009 and COVID-19 was manifest in the crude oil records of both the Middle and West African sub regions as both recorded 3.87% and 7.69% decline in 2009 and 5% and 29.1% decline in 2020 respectively.



` Fig. 1: Crude Oil (in Million Metric Tons)

Figures 2 and 3 reflected the records of dry cargo and other tanker recorded by the four regions during the study period. South Africa had the highest dry cargo throughput for the entire period followed by West Africa and East Africa. Whereas, West Africa recorded highest throughput for other tanker throughout the study period. This was followed by Middle Africa which though was initially surpassed by South African region between 2006 and 2010.

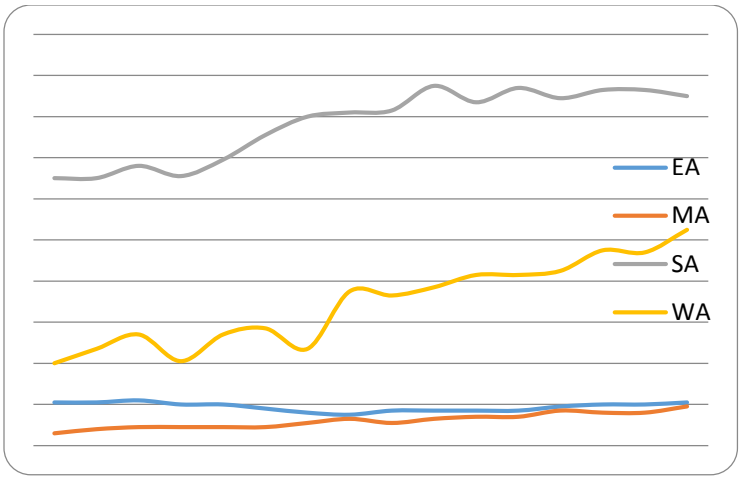


Fig. 2: Dry cargo comparative (in Million Metric Tons)

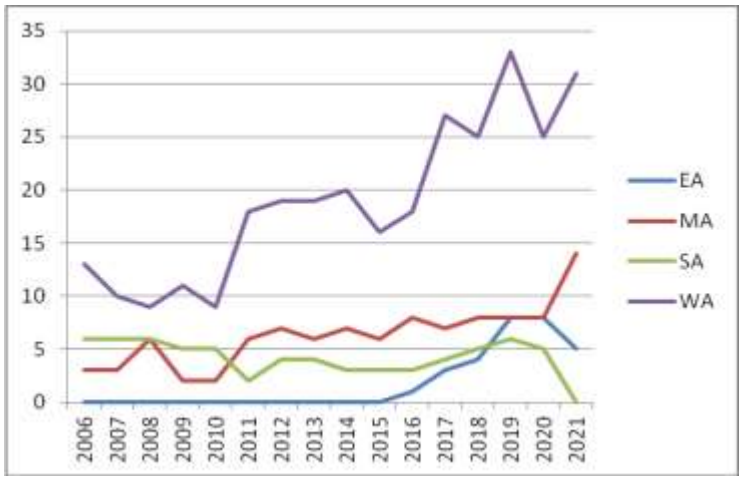


Fig. 3: Other Tankers (in Million Metric Tons)

3.2 Linear Trend Results for the models

3.2.1 Models for crude oil throughput for the four regions are given as:

EA = -0.485 + 0.116X;

MA = 131.53 - 1.72X

SA = 0.000 + 0.000X;

WA = 117.73 - 1.96X

The regression results indicate that MA and WA exhibit statistically meaningful negative temporal trends, with annual declines of approximately 1.72 and 1.96 units respectively. The coefficient of determination (R^2) shows that time explains about 54.3% of the variation in MA and 47.6% of the variation in WA, suggesting moderate-to-strong temporal influence. The predictive performance of the linear trend models was evaluated using Mean Absolute Percentage Error (MAPE). Results showed that the MA and WA models achieved excellent forecasting accuracy with MAPE values of 6.67% and 6.73%, respectively, indicating that the estimated trend equations closely reproduced the observed values. Conversely, the EA model yielded a MAPE of 41.81%, reflecting substantial prediction error arising from the abrupt appearance of EA in the final years of the study period as shown in Table 1.

Table 1: Estimated regression coefficients for the linear trend for Crude Oil throughput (2006-2021)

Variable	**EA**	**MA**	**SA**	**WA**
t	16	16	16	16
α	-0.485	131.53	0	117.73
β	0.12	-1.72	0	-1.96
R-Squared	0.435	0.543	0	0.476
Adjusted R-Sqaured	0.395	0.51	0	0.438
MAPE(Mean Absolute Percentage Error)	41.81	6.67	0	6.73

3.2.2 Models for dry cargo throughput for the four regions are given as:

$$EA = 20.15 - 0.06X$$

$$MA = 4.10 + 0.85X$$

$$SA = 129.15 + 3.11X$$

$$WA = 36.65 + 3.88X$$

The linear trend analysis as shown in Table 2, revealed distinct temporal patterns among the four categories. EA remained largely stable throughout the study period and exhibited no statistically

meaningful trend ($R^2 = 0.030$). In contrast, MA, SA, and WA demonstrated strong positive trends with coefficients of determination exceeding 0.88. WA recorded the highest annual growth rate (b = 3.88), followed by SA (b = 3.11) and MA (b = 0.85). The forecasting performance of the trend models was evaluated using Mean Absolute Percentage Error (MAPE). The results showed excellent predictive accuracy for EA (8.29%), SA (3.89%), and WA (9.12%), while MA achieved good forecasting accuracy (13.96%). These findings indicate sustained growth in MA, SA, and WA over the study period, whereas EA remained relatively unchanged.

Table 2: Estimated regression coefficients for the linear trend for Dry Cargo throughput **(2006-2021)**

Variable	EA	MA	SA	WA
α	20.15	4.10	129.5	36.65
β	-0.06	0.85	3.11	3.88
R-Squared	0.030	0.910	0.882	0.896
Adjusted R-Squared	-0.039	0.903	0.874	0.889
MAPE (Mean Absolute Percentage Error)	8.29	13.96	3.89	9.12

3.2.3 Models for other tanker throughput for the four regions are given as:

$EA = -1.88 + 0.48X$

$MA = 2.80 + 0.46X$

$SA = 5.98 - 0.13X$

$WA = 8.90 + 1.33X$

The trend analysis as shown on Table 3 revealed substantial temporal changes among the four categories between 2006 and 2021. EA exhibited an emerging positive trend following a prolonged period of inactivity, with time accounting for approximately 79.2% of the observed variation. MA also showed a positive trend, increasing steadily over the study period and achieving a coefficient of determination of 0.616. In contrast, SA experienced a gradual decline, culminating in a complete absence of observations by 2021. WA recorded the most pronounced increase, rising from 13 to

31 over the study period and displaying the highest growth rate (b = 1.33). The forecasting performance of the trend models was assessed using Mean Absolute Percentage Error (MAPE). WA achieved the best predictive accuracy (14.27%), while EA, MA, and SA recorded reasonable levels of accuracy. Overall, the findings indicate increasing prominence of EA, MA, and WA, alongside a gradual decline in SA during the study period.

Table 3: Estimated regression coefficients for the linear trend for Other Tanker throughput **(2006-2021)**

Variable	EA	MA	SA	WA
α	-1.88	2.80	5.98	8.90
β	0.48	0.46	-0.13	1.33
R-Squared	0.792	0.616	0.312	0.796
Adjusted R-Squared	0.777	0.589	0.263	0.781
MAPE	30.74	25.38	32.91	14.27

3.3 Actual, predicted and forecasted throughputs for the selected cargo types

In Tables 4-6, actual and predicted values for all the selected cargo types for the 16 years were reported while only the forecast values for the next five years of between 2022 and 2026 were reported.

For the crude oil, predicted values returning negative and positive for EA between 2006 and 2010 and 2011 and 2018 respectively only showed contrary actual values of zeros. However, actual values between 2019 and 2021 show increasing actual values from predicted values. For MA, predicted values for crude oil showed declining values throughout while actual values showed increases for the first three years before some fluctuations set in between 2009 and 2021, whereas, predicted and actual values for SA showed no difference of non-performance. However, WA exhibited similar records of decline in predicted values as EA and fluctuating actual records throughout the study years. Meanwhile, forecasted values for EA follows an upward trend though it took a dive from the actual value in 2021. But for MA, apart from the initial rise in 2022, values

for all other years continue to dwindle. Same record goes for WA. However, SA had no record of forecast due to lack of record for the crude oil in the region.

For dry cargo, EA predicted values between 2006 and 2010 were surpassed whereas, actual values fell between 2011 and 2017 fell short of the predicted values before taking increasing values over predicted values for the last four years. Predicted values for MA revealed increasing values throughout the study period while actual values showed fluctuating matches with the predicted values. Similar records of increasing predicted values were reported for both SA and WA with fluctuating actual values that are either higher or lower than the predicted values. Meanwhile, apart from EA whose forecasted values dwindled for between 2022 and 2026, other regions showed increasing forecasted values for dry cargo for the forecast years.

Records of other tanker showed appreciation in predicted values for only EA, MA and WA while SA exhibited declining predicted values throughout. However, when compared with actual values, they all exhibited fluctuating records of increase or decrease from predicted values. Meanwhile, in the case of other tanker, apart from SA with decreasing forecasted values, other regions recorded increasing values of forecast throughput for the five years of 2022-2026.

Table 4: Actual, Predicted and Forecasted Crude Oil Throughput

	ACTUAL				PREDICTED				FORECASTED			
Year	**EA**	**MA**	**SA**	**WA**	**EA**	**MA**	**SA**	**WA**	**EA**	**MA**	**SA**	**WA**
2006	0	114	0	111	-0.63	133.6	0	114.17	nil	nil	nil	nil
2007	0	123	0	110	-0.48	131.54	0	112.39	nil	nil	nil	nil
2008	0	134	0	112	-0.33	129.49	0	110.61	nil	nil	nil	nil
2009	0	129	0	104	-0.18	127.43	0	108.83	nil	nil	nil	nil
2010	0	124	0	96	-0.03	125.38	0	107.05	nil	nil	nil	nil
2011	0	129	0	115	0.13	123.32	0	105.26	nil	nil	nil	nil
2012	0	128	0	108	0.28	121.27	0	103.48	nil	nil	nil	nil
2013	0	132	0	99	0.43	119.21	0	101.70	nil	nil	nil	nil
2014	0	124	0	112	0.58	117.16	0	99.92	nil	nil	nil	nil
2015	0	125	0	105	0.73	115.11	0	98.14	nil	nil	nil	nil
2016	0	124	0	90	0.88	113.05	0	96.36	nil	nil	nil	nil
2017	0	113	0	95	1.03	111	0	94.58	nil	nil	nil	nil

2018	0	99	0	99	1.18	108.94	0	92.80	nil	nil	nil	nil
2019	3	105	0	102	1.33	106.89	0	91.02	nil	nil	nil	nil
2020	3	100	0	79	1.48	104.83	0	89.24	nil	nil	nil	nil
2021	2	88	0	76	1.63	102.78	0	87.46	nil	nil	nil	nil
2022									1	102	0	84
2023									2	101	0	82
2024									2	99	0	80
2025									2	97	0	79
2026									2	95	0	77

Table 5: Actual, Predicted and Forecasted Dry Cargo Throughput

	ACTUAL				**PREDICTED**				**FORECASTED**			
Year	**EA**	**MA**	**SA**	**WA**	**EA**	**MA**	**SA**	**WA**	**EA**	**MA**	**SA**	**WA**
2006	21	6	130	40	19.53	6.4779	131.3	37.90	nil	nil	nil	nil
2007	21	8	130	47	19.43	7.2309	134.65	42.09	nil	nil	nil	nil
2008	22	9	136	54	19.34	7.9838	138.00	46.29	nil	nil	nil	nil
2009	20	9	131	41	19.24	8.7368	141.36	50.49	nil	nil	nil	nil
2010	20	9	139	54	19.15	9.4897	144.71	54.69	nil	nil	nil	nil
2011	18	9	151	57	19.05	10.243	148.06	58.88	nil	nil	nil	nil
2012	16	11	160	47	18.96	10.996	151.41	63.08	nil	nil	nil	nil
2013	15	13	162	75	18.86	11.749	154.76	67.28	nil	nil	nil	nil
2014	17	11	163	73	18.76	12.502	158.11	71.47	nil	nil	nil	nil
2015	17	13	175	77	18.67	13.254	161.46	75.67	nil	nil	nil	nil
2016	17	14	167	83	18.57	14.007	164.82	79.87	nil	nil	nil	nil
2017	17	14	174	83	18.48	14.76	168.17	84.06	nil	nil	nil	nil
2018	19	17	169	85	18.38	15.513	171.52	88.26	nil	nil	nil	nil
2019	20	16	173	95	18.29	16.266	174.87	92.46	nil	nil	nil	nil
2020	20	16	173	94	18.19	17.019	178.22	96.66	nil	nil	nil	nil
2021	21	19	170	105	18.10	17.772	181.57	100.85	nil	nil	nil	nil
2022									19	19	182	103
2023									19	19	185	106
2024									19	20	188	110
2025									19	21	191	114
2026									19	22	194	118

Table 6: Actual, Predicted and Forecasted Other tanker Throughput

	ACTUAL				PREDICTED				FORECASTED			
Year	**EA**	**MA**	**SA**	**WA**	**EA**	**MA**	**SA**	**WA**	**EA**	**MA**	**SA**	**WA**
2006	0	3	6	13	-1.82	2.46	5.39	8.21	nil	nil	nil	nil
2007	0	3	6	10	-1.33	2.98	5.23	9.64	nil	nil	nil	nil
2008	0	6	6	9	-0.85	3.49	5.07	11.07	nil	nil	nil	nil
2009	0	2	5	11	-0.36	4.00	4.91	12.50	nil	nil	nil	nil
2010	0	2	5	9	0.12	4.52	4.75	13.93	nil	nil	nil	nil
2011	0	6	2	18	0.60	5.03	4.59	15.36	nil	nil	nil	nil
2012	0	7	4	19	1.09	5.54	4.43	16.79	nil	nil	nil	nil
2013	0	6	4	19	1.57	6.06	4.27	18.22	nil	nil	nil	nil
2014	0	7	3	20	2.05	6.57	4.11	19.65	nil	nil	nil	nil
2015	0	6	3	16	2.54	7.08	3.95	21.08	nil	nil	nil	nil
2016	1	8	3	18	3.02	7.60	3.79	22.51	nil	nil	nil	nil
2017	3	7	4	27	3.51	8.11	3.63	23.95	nil	nil	nil	nil
2018	4	8	5	25	3.99	8.62	3.47	25.38	nil	nil	nil	nil
2019	8	8	6	33	4.47	9.14	3.31	26.81	nil	nil	nil	nil
2020	8	8	5	25	4.96	9.65	3.15	28.24	nil	nil	nil	nil
2021	5	14	0	31	5.44	10.16	2.99	29.67	nil	nil	nil	nil
2022									6	11	4	32
2023									7	11	4	33
2024									7	12	4	34
2025									8	12	3	36
2026									8	12	3	37

4.0 Discussion

The study was carried out to examine the performance of selected cargo types in sub-Saharan African regions with the purpose of providing informed policy instruments for enhanced trade performance in the regions. Results showing consistent downward trend in crude oil throughput for MA and WA, both historically and in the forecasts may be an indication of a significant shift or challenge in these regions which may include but not be limited to low refinery capacities, aging infrastructure and economic stress. Refineries in these areas might be operating at lower capacities due to aging infrastructure, maintenance issues. In addition, downward trend in throughput may be due to declining demand for refined petroleum products especially in the market served by these two regions. However, significant differences between the throughput levels of MA/WA versus EA/SA is suggestive of their operational statuses within the crude oil processing landscape (United Nations Conference on Trade and Development, 2024; Hellenic Shipping News Worldwide, 2025). In another vein, overall result of dry cargo throughput indicates a robust and growing sector, which is particularly driven by strong performance in SA, WA, and MA. For instance, SA consistent dominance in this sector may indicate its strategic importance in dry cargo handling made possible by infrastructural development, increased trade and progressive economy. Also, MA and WA revealed a significant and sustained growth in dry cargo handling which may be attributed to increasing importance in their dry cargo trade networks. Based on the forecasts, the overall dry cargo throughput is expected to continue its upward trajectory, particularly led by SA, WA, and MA given the role of continued investment in dry cargo handling infrastructure and strong demand for dry bulk and containerized goods.

For Other tanker throughput which are usaully tanker movements and cargo volumes that are not crude oil which include but are not limited to refined petroleum products, chemicals, liquefied

natural gas (LNG), or other bulk liquids. The dynamics in trends of other tanker throughput across different areas show a clear historical leading region (WA), emerging market (EA) occasioned by new infrastructure or logistics shift; and a declining sector in (SA)

5.0 Conclusions

The study carried out an estimation of seaborne trade by cargo types in sub-Saharan African regions between 2006 and 2021 using trend analysis to explain performance of each region against predicted performance and also forecast throughput for upward of 5years between 2022 and 2026. Annual data of crude oil, dry cargo and other tanker throughputs from UNCTAD were used for the study. Results showed variations in performance for all the regions in terms of throughput recorded for all the cargo types. Predicted values were shown to be surpassed by some of the regions while others were swinging between predicted values and their actual performance. Also, forecast results for the following five years revealed three regions (MA,SA,WA) likely to have decreasing record of crude oil, only one region having declining record of dry cargo (EA) while SA only is likely to have declining record for other tanker. This record may be a reflection of various challenges weighing on the maritime sector in most of the countries within the regions. Such challenge includes general poor performance of most regional ports' performance occasioned by long port call time for vessel, long dwell time, congestion liner shipping connectivity issue, cumbersome port administration, and dysfunctional rail and road networks (Sakyi, et al., 2018). In addition, it could be attributed to the nature of exports and export capacity of the regions. Apart from crude oil from selected countries in the region, commodity exports form greater percentage of the non-oil exports in the region. African regions are limited in manufacturing capacity. Manufacturing sector contributes far less to the export of the regions as against other regions of the world where manufacturing sector contributes hugely to their export volumes and value. As such the over-

reliance on commodity export does not only reduce their regional comparative-competitive advantage only, but reduces the reliability of their export volume and value especially due to incessant fluctuations in global prices of these commodities. In addition, weak export reduces traffic which in turn ends up incurring increasing maritime transport costs.

It is pertinent to conclude that though throughput forecasting, especially using short term forecasting strategy is significant to optimizing port operations and development, it cannot provide for loss of performance occasioned by structural challenges or disruption caused by unforseen global or regional pandemic like COVID-19. However, by monitoring the annual changes or fluctuations, the predicted values will provide decision tool for stakeholders and government in the regions to plan especially in the context of uncertainties. This is crucial for these regions because of importance maritime cargo trade play as an enable and driver of socio-economic development of any global region. However, if selected African regions must match their predicted cargo throughput with actual values, countries within the regions must be enhanced by their respective leaders to improve their freight transport network through infrastructural development, relaxation of some very stringent institutional regulations which are impeding trade flows. More so, regional governments must seek collaborations to harness the potential of their various rich maritime resources for trade expansion and regional development. In addition, governments and development partners as well as shipping stakeholders must seek way to improve the security of the trade routes in the region.

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