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Decarbonization of shipping: an African Union perspective

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DECARBONIZATION OF SHIPPING: AN AFRICAN UNION PERSPECTIVE

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Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views and are not necessarily endorsed by the University.

(Signature): 

(Date): **25/09/2023**

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Decarbonization of Shipping: An African Union Perspective.

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Abstract

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Shipping decarbonization has recently gain the attention of the global community and the shipping world with notable energy efficiency gap. Shipping emissions account for about 3% of the global total which requires urgent global solutions to reposition the industry for sustainable future. Most of the literatures on shipping decarbonization focuses on barriers/solutions, renewable and alternative energies for the industry without censoring regional inter-government frameworks to deepen the implementation of emissions reduction regulations in the shipping industry.

The study utilizes the content analysis method, which systematically evaluate the role of African Union in the implementation of MARPOL Annex VI regulation with its significance to improving air pollution and energy efficiency for combating climate change; the extent to which African countries are complying with the IMO's initial strategy in decarbonizing the shipping industry, and the possible challenges and solutions in shipping decarbonization under the African Union umbrella for the African continent.

Additionally, findings of the study indicate that the poor ratification and implementation of MARPOL Annex VI regulation in African countries is mostly attributable to the lack of economic and organizational resources as well as technical capacity to fully participate in international conventions and implement the obligations and regulations effectively as a developing continent.

This study concluded that achieving the IMO's ambitions on decarbonization of the shipping industry should not be left solely on the shoulders of IMO, it requires the communality of the global community to have a binding regulation under the umbrella of IMO for shipping decarbonization; thus this study recommends that, the AU platform is good fertile ground to breed and create a receptive forum for regional focus to have common position in the continent for the adoption and implementation of the IMO's GHG emissions reduction regulations and the subsequent decarbonization of the shipping industry, which also open a new economic/investment opportunities in the sub-Saharan Africa continent.

KEYWORDS: Decarbonization, international shipping, green shipping, greenhouse gas emission, low-carbon fuel, alternative/renewable energy, sustainable shipping, climate change, African Union.

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List of Abbreviations

2050 Aim Strategy	-	2050 Africa's Integrated Maritime Strategy
Agenda 2063	-	African Union Strategic Plan Agenda 2063
ACFTA	-	African Continental Free Trade Area
AU	-	African Union
CII	-	Carbon Intensity Indicators
ECOSOCC	-	Economic, Social and Cultural Council
GDP	-	Gross Domestic Product
EEXI	-	Energy Efficiency Existing Ship Index
EIA	-	Environmental Impact Assessment
HG	-	Greenhouse Gas
GMN	-	Global MTCC Network
EUC	-	European Union Commission
ICS	-	International Chambers of Shipping
IMO	-	International Maritime Organization
IPCC	-	Intergovernmental Panel for Climate Change
KMA	-	Kenya Maritime Authority
MARPOL	-	73/78 International Convention for the Prevention of Pollution from Ships
MARPOL ANNEX VI	-	Annex VI Regulation
MEPC	-	IMO Marine Environment Protection Committee
MSP	-	Marine Spatial Planning
NAPs	-	National Action Plans
NDCs	-	Nationally Determined Contributions
NIMASA	-	Nigerian Maritime Administration and Safety Agency
NOx	-	Nitrogen Oxides
NNPC	-	Nigerian National Petroleum Cooperation
NPA	-	Nigerian Port Authority
ODs	-	Ozone Depleting Substances

PM	-	Particulate Matter
PRC	-	Permanent Représentatives Committee
PSC	-	Peace and Security Council
SEEMP	-	Ship Energy Efficiency Management Plan
SAMSA	-	South Africa Maritime Safety Authority
STCs	-	Specialized Technical Committees
SON	-	Standard Organization of Nigeria
SOx	-	Sulphur Oxides
UN	-	United Nations
U		
NSDGs	-	United Nations Sustainable Development Goals

1.1.0. Introduction:

1.2.0. Background of the study

The shipping industry is the global network of the cheapest bulk transportation of cargoes around the world. According to the international chambers of shipping (ICS), around 90% of cargoes were carried by seaborne trade in volume. The shipping industry plays a fundamental role in the global economy, it is the connecting dots of the supply chain of global trade, goods, and services.

There are about 50,000 commercial ships engaged in international trade and transporting various types of goods. The world fleet is registered in more than 150 countries and is crewed by more than a million sailors from nearly every nation.[1] According to the United Nations Conference on Trade and Development (UNCTAD), the operation of commercial ships generates about 380 billion US dollars in freight rates for the global economy, or about 5% of world trade. On the other hand, the shipping industry is one of the global emitters of greenhouse gas which is the fundamental cause of climate change. It is reported that the global maritime industry emits approximately about 2.9% of total emissions. The rapid growth of international trade in recent years shows that international shipping emissions will continue to rise and are predicted to increase between 50% and 250% by 2050 unless urgent action is taken.[2]

The climate change crisis, which is mainly caused by GHG emissions, is intensifying, causing massive wildfires, hurricanes, droughts, floods, and sea level rise, thereby

[1] *International Chamber of Shipping*. www.ics-Shipping.org. https://www.ics-shipping.org/.

[2] Alamoush, A. S., Ölçer, A. I., & Ballini, F. (2022). Ports' role in shipping decarbonisation: A common port incentive scheme for shipping greenhouse gas emissions reduction. *Cleaner Logistics and Supply Chain*, *3*, 100021. https://doi.org/10.1016/j.clscn.2021.100021

impacting more than 39 million people in 2018 only (UN, 2020).[3] According to United Nations, 2022 report, "Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning of fossil fuels like coal, oil and gas". To combat climate change (reduce GHG emissions), all businesses must adhere to the Paris Agreement's aim of keeping global temperature rise well below 1.5C-2C. Shipping GHG emissions are no exception, since they contribute to climate change, and as a result, the whole marine transport sector must decarbonize.[4] The shipping industry and its environmental externalities spur IMO in 2018 to announce a greenhouse gas (GHG) emission reduction target for international shipping by 50% in 2050 compared 2008 which is an historic moment in global climate regulations.[5]

Notably, IMO in an attempt to prevent and protect the marine environment adopted the international convention for the prevention of pollution from ships (MARPOL 73/78) which deals with different aspects of marine pollutants.[6] Moreso, in 1997, a Protocol was adopted to amend the Convention and a new Annex VI was added which entered into force on 19 May 2005. However, Annex VI deals with air pollution from ships, this was the first entry of regulatory framework internationally in addressing the issue of air pollution from ships, specifically dealing with air pollutants by establish limits on nitrogen oxides (NO_x) emissions and require the use of fuel with lower sulphur content, protecting people's health and the environment by reducing ozone-

[3] United Nations. (2021) Climate Report, https://www.un.org/en/climatechange/reports.

[4] Bouman, E. A., Lindstad, E., Rialland, A. I., & Strømman, A. H. (2017). State-of-the-art technologies, measures, and potential for reducing GHG emissions from shipping – A review. *Transportation Research Part D: Transport and Environment*, *52*, 408–421. https://doi.org/10.1016/j.trd.2017.03.022.

[5] Garcia, B., Foerster, A., & Lin, J. (2020). Net Zero for the International Shipping Sector? An Analysis of the Implementation and Regulatory Challenges of the IMO Strategy on Reduction of GHG Emissions. *Journal of Environmental Law*. https://doi.org/10.1093/jel/eqaa014.

[6] International convention for the prevention of pollution from ships, 2 November 1973, 1340, UNTS 61 (MARPOL).

producing pollutant, which can cause smog and aggravate asthma. The IMO Green House Gas (GHG) reduction strategy that was introduced under MARPOL Annex VI specifically addresses the air pollution from ships by stipulating the measures required to reduce and control such pollutants. As earlier noted, IMO in 2018 announced its greenhouse emission reduction target for international shipping which will kickstart the initial IMO strategy that proposes implementation measures (known as candidate measures). A mix of planning, market-based, technological, and operational measures is proposed, with implementation to be staggered over three timeframes – short (2018-2023), medium (2023-2030) and long term (beyond 2030).[7]

It is worth noting that, MARPOL 2023 regulation is basically an update to the International Convention for the prevention of pollution from ships by updating the Ship Energy Efficiency Management Plan (SEEMP), Energy Efficiency Existing Ship Index (EEXI) Carbon Intensity Indicators (CII) which was aimed to improve the energy efficiency of ships and reduce greenhouse gas emission from the shipping industry.

Despite IMO's intervention in decarbonizing shipping, the anticipated outcome is slow, this is because it is almost impossible to attribute carbon emissions from international shipping to any nation. This further underscores the gains of the incremental approach to ascertaining the level of progress in decarbonizing the shipping industry, more so, the complex nature of the industry is partly responsible for the lack of a central representative body for enforcing regulations of international shipping with the fact that states are sovereign and IMO instruments implementation are at the prerogative of state parties. It is also fundamental to understand that shipping with its infused international character does not favor unilateral applications of rules and regulations, regionalism and country wise application becomes difficult and almost impossible. However, the present study will explore the role African Union as the umbrella body within the African continent in cultivating roadmap for the countries

[7] Lin, J. (n 5)

in the region to implementing regulations within the auspices of IMO's journey in decarbonizing the shipping sector.

This study will systematically evaluate the role of African Union in the implementation of MARPOL Annex VI with its significance to improving air pollution and energy efficiency for combating climate change; the extent to which African countries are complying with the IMO's initial strategy in decarbonizing shipping, and the possible challenges and solutions in shipping decarbonization under the African Union umbrella for African countries.

To achieve the objectives of this dissertation within the scope of the study, Secondary data will be gathered from peer-reviewed journals, scientific publications, as well as other websites on shipping administration, ports management and security, maritime safety, engineering, logistics, and others. The data will then be analyzed using content analysis method that is considered most appropriate for the data analysis to establish the commonalities between the findings of the literature review.[8]

To set the scene for proper evaluation, the discussion in section 2 underpins the key features of IMO's initial strategy and the African Union Strategic Plan Agenda 2063 (Agenda 2063) with its implementation design. The discourse in section 3 will primarily focus on the compliance status of African countries with IMO's shipping decarbonization and the possible challenges in the implementation of the regulatory design by African Union and African countries.

Finally, section 4, will conclude by proffering recommendations and how regionalism can be explored as an integrated overarching approach which can be used to strengthen IMO's governance approach in this critical time of global crises of climate emergency

[8] . Caliskan, A. (2022). Seaports participation in enhancing the sustainable development goals. *Journal of Cleaner Production*, *379*, 134715. https://doi.org/10.1016/j.jclepro.2022.134715.

to fully speeding the implementation design to mediate the effects of climate change and global warming.

1.3.0. IMO's Initial Strategy for Shipping Decarbonization

The uptake of IMO's journey for the decarbonization of the shipping industry begins at the 62nd Meeting (2011) of the Marine Environment Protection Committee (henceforth MEPC), the IMO by adoption of the proposed amendment to the MARPOL Annex Chapter VI which becomes mandatory, the EEDI (Energy Efficiency Design Index) for new ships as well as the SEEMP (Ship Energy Efficiency Management Plan) for all ships. This was finally implemented to reduce GHG emissions from merchant vessels on January 1st, 2013, for ships of 400GT on international shipping.[9] Inherently, at the 70th MEPC, a feasible plan to develop a roadmap was established for an all-inclusive IMO strategy and accepted for the reduction of GHG's from ships on international shipping, which comprises of short-term, mid-term, and long-term mechanisms, with the goal of adopting the highlighted strategy in 2023.[10]

The approval of the roadmap at the 72nd MEPC (April 2018) necessitated the first phase of GHG emissions from ships, which was adopted as the initial IMO strategy[11] for the reduction of GHG emissions from ships (henceforth Initial IMO GHG Strategy), wherein under the aegis of the IMO, the measures are to be further

[9] Joung, T.-H., Kang, S.-G., Lee, J.-K., & Ahn, J. (2020). The IMO initial strategy for reducing Greenhouse Gas (GHG) emissions, and its follow-up actions towards 2050. *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, *4*(1), 1–7. https://doi.org/10.1080/25725084.2019.1707938.

[10] Chircop, A. (2019). The IMO Initial Strategy for the Reduction of GHGs from International Shipping: A Commentary. *The International Journal of Marine and Coastal Law*, *34*(3), 482–512. https://doi.org/10.1163/15718085-13431093.

[11] Resolution MEPC.304(72), adopted on 13 April 2018 at Maritime Environmental Protection Committee (MEPC) 72nd Session (9-13 April 2018).

negotiated, developed, and agreed upon[12], however at the 73rd MEPC (October 2018), subsequent programmes following the Initial IMO GHG Strategy were arranged.[13]

Enigmatically, IMO finds its fulcrum from several international climate law regimes and the law of the sea, international diplomacy and the principles and practices of international maritime regulations as the foundation of its journey for the decarbonization of the maritime industry. Furthermore, it is fundamental at this juncture, to discuss the Initial IMO Strategy Candidate Measures for proper comprehensiveness of the discourse as earlier mentioned; short-term, mid-term and the long-term measures for reduction of GHGs from shipping.

1.3.1. Short-Term Measures

The Initial IMO Strategy presents candidate measures to implement the new emission reduction objectives over the course of three timeframes. Of vital importance, the Short-term candidate measures aims at the implementation of mechanisms already in existence which are meant to finalized and agreed between 2018 and 2023 and to be concluded and adopted in 2023.[14] The complexity of the shipping world and its international character with 25 years life span of ships used for international trade, makes its rigorous for the phasing out of the entire international fleets in shipping decarbonization regime by constructing new ships to replace the existing world fleets, that hugely depends on fossil fuels regime which is entirely impossible.

In considering the difficulties associated with the transition of the shipping world from the use of fossil fuels regime to biofuels/renewable energy, IMO in its critical

[12] Resolution MEPC.304(72), Annex 11 'Initial IMO Strategy on Reduction of GHG Emissions from Ships' (Initial Strategy) 6, para 4.1.

[13] Resolution MEPC. 305 (73) Annex 9 Programme of follow-up actions of the initial IMO Strategy on Reduction of GHG Emissions from Ships up to 2023.

[14] Initial Strategy (n, 11) 7, para 3.2.

assessment adopts measures in the Short-term not to burden international shipping, streamline its regulations to leverage on operational measures such as speed optimization and speed reduction) were advocated.[15] Interestingly, IMO in considering the role of ports in the global logistic chain, (ship and port interphase), ports in this journey should also be optimized by developing infrastructure to support alternative low-carbon fuels or to provide onshore power from renewal energy sources.[16]

Again, critical to the Initial IMO Strategy measures, seeing that countries were vital in the implementation and adoption of the measures were encouraged to develop National Action Plans (NAPs) that represent the conditions for future national emission reduction guidelines.[17]

1.3.2. Candidate Mid-Term Measures

The realization of the mid-term candidate measures was centered on the continuation of the implementation of measures already put in place at the initial short-term candidate measures such as updating of national action plans and continuation of technical cooperation and capacity-building, and new operational energy-efficiency measures for both new and existing ships are also expected[18] finalized and agreed between 2023 and 2030. At this juncture (the era between 2023 and 2030), it is expected that alternative low-carbon and zero-carbon fuels, their choice and availability should have scaled up to meet market demand of the shipping industry, therefore it would be necessary at that time to implement a regulatory framework for their uptake in the industry. The phase between 2023 and 2030.[19]

[15] Initial IMO Strategy, (n, 11) 7, para 4.7.

[16] ibid.

[17] ibid.

[18] Initial IMO Strategy, (n, 11) 9, para 4.8

[19] ibid.

Additionally, from the IMO's viewpoint, any measures taken should follow a three-step process that includes data collecting, data analysis, and decision-making that will impact future actions.[20] Also, fundamental among other mechanisms were the market-based mechanisms should be allowed as mid-term candidate measures for the purpose of incentivizing emission reductions.[21]

3.3.3. Long-Term Measures

The long-term candidate measures were finalized and agreed upon beyond 2030 which considered the manufacture and distribution of fossil-free or zero-carbon fuels so that the maritime industry can examine and explore decarbonization in the second half of the century; and encourage and facilitate the general adoption of other possible new/innovative emission reduction mechanism(s).

Although, long-term candidate measures which seem not to provide any specific mechanism or approach, however, rather rely heavily on the development and use of zero-carbon or low-carbon fuels for seamless transition of the shipping industry in the second half of the century.[22] Equally, the initial IMO strategy tasked countries to implement national action plans, noting that member states are the enforcement agents through which the decarbonization of the shipping industry would be implemented. The NAPs are to be developed in line with IMO's guidelines, bearing mind with the need to avoid unilateral or regional application considering the international character of shipping industry.[23]

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[20] The Maritime Environment Protection Committee (MEPC) 68 (15 May 2015) agreed on this three-step approach: IMO Regulation MEPC.263(68).

[21] Initial IMO Strategy, (n, 11) 9, para 4.8.

[22] ibid 9, para 4.9

[23] Initial Strategy (n 11) 6, para 4.7. MEPC 74 instructed the Intersessional Working Group on Reduction of GHG Emissions from Ships to 'consider [in its meetings in November 2019 and

On a final note, according to the agreed-upon programme of follow-up measures, the IMO adopted the 2023 IMO strategy on reduction of GHG Emissions from Ships in July 2023 (MEPC 80). The 2023 IMO GHG strategy aims for, among other things, a reduction in the carbon intensity of international shipping (decrease CO2 emissions per transport work), as an average across international shipping, by at least 40% by 2030, and that the total annual GHG emissions from international shipping should reach net-zero GHG emissions by or around, i.e., close to, 2050, compared to 2008.[24]

The 2023 IMO GHG strategy also provides a new level of ambition about the adoption of zero or nearly-zero GHG Emissions technologies, fuels, and/or energy sources that are to account for at least 5%, with a goal of 10%, of the energy consumed by international shipping by 2030 which was agreed upon at the Initial IMO Strategy in 2018.[25] Consequently, the 2023 revised IMO GHG strategy consists of the following levels of ambition: carbon intensity of the ship to decline through further improvement of the energy efficiency for new ships, carbon intensity of international shipping to decline, uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources to increase, and GHG emissions form international shipping to reach net zero.

The adoption of the revised 2023 IMO GHG strategy is a monumental achievement of decarbonization of the shipping industry, though not the end of all things but the beginning of a policy design for a future IMO legal/regulatory framework of shipping world transport system.

March 2020] a draft MEPC resolution urging Member States to develop and update a voluntary National Action Plan (NAP) with a view to contributing to reducing GHG emissions from international shipping, and develop associated guidelines, as appropriate.'

[24] Resolution MEPC.377(80) adopted on 7 July 2023 at Marine Environment Protection Committee (MEPC), 80th Session (3-7 July 2023).

[25] . ibid.

1.4.0. The Compliance Status of African Countries with the Implementation of MARPOL Annexes VI

The protection and preservation of the marine environment has been within the IMO radar as the only specialized global agency with the mandate to formulate policies and regulations for the shipping industry. It is under this prerogative that IMO with its acute expertise, understanding of shipping industry, and ship bond pollution to the marine environment adopted a holistic approach to protect the marine environment from ship-generated pollution, waste and dumping to the oceans. Notably, in order to deal with ship-generated pollution to the marine environment, IMO adopted the International Convention for the Prevention of Pollution from Ships,[26] aim at preventing and reducing both accidental pollution and that from routine operations from ships. MARPOL 73/78 and its Annexes contain regulations addressing several sources of ship-generated pollution for ocean going vessels.

The convention (MARPOL) covers series of ship-generated pollution by classifying them into Annexes (I-VI):

Annexe I: Regulation for pollution prevention by oil (October 1983).

Annex II: Regulations for controlling pollution by Noxious Liquid Substance in bulk (April 1987).

Annexe III: Regulation for preventing pollution by harmful substances carried at sea in packaged form (July 1992).

Annexe IV: Regulation for pollution prevention by sewage from ships (Sep 2003).

Annexe V: Regulation for pollution prevention by Garbage from ships (Dec 1998).

Annex VI: Regulation for prevention of Air pollution from ships (May 2005).

[26] International convention for the prevention of pollution from ships, 2 November 1973, 1340, UNTS 61 (MARPOL).

It is imperative to underpin MARPOL Annex VI as the focal point of this discourse noting that, this is IMO's entry and the journey for the decarbonization of the shipping industry[27], though the primary aim of Annex VI is the prevention of air pollution from ocean going ships which limit values for nitrogen oxide and sulphur oxide. The MARPOL Annex VI has four (4) Chapters with a total of 23 Regulations, it provides requirements for the control of emissions from ships such as ozone depleting substances (ODS), nitrogen oxides (NOx), sulphur oxides (SOx) and particulate matter (PM), volatile organic compounds (VOCs), greenhouse gases (GHG) and other pollutants.[28] Climate change and global warning which is noted as a global crisis[29] is partly exacerbated by greenhouse gas emission from shipping, immediate climate actions is required to reduce the impact on human and the marine ecosystem. In this wise, in 2011 IMO adopted a chapter that covers mandatory technical and operational energy efficiency measures aimed at reducing greenhouse gas emissions from ships.

It is instructive to mention that the relevance of MARPOL in maritime governance cannot be overlooked. It is one of the IMO instruments that has achieved universal ratification and among the standing four pillars of shipping with its omniscient composition for the regulation of maritime pollution from ships.[30] Due its importance to maritime governance and considering its universal ratification, countries in the African region is also part of the bandwagon in the ratification of MARPOL and its annexes. The African Union in this regard consist of fifty-five (55) countries, sixteen

[27] Joung, T.-H., (n.11)

[28] (IMO, 2019); Zhou, Y., Li, X., & Yuen, K. F. (2023). Sustainable shipping: A critical review for a unified framework and future research agenda. *Marine Policy*, *148*, 105478. https://doi.org/10.1016/j.marpol.2023.105478.

[29] Khojasteh, D., Davani, E., Shamsipour, A., Haghani, M., & Glamore, W. (2022). Climate change and COVID-19: Interdisciplinary perspectives from two global crises. *Science of the Total Environment*, *844*, 157142. https://doi.org/10.1016/j.scitotenv.2022.157142.

[30] The Four Pillars of International Maritime Law. (2020, June 12). Marine Information Solutions. https://mismarine.com/the-four-pillars-of-international-maritime-law/

countries are landlocked, nineteen (19) countries had ratified MARPOL Annex I-V, without Annex VI.

However, there are seventeen (17) countries within the African Union body that had fully ratified MARPOL 73/78 with all its annexes.[31] This ratification status shows the level of commitment by the African countries in the continent in maritime governance and its associated ship-generated pollution to the marine ecosystem in the decarbonization of shipping industry.

Furthermore, as earlier noted, the central focus of this discourse is to understand the level of commitment of African countries in the drive to decarbonizing the shipping industry, and MARPOL Annex VI been IMO's entry phase and the journey for the decarbonization of the shipping industry. To broaden the understanding of the objective the paper, it is the interest of the writer to understudy some African countries with implementation of MARPOL Annex VI to understand African's position in this journey of decarbonizing of the global shipping sector.

The following list shows all members states grouped by region, in alphabetical order, and their date of joining the AU or its predecessor the OAU.[32]

Member State	**Abbreviation**	**Date of joining the OAU or AU**
	Central Africa	
Republic of Burundi	Burundi	25 May 1963
Republic of Cameroon	Cameroon	25 May 1963
Central African Republic	Central African Republic	25 May 1963

[31] *Status of Conventions*. (n.d.) https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx

[32] African Union. (2019). Member States | African Union. Au.int. https://au.int/en/member_states/countryprofiles2

Republic of Chad	Chad	25 May 1963
Republic of the Congo	Congo Republic	25 May 1963
Democratic Republic of Congo	DR Congo	25 May 1963
Republic of Equatorial Guinea	Equatorial Guinea	12 October 1968
Gabonese Republic	Gabon	25 May 1963
Democratic Republic of São Tomé and Príncipe	São Tomé and Príncipe	18 July 1975
Eastern Africa		
Union of the Comoros	Comoros	18 July 1975
Republic of Djibouti	Djibouti	27 June 1977
State of Eritrea	Eritrea	24 May 1993
Federal Democratic Republic of Ethiopia	Ethiopia	25 May 1963
Republic of Kenya	Kenya	25 May 1963
Republic of Madagascar	Madagascar	25 May 1963
Republic of Mauritius	Mauritius	August 1968
Republic of Rwanda	Rwanda	25 May 1963
Republic of Seychelles	Seychelles	29 June 1976
Federal Republic of Somalia	Somalia	25 May 1963
Republic of South Sudan	South Sudan	27 July 2011
Republic of the Sudan	Sudan	25 May 1963
United Republic of Tanzania	Tanzania	25 May 1963
Republic of Uganda	Uganda	25 May 1963
Northern Africa		
People’s Democratic Republic of Algeria	Algeria	25 May 1963
Arab Republic of Egypt	Egypt	25 May 1963
Libya	Libya	25 May 1963
Islamic Republic of Mauritania	Mauritania	25 May 1963

Kingdom of Morocco	Morocco	1963/31 January 2017
Sahrawi Arab Democratic Republic	Sahrawi Republic	22 February 1982
Republic of Tunisia	Tunisia	25 May 1963
	Southern Africa	
Republic of Angola	Angola	11 February 1975
Republic of Botswana	Botswana	31 October 1966
Kingdom of Eswatini	Eswatini	24 September 1968
Kingdom of Lesotho	Lesotho	31 October 1966
Republic of Malawi	Malawi	13 July 1964
Republic of Mozambique	Mozambique	18 July 1975
Republic of Namibia	Namibia	June 1990
Republic of South Africa	South Africa	6 June 1994
Republic of Zambia	Zambia	16 December 1964
Republic of Zimbabwe	Zimbabwe	18 June 1980
	Western Africa	
Republic of Benin	Benin	25 May 1963
Burkina Faso	Burkina Faso	25 May 1963
Republic of Cabo Verde	Cabo Verde	18 July 1975
Republic of Côte d'Ivoire	Côte d'Ivoire	25 May 1963
Republic of the Gambia	Gambia	9 March 1965
Republic of Ghana	Ghana	25 May 1963
Republic of Guinea	Guinea	25 May 1963
Republic of Guinea-Bissau	Guinea-Bissau	19 November 1973
Republic of Liberia	Liberia	25 May 1963
Republic of Mali	Mali	25 May 1963
Republic of Niger	Niger	25 May 1963

Federal Republic of Nigeria	Nigeria	25 May 1963
Republic of Senegal	Senegal	25 May 1963
Republic of Sierra Leone	Sierra Leone	25 May 1963
Togolese Republic	Togo	25 May 1963

Table 2: Landlocked countries in Africa[33]

Member State	**Abbreviation**
Republic of Burundi	Burundi
Central African Republic	Central African Republic
Republic of Chad	Chad
Republic of Uganda	Uganda
Republic of Botswana	Botswana
Kingdom of Eswatini	Eswatini
Kingdom of Lesotho	Lesotho
Republic of Malawi	Malawi
Republic of Zambia	Zambia
Republic of Zimbabwe	Zimbabwe
Burkina Faso	Burkina Faso
Republic of the Gambia	Gambia
Republic of Liberia	Liberia

[33] landlocked countries in Africa - Google Search. (n.d.). www.google.com. Retrieved July 14, 2023, fromhttps://www.google.com/search?q=landlocked+countries+in+africa&rlz=1C1VDKB_enCA1017CA1017&oq=landlocked+&aqs=chrome.4.69i57j0i433i512j0i131i433i512j0i512l2j46i512j0i512l4.1516607580j0j15&sourceid=chrome&ie=UTF-8.

Republic of Mali	Mali
Republic of Niger	Niger
Republic of Rwanda	Rwanda

Table 3: List Showing the Ratification/Compliance Status of African Countries with MARPOL 73/78 and its Annexes.

S/No.	Name of Countries	MARPOL I-V	MARPOL VI
1.	Algeria	❖	
2.	Angola	❖	
3	Benin	❖	❖
4.	Cameroon	❖	
5.	Cabo Verde	❖	
6.	Comoros	❖	
7.	Congo	❖	❖
8.	Cote d'Ivoire	❖	
9.	Djibouti	❖	
10.	Egypt	❖	
11.	Equatorial Guinea	❖	
12.	Gabon	❖	❖
13.	Gambia	❖	
14.	Ghana	❖	❖
15.	Guinea	❖	
16.	Guinea-Bissau	❖	❖
17.	Kenya	❖	❖
18.	Liberia	❖	❖
19.	Libya	❖	
20.	Madagascar	❖	❖

21.	Mauritius	❖	❖
22.	Morocco	❖	❖
23.	Mozambique	❖	
24.	Namibia	❖	
25.	Nigeria	❖	❖
26.	Papua New Guinea	❖	
27.	Sao Tome & Principle	❖	❖
28.	Senegal	❖	
29.	Seychelles	❖	❖
30.	Sierra Leone	❖	❖
31.	Somalia	(Annex I/II)	
32	South Africa	❖	❖
33.	Sudan	❖	
34.	Togo	❖	❖
35.	Tunisia	❖	❖
36.	United Rep. of Tanzania	❖	

1.4.1. National Framework of Major Flag States in African Union for the Implementation of MARPOL Annex VI

Suffice to note that IMO's governance for the enforcement of its instruments for the maritime industry is primarily hinged on the flag and port state inspections/control which is the motherboard and the international policing to ensure adherence to its regulation by the shipping world.[34] In Africa, there are major flag states which are within the radar of this paper, to give focus and bearing for the understanding of the national framework for the implementation of MARPOL Annex VI.

The focus of the major flag states in this design is to understudy few countries within the AU body, to showcase the national framework for the implementation of MARPOL Annex VI, countries under this category are Nigeria, Liberia, South Africa, and Kenya.

1.4.2. Nigerian' National Framework for the Implementation of MARPOL Annex VI

Nigeria is the second largest registry in West Africa and a member state of the International Maritime Organization. Nigeria became a member of IMO in 1962 and a major stakeholder in maritime governance in the West African region. Its maritime governance and interest have spurred Nigeria to be part of several maritime unions (bilateral and multilateral agreements) within the region and Africa as whole.

[34] Nwokedi, T. C., Eko-Rapheals, M. U., Obasi, C., & Okechkwu, A. J. (2022). Performance of Abuja MOU on Port State Control in Enforcement of IMO Regulations on Maritime Safety. *LOGI – Scientific Journal on Transport and Logistics*, *13*(1), 233–244. https://doi.org/10.2478/logi-2022-0021;, **Ceylan, B. O., Akyar, D. A., & Celik, M. S. (2023).** A novel FMEA approach for risk assessment of air pollution from ships. *Marine Policy*, *150*, 105536. https://doi.org/10.1016/j.marpol.2023.105536

Notably, Nigeria has ratified the major IMO Conventions which represent the four (4) pillars of shipping to position its flag Administration for maritime governance. Suffice to note that the central focus of this discourse is MARPOL Annex VI, the regulation for the prevention and control of air pollution from ship. Inherently, Nigeria is a State Party to Annex VI regulation, having acceded to it on 18 June 2015, and its subsequent entry into force in the country on 18 September 2015 [35], however national implementation framework was not designed, this was as result of the fact that Annex VI implementation requires the domestication of the regulation into national law for it to be effective and binding. The Dualist practice of Nigeria is a clog in the national implementation framework of international law that requires the transposing of such international regulation into national law for implementation.[36]

MARPOL Annex VI implementation is also suffering the same ordeal, however, the Nigerian Administration and Safety Agency (NIMASA) being the apex maritime regulatory agency in Nigeria and its sister agencies in this regard towed different pathway in addressing the implementation of Annex VI in Nigeria whilst awaiting domestication of Annex VI regulation by the Nigerian government. Noting that the speedy implementation of Annex VI is fundamental owing to the climate crises across the globe, which is exuberated by burning of fossil fuels and the shipping industry is considered one of the primary contributors.[37]

NIMASA being the maritime janitor of the country has commenced the review of the Nigerian merchant Shipping Act, 2007[38] in 2020 that is intended to reflect the international maritime regulations, the country is yet to transposed into her national layers of laws which also includes the MARPOL Annex VI. Conversely, NIMASA

[35] Status of Conventions (n. 31).

[36] Amended Constitution of the Federal Republic of Nigeria 1999 (Amended 1999 Constitution section 12(1).

[37] Nations, U. (2021) (n.3)

[38] Nigerian Merchant Shipping Act, 2007.

and its sister agencies (the Nigerian Port Authority and the Standard Organization of Nigeria) impliedly commenced the national implementation of Annex VI by virtue of S. 335 (1) (a) of the Merchant Shipping Act, 2007.[39] Notably, this provision forms the fabric of the national framework for the implementation of Annex VI in Nigeria and other related international conventions. In this regard, NIMASA, SON, NPA, NNPC and other maritime stakeholders work collaboratively to set the bunker standards to the recommended 0.5 in compliance with Annex VI .[40] Additionally, NIMASA being the apex maritime administration working to achieve the mandate of Annex VI issued marine notice for the implementation of Annex VI in the Nigerian maritime space in 2021.[41] Likewise, the NPA in this regard issued a marine notice for its maritime stakeholders for the compliance and enforcement of Annex VI regulation in Nigerian ports and the maritime space in 2021.[42] The fragrance of implementation of Annex VI regulation can be perceived within Nigeria maritime space despite the domestication of MARPOL Annex VI in Nigeria still underway with the current review of the merchant shipping act that will crystalize into full blooded law in Nigeria.

[39] As from the commencement of this Act, provisions of the following International Conventions shall apply (a) International Convention for the Prevention of Pollution from Ships, 1973/1978 and the Annexes thereto.

[40] Ship Pollution: NIMASA to Ensure Availability of Sulphur Compliant Fuel | NIMASA. (2021, April 14). https://nimasa.gov.ng/ship-pollution-nimasa-to-ensure-availability-of-sulphur-compliant-fuel/

[41] Implementation of MARPOL VI: Prevention of Air Pollution from Ships | NIMASA. Retrieved July 20, 2023, from https://nimasa.gov.ng/implementation-of-marpol-vi-prevention-of-air-pollution-from-ships/.

[42] Nigerian Ports Authority Notice to Mariners MARPOL Annex VI -2020 Marine Fuel Oil Sulphur CAP. (n.d.). Retrieved July 20, 2023, from http://www.abujamou.org/NOTICE%20TO%20MARINERS%20FROM%20NPA.

1.4.3. Liberian's National Framework for the Implementation of MARPOL Annex VI

Liberia is largest ship registry in the world[43] very well known for its flag of convenience, Liberia is one of the flags that operates the open registry concept which allows nationals of other countries to own and register vessels under the Liberian flag. The open registry concept is the trademark of the Liberian flag which has position the country as one of the global maritime demigods resulting from the vessel fleets and global tonnage it commands in the shipping world. Suffice to note that, Liberia became a member of the IMO in 1959 as a critical player in the IMO system and governance.

In addition, Liberian have ratified the major IMO conventions to position its flag for competitiveness among other world class flags.[44] Liberia is a State Party to Annex VI regulation, having acceded to it on 28 August 2002, and its subsequent entry into force in the country on 19 May 2005 [45] however, Liberia unlike other Africa countries that subject the rigour of implementation to National Law for it to take effect, the national framework for the implementation of Annex VI regulation was acceded to the Recognized Organizations of the Flag Administration for its implementation.[46]

Suffice to mention that the Liberia Maritime Authority issued series of marine notice to its maritime stakeholders for the implementation of Annex VI regulation in Liberia.[47] This is one of the remarkable features of Liberian Flag Administration to the rest of the countries in Africa, making the Liberian Flag as one of the world most

[43] Chambers, S. (2023, July 28). *Liberia replaces Panama as the world's largest flag*. Splash247. https://splash247.com/liberia-replaces-panama-as-the-worlds-largest-flag.

[44] Recognized Organizations | The Liberian Registry. www.liscr.com. Retrieved July 29, 2023, from https://www.liscr.com/recognized-organizations.

[45] Status of Conventions (n. 31).

[46] The Republic of Liberia: Liberia Maritime Authority, Marine Advisory 14/2021; Amendments to MARPOL Annex VI – EEXI, CII and SEEMP, 17 November 2021.

[47] The Republic of Liberia: Liberia Maritime Authority Marine Notice POL-009 Rev 10/22.

competitive/largest flag currently in the world. It is imperative to note that, Liberia whilst working in IMO's blueprint of the decarbonization of the shipping and aligning with Annex VI regulation "the Liberian Registry and its dedicated Global Gas Team, is leading the way through a risked based approach of new technologies to unlock the potential of alternative fuels such as Hydrogen, Ammonia and Methanol in the maritime industry's joint pursuit for zero emission shipping".[48]

1.4.4. Kenyan's National Framework for the Implementation of MARPOL Annex VI

Kenya Maritime Authority (KMA) was established in June 2004 as the semi-independent organisation responsible for regulating the Kenyan maritime industry. Safety and security at sea is one of the Authority's primary tasks. As the leader of the Kenyan maritime industry, KMA strives to strengthen national maritime administration by enhancing regulatory and institutional capacities for safety and security, promoting the effective implementation of international maritime conventions and other mandatory instruments on safety & security, promoting maritime training, coordinating Search and Rescue, preventing marine pollution, and promoting the preservation of the marine environment.

Kenya is a party to Annex VI regulation, having acceded to it on 14 January 2008, and its subsequent entry into force in the country on 14 April 2008.[49] Kenya is a monist State by virtue of Article 2(6) of the Constitution (2010)[50], which establishes that any treaty or convention ratified by Kenya forms part of the laws of Kenya, Annex VI regulation formed part of its laws upon ratification. Interestingly, the Republic of Kenya adopted its national guidelines for the implementation of Annex VI regulation

[48] Environmental, | The Liberian Registry. (n.d.). Www.liscr.com. Retrieved July 29, 2023, from https://www.liscr.com/enviromental.

[49] ibid.

[50] The Constitution of Kenya 2010.

in 2019 and tasked all key government entities with collaborating to meet the Annex VI standards for maritime fuel.[51]

1.4.5. South African's National Framework for the Implementation of MARPOL Annex VI

South Africa is one of countries in Africa leading the call for decarbonization of the shipping industry, considering the impact of fossil fuel as lead cause of climate change and global warming.[52] Notably, South Africa is in one of strategic geographical position, a key maritime transport hub in the southern hemisphere, co-terminus by three large oceans: the Indian, Atlantic, and Southern Oceans. This favoured position in the southern hemisphere has bolstered South Africa to ratifying IMO conventions to deal with the maritime traffic in its coastal waters and shipping at large.

Accordingly, sustainable shipping is dear to South Africa with the huge deposit of renewal energy in commercial volume,[53] however, the country in the maritime world is not known as a significant ship owning and ship operating country.[54] South Africa joined the IMO system as a member state in 1995[55] and have ratified the four pillars of shipping to strategically position its maritime administration to addressing the maritime deliverables in ocean governance. The Annex VI regulation being the focal

[51] Nyamoko Okong'o, G. (2019, December). Republic of Kenya: National Guideline Implementation of IMO2020: MARPOL Annex VI Requirement for Marine Fuel Oil.

[52] Johannes Stephanus Spamer. (2015). Riding the African Blue Economy wave: A South African perspective. *2015 4th International Conference on Advanced Logistics and Transport (ICALT)*. https://doi.org/10.1109/icadlt.2015.7136591

[53] South Africa: Fueling the Future of Shipping South Africa's role in the transformation of global shipping through green hydrogen - derived green. (n.d.).

[54] Matekenya, W., & Ncwadi, R. (2022). The impact of maritime transport financing on total trade in South Africa. *Journal of Shipping and Trade*, *7*(1). https://doi.org/10.1186/s41072-022-00106-9.

[55]Member States. (n.d.). Www.imo.org. https://www.imo.org/en/OurWork/ERO/Pages/MemberStates.aspx

point of this discourse as the springboard for the decarbonization of the shipping industry, South Africa is a party to Annex VI regulation having acceded to it on 17 September 2015, and its subsequent entry into force in the country on 17 December 2015.[56] South Africa is both monist and dualist state by virtue of S. 231 and 232 of the constitution, therefore international customary law becomes South Africa national law automatically as monist state while international law requires to be transposed into internal law in South Africa before it becomes effective or operational.[57]

The South African Maritime Safety Authority (SAMSA) is tasked with the administration of MARPOL through the Marine Pollution (Prevention of Pollution from Ships) Act, 2 of 1986 ("the Act"). Essentially, SAMSA in 2019 held a workshop with several stakeholders in the maritime industry for the implementation of Annex VI regulation as the regulatory agency laying its roadmap.[58] To fully achieve the mandate of Annex VI regulation as a flag and port state control mechanism enshrined in the IMO regulatory framework for national implementation, South Africa issued a Marine Notice No. 8 of 2019 for the effective implementation of IMO 2020 0.50% sulphur cap.[59]

Summary

Despite the relevance of Annex VI regulation to the global oceans, the environment, and human health, the ratification and implementation of Annex VI regulation is poorly conceived by African countries. This is manifestly shown from the ratification status of Annex VI regulation in the IMO website.[60] The African continent consists of

[56] . Status of Conventions (n. 31).

[57] . The Constitution of South Africa 1996 (The Constitution).

[58] . SAMSA. (2019). South Africa National Workshop on Implementation of MARPOL ANNEX VI on 0.50% Sulphur Limit Regulation Report.

[59]. SAMASA. (2019). Effective Implementation of IMO 2020 0.50% Sulphur Cap. https://www.samsa.org.za/Marine%20Notices/2019/MN%208%20of%202019%20Effective%20Implementation%20of%20IMO%202020%20Sulphur%20Cap.pdf

[60]. Status of Conventions (n. 31)

55 countries and as earlier noted, it is only 17 countries in Africa that had ratified Annex VI regulation.[61]

The ratification of IMO conventions is the foundation of global maritime governance, however National framework for the implementation is potentially the building block through which IMO conventions can achieve the breath required for enforcement of the conventions by IMO member states.[62] Furthermore, the poor ratification and implementation of Annex VI regulation in countries in the African region is fundamentally associated with lack of human expertise, financial, technological, infrastructure and the knowledge to meet the international obligation by the individual countries in Africa.

1.5.0. The African Union Strategy plan "Agenda 2063" and the IMO's Shipping Decarbonization.

The African Union (AU) is the one of the largest continental intergovernmental bodies in the world founded in 2002, consisting of 55 African countries, the successor of the Organization of African Unity (OAU, 1963-1999).[63] Accordingly, the fundamental principle of the AU is guided by its vision of *"An Integrated, Prosperous and Peaceful Africa, driven by its own citizens and representing a dynamic force in the global arena."* The AU is a strategic continental union at the central of global frontiers to position and promote African ideologies in ensuring that Africa is self-sufficient and free from outside domination.

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[61] See table showing the Ratification/Compliance Status of African Countries with MARPOL 73/78 and its Annexes.

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[62] International Chamber of Shipping (ICS) IMO Conventions: Effective Implementation IMO World Maritime Day 2014. (2014). https://www.ics-shipping.org/wp-content/uploads/2014/09/IMO-Conventions-Effective-Implementation-%E2%80%93-IMO-World-Maritime-Day-2014.

[63]. African Union. (2019). About the African Union | African Union. Au.int; African Union. https://au.int/en/overview.

The fundamental aims of the Union are laid down in the Constitutive Act of the African Union and the Protocol on Amendments to the Constitutive Act of the African Union which are:[64]

- Achieve greater unity and solidarity between African countries and the people,
- Defend the sovereignty, territorial integrity, and independence of its Member States,
- Accelerate the political and socio-economic integration of the continent,
- Promote and defend African common positions on issues of interest to the continent and its people,
- Encourage international cooperation,
- Promote peace, security, and stability on the continent,
- Promote democratic principles and institutions, popular participation, and good governance,
- Promote and protect human and peoples' rights in accordance with the African Charter on Human and Peoples' Rights and other relevant human rights instruments,
- Establish the necessary conditions which enable the continent to play its rightful role in the global economy and in international negotiations,
- Promote sustainable development at the economic, social, and cultural levels as well as the integration of African economies,
- Promote cooperation in all fields of human activity to raise the living standards of African peoples,
- Coordinate and harmonise the policies between the existing and future Regional Economic Communities for the gradual attainment of the objectives of the Union,
- Advance the development of the continent by promoting research in all fields, in science and technology,

[64] . ibid.

- Work with relevant international partners in the eradication of preventable diseases and the promotion of good health on the continent,
- Ensure the effective participation of women in decision-making, particularly in the political, economic, and socio-cultural areas,
- Develop and promote common policies on trade, defence, and foreign relations to ensure the defence of the Continent and the strengthening of its negotiating positions, and
- Invite and encourage the full participation of the African Diaspora as an important part of our Continent, in the building of the African Union.

Also, the Union is principally comprised of six (6) key organs that are responsible for the work, the making of decisions, and the execution of policies. These organs are: The Assembly of Heads of State and Government, the Executive Council, the Permanent Representatives Committee (PRC), Specialized Technical Committee (STCs), the Peace and Security Council (PSC), and the African Union Commission. Its structure allows the participation of African citizens and civil society through the Pan-African Parliament and the Economic, Social and Cultural Council (ECOSOCC). To ensure that the Union achieve its mandate for the African continent and its people, a fifty (50) years strategic plan was drawn up (Agenda 2063). Agenda 2063 is a strategic framework for Africa's long-term socio-economic and integrative development that aims to realise the Pan African Vision of an integrated, wealthy, and peaceful Africa.[65] Agenda 2063 is a framework document that will serve as a compass for steering the long-term strategy of the aspirations of the continent's citizens over the next 50 years, which is the brainchild of AU as the pilot for the actualization of Africa's dream for both those at home and in diaspora. The agenda 2063 captured key milestone converging aspirations which encompasses all facets of Africa society for structural transformation which are:[66]

[65] ibid.

[66] AU. (2015, September). Agenda 2063.

1. A prosperous Africa based on inclusive growth and sustainable development,
2. An integrated continent, politically united, based on the ideals of Pan Africanism and the vision of Africa's Renaissance,
3. An Africa of good governance, respect for human rights, justice, and the rule of law,
4. A peaceful and secure Africa,
5. An Africa with a strong cultural identity, common heritage, values, and ethics,
6. An Africa whose development is people-driven, relying on the potential of African people, especially its women and youth, and caring for children, and
7. Africa as a strong, united, resilient, and influential global player and partner.

It is interesting to note that the converging aspiration which unveil the exposition of a prosperous Africa based on inclusive growth and sustainable development becomes the theme of this discourse setting the pathways for understanding the Africa's dream for climate resilient and sustainable maritime governance. In recent years, climate change and global warming is noticed globally wherein no single country/continent in the world is immune to its impact,[67] and the primary cause of climate change is induced by greenhouse gas emissions by burning of fossil fuels. Moreover, bearing in mind that Africa is not living in isolation and as part of the global community is deeply affected by the impact of climate change and global warming. The Intergovernmental panel for climate change (IPCC) in line with United Nations Sustainable Development Goals (SDGs 13, climate action) tasked countries to adopt climate resilient measures to combat and mitigate the impact of climate change.

Notably, the AU on its Agenda 2063 reflected the need to embed climate resilient measures and inclusive sustainable development underpinning the carbon footprint of the Africa continent, understanding that climate change and global warming is a global crisis that require urgent human intervention in all aspect of human endeavours to

[67] IPCC. (2019). Reports — IPCC. Ipcc.ch; IPCC. https://www.ipcc.ch/reports.

mitigate the impact of climate.[68] Undoubtably, the marine environment and its resources are of critical concern to AU due to the unique marine habitats and the biodiversity across the Atlantic and Indian oceans, the Mediterranean and the Red Seas which houses the coastline of Africa. The Africa's Ocean and coastal resources include a total length of over 26,000 nautical miles of coastline across the Atlantic and Indian Oceans, the Mediterranean and Red Seas,[69] its waters cover more than two-thirds of the earth's surface and affects life everywhere. As the second biggest continent and the largest island, Africa's 43 million km² area covers one-fifth of the total surface of the earth. Thirty-eight (38) African countries are either coastal or island states while fifty-two (52) of its over one hundred port facilities handle containers and various forms of cargo. Whilst the ports handle only 6% of worldwide water borne cargo traffic and approximately 3% of the worldwide container traffic.[70] The marine environment and its resources (maritime governance) spur the AU as the apex intergovernmental organization, the African voice to join the IMO and concluded an agreement of cooperation in 1974 to work with the IMO system of maritime governance to strategically position Africa for its maritime wellbeing.[71]

Accordingly, Africa's maritime profile reported by the United Nations Conference for Trade and Development (UNTAD) in 2022 that in 2021, Africa's maritime trade, including both goods loaded and discharged, amounted to 1.3 billion tons, a 5.6% increase over 2020. This increase is expected to continue as result of Africa scale for industrialization, as the continent is ranked as the least industrialized continent[72] in the world. Therefore, Africa is considered to pursue this dream of the AU's Agenda 2063

[68] Hasanspahić, N., Vujičić, S., Čampara, L., & Piekarska, K. (2020). Sustainability and Environmental Challenges of Modern Shipping Industry. *Journal of Applied Engineering Science*, 1–6. https://doi.org/10.5937/jaes0-28681.

[69] ibid.

[70] AU. (2012, June 3). 2050 Africa's Integrated Maritime Strategy (2050 Aim Strategy).

[71] Intergovernmental Organizations which have concluded agreements of cooperation with IMO. (n.d.). www.imo.org.https://www.imo.org/en/OurWork/ERO/Pages/IGOsWithObserverStatus.aspx.

[72] Dagnachew, A., & Hof, A. (2022, July). An African Vision for the Continent's Energy Transition.

for industrialization and Africa's inclusive economy growth, even though Africa is considered as one of the most vulnerable continents globally to the devastating woes of climate change and global warning,[73] notably only 3.8 percent of the world's total greenhouse gas emissions are attributed to Africa, making it the continent with the least share.[74] Equally, the continent is predominantly import oriented with a population of 1.4 billion people[75] which scale the demand for mercantile goods while raw materials exports is relatively low compared to the demand for finish produce.

In particular, the AU in its ambition to achieve the mandate of Agenda 2063 for a prosperous Africa based on inclusive growth and sustainable development and the drive for blue/ocean economy developed and launched the 2050 Africa's Integrated Maritime Strategy (2050 Aim Strategy) in 2012 to help tackle all-inclusive ocean related issues in a strategic, coordinated, and sustainable manner.[76] The 2050 Aim Strategy is robust and important maritime framework document for the Africa continent for the protection and sustainable exploitation of the Africa Maritime Domain (AMD) for wealth creation, noting that international trade is very critical to many African economies, with over 90% of Africa's imports and exports trade are conducted by sea.

[73] (2021). Unfccc.int. https://unfccc.int/files/press/backgrounders/application/pdf/factsheet_africa

[74] Al-Zu'bi, M., Dejene, S. W., Hounkpè, J., Kupika, O. L., Lwasa, S., Mbenge, M., Mwongera, C., Ouedraogo, N. S., & Touré, N. D. E. (2022). African perspectives on climate change research. *Nature Climate Change*, *12*(12), 1078–1084. https://doi.org/10.1038/s41558-022-01519-x; CDP. (n.d.) Africa Report - CDP. Www.cdp.net. https://www.cdp.net/en/research/global-reports/africa-report.

[75] Worldometer. (2023). *Population of Africa (2023) - Worldometer*. Www.worldometers.info. https://www.worldometers.info/world-population/africa.

[76] African Union. Commission. (2015). *Agenda 2063: the Africa we want: kit.* African Union Commission.

However, the 2050 Aim Strategy is principally rooted and imbued on Africa maritime challenges that confronts the Africa's continent in the following areas namely:

i. Diverse illegal activities which include toxic waste dumping and discharge of oil, dealing in illicit crude oil, arms and drug trafficking, human trafficking and smuggling, piracy, and armed robbery at sea,
ii. Energy exploitation, climate change, environmental protection and conservation and safety of life and property at sea and,
iii. Research, innovation, and development; iv. Maritime sector development including competitiveness, job creation, international trade, maritime infrastructure, transport, information, communication and technology, and logistics.

The 2050 Aim Strategy which is the Africa's maritime governance framework, a building block for the continent, critical to this ambitious document is protection, preservation, and sustainable use of AMD for wealth creation and inclusivity. In contrast, the 2050 Aim Strategy and its mother convention, Agenda 2063 discusses climate change and adaptive measures by creating climate resilient and mitigative measures to combat the effects of climate change within the prism of their sovereign state (national transportation sectors). The continent is considered major exporter of crude oil and the economy is driven by the oil and gas industry; renewal energy transition would majorly shrink her economy.[77] On the other hand, the continent is the most affected by the woes of climate change globally, though considered as the least emitter of greenhouse gas emissions and it was expected that Africa through the AU umbrella will prioritize the issues of decarbonization of shipping sectors as one of the ways to mitigate the effect of climate change following the loud cry of the IPCC report, the Paris Agreement and as an IGO in the IMO system.

[77] Dagnachew, A., & Hof, A (n.74).

It is crucial to mention that decarbonization of the global transport system is one of the front burner debates in contemporary times to mitigate the effects of climate change, and IMO as specialized Agency under the United Nations system is saddled with the responsibility of regulating the global maritime space is heavily concern with shipping decarbonization. Surprisingly, Agenda 2063 and its 2050 Aim Strategy as blueprint framework documents failed to capture decarbonization of the shipping industry, though the documents took into mind the sustainable use of Africa Maritime Domine for wealth creation. Arguably, the continent is not too keen with decarbonization of its transport sectors as compared to other continent of the world, like the European Union Commission who is at global forefront routing heavily to decarbonize various sectors of its transport industries inclusive of shipping. The reason for AU not taking a long leap in its policy formulation with decarbonization is to balance industrialization of Africa's economy at mid-century in order to catch up with other continents of the world, seeing that it is least industrialized continent. Fossil fuel energy consumption is fundamental to economy growth and industrialization which other continent has used to its advantage over the centuries considering the fact Africa is the least emitter globally.

In this regard, the Africa continent noting the impacts of climate change and its interconnectivity globally is poised in tackling the climate emergency in working in line with the Paris Agreement,[78] by foraging Africa's common position in mitigating the impacts of Climate change in the region. The signatories to the Paris Agreement comprise of 195 countries of the world and among the 195 countries, all 54 African countries are signatories in this regard, this shows the commitment of the African region to the climate change crisis despite considered as the least emitter to global cumulative GHG emissions. It is essential to highlight that, in order to meet the overarching demands of the pillars of the Paris Agreement which supposedly tasked signatories to submit Nationally Determined Contributions (NDCs) to show efforts by

[78] Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104 entered into force Nov. 4, 2016.

each country to reduce national emissions and adapt to the impacts of climate change.[79] The African signatories to Agreement have all submitted their NDCs except Libya in this regard, African NDCs where mostly centred on emissions reduction (national transport sector), ecosystem restoration, and agriculture by imbibing smart agricultural resilience to combat the impacts of climate in the region.[80] In particular, the impact of climate change related risks in African includes flooding, drought, heatwaves, reduced food production, and reduced labour productivity.[81] The severity of these impacts in the region has forced states and the African Union to chart a common front to combat the impact of climate change.

To this end, the AU Assembly has made significant decisions that ignited the advancement of Africa's common position on climate change. The 8th ordinary session encouraged member states and the Regional Economic Communities (RECs) to incorporate climate change concerns in their respective development policies and programmes.[82] This includes Africa's preparations for the development of a common position on climate change and an inclusive agenda on African climate change programmes in line with the Paris agreement.[83] This was subsequently captured by the agenda 2063 to develop a framework document reflecting African common position to combat and adapt to climate change impacts, the African Union Climate Change and Resilient Development Strategy and Action Plan 2022-2032, framework

[79] Article 4 (2) of Paris Agreement to the United Nations Framework Convention on Climate Change.

[80]UNFCCC. (2022). Nationally Determined Contributions Registry. Unfccc.int. https://unfccc.int/NDCREG.

[81] Atwoli, L., Erhabor, G. E., Gbakima, A. A., Haileamlak, A., Ntumba, J.-M. K., Kigera, J., Laybourn-Langton, L., Mash, R., Muhia, J., Mulaudzi, F. M., Ofori-Adjei, D., Okonofua, F., Rashidian, A., El-Adawy, M., Sidibé, S., Snouber, A., Tumwine, J., Yassien, M. S., Yonga, P., & Zakhama, L. (2022). COP27 Climate Change.

[82] The AU Assembly, 2004.

[83] Munang, R., & Mgendi, R. (2017, May 16). Paris Agreement on climate change: One year later, how is Africa faring? Africa Renewal. https://www.un.org/africarenewal/magazine/may-july-2017/paris-agreement-climate change-one-year-later-how-Africa-faring.

document was the shared aspiration of the African states towards building the desired buffer against the climate change menace in this era of climate emergency. Evidently, having African common position is easier within the Paris Agreement due to the fact that NDCs are within the mandate and scope of the sovereignty of a state to formulate its climate change mitigation framework. However, this is different when it relates to shipping decarbonization which is not captured within the scope of the Paris Agreement and left solely in the hands of the IMO.

The complexity of the shipping world with its emissions which cannot be attributed to any single state make it difficult to have unified African position when it comes to shipping decarbonization. This is one of the fundamental challenges the IMO is currently facing in the process of formulating global regulations to decarbonizing the shipping industry. This raises the question, "to what extent can the AU assist the IMO's road to decarbonization of the global shipping industry in the Africa continent bearing in mind that shipping technical standards/regulations does not favour unilateral applications"?

On this premise one can agree that the AU as a pan Africa movement, the voice of the African people comprising of the all the African states is a fundamental hotspot to coordinate, cooperate and facilitate the ratification and domestication of Annex VI regulation in the continent to support the IMO's air pollution regime from ships. The AU platform is good fertile ground to breed and create a receptive forum for regional focus like the EU to have common basic in the continent for the adoption and implementation of the IMO's GHG emissions reduction regulations and subsequent decarbonization of the shipping industry in the Africa continent.

Summarily, one can agree that there is a nexus between the poor ratification and implementation of Annex VI regulation in the continent and the AU position as manifestly shown in the mother blueprint documents, the attitude toward decarbonization of the shipping industry. The AU within its mandate alluded to

strengthen the domestication and implementation of international environmental law for the sustainable use of the Africa Maritime Domain, however this is not stimulated within the auspices of the AU umbrella to position the Africa's oceans wellbeing with regards to air pollution to deepen Africa's collective action in maritime governance.

1.6.0. Challenges of African union and Sub-Sahara African Region with Shipping Decarbonization

Africa is considered as a developing continent and the poorest compared to the rest of the world, the regime of shipping decarbonization posed a huge challenge to the umbrella body of the AU and the Africa continent. This is because of the lack of economic and organizational resources as well as technical capacity to fully participate in international conventions and implement the obligations and regulations effectively as a developing continent.[84]

To clarify, this multi-dimensional composition of the challenges faced by the AU and the Africa countries as developing continent are enormous which were made manifest in the following areas wherein this paper will critically examine for proper comprehension.

[84] Wan, Z., el Makhloufi, A., Chen, Y., & Tang, J. (2018). Decarbonizing the international shipping industry: Solutions and policy recommendations. *Marine Pollution Bulletin*, *126*, 428–435. https://doi.org/10.1016/j.marpolbul.2017.11.064

Financial capacity: a major challenge faced by the AU and the Africa continent at large is lack of funds, the body as a continental voice is dependent on external donors who dictate the policy initiatives the AU can pursue at any material time, thus weakening the organizational structure and focus. When it comes to the issue of decarbonization of the shipping industry, the AU lack the financial muscle to invest in low-carbon transition which is a major challenge in the continent as its funding is from external donors even though environmental sustainability is at the centre of its policies to mitigate the impact of climate change in the continent.

Additionally, Africans owned ships account for about 1.2% of world shipping by number and about 0.9% by gross tonnage of the world fleet, also the ship building industry is far from the continent. This is practically being dominated by China, Japan, and the Republic of Korea. Shipping as an industry is highly capital-intensive[85] and thrive by government subsidies which is mostly state support. African countries primarily are developing economy with low capital formation, which makes it impossible to galvanize the most needed aid to support Africa's ship owing status, even with AU platform this is difficult to achieve due to financial constraints. This in turn limit the interest of the continent and the AU's drive with the IMO decarbonization regime.

More so, investment in shipping does not yield quick returns especially as most African investors do not have access to foreign guaranteed loans due to lack of suitable collateral. This makes it difficult for African shipping companies to acquire ships through loan finance from the shipyards globally and this is reflected in the fleet capacity of the continent. As a matter of concern, African shipping companies are not among the top twenty (20) shipping companies globally[86]and not among the top ship

[85] Alexopoulos, I., & Stratis, N. (2016). *Structured Finance in Shipping*. https://doi.org/10.1057/978-1-137-46546-7_8.

[86] MI News Network. (2022, January 11). *10 Largest Container Shipping Companies in the World*. Marine Insight. https://www.marineinsight.com/know-more/10-largest-container-shipping-companies-in-the-world/

owing countries, therefore the lack of capital plays a huge setback in its investment in the shipping world as a continent and its role in the global maritime governance.

The IMO decarbonization regime will cost the shipping industry about $6o million USD per annum,[87] whilst noting that restricted access to the capital market is widely recognized as a barrier to investing in emission reduction solutions.[88] However, the industry and its critical stakeholders are tiptoeing to understand the regulatory framework and investing in the right technology that will be compact with future regulatory context, these includes bunker fuels, capital and operational cost of the vessel design.

Evidentially, the competitiveness of conventional bunker marine fuel to other energy sources is cheaper, therefore small-scale shipping companies/owners will be reluctant to make any huge leap to invest in scrubbers, retrofitting or alternative/renewable energy and that is the case with the Africa continent as most shipping companies are relatively small and with limited resources to invest in emerging technologies and in tune with the IMO's decarbonization regime. Equally, the AU under its flagship did not encourage Flag Administrations within the continent to deepen the implementation of environmental conventions which most member states are adamant, seeing it as under the prerogative of the Flag Administration and under sovereign powers of the state.

The 2050 Aim Strategy noting the financial drawback of its members in the maritime space detailed a concerted and coherent long-term, multi-layered plans of action expected to enhance maritime viability in Africa and establishes targets and strategies

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[87] Serra, P., & Fancello, G. (2020). Towards the IMO's GHG Goals: A Critical Overview of the Perspectives and Challenges of the Main Options for Decarbonizing International Shipping. *Sustainability*, *12*(8), 3220. https://doi.org/10.3390/su12083220.

[88] Rehmatulla, N., & Smith, T. (2015). Barriers to energy efficient and low carbon shipping. *Ocean Engineering*, *110*, 102–112. https://doi.org/10.1016/j.oceaneng.2015.09.030.

for member states to significantly improve Africa's share of global ship ownership by gross tonnage to at least 7 % by 2050[89] compared with 1.2 % (of deadweight tonnes) in 2021.[90]

Lack of infrastructure: The issue of infrastructure in the AMD is a critical barrier for the uptake of emerging technologies and alternative/renewable energy in the face of shipping decarbonization in the continent[91]. This is seen in port infrastructures, poor road networks,[92] single windows, logistic platforms, dry docks, warehouses, satellite and tracking of containers as well as vessels using the maritime space. Interestingly, the IMO's shipping decarbonization regime requires the integration of port infrastructures to support the energy transition in the industry, also energy firms are reluctance to invest and build critical infrastructures to house emerging biodiesel in the continents which acts as a clog to shipping decarbonization.

Given the small size of many African ports compared to the developed world, port infrastructure deficit in continental Africa is a major challenge in the era of environmental sustainability and maritime decarbonization which requires urgent facelift, to manage the environmental crises of climate change. Also, there no unified standards by ports in Africa for the implementation of emissions reduction regulations adopted by IMO owing to defective infrastructures and small size of most of the port's country in continental Africa.

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[89] African Union Commission, 2015 (n.76).

[90] UNCTAD. (2022). *Trade and Development Report 2022*. UNCTAD. https://unctad.org/tdr2022.

[91] Animah, I., Addy-Lamptey, A., Korsah, F., & Sackey, J. S. (2018). Compliance with MARPOL Annex VI regulation 14 by ships in the Gulf of Guinea sub-region: Issues, challenges, and opportunities. *Transportation Research Part D: Transport and Environment*, *62*, 441–455. https://doi.org/10.1016/j.trd.2018.03.020.

[92] John Gachunga, M., & Kuso, Y. (2019, April 4). Contribution of Infrastructure to Economic Growth in Africa. Social Science Research Network. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3399519.

Lack of capacity and expertise: Is a challenge that both governments and corporations face. Because of the uncertainties in the global transportation chain in adopting the most feasible alternative/renewable energy for the sector, a lot of technical expertise and capacity are required to accomplish the necessary transition to carbon neutrality.[93] There is a gap in AU and continental Africa in shipping decarbonization on the issue of the technical capacity and requisite knowledge needed to drive and facilitate the transition to renewable energy in the maritime sector.[94] Arguably, the issue of lack of capacity and expertise is not only being faced by the AU and the Africa continent but is a global challenge. IMO as the chief captain stirring the ship is also affected by the issue of lack of capacity in charting the path for shipping decarbonization associated with emerging technologies and the uncertainty in the industry.[95]

Research and Data: To mid-wife the IMO's decarbonization of the shipping industry, research and data plays a crucial role in understanding shipping emissions in AMD and the most feasible applicable alternative maritime fuels for the continent to invest in and produce to meet the demands of shipping. **S**ince emissions from shipping cannot be attributed to a particular country, the necessity for data becomes fundamental to understand emissions hotspots in the region to guide policy formulations as well as research to enable ease transition in shipping decarbonization. A fundamental challenge to shipping decarbonization is lack of investment on research, development, and data by the AU and the Africa continent at large which posed a huge setback to

[93] Zhang, A., Alvi, M. F., Gong, Y., & Wang, J. X. (2022a). Overcoming barriers to supply chain decarbonization: Case studies of first movers. *Resources, Conservation and Recycling*, *186*, 106536. https://doi.org/10.1016/j.resconrec.2022.106536

[94] MTCC. (2019). 2019 Report on Maritime Technology Needs Assessment for African Countries Collaborating with MTCC-Africa.

[95] Bach, H., & Hansen, T. (2023). IMO off course for Decarbonisation of Shipping? Three Challenges for Stricter Policy. *Marine Policy*, *147*, 105379. https://doi.org/10.1016/j.marpol.2022.105379.

the anticipated growth in understanding and implementing emissions reduction regulations in the region.[96]

According to Akinwumi Adesina, President of the African Development Bank, Africa's inadequate public research financing is well recognised. In 2006, African Union member states agreed to invest 1 percent of their GDP on research and development, however, in 2019, financing on the region was only 0.42 percent, a stark contrast to the worldwide average of 1.7%. Funding for research, data and development were almost from Europe, even the pan Africa movement, AU the African voice got its funding from external sources which limit its scope of operation. The AU/continent's attitude and funding towards research, data and development is limited in global scale, moving forward as continent in shipping decarbonization with emerging technologies requires investment and funding research, data, and development to create a feasible transition process in the continent.

Political Sovereignty: A fundamental challenge ravaging the AU and continental governance in Africa is the issue of political sovereignty of member states which is a huddle in actualizing the federation of Africa state.[97] Therefore, the climate change crises which were primarily caused by the burning of fossil fuel and GHG emissions from the shipping industry cannot be fully tackled without forming a united front regionally and globally to combat and mitigate the effect of climate change. The African countries within AU pan-African agenda modelled after the European Union suffer a huge defect as member states refused to cede their sovereignty to having a united Africa in the global space, this in turn has limited the AU's scope of operation and the anticipated progress in terms of Africa governance.

[96] IPCC. (2022, February 27). Climate Change 2022: Impacts, Adaptation and Vulnerability. Www.ipcc.ch; IPCC. https://www.ipcc.ch/report/ar6/wg2/.

[97] Mukundi Wachira, G. (2007, June). Sovereignty and the "United States of Africa" Insights from the EU.

Also, countries within the Africa space are pursuing their national interest and policy rather than the common interest of a union in era where global or regional cooperation is most needed to solving global common crises e.g., climate change and global warming. It would be difficult for the AU to legitimate a process of political integration amongst nations with various regimes, demographic profiles, and interests due to the sensitivity of sovereignty in Africa. It is significant note that the IMO's shipping decarbonization suffers a fundamental setback in the Africa region as a result of lack of regional coercion, a unified Africa central government like the European Union to deepen good implementation of environmental law and maritime governance.

Peace and Political Stability: The Africa continent is known for insecurity and wars; the continent has suffered decades of wars which negate inclusive socio-economic development because of the heighten effect of arm conflict in the region. These includes the resurgence of unconstitutional changes of government, civil wars, arm conflicts, terrorism and political unrest which threaten the very existence of the Africa state.[98] The region is known for aggression with the recent trends of events, the year 2021 saw a recurrence of unconstitutional change of government, with military takeovers in Guinea, Mali, and Sudan in 2021, Burkina Faso in January 2022, the current military junta in Niger Republic, the Republic of Congo and Gabon in 2023.

These trends of events are unpalatable in the minds of investors and deny the African region the most anticipated development needed in social, economic, and cultural integration envisaged by the AU, fighting for a pan-Africa movement for the development of the continent. Moreso, peace, security, and political stability are antidotes to bad governance which promote inclusive growth and development in the circle of human existence. Therefore, the Africa region is not most desirable for

[98] Chigora, P. (2008). The Challenges facing African Union in achieving continental security: towards a comprehensive analysis of some enlightening views at the new millennium. journal of sustainable development in Africa, 10(1). https://jsd-africa.com/jsda/v10n1_spring2008.

investment, GHG emissions reduction regulations requires investment in new and emerging technologies to drive the transition from fossil fuel to alternative/renewal energies.

The Paris Agreement: The African region and the AU are primarily more concern with the overarching Paris Agreement, noting the interlocking impact of climate change risks to the region by addressing it in a holistic framework. Given that the exclusion of shipping emissions from the Paris Agreement has made most countries to be less concern with shipping decarbonization, most countries are more inclined with reduction of emissions from their national transportation sectors, ecosystem restoration, and agriculture by imbibing smart agricultural resilience to combat the impacts of climate within the sphere of their territorial sovereignty.

Arguably, this is the reflection of the position of the African states as indicated in their NDCs[99] within the Paris Agreement and in the AU, blueprint documents (Agenda 2063, and the African Union Climate Change and Resilient Development Strategy and Action Plan 2022 – 2032.

The Paris Agreement in this regard is seen as clog to achieving shipping decarbonization in the African region couple with the fact that the Sub-Saharan Africa is a developing continent with infrastructural and technological deficit in embracing shipping decarbonization.

A fundamental limitation of the research is the reliance on secondary data which weaken the data collection approach; the study would have benefited from interviews with significant maritime industry stakeholders such as regulators and shipping companies in the region, occasioned with the challenge of the African's state party to Annex VI regulation failed to submit national implementation policies to the IMO's

[99] UNFCCC, 2022 (n. 79).

database to fully understand the objective of the study by establishing African's common position in IMO's shipping emission reduction regime.

1.7.0. Conclusion

The IMO's decarbonization of the shipping industry is the future of sustainable maritime transportation of global cargo with low/zero carbon emissions to ameliorate the impacts of climate change and global warming exacerbated by the burning of fossil fuel. Climate change is a global emergency which affect the global commons and requires a global solution. Achieving the IMO's ambitions on decarbonization of the shipping industry should not be left solely on the shoulders of IMO, it requires the communality of the global community to have a binding regulation under the umbrella of IMO for shipping decarbonization.

The Sub-Saharan African region and AU interest in shipping decarbonization is regrettably low as result of the certain factors militating against the region as one of the least developing continents globally, it lacks the necessary financial strength, infrastructures, human resources, and scientific/technological solutions to drive the process. Actualizing the IMO's decarbonization agenda in the shipping industry, opens a new pathways for economic/investment opportunities in the Africa continent, which requires large-scale of capacity building, construction and upgrading of ports, roads and rail infrastructures, bunker fuelling infrastructures of alternatives and renewable energy/product, the ship building and recycling industry are areas that needs urgent investment attention to meet and accelerate the demands of decarbonization of the shipping sector in the continent.

To this end, Africa is not immune to the impact of climate change and global warming which is a common global enemy and to deepen the decarbonization of shipping in the Sub-Saharan African region will require the IMO to create synergy with the AU as the

coordinating voice for the continent, to strengthen implementation of Annex VI regulations by its member states. Also, Sub-Saharan African region needs the renewed global support in the face of climate change and shipping decarbonization to meet the needed transition, in this regard, Africa should be a supreme concern to IMO and to developed nations seen as the least emitter to the global cumulative emissions aggravating the climate change crisis.

The AU platform is good fertile ground to breed and create a receptive forum for regional focus to have common basic in the continent for the adoption and implementation of the IMO's GHG emissions reduction regulations and the subsequent decarbonization of the shipping industry in the Africa continent.

1.7.1. Recommendations

The decarbonization of the shipping industry is an important IMO's global mission to having a carbon free industry towards mitigating the impact of climate change and global warming. However, the journey of shipping decarbonization posed fundamental challenges to the AU and the Africa region to achieving IMO's drive in the decarbonizing the shipping industry. It is of greater significant to note that despite the challenges of AU and the Sub-Saharan Africa continent with respect to IMO's decarbonization of the shipping industry, there are huge potentials and benefits from its upshot to the Africa continent at large, seen that the continent suffers the most in terms of climate change and its impact.

To the deepen the understanding of the IMO's decarbonization agenda of the shipping industry, it opens a new pathways for economic/investment opportunities in the Africa continent, which requires large-scale of capacity building, construction and upgrading of ports, roads and rail infrastructures, bunker fuelling infrastructures of alternatives and renewable energy/product, the ship building and recycling industry are areas that needs urgent investment attention to meet and accelerate the demands of decarbonization of the shipping sector in the continent.[100] Nevertheless, this can only be actualized if the continent resolve to have a common front under an umbrella to rigorously pursue and prioritize the decarbonization of shipping. The AU platform is the motherboard seen as a sprinter in the continent through which member states can be constructively engaged to rejig Agenda 2063 and the 2050 Aim Strategy to reflect the continental needs of decarbonization of the shipping industry due to the uniqueness of the African continental setting.

[100] Dagnachew, A., & Hof, A. (2022, July). An African Vision for the Continent's Energy Transition.

Evidentially, Africa is one of the poorest developing continents in the world, rich in natural resources with a young resilient population, infrastructural growth to aid the IMO's shipping decarbonization in the continent will also require partnership with other developed continents, donor agencies and entrepreneurs to invest, transfer skills and technologies for the uptake of shipping decarbonization in the region. Also, the movement of some of the global manufacturing/processing firms into the region to reduce the distance of shipping transportation of raw materials out to other regions for processing will reduce shipping GHG emissions.[101]

To achieve infrastructural growth and investment in the region, the AU and its member states need to incentivise investments in development of critical infrastructures as earlier mentioned to attract private investors to participate to meet the urgent demand of shipping decarbonization in the region. In addition, tax holidays, tax rebates and government grant can be utilized under the AU umbrella to draw private firms and conglomerates into investing on alternative/renewable energy supply chain and bunkering infrastructures in the region to enable the up scaling of decarbonization of the ship industry.

Furthermore, to accelerate shipping decarbonization, the Africa region and AU will need to have attitudinal change towards Research and Development, for the region to have a smooth sail, seeing that scientific knowledge is an important driver of human health and wellbeing, economic prosperity, and environmental sustainability. As earlier noted, investment in research and development in the AU and the continent is poorly funded and laughable, despite the launching of series of programmes in this direction. The lack of funding for most of the programme no matter how creditable is seeing as paper pacts. However, the AU and the African region requires a stronger framework to aid shipping decarbonization by encouraging its member states within

[101] Owen-Burge, C. (2022, November 7). Africa's Role in Decarbonizing the Planet. Climate Champions. https://climatechampions.unfccc.int/africas-role-in-decarbonizing-the-planet.

the union to aggressively invest in R&D for emerging technologies and feasible alternative/renewable energy for the shipping industry.

In addition, Africa has a very young and resilient population compared to the rest of the world[102] however, Africa as a developing continent lack human capacity and expertise to support and navigate the shores of shipping decarbonization. In order to stimulate growth and the uptake of shipping decarbonization in the Africa region, there is the need for capacity building and development of the requisite expertise to enable easy transition. The IMO noting this challenge launched the Global MTCC Network (GMN) in 2017 funded by the European Union to bridge the gap between the developed and developing regions of the world to achieve equity to accelerate the negotiations and implementation of shipping decarbonization. As a matter of fact, the GMN platform is a fertile ground for the AU and continental Africa to leverage in building the needed knowledge, human capacity, and expertise for climate change mitigation in the African maritime shipping industry.

Also, the African continental free trade area (ACFTA) which is an upshot of the AU's agenda 2063 to bolster intra-African trade/economy by removing trade barriers and uneven trade competitions in the region is a good platform to engender maritime decarbonization. The ACFTA is an inclusive single trade agreement for the Africa region to grow its economy, however as one of the largest trade agreements in the world, it is an important avenue to attract foreign direct investment both from within and outside Africa to grow its maritime economy. The ACFTA will open the continent to the world to invest in critical sectors, an avenue to deepen investment in ship building and recycling industry, port infrastructures, marine renewable/alternative

[102] United Nations. (2022). Young people's potential, the key to Africa's sustainable development | office of the high representative for the least developed countries, landlocked developing countries and small island developing states. Un.org. https://www.un.org/ohrlls/news/young-people%E2%80%99s-potential-key-africa%E2%80%99s-sustainable-development.

energy supply chain and to grow all-inclusive African shipping industry for the region in the era of maritime decarbonization.

Notably, ACFTA is significant because it will foster and provide investment possibilities to attract the fresh capital, technology, and skills to enhance living standards and lessen Africa's reliance on volatile commodity exports. Therefore, the ACFTA should open its frontiers to embrace the IMO's shipping decarbonization as critical investment pathways by creating the enabling environment to harness shipping growth and its sustainability in the region. ACFTA should also simplify its investment possibilities to incorporate Environmental Impact Assessment (EIA) prior to the adoption of any infrastructural projects in its maritime domains to decrease environmental externalities in order to develop a competitive and inclusive single market base for Africa. This will allow the AU and its member states to strive, foster and develop at the same pace without playing undue advantage and allow fair competition among member states in the Union.

Equally, Africa's blue economy and maritime transport policy are key drivers in achieving shipping decarbonization in the region. These documents are circuit for national governments in the implementation of a holistic framework for maritime governance to fully harness the potentials of ocean economy in the AMD. Regrettably, most African countries are yet to develop a marine spatial planning (MSP) to support the blue economy drive and maritime policies which gives a blueprint in the implementation of ocean governance that is lacking in the Africa maritime space for shipping decarbonization. The AU under its flagship 2050 Aim Strategy should encourage member states as matter of urgency to develop and integrate MSP and maritime transport policies to support its blue economy drive in ocean governance to deepen maritime decarbonization in the region. Additionally, to facilitate the process of shipping decarbonization in Africa, the AU must collaborate with civil society to create awareness of the impact of fossil fuels to climate change and put pressure on national governments to prioritize shipping decarbonization in the region.

There is also the need to create global synergy within the Paris Agreement to include shipping emissions, to deepen the IMO's decarbonization of shipping industry, this will generate the needed awareness in the minds of member states to draw national policies in this regard.

Furthermore, peace and security in Africa are essential to the continent's socio-economic development in the region. The goals outlined above would not be accomplished if Africa remain in its current state of instability with series of military juntas in the region. Inclusive economic development and growth through investment can only flourish in an environment that is politically stable, peaceful, and secured.
In the final analyses of the discourse in this segment, what is most fundamental for the IMO's shipping decarbonization, AU and the Sub-Saharan Africa region is to strengthen the IMO's partnership with the AU, seeing that regionalism can aid and play a significant catalytic role in promoting global policy action. Noting that the international character of the shipping industry does not favour unilateral actions and at the same time the IMO system requires member states within a region to implement its regulations.

Therefore, moving forward with IMO's shipping decarbonization in the Africa region requires IMO to work with AU to create the most feasible pathways to speeding the decarbonization of shipping industry in the region.

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