Developing the Blue Economy Concept in Akwa Ibom State, Nigeria

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Abstract
Countries across the world are leveraging the blue economy (BE) as a strategic framework for the sustainable exploitation of ocean resources, driving economic growth and creating employment. Economic activities emanating from marine and coastal environments are contributing significantly to the economies of the world. This review explores the role of BE in enhancing national prosperity and proposes actionable pathways for Akwa Ibom State of Nigeria (AKS) to harness its marine potentials. It highlights the vast opportunities and existing legal frameworks that support BE, examines the UN-SDGs alignment, identifies key sectors for exploitation, and analyzes the challenges and solutions for sustainable implementation. The study design followed the survey technique and through qualitative insights and reference to global practices, the paper affirms that Akwa Ibom State can effectively leverage its marine and coastal assets for inclusive growth and sustainability. Major barriers to be encountered include over-exploitation, insecurity and piracy, limited infrastructure and oil spillages. These challenges could result to stock depletion and loss of revenue, pollution and destruction of marine ecosystems as well as exacerbating climate change phenomena. However, these obstacles can be mitigated to ensure success of this concept in AKS and its contribution to national prosperity.

Keywords: *Economic growth, Fisheries, Marine economy, Ocean resources, Sustainable development.*

INTRODUCTION

The concept of the Blue Economy (BE) has evolved significantly in global, regional, and national discourse serving as a protocol for preserving the world's oceans and water resources (Wenhai *et al.,* 2019). According to Ki.-Hoon, *et al.,* (2020), the idea of the BE came from the Conference held on Sustainable Development in Rio de Janeiro in 2012 (UNCTAD, 2014). The term 'Blue Economy' does not have a universally agreed definition and therefore, synonymous terms such as "ocean economy" or "marine economy" are used interchangeably. However, the United Nations defined the concept as an ocean economy that aims at "the improvement of human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UN, 2014.)". World Bank (2017) defines the Blue Economy as the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems. The concept in Australia accepts the contributions of both existing and new marine industries as the overall contributions of their blue economy. Similarly, India depends on their marine resources for the development of the concept.

Nigeria's Blue Economy potential, especially in the coastal regions like Akwa Ibom State (AKS), has been under-researched. Iheduru (2020) emphasized the geopolitical and regional integration dimensions of maritime economies in Africa, whereas Eyo and Effiom (2019) focused on marine biodiversity management in the Niger Delta. Choi (2017) opines that the blue economy can be thought of as the development of necessary marine infrastructure for the promotion of relevant economic activities. Hamisu (2019) concentrated on the use of marine management tools to consolidate and manage sustainably, the offshore resources, including oil and gas. These foundational studies support this paper's assertion that Akwa Ibom's untapped marine and coastal resources are key to diversifying the state's economy. Moreover, Akankali et al. (2017) studied fisheries governance and policy inadequacies in Nigeria, which complements this manuscript's proposal for inclusive policy frameworks. Similarly, Abubakar et al. (2020) explored aquaculture's role in national food security, reinforcing arguments for blue entrepreneurship promotion. The development of blue economy in Akwa Ibom State of Nigeria (AKS) is expected to expand and add to traditional aquatic ecosystems through planned conservation and protection measures (Wenhai *et al.,* 2019). It will also strengthen ecosystems security at both the maritime and national levels (Hamisu, 2019).
Comparatively, this manuscript contributes a subnational focus by evaluating localized potentials, challenges, and recommendations for Akwa Ibom State. Unlike broader national analyses, this paper offers a case-specific blueprint integrating governance, education, and infrastructure needs at the state level.

UN-SDGs and the Blue Economy:

The Blue Economy has become a major driver of Sustainable Development and an avenue to actualize the UN-SDGs, in particular the SDG 14 whose main focus is on conservation and sustainable use of the oceans, seas and marine resources. The main purpose of the SDGs by the year 2030 is that of a short term program to end all forms of poverty while protecting the earth and building economic growth. Diversifying the countries' economies beyond land-based activities and along their coasts is critical to achieving these t Goals and appropriating purposeful, sustainable and inclusive growth to the state. In India, the BE encompasses all economic activities relying on the marine ecosystem or seabed (Bari, 2017). This way, the BE space could be expanded to all aquatic (marine, coastal and open ocean-deep sea) ecosystems. China on the other hand, opines that the BE is a paradigm shift in economic development and focusing more on the use and protection of coastal and marine resources without harming the ecosystem. In Europe, for example, their blue economy concepts provide millions of jobs in the region annually and contribute significantly to the regional economy. The African concept tends to focus more on ensuring sustainability in food security, creating of jobs and economic development (Youssef, 2023). AKS can develop their concept along such sectors as coastal tourism, aquaculture, ocean energy, fisheries and marine biotechnology (WBG, 2016). In Akwa Ibom State (AKS), most of these resources are yet to be fully exploited. Therefore, the state can key into this blue economy concept and benefit tremendously from this provision. The state is blessed with abundant natural and manpower resources that can be harnessed for the development of the state. Focusing on job creation and revitalizing the economy, the BE include sustainable energy from wind and waves, transportation, ship building, pharmaceutical enterprises, construction, mineral resources development, fisheries and aquaculture and seaside tourism. These sectors can be sustainably developed to create employment and usher in physical, social and economic development.

MATERIALS AND METHODS:

This study utilized a systematic literature review of secondary sources to assess how the blue economy could be developed in Akwa Ibom State of Nigeria (AKS). The review assessed and analyzed views on legal framework, economic activities and attributes of the blue economy, its implications, challenges for mitigation and remediation. Databases used in the study included Publication database, Crossref and internet databases with publishers drawn from Nature Springer, Elsevier, Research gate and online libraries, purposively selected for the study. The main findings in the literature regarding the implementation of the concept are both political as well as socio-economic such as, policy, developmental priorities and enforcement of the relevant extant laws.

RESULTS AND DISCUSSIONS:

Attributes of the blue economy concept:

As the concept continues to soar in global acceptability, the BE attempts at incorporating ocean processes of economic value, social developments and improvements in human well-being and livelihoods and simultaneously, guarantee environmental health and integrity of the ecosystem. In considering the concept, the blue economy presents the following attributes;

- The blue economy also consists of the non-formal sectors such as sequestration of carbon, biodiversity and pollution sink.
- The concept encourages innovations, promotion of local and collaborative technologies as well as technology transfer in new and emerging industries such as Artificial Intelligence and renewable energy.
- The concept allows incorporating the value of the oceans into decision- making.
- Blue economy separates clearly the developmental concerns, social sector activities and ecosystem health and stability. This way, it is plausible to attain maximum resource utilization and sustainability.
- The BE can be utilized for sustainable livelihoods, economic development and growth.
- It advocates equal benefits for all key players in the various domains of the blue economy. This way, community development, private partnership participation (PPP) and inclusive governance is promoted.

The blue economy and the Nigerian Maritime Laws:

Developing a sustainable blue economy for Akwa Ibom State will require in addition to identifying the areas of marine ecosystem of greater potential for sustainability and growth but also adequate legal provision to safeguard the environment against challenges that may arise as a result of increased economic activities.

Section 20 of the 1999 Constitution of the Federal Republic of Nigeria empowers the State to safeguard the territorial waters, protect the Wildlife, Air, Lands and Forests of Nigeria. The law also allows for the government to develop and improve the aquatic environment in a sustainable way

Another law which relates specifically to the blue economy development in Nigeria is the Water Resources Act of 2004. Section 5(a)(ii) of the Act stipulates the development of water resources for fish and fisheries, transportation, hydro-power generation and for recreation.

The Environmental Impact Assessment Act of 2004 is another instrument designed to safeguard the environment of the Federal Republic of Nigeria against activities and new projects that could

impact negatively or otherwise on the environment. That way, activities and projects capable of jeopardizing the blue economy development in the Nation is checkmated.

Oil pollution along the marine and coastal ecosystems is a major environmental malady that can adversely impede the BE concept in the Nigerian State. Crude oil exploration and exploitation is the economic mainstay of the Nigerian State, accounting for about 90% of her gross earnings (Hamisu, 2018). The challenge of oil pollution on the main economic domain of the BE is amplified by the interconnectivity of these domains by waters and lands (Gbadegesin and Akintola, 2021). In order to regulate, control and abate oil pollution, the oil in navigable waters Act of 1968 was also put in place. This Act, together with the other relevant Acts, collectively known as Laws of the Federation of Nigeria (LFN, 2004) (Petroleum Industry Act of 2021; Pipeline Act of 2004; Water Resources Act of 1993 and the Oil Terminal dues Act of 2004); are all designed to prevent and control oil spillage and pollution in the aquatic ecosystems. As a contingency provision, the National Oil Spill Detection and Response Agency (NOSDRA) was established in 2006 to provide timely intervention in the event of accidental discharges and spillages. In order to enforce compliance to the various environmental laws and regulations for the health of the aquatic ecosystems, the National Environmental Standards and Regulations and Enforcement Agency (NESREA) was established in 2007. Also, to regulate the Fisheries sector, the Sea Fisheries Act of 2004 was enacted to regulate and control all forms of unsustainable fishing techniques in the Nigerian water bodies. These extant laws for the protection of the aquatic ecosystem were considered adequate and suitable for the realization of blue economy in AKS (Gbadegesin and Akintola, 2021).

Scope of the Blue Economy in Akwa Ibom State (AKS):

The scope of the blue economy is enormous globally. In Nigeria it has innumerable multiplier-effects to positively contribute to the economies of the coastal states of Nigeria, including AKS. These states are characterized by their extensive coastlines, access to the Atlantic Ocean and the Gulf of Guinea as well as their rich biodiversity (Chircop, *et al.,* 2016). Aspects of the blue economy scope in Akwa Ibom State include the following;

Commodity Trading:

The seafood market including Fish and fisheries remains the most active sector of commodity trade, globally (WBG, 2016). Of all fish produced globally, over 36 percent were exported with an export value of US$139 billion representing 75% of global fish imports by developed countries (Kigbu *et al.,* 2014). In Nigeria, the sector accounts for an annual turnover of about US$1.5 billion, thus contributing substantially to both the national and global economies (FMAR, 2020). According to Gbadegesin and Akintola (2021), the sector is expected to expand beyond US$155.32 billion by the year 2023. Akwa Ibom State has abundance of aquatic resources and the fisheries sector alone if developed can improve livelihoods, mitigate food insecurity, provide jobs and earn foreign exchange for the State (Elisha, 2019).

Shipping and Marine transportation:

Generally considered the cheapest mode of transportation, maritime transportation is responsible for over 80% of the global merchandise trading between countries (Bari, 2017). According to, Amarh (2017), sea transportation accounts for more than 90 percent global cargo movement because it is environmentally safe and secure and presents less hazards to life and property. In Nigeria, international shipping accounts for over 95% of Nigeria's imports by sea (Hamisu,

2019; NPA, 2020). Employing over 100,000 people, the sector represents an important contributor to the blue economy (NPA, 2020).

Food security, Nutrition and Health:
All over the world, fish and fish products contribute significantly to the life and economy of coastal communities. It supplies the world with 6.5% of the needed protein and more than 16% animal-based protein world-wide (WBG, 2016). Seafood, including fish products, remains a major staple particularly among poor vulnerable communities where it can effectively address food and nutritional insecurity. According to Amarh (2017), the world Aquaculture production accounts for about 47% of fish eaten in the world. World Bank Group has reported that aquaculture will still enjoy steady expansion even in the near future (WBG, 2016). In Nigeria, the potential is enormous (FMAR, 2019). AKS can tap into this BE provision and prepare adequately to optimize its full benefits. The sea also has significant medicinal benefits which can substantially impact the BE of the state. In Nigeria, biotechnology is fast gaining traction with emphasis on developing new marine based foods and healthcare products (FMST, 2020). According to Amarh (2017), these drugs can be more potent than conventional drugs. Biotechnology can provide great opportunities to develop marine based goods and services.

Renewable Marine Energy:
The world demand for clean and renewable energy is projected to rise by 250% in 2035 (Bartels *et al.,* 2010). This assertion is because according to Bari (2017), energy is the driving force behind all global developments including the BE concept. The state, with her expansive coastlines has the ability to develop clean energy from tidal currents and waves, sub-marine geothermal resources as well as marine biomass resources (Youssef, 2023). The clean energy sector also has the potential of creating jobs and mitigating carbon emissions and climate change (Barthelmie and Pryor, 2023). Also, the provision of clean energy will expand the energy mix of the State beyond oil and gas, and with considerable reduction in fossil fuel dependency (Gbadegesin and Akintola, 2021).

Ecotourism:
The tourism and recreation industry has become a major global economic player attracting both revenue and investments into national economies. Tourism also is a major employer of labour, accounting for over 9.1% of the global workforce (Amarh, 2017). Coastal tourism is enjoying increasing global popularity with bird watching, fishing, boating, sun bathing and wind surfing constituting the main recreational activities Gbadegesin and Akintola, (2021). According to Amarh (2017), global estimates suggest an expansion rate of 7.5% annually in the sector and passenger expenditure estimated at US$18 billion. The industry is a fast-paced expanding sector in Nigeria, accounting for over US$1 billion in commerce (FMIC, 2020). AKS with her rich cultural and abundant ecological resources has the potential to create sustainable tourist locations and thus become a major tourist destination in the world.

Marine biotechnology:
The aquatic ecosystems consist of both the biotic and abiotic components including the macro and micro-organisms with abundance in biodiversity (UNDP, 2018). By utilizing modern biotechnological techniques, new pharmaceuticals, biochemical products and foods can be synthesized to increase revenue and boost food security in the State (Gbadegesin and Akintola,

2021). Exploring and exploiting biodiversity for new products is predicted to increase substantially as the concept gains more acceptability (Suttle, 2013).

Mitigation of climate change:
Regulation of the climate is effected by storing harmful gases in the ecosystem such as, hydrogen, carbon dioxide, and methane which contribute to global warming and other extremes of climatic variations. Carbon is removed by mangroves and other marine vegetation which utilize them for photosynthesis. Global reports opined that the marine vegetation are more effective in carbon sequestration than tropical forests (WBG, 2016). The oceans occupy about ¾ of the earth and are responsible for all forms of life in the universe (Hamisu, 2019). In addition to these regulatory services, oceans also protect and restore eroded habitats and coastal areas and digest nutrients and wastes for a healthy ecosystem (Bari, 2017). Besides, over 40% of the world populations live in homes and shelters near seas and oceans around the world and are interested in environmental preservation and reducing degradation (Visbeck, 2018).

Deep seabed Minerals:
There is increasing global demand for minerals partly due to dwindling reserves in the land-based mines and also because of the high level of pollution generated by land-based operations. Minerals are used for many and varied purposes such as in equipment and machinery, specialty products in agricultural and aerospace equipment, and many more. There is therefore the need for better understanding of the deep sea technologies of exploiting these minerals (Wenhai *et al.*, 2019). The BE has great potential for our deep oceans because the ocean-based minerals are available in huge deposits under the oceans (Bari, 2017). The deep seabed floor promises massive polymetallic sulphide deposits, polymetallic nodules, copper, zinc and precious metals (Wenhai *et al.,* 2019). Earnings from the deep seabed mining operations are expected to exceed US$50 globally (International Seabed Authority, 2020; EU, 2021). However, oil and gas are still considered strategic and most valuable.

Livelihoods:
There are enormous provisions and opportunities in the marine ecosystem for great improvements in the livelihoods of those nations so endowed, provided the right policies and investments are made. Pendleton *et al.,* (2020), reported that the BE can provide about 40 million jobs and contribute trillions of USD in revenue by 2030. In 2015, the EU report stated that the maritime sector employed over 5 million jobs and generated more than EUR500 billion yearly. Similarly, Ghana reported improvements in livelihoods through Job creation by BE (Amarh, 2017). The WBG (2016) has stated that FAO report estimated that the fish/fisheries sector provides assured livelihoods of 660-820 million people globally. AKS can also benefit from these improvements in the livelihoods of her citizens.

Challenges threatening Blue Economy in AKS:
There are numerous opportunities and benefits provided by the blue economy. However, there are equally several challenges also, which must be addressed to ensure its sustainable development in AKS. Most of the challenges include the following;

Over-exploitation:
Improved technological development in the design of fishing nets and trawlers together with poor monitoring and surveillance by regulating authorities have encouraged the use of explosives and undersized fishing nets in fish and fisheries, thus resulting in exploiting the ecosystem resources to dangerous levels. Aside stock depletion by these unknown and stolen practices, there is the loss of huge revenue that could have accrued to the State (WBG, 2016). These factors can seriously undermine implementation of the BE concept in Akwa Ibom State.

Insecurity and Piracy in the coastal waters:
The Nigerian coastal space is reported to be bedeviled by high rate of piracy and armed robbery incidences in recent times (Hamisu, 2019). These nefarious activities can significantly impact the BE negatively by disrupting economic activities and growth in all sectors of the BE.

Limited infrastructure:
Provision of suitable infrastructural development including harbours, ports, quays and coastal facilities is necessary for the growth of the BE. Lack of these facilities could constitute a serious limitation to the development of some sectors of the BE.

Oil Spillage:
Activities of the oil industries, particularly in the off-shore sector, constitutes one of the greatest threats to the development of the BE in the state. Oil spillages pollute the marine environment, destroy the aquatic ecosystems and disrupt economic activities in the affected areas. These can seriously hinder BE activities in the state. Oil spillage in the Niger-Delta region has become so endemic such that the region has been named among the most negatively impacted resource exploited areas globally. (Kadafa, 2012). Akwa Ibom State is one of the frontline states in the Niger-Delta region.

Invasion of Exotic species:
Massive invasion of exotic species of flora and fauna into the coastal space of AKS can seriously jeopardize development of BE in the state. *Nipa fruticans*, an exotic palm species, that has become native to the Ibeno coastal waters, is reportedly responsible for increased flooding, loss of habitat, loss of biodiversity and loss of breeding/nursery grounds for fish (Danladi, *et al.,* 2017).

Climate change phenomena:
Long term climate variability occasioned by carbon accumulation, results in global warming and dangerous climatic conditions such as increasing sporadic precipitation as well as eutrophication and enrichment of nutrients. Surface run-off from heavy downpour also results in polluting the aesthetics of the environment. Other effects of climate change include habitat destruction, coastal erosion and depletion of marine life and biodiversity. These phenomena are capable of jeopardizing the benefits of BE in the state.

Constraints in Project financing:
Sourcing for funds to execute projects and businesses on the blue economy can be herculean especially for indigenous and non-multinational organizations. This may put a limitation on the scope and scale of projects that can be developed under this concept (Youssef, 2023). However,

AKS can circumvent this challenge by utilizing the extra revenue accruing from the off-shore oil resources.

Microplastics:
Microplastics have emerged as a major anthropogenic marine pollution challenge globally, with devastating effects on settlements and ecosystem communities (Cole, *et al.*, 2011; Jambeck, *et al.*, 2015). Besides, plastics float and clog water bodies; thus, defacing the aquatic environment and destroying nursery and breeding sites. This menace is fast gaining traction in AKS.

CONCLUSION:
For Akwa Ibom State to fully benefit from the BE, it must deepen its understanding of marine ecosystems. This will provide a better understanding of the various interactions between the ecosystem compartments and show how best they could be harnessed to ensure all-round sustainable growth, as well as environmental and developmental sustainability. Moreover, societal awareness and attitude to optimize the dependency on ecosystem services is necessary to achieve the long-term goals.
Akwa Ibom State marine ecosystems are highly productive and as such require effective mitigation measure to protect against piracy and other security challenges in the region. Deployment of Coast guards to compliment the services of the Navy and Police force may be an effective and practical means of checking this menace. Severe sanctions and punishments must be meted out to defaulters and violators of the extant laws of the State concerning the BE development; e.g. Fisher folks employing unsustainable fishing techniques such as using wrong net sizes, explosives or dangerous chemicals for fishing, should be prosecuted. Similarly, the polluter-pay-principle should apply to both the Maritime and other land-based activities polluting the AKS coastal areas.
Governments at every level are the major stakeholders and proponents of the BE and as such should be purposeful in governance, establish and enforce governance rules and clear regulations with regular dialogues and encourage public and private participation. Government should also encourage and direct research interests in the areas of the BE in order to provide more knowledge, better understanding and practical solutions to the diverse challenges that may emanate from this novel concept.
Overall, we submit that the blue economy development offers numerous economic growth, sustainable livelihoods and developmental opportunities in Akwa Ibom State, especially in sectors such as coastal tourism, renewable energy, fisheries and aquaculture. There are great prospects in employing the concept to ensure food security, create jobs, and drive industrialization in the State. However, visionary leadership at all sectors of the economy and also adopting stringent sustainable management techniques may be necessary to sustainably conserve the benefits and dependencies of the blue economy in Akwa Ibom State.

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CRediT authorship contribution Statement*:*
Henry Anwan: Conceptualization, Investigation, Methodology, Original draft, Writing-review and editing. **Felix Ezeh:** Visualization, Writing-review and editing, Conceptualization. **Martin**

Anetekhai: Conceptualization, Supervision. All authors read and approved the submitted manuscript.

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