



Exploring the Intersections of Blue, Green, and Grey Economies in Nigeria: Opportunities, Challenges, and Strategic Pathways for Sustainable Development

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ABSTRACT

This review paper explores the integration of Blue, Green, and Grey economies as viable pathways for sustainable economic development in Nigeria. By examining the principles, current status, challenges, and opportunities of these economic models, the study highlights their potential in diversifying Nigeria's economy, enhancing environmental sustainability, and promoting social inclusion. The Blue Economy focuses on harnessing Nigeria's vast coastal and marine resources for sustainable fisheries, aquaculture, and maritime activities. The Green Economy emphasizes eco-friendly practices, renewable energy, sustainable agriculture, and land management as means to address climate change and improve food security. Meanwhile, the Grey Economy, predominantly informal, presents opportunities for sustainable urban development, particularly in waste management, recycling, and construction sectors. The study identifies significant challenges, including policy gaps, inadequate infrastructure, limited access to financing, and the need for a more robust regulatory framework. It emphasizes the necessity of an integrated policy approach that aligns with Nigeria's Vision 2050 and the Sustainable Development Goals (SDGs). Strategic recommendations include fostering public-private partnerships, investing in capacity building, and leveraging innovative financing mechanisms to support sustainability projects. This review concludes that a comprehensive approach to integrating Blue, Green, and Grey economies can enhance Nigeria's economic resilience, reduce environmental degradation, and promote inclusive growth. The findings serve as a blueprint for policymakers, stakeholders, and researchers interested in advancing sustainable development in Nigeria.

Keywords: Sustainable Development, Blue Economy, Green Economy, Grey Economy, Nigeria.



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1. Introduction

The concept of sustainable development has evolved over the decades, emphasizing the need for an economic paradigm that not only fosters economic growth but also preserves the environment and promotes social equity. Within this context, the Blue, Green, and Grey economies have emerged as distinct yet interconnected models aiming to achieve sustainable development ([Khoshnava et al., 2019](#)). These economies seek to balance the utilization of natural resources, environmental protection, and socio-economic development. The Blue Economy focuses on the sustainable use of ocean resources, the Green Economy emphasizes environmentally friendly practices across various sectors, and the Grey Economy encompasses informal economic activities with the potential to transition towards sustainable practices ([Okafor-Yarwood et al., 2020](#)). This review paper aims to explore the synergies, challenges, and strategic pathways for integrating these economic models in Nigeria, a country with diverse natural resources and unique socio-economic dynamics.

The Blue Economy is a relatively recent concept that gained prominence during the 2012 United Nations Conference on Sustainable Development (Rio+20). It encompasses the sustainable use of ocean resources for economic growth, improved livelihoods, and job creation, while preserving the health of ocean ecosystems ([Liang et al., 2022](#)). The Blue Economy covers diverse sectors such as fisheries, aquaculture, maritime transport, tourism, and renewable ocean energy. For a coastal nation like Nigeria, with an extensive coastline and rich marine biodiversity, the Blue Economy presents significant opportunities for diversifying the economy beyond oil and gas, creating jobs, and ensuring food security ([Adepoju et al., 2023](#)).

The Green Economy, on the other hand, focuses on reducing environmental risks and ecological scarcities. It aims for sustainable development without degrading the environment. The United Nations Environment Programme (UNEP) defines the Green Economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks ([Zhang et al., 2022](#)). This model promotes the use of renewable energy, sustainable agriculture, waste management, and conservation efforts. For Nigeria, a country facing challenges such as deforestation, pollution, and climate change impacts, adopting Green Economy practices is critical for long-term sustainability.

The Grey Economy refers to informal economic activities that operate outside the formal regulatory framework but significantly contribute to national economies, especially in developing countries. In Nigeria, the Grey Economy is particularly substantial, accounting for over half of the country's GDP and employing a significant portion of the labor force ([Echendu, 2020](#)). This sector includes activities such as informal trading, waste recycling, and small-scale manufacturing. While the Grey Economy is often associated with negative externalities like pollution and poor working conditions, it also offers opportunities for transitioning to more sustainable practices, especially in areas like waste management and recycling ([Gou et al., 2021](#)).

Nigeria, as the most populous country in Africa and one of its largest economies, faces significant challenges in balancing economic growth with sustainable environmental practices. The country is heavily reliant on oil and gas exports, which has led to environmental degradation, pollution, and a volatile economic landscape due to fluctuations in global oil prices. ([Adejumo, 2019](#)) At the same time, Nigeria has vast potential in sectors aligned with the Blue and Green economies, such as agriculture, fisheries, renewable energy, and eco-tourism. Leveraging these resources could diversify the economy, reduce dependency on fossil fuels, and promote sustainable development ([Jacob & Umoh, 2022](#)).

Furthermore, the informal sector, representing Nigeria's Grey Economy, plays a crucial role in the livelihoods of millions of Nigerians. However, it is often characterized by inefficiencies, lack of regulation, and environmental concerns. By integrating sustainability principles into the Grey Economy, Nigeria can unlock new pathways for inclusive growth, job creation, and environmental protection ([Ogbonna, 2022](#)).

Focusing on Nigeria is also essential due to its commitment to international agreements such as the Sustainable Development Goals (SDGs) and the African Union's Agenda 2063. The country's Vision 2050 aims to transform Nigeria into a leading industrialized nation, but achieving this goal requires integrating sustainable economic models ([Modibbo et al., 2020](#)). Therefore, a comprehensive review of Blue, Green, and Grey economic approaches in the Nigerian context is timely and relevant.

Objectives of the Review

The primary objective of this review is to explore the potential of integrating Blue, Green, and Grey economic models to promote sustainable development in Nigeria. This review paper is structured to provide a comprehensive exploration of the Blue, Green, and Grey economies, particularly in the context of Nigeria. By exploring the intersections of Blue, Green, and Grey economies, this review aims to provide valuable insights for policymakers, researchers, and stakeholders interested in sustainable economic development in Nigeria.

2. Conceptual Framework

2.1 Defining the Blue Economy

The Blue Economy is a transformative economic paradigm that seeks to balance economic development with the sustainable use of ocean and marine resources. It encompasses a wide range of sectors, including fisheries,

aquaculture, maritime transport, coastal tourism, and renewable ocean energy ([Choudhary et al., 2021](#)). The principles of the Blue Economy align with sustainable development goals, emphasizing economic growth, social inclusion, and the preservation of marine ecosystems. The Blue Economy promotes innovation in maritime industries by harnessing technology and sustainable practices to optimize resource use, minimize environmental impact, and protect the livelihoods of communities dependent on marine resources ([Lee et al., 2020](#)).

In the Nigerian context, the Blue Economy is of particular importance due to the country's extensive coastline, which stretches over 850 kilometers along the Gulf of Guinea. Nigeria's coastal and marine environments are rich in biodiversity, offering substantial resources in fisheries, aquaculture, and tourism ([Akomolafe et al., 2022](#)). The country's Exclusive Economic Zone (EEZ) provides a vast area for potential economic activities, including offshore oil and gas exploration, maritime trade, and ocean-based renewable energy. Nigeria's fishing industry is a critical component of the Blue Economy, contributing to food security, employment, and income for coastal communities ([Bebeteidoh et al., 2020](#)). However, the sector faces challenges such as overfishing, pollution, and climate change, which threaten marine biodiversity and coastal livelihoods.

Coastal management is another significant aspect of the Blue Economy in Nigeria, particularly in addressing issues like coastal erosion, habitat degradation, and the impacts of rising sea levels. Effective coastal management strategies are essential to safeguarding the nation's coastal infrastructure, tourism potential, and the well-being of coastal populations ([Popoola, 2022](#)). Developing Nigeria's Blue Economy requires integrated policies that address both economic and environmental dimensions, promoting sustainable practices in fisheries, tourism, and marine industries while enhancing resilience to climate change.

2.2 Defining the Green Economy

The Green Economy is an economic framework that seeks to promote sustainable development by reducing environmental risks, resource scarcity, and ecological degradation. It is guided by principles that prioritise low carbon emissions, resource efficiency, and social inclusivity ([Zvarych et al., 2023](#)). The Green Economy model emphasizes the shift from conventional growth patterns to more sustainable practices, focusing on sectors like renewable energy, sustainable agriculture, waste management, and natural resource conservation ([Souad, 2023](#)). By integrating economic, social, and environmental objectives, the Green Economy aims to create jobs, enhance human well-being, and protect the planet for future generations.

For Nigeria, the Green Economy presents a strategic pathway for diversifying the economy, reducing dependence on fossil fuels, and addressing the environmental challenges that the country faces. Nigeria's agricultural sector, which employs a significant portion of the population, stands to benefit greatly from green practices such as sustainable farming, organic agriculture, and agroforestry ([Ume et al., 2023](#)). By adopting these practices, Nigeria can improve food security, increase crop yields, and reduce environmental impacts like deforestation and soil degradation. The adoption of renewable energy is another critical aspect of the green economy in Nigeria. As the country faces energy challenges, including power shortages and reliance on non-renewable energy sources, the transition to solar, wind, and hydropower offers a sustainable alternative ([Olayide, 2021](#)). By investing in renewable energy infrastructure, Nigeria can reduce its carbon footprint, enhance energy security, and promote economic resilience.

Eco-friendly practices in waste management, water conservation, and pollution control are vital components of the green economy in Nigeria. These practices not only contribute to environmental sustainability but also open up new economic opportunities in areas such as recycling, green technology, and environmental consultancy ([Eneh, 2021](#)). Transitioning to a green economy requires comprehensive policies, public awareness, and capacity-building initiatives to overcome barriers such as inadequate infrastructure, financial constraints, and limited access to green technologies.

2.3 Defining the Grey Economy

The grey economy, often referred to as the informal economy, encompasses economic activities that occur outside formal regulatory frameworks. While the gray economy is characterized by a lack of official recognition, taxation, and regulation, it plays a crucial role in the livelihoods of millions of people, particularly in developing countries like Nigeria ([Cwiakala-Malys et al., 2020](#)). The principles of the Grey Economy

include flexibility, resilience, and adaptability, as they often provide income opportunities for marginalized groups, including low-skilled workers, women, and youth. However, the lack of formal oversight can lead to issues such as poor working conditions, environmental degradation, and limited access to social protections.

In Nigeria, the gray economy constitutes a substantial portion of the national economy, contributing over 50% to the country's GDP and employing a significant share of the labor force. Key sectors within Nigeria's grey economy include construction, waste management, street trading, and informal recycling. (Mbah et al., 2019) The construction sector, for example, is driven largely by informal labour, providing employment to thousands of unskilled and semi-skilled workers. However, the absence of regulatory standards often results in substandard building practices, safety concerns, and negative environmental impacts (Ndlangamandla & Combrinck, 2019).

Waste management is another critical area within Nigeria's grey economy. Informal waste collectors and recyclers play a significant role in reducing waste accumulation in cities, yet they operate under hazardous conditions without adequate safety measures. By integrating sustainable practices within the Grey Economy, particularly in waste recycling, Nigeria has the potential to not only improve environmental outcomes but also create formal employment opportunities and enhance public health (Okwu et al., 2022). Furthermore, transitioning elements of the Grey Economy into formalized structures can support sustainable urban development, reduce poverty, and contribute to economic resilience. This transition, however, requires supportive policies, access to credit, and training programs that empower informal workers to adopt sustainable and efficient practices (Peter, 2021). A key challenge for Nigeria is balancing the benefits of the Grey Economy—such as employment and income generation—with the need for formalization, regulation, and sustainability.

By exploring the Blue, Green, and Grey economies, this review paper aims to provide a comprehensive understanding of their individual contributions and collective potential for fostering sustainable development in Nigeria. Integrating these economic models can drive inclusive growth, environmental protection, and social equity, thereby aligning with Nigeria's broader development goals and international commitments to sustainability.

3. Review of Existing Literature

Globally, the concept of the Blue Economy has been explored extensively in the context of oceanic and marine resources. According to studies by the World Bank and the United Nations, the Blue Economy aims to harness the potential of oceans, seas, and coastal areas for sustainable economic activities, including fisheries, marine tourism, and renewable ocean energy (Choudhary et al., 2021). These studies emphasise the importance of adopting sustainable practices to mitigate the impacts of overfishing, pollution, and climate change on marine ecosystems (Sumaila & Tai, 2020). Research in the Asia-Pacific region, particularly in countries like Indonesia, the Philippines, and India, has demonstrated the benefits of investing in marine conservation and sustainable fisheries management (Dwihastuty et al., 2022). These initiatives have been linked to improved livelihoods for coastal communities, enhanced food security, and the conservation of biodiversity. Similarly, studies from the Caribbean highlight the role of the Blue Economy in promoting economic diversification through coastal tourism and marine biotechnology (Bethel et al., 2021).

Regionally, within the African context, the Blue Economy has been recognised as a vital strategy for economic growth and poverty alleviation. Reports from the African Union emphasise the potential of the continent's extensive coastline and marine resources in sectors such as fisheries, aquaculture, and offshore renewable energy (Akpomera, 2020). However, these studies also point out challenges such as weak governance, inadequate infrastructure, and limited access to financing, which hinder the full realisation of the Blue Economy's potential. In Nigeria, a few studies have examined the opportunities within the Blue Economy, focusing primarily on the fisheries and maritime sectors. For example, research indicates that Nigeria's fishing sector has the potential to significantly contribute to food security and job creation if sustainable practices are implemented (Igbozurike, 2020). However, the sector faces challenges related to illegal fishing, pollution, and the degradation of marine habitats.

The Green Economy, another vital pillar of sustainable development, has been the subject of numerous studies globally. The United Nations Environment Programme (UNEP) defines the green economy as one that results in improved human well-being and social equity while significantly reducing environmental risks. Global studies have highlighted the benefits of transitioning to green practices, particularly in sectors like agriculture, energy, and waste management ([Lachkepiani et al., 2023](#)). In Europe, there has been considerable progress in promoting the green economy through policies supporting renewable energy, sustainable agriculture, and circular economic practices. The European Green Deal, for instance, aims to make the continent climate neutral by 2050, setting a precedent for green policy frameworks worldwide. In Latin America, countries like Costa Rica have demonstrated how sustainable agriculture and eco-tourism can drive economic growth while preserving natural ecosystems ([Montanarella & Panagos, 2020](#)).

In the African context, the green economy has been identified as a crucial driver for sustainable development, especially in addressing challenges related to climate change, energy access, and food security. Studies conducted in countries like Kenya, South Africa, and Ethiopia have explored the potential of renewable energy projects, sustainable agriculture, and reforestation initiatives to reduce poverty and promote economic resilience ([Adenle, 2019](#)). Nigeria, with its diverse ecological zones and abundant natural resources, presents significant opportunities for green economic initiatives. Research on Nigeria's green economy has predominantly focused on renewable energy, particularly solar power, as a solution to the country's energy deficit ([Elum & Mjimba, 2020](#)). Additionally, studies have highlighted the potential of sustainable agricultural practices, such as organic farming and agroforestry, in enhancing food security and resilience to climate change. However, the adoption of green practices in Nigeria is impeded by challenges such as policy inconsistency, inadequate funding, and limited public awareness ([Phiri et al., 2022](#)).

The grey economy, often synonymous with the informal sector, is a critical yet understudied component of sustainable economic development. Globally, the grey economy accounts for a substantial share of economic activity, particularly in developing regions. Studies from South Asia, Latin America, and Sub-Saharan Africa indicate that the informal sector plays a vital role in providing livelihoods, especially for marginalised groups, despite its challenges, such as the lack of regulation, social protections, and access to financial services ([Danquah et al., 2019](#)). In Africa, the informal sector is a significant contributor to GDP, yet it remains largely excluded from formal economic policies and planning.

Nigeria's grey economy is particularly notable for its scale and impact, contributing over 50% to the national GDP. Studies on Nigeria's informal sector reveal its critical role in job creation, poverty reduction, and economic resilience, particularly in urban centers. Key areas of focus within the Nigerian grey economy include informal trading, construction, waste management, and small-scale manufacturing ([Edewor et al., 2023](#)). Research indicates that while the informal sector provides essential income opportunities, it also poses challenges related to tax evasion, regulatory compliance, and environmental degradation, particularly in the case of informal waste disposal and recycling activities. There is a growing recognition of the need to integrate the grey economy into formal policy frameworks to enhance its contributions to sustainable development ([Abid, 2014](#)).

Despite the extensive body of literature on the Blue, Green, and Grey economies, several research gaps remain, particularly in the Nigerian context. First, there is a paucity of comprehensive studies that examine the interplay between these three economic paradigms and their collective impact on sustainable development in Nigeria ([Khoshnava et al., 2019](#)). Most existing studies are sector-specific, focusing on either the Blue, Green, or Grey economies in isolation, which limits a holistic understanding of how these economies can be synergised to achieve broader sustainability goals. Additionally, there is limited empirical research on the policy and institutional frameworks needed to support the transition to blue and green economies in Nigeria. While some studies have identified the potential benefits of sustainable practices, there is a lack of detailed analysis on the barriers to their implementation, including socio-economic, cultural, and political challenges ([Shaker et al., 2022](#)).

Another significant gap is the absence of localised data and case studies that capture the unique socio-economic and environmental dynamics of Nigeria's diverse regions. Existing research tends to generalise findings across the country without accounting for regional differences in resource availability, economic activities, and environmental challenges ([Ukhurebor et al., 2021](#)). There is also a need for longitudinal studies that assess the long-term impacts of adopting blue, green, and grey economic practices on Nigeria's sustainable development

goals. Addressing these research gaps is crucial for developing targeted strategies that align with Nigeria's national development plans and international sustainability commitments.

4. The Blue Economy in Nigeria

The Blue Economy, which encompasses the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems, holds significant promise for Nigeria. Given its extensive coastline along the Atlantic Ocean, abundant marine resources, and strategic location in the Gulf of Guinea, Nigeria is well-positioned to harness the benefits of the Blue Economy. This section examines the current status and potential of Nigeria's Blue Economy, explores the challenges and barriers it faces, and proposes strategic pathways for sustainable growth.

4.1. Current status and potential

Nigeria's coastal and marine resources are diverse and abundant, offering a wide range of opportunities for economic development. The country's coastline spans over 850 kilometers, with access to rich marine biodiversity, significant fish stocks, and vast oil and gas reserves ([Akomolafe et al., 2022](#)). The fisheries and aquaculture sectors are particularly crucial to Nigeria's Blue Economy, providing employment for millions of people, especially in coastal communities, and contributing to national food security. Nigeria's fisheries sector is one of the largest in West Africa, with artisanal fishing accounting for about 80% of the total fish production ([Onwuka & Ohaturuonye, 2020](#)). The aquaculture industry is also expanding, with a growing emphasis on catfish and tilapia farming, which are crucial for meeting the protein needs of the population.

Beyond fisheries, Nigeria's maritime transport sector plays a critical role in the national economy. As the gateway to West Africa, Nigeria's ports handle over 60% of the total seaborne traffic in the region, making maritime transport a significant contributor to trade and economic activities ([Clarke & Huseyinoglu, 2019](#)). The country's major ports, including Lagos, Port Harcourt, and Calabar, are vital hubs for imports and exports, particularly for the oil and gas industry. However, despite its strategic position, Nigeria's maritime sector remains underused due to infrastructural deficits, inefficient port operations, and regulatory bottlenecks ([Edih et al., 2022](#)).

The potential for tourism is another promising aspect of Nigeria's blue economy. Coastal states such as Lagos, Ondo, and Cross River are endowed with beautiful beaches, mangrove forests, and cultural heritage sites, which present significant opportunities for developing eco-tourism and sustainable coastal tourism. Leveraging these natural assets could diversify the economy and create jobs, especially for youth and women in coastal areas ([Atamewan, 2023](#)). Nigeria's Exclusive Economic Zone (EEZ) offers vast untapped potential for ocean-based renewable energy, such as offshore wind and tidal energy. Harnessing these resources could provide sustainable energy solutions and help the country meet its renewable energy targets.

4.2. Challenges and barriers

Despite the promising potential of Nigeria's blue economy, several challenges and barriers hinder its growth and development. A major issue is the lack of comprehensive and coherent policy frameworks to guide the sustainable exploitation of marine resources. Currently, Nigeria's ocean governance is fragmented, with overlapping mandates among various government agencies, leading to inefficiencies and regulatory conflicts ([Moruf, 2020](#)). This lack of coordination has resulted in the unsustainable use of marine resources, with consequences such as overfishing, illegal fishing activities, and habitat destruction.

Environmental threats pose another significant challenge to the blue economy in Nigeria. Coastal erosion, marine pollution, and the impacts of climate change are increasingly affecting Nigeria's coastal ecosystems. For instance, oil spills, especially in the Niger Delta region, have caused severe environmental degradation, impacting marine life and the livelihoods of coastal communities ([Onyena & Sam, 2020](#)). Additionally, plastic pollution in coastal waters poses a growing threat to marine biodiversity and fisheries. The degradation of mangroves and coral reefs, which serve as critical habitats for fish breeding, further exacerbates the challenges of sustainable fishery management.

Socioeconomic challenges, including poverty, lack of infrastructure, and limited access to finance, also impede the growth of the Blue Economy in Nigeria. Many coastal communities lack the necessary infrastructure and technological capabilities to engage in sustainable fishing, aquaculture, or marine tourism ([Obamuyi & Oladapo, 2016](#)). Furthermore, the absence of robust financial mechanisms and investment incentives discourages private sector participation in the Blue Economy. The lack of capacity-building programs and technical expertise further constrains the ability of local communities to participate in and benefit from Blue Economy initiatives.

4.3. Strategic Pathways for Growth

To unlock the full potential of the Blue Economy in Nigeria, strategic interventions are needed to address the existing challenges and leverage available opportunities. One of the critical pathways for growth is the development of a cohesive policy framework that integrates the various aspects of the Blue Economy. The Nigerian government should adopt a national Blue Economy strategy that outlines clear objectives, governance structures, and regulatory frameworks to ensure the sustainable use of marine resources ([Farouk et al., 2021](#)). This strategy should also prioritise the protection of marine ecosystems, aligning with global commitments such as United Nations Sustainable Development Goal 14, which focuses on the conservation and sustainable use of oceans, seas, and marine resources.

Capacity building and institutional strengthening are essential for the effective implementation of Blue Economy initiatives. There is a need to invest in research and development, particularly in areas such as marine biotechnology, sustainable aquaculture, and ocean-based renewable energy. Establishing partnerships with international organizations, research institutions, and the private sector could facilitate knowledge transfer and innovation ([Kobayashi, 2023](#)). Empowering local communities through training programs, access to finance, and support for small and medium-sized enterprises (SMEs) in coastal areas would enhance their participation in the Blue Economy, thereby promoting inclusive growth.

Investment in infrastructure is another strategic pathway for advancing the Blue Economy in Nigeria. Upgrading port facilities, improving maritime security, and enhancing logistics networks would boost the efficiency of the maritime transport sector. Developing sustainable coastal tourism infrastructure, such as eco-friendly resorts, marine parks, and cultural heritage sites, could attract both local and international tourists, generating revenue and creating employment opportunities ([Onwuegbuchunam, 2019](#)). Additionally, exploring the potential of ocean-based renewable energy projects, such as offshore wind farms, could contribute to Nigeria's energy security and reduce its dependence on fossil fuels.

Lastly, fostering regional cooperation and collaboration is crucial for the sustainable development of the Blue Economy. Nigeria can benefit from partnerships with other West African countries through platforms such as the African Union's Blue Economy Strategy and the Abidjan Convention, which promote sustainable use of marine resources in the region ([Igechi, 2021](#)). Collaborative efforts in combating illegal fishing, marine pollution, and climate change impacts could enhance the resilience of Nigeria's coastal ecosystems and ensure the long-term sustainability of its blue economy.

Nigeria's blue economy presents immense potential for economic diversification and sustainable development, but realizing this potential requires addressing key challenges related to policy gaps, environmental threats, and capacity constraints. Strategic pathways, including policy reform, capacity building, infrastructure investment, and regional collaboration, offer viable solutions to drive the sustainable growth of Nigeria's Blue Economy. By adopting a holistic and integrated approach, Nigeria can harness its marine resources to achieve economic prosperity, environmental sustainability, and social inclusion.

5. The Green Economy in Nigeria

The concept of a "Green Economy" emphasizes sustainable development through the efficient use of resources, reducing environmental risks, and promoting social equity. It seeks to achieve economic growth while

preserving natural capital and minimizing its negative impacts on the environment. For Nigeria, a country rich in natural resources and biodiversity, transitioning to a green economy presents a unique opportunity to address its economic, social, and environmental challenges. This section explores the current status and potential of the green economy in Nigeria, examines the existing challenges and barriers, and discusses strategic pathways to drive sustainable growth.

5.1. Current status and potential

Nigeria's green economy encompasses various sectors, with agriculture, forestry, renewable energy, and eco-tourism being the most significant contributors. Agriculture remains the backbone of Nigeria's economy, employing about 70% of the workforce and contributing significantly to the country's GDP. The "green economy" approach in agriculture emphasizes sustainable practices such as organic farming, agroforestry, and conservation agriculture ([Akpaeti et al., 2017](#)). These practices not only increase productivity but also improve soil health, conserve water, and reduce greenhouse gas emissions. Sustainable land management, particularly in regions prone to desertification like the northern parts of Nigeria, is crucial for maintaining agricultural productivity and enhancing resilience to climate change ([Jellason et al., 2020](#)). The introduction of climate-smart agricultural techniques and technologies offers potential for enhancing food security and promoting rural livelihoods.

Forestry is another vital component of Nigeria's green economy, with the country's forests serving as critical carbon sinks that contribute to carbon sequestration and biodiversity conservation. However, deforestation, driven by illegal logging, agricultural expansion, and fuelwood harvesting, poses a severe threat to these ecosystems ([Agbelade & Onyekwelu, 2020](#)). The Nigerian government has initiated several reforestation programs, such as the National Afforestation Program, to restore degraded forest areas. The promotion of community-based forest management and sustainable harvesting practices could further enhance the role of forests in Nigeria's green economy ([Ohwo & Nzekwe-Ebonwu, 2021](#)).

Renewable energy is a promising sector for driving the green economy in Nigeria, given the country's vast potential for solar, wind, hydro, and biomass energy. Currently, Nigeria faces significant energy challenges, with a large portion of the population lacking access to reliable electricity ([Elum & Mjimba, 2020](#)). The Green Economy Framework prioritizes the development of renewable energy sources to reduce dependence on fossil fuels, decrease carbon emissions, and provide sustainable energy solutions for rural and urban communities. Investments in solar mini-grids, particularly in off-grid rural areas, have shown success in providing access to clean energy, thereby improving livelihoods and fostering economic development ([Babalola et al., 2022](#)). Nigeria's commitment to the Paris Agreement and the National Renewable Energy and Energy Efficiency Policy highlights its dedication to increasing the share of renewables in the national energy mix.

Eco-tourism is another area with substantial potential for Nigeria's green economy. The country's rich cultural heritage, diverse wildlife, and natural landscapes offer opportunities for sustainable tourism that can generate revenue while conserving natural ecosystems. Eco-tourism initiatives in regions such as Cross River State, home to the Cross River National Park and Afi Mountain Wildlife Sanctuary, have demonstrated the potential for community-based conservation and sustainable development ([Idowu, 2021](#)). Promoting eco-tourism can also create jobs, particularly for local communities, contributing to poverty alleviation and social inclusion.

5.2. Challenges and barriers

Despite its potential, Nigeria's transition to a green economy is hindered by several challenges and barriers. One of the most significant challenges is the lack of infrastructure, which affects the implementation of green initiatives across various sectors. In agriculture, for instance, poor infrastructure limits access to markets, reduces the efficiency of supply chains, and leads to significant post-harvest losses ([Okon et al., 2021](#)). The absence of adequate storage facilities, transportation networks, and irrigation systems hampers the adoption of sustainable agricultural practices. Similarly, the renewable energy sector faces challenges related to the underdeveloped power grid, which restricts the integration of renewable energy sources and limits the expansion of clean energy access.

Financing issues also pose a significant barrier to the green economy in Nigeria. Many green projects, such as renewable energy installations, sustainable agriculture initiatives, and eco-tourism ventures, require substantial

upfront investments. However, limited access to finance, especially for small and medium-sized enterprises (SMEs) and rural communities, constrains their ability to invest in sustainable practices ([Ugulu, 2019](#)). The high cost of capital, coupled with the perceived risks associated with green investments, discourages private sector participation. Furthermore, public funding for green projects is often inadequate, and there is a lack of financial instruments, such as green bonds and climate funds, that could support sustainable development initiatives.

Policy implementation gaps also present significant challenges for Nigeria's green economy. While the country has developed several policies and strategies aimed at promoting sustainable development, including the National Policy on the Environment and the Renewable Energy Master Plan, the effectiveness of these policies is often undermined by weak enforcement, lack of coordination among government agencies, and bureaucratic inefficiencies ([Omojolaibi, 2016](#)). There is a need for greater awareness and capacity-building at both the governmental and community levels to ensure the successful implementation of green policies. Issues such as land tenure insecurity, which affects sustainable land management and reforestation efforts, also need to be addressed to facilitate the transition to a green economy.

5.3. Strategic Pathways for Growth

To overcome these challenges and harness the potential of the green economy, Nigeria needs to adopt strategic pathways that include robust policy frameworks, public-private partnerships, and innovative green finance mechanisms. Strengthening policy frameworks is essential for creating an enabling environment that supports the green economy. This involves not only developing comprehensive and coherent policies but also ensuring effective implementation and enforcement ([Ogbonna, 2022](#)). The government should prioritize policies that promote sustainable agriculture, renewable energy, and eco-tourism with a focus on building resilience to climate change. Additionally, integrating green economy principles into national development plans and sectoral strategies could facilitate the alignment of economic growth with environmental sustainability.

Public-private partnerships (PPPs) offer a viable solution for addressing the infrastructure and financing gaps in Nigeria's green economy. By leveraging the resources and expertise of the private sector, PPPs can support the development of sustainable infrastructure, such as renewable energy projects, green buildings, and eco-friendly transport systems ([Ochinanwata et al., 2021](#)). These partnerships can also enhance access to finance for green initiatives, particularly for SMEs and local communities, by providing innovative financing models such as blended finance, where public and private funds are combined to reduce investment risks. Encouraging corporate social responsibility (CSR) initiatives and green entrepreneurship can further stimulate investments in sustainable development ([Adeyeye et al., 2021](#)).

Green finance is a critical enabler of Nigeria's transition to a green economy. Expanding access to green finance requires the development of financial instruments that attract both domestic and international investors ([Raimi et al., 2021](#)). The introduction of green bonds, for example, could provide a sustainable source of funding for renewable energy projects, reforestation programs, and other green initiatives. The Nigerian government could also explore opportunities to access global climate funds, such as the Green Climate Fund and the Global Environment Facility, to support national green economy projects ([Ngwenya & Simatele, 2020](#)). Promoting financial inclusion and providing capacity-building programs for local communities could enhance their ability to access green finance and invest in sustainable practices.

In conclusion, while Nigeria's green economy presents significant opportunities for achieving sustainable development, addressing infrastructure deficits, financing constraints, and policy implementation gaps is crucial for realizing this potential. By adopting strategic pathways that include robust policy frameworks, public-private partnerships, and innovative green finance mechanisms, Nigeria can build a resilient and inclusive green economy that contributes to economic growth, environmental sustainability, and social well-being. The transition to a green economy is not only vital for Nigeria's future but also aligns with global efforts to achieve the Sustainable Development Goals and address the impacts of climate change.

6. The Grey Economy in Nigeria

The Grey economy, often referred to as the informal or shadow economy, plays a crucial role in Nigeria's socio-economic landscape. It encompasses economic activities that are not fully regulated by the government

but are not necessarily illegal. This sector includes a wide range of informal jobs, services, and businesses that contribute significantly to Nigeria's GDP, especially in urban areas where many rely on informal employment for their livelihoods. The grey economy is a critical component of the Nigerian economy, offering both challenges and opportunities for sustainable development. This section explores the nature of Nigeria's grey economy, focusing on its current status, the associated challenges and opportunities, and strategies for integrating sustainability within this sector.

6.1. Understanding the Grey Economy in Nigeria

The grey economy in Nigeria is extensive, involving a substantial proportion of the workforce and contributing to the overall economic output. According to the International Labour Organisation (ILO), a significant percentage of Nigeria's working population is engaged in the informal sector, which includes activities such as petty trading, street vending, small-scale construction, waste collection, recycling, and other micro-enterprises ([Etim & Daramola, 2020](#)). These activities are often characterised by a lack of formal registration, tax evasion, and limited access to social protection or employment benefits. Nevertheless, they serve as a crucial means of livelihood for millions of Nigerians, especially in urban areas where formal job opportunities are limited.

A key aspect of Nigeria's grey economy is waste management and recycling. In cities like Lagos, Kano, and Abuja, waste management is a significant concern due to rapid urbanisation and population growth. The informal waste management sector, which involves scavengers and informal recyclers, plays a vital role in reducing waste accumulation and promoting recycling ([Opoko & Oluwatayo, 2016](#)). Informal waste pickers collect materials such as plastics, metals, and paper, which are then sold to recycling companies. This sector not only helps reduce waste volume in landfills but also provides a source of income for many low-income households. However, the informal nature of these activities means that they are often unregulated, leading to poor working conditions and health risks for those involved.

The construction industry is another vital component of Nigeria's grey economy. Informal construction activities are prevalent in both rural and urban areas, driven by the demand for affordable housing and infrastructure. Small-scale builders and contractors, often operating outside formal regulatory frameworks, contribute significantly to the construction of residential and commercial buildings ([Farinmade et al., 2018](#)). However, these activities are typically characterised by low-quality construction materials, inadequate safety standards, and a lack of compliance with building regulations. While this sector provides employment opportunities and addresses housing shortages, it also poses risks in terms of structural safety and environmental sustainability.

6.2. Challenges and Opportunities

The grey economy in Nigeria presents both challenges and opportunities. One of the major challenges is the environmental degradation associated with informal sector activities. For instance, informal waste management, though beneficial for waste reduction, often results in environmental pollution due to improper disposal methods, such as open burning and unregulated dumping of waste. These practices contribute to air and water pollution, which can have adverse effects on public health and the environment ([Ayobamiji & Kalmaz, 2020](#)). Similarly, informal construction activities can lead to land degradation, deforestation, and unsustainable use of natural resources, further exacerbating environmental challenges.

Despite these challenges, the grey economy offers substantial economic benefits, particularly in terms of job creation and poverty alleviation. The sector provides a safety net for many Nigerians who might otherwise be unemployed, offering flexible work arrangements that do not require formal education or training. Informal businesses often serve as a breeding ground for entrepreneurship, with many small-scale traders and artisans gradually scaling their operations into more formal enterprises ([Igwe et al., 2020](#)). The sector also contributes to economic resilience by enabling communities to adapt to economic shocks and providing a buffer during times of economic downturn.

Integrating sustainability into the Grey Economy presents an opportunity to maximise its economic benefits while minimising its environmental impact. By formalising informal sector activities, the government can enhance productivity, improve working conditions, and increase tax revenues. This process, however, requires a delicate balance, as over-regulation could stifle the entrepreneurial spirit that drives the informal sector ([Omodero, 2020](#)). Therefore, a nuanced approach is needed to ensure that efforts to formalise the sector do not inadvertently push people into unemployment or deeper poverty.

6.3. Strategies for Integrating Sustainability

To address the challenges associated with Nigeria's grey economy while harnessing its potential, several strategies can be implemented to promote sustainability. One of the primary strategies is the formalisation of informal sector activities. This can be achieved by simplifying the process of business registration, providing incentives such as access to microfinance, and implementing supportive policies that encourage informal businesses to transition into the formal economy. Formalisation not only increases government revenue through taxation but also improves access to social protections for workers, such as health insurance and retirement benefits ([Osiki, 2020](#)). Formalising the waste management sector can enhance waste collection efficiency, promote recycling, and reduce environmental pollution.

Another strategy involves promoting sustainable urban planning to accommodate the growing informal sector. Urban areas in Nigeria are experiencing rapid population growth, leading to increased pressure on infrastructure and resources. Integrating the grey economy into urban planning can help in the design of inclusive cities that accommodate informal businesses while promoting sustainable development ([Abubakar & Dano, 2017](#)). This includes creating designated spaces for street vendors, supporting small-scale waste management enterprises, and ensuring that informal housing developments comply with safety and environmental standards. Sustainable urban planning can also mitigate the negative environmental impacts of informal construction activities by promoting the use of eco-friendly building materials and energy-efficient designs.

Public-private partnerships (PPPs) can also play a crucial role in integrating sustainability within Nigeria's grey economy. By collaborating with private sector entities, the government can leverage resources and expertise to support informal sector development. For instance, partnerships with recycling companies can formalise the waste management sector, improve the livelihoods of informal waste pickers, and promote a circular economy ([Ezeudu et al., 2021](#)). Similarly, collaborations with construction firms can enhance the quality of informal construction projects, ensuring that they meet safety and environmental standards.

Capacity building and awareness campaigns are essential for promoting sustainability in the grey economy. Educating informal sector workers on sustainable practices, such as waste segregation, recycling, and eco-friendly construction techniques, can help reduce the environmental impact of their activities. Providing training and technical assistance can also enhance productivity and enable informal businesses to grow sustainably ([Babajide et al., 2021](#)). Furthermore, promoting green entrepreneurship by supporting informal sector enterprises that focus on environmental solutions can stimulate innovation and drive the transition towards a more sustainable economy.

7. Comparative Analysis of Blue, Green, and Grey Economies

The Blue, Green, and Gray economies represent distinct yet interconnected approaches to economic development, each emphasizing different aspects of sustainability and resource management. In the context of Nigeria, these three economic models offer unique opportunities and challenges, especially as the country seeks to achieve its Sustainable Development Goals (SDGs). Understanding the synergies, overlaps, and conflicts among these models is essential for developing a comprehensive strategy that can drive sustainable growth, reduce poverty, and enhance environmental stewardship ([Modibbo et al., 2020](#)).

The Blue Economy focuses on sustainable use of ocean and marine resources, including fisheries, aquaculture, coastal tourism, and maritime transport. In Nigeria, this sector is particularly relevant given the country's extensive coastline along the Gulf of Guinea, which is rich in marine biodiversity and resources ([Oladele et al., 2018](#)). The Green economy, on the other hand, emphasizes sustainability on land, particularly in sectors like agriculture, forestry, renewable energy, and sustainable land management. Nigeria's vast agricultural lands

and diverse ecosystems make the green economy a critical area for promoting food security, energy sustainability, and climate resilience ([Olayide, 2021](#)). The Grey economy, which encompasses the informal sector, plays a significant role in Nigeria's economic landscape. It includes activities that are not fully regulated, such as informal construction, waste management, and recycling, providing livelihoods for millions of Nigerians ([Etim & Daramola, 2020](#)).

Synergies among the Blue, Green, and Grey economies can create a comprehensive approach to sustainable development. For instance, integrating sustainable practices in marine and coastal management (Blue Economy) with land-based environmental initiatives (Green Economy) can enhance ecosystem resilience and biodiversity conservation ([Ogbonna, 2022](#)). Coastal mangroves, which are critical for both marine and terrestrial ecosystems, can serve as a point of intersection where blue and green economic strategies align. Additionally, the Grey Economy's role in waste management and recycling can support the circular principles needed for both Blue and Green economies, reducing environmental pollution and promoting resource efficiency ([Mbah et al., 2019](#)).

However, overlaps and conflicts between these economies can pose challenges. For example, the expansion of coastal tourism (a Blue Economy initiative) may conflict with efforts to preserve coastal ecosystems, which are vital for the Green Economy's biodiversity goals. Similarly, the informal activities in the Grey Economy, such as unregulated fishing or sand mining, may undermine the sustainability targets of the Blue Economy. Addressing these conflicts requires a robust governance framework that aligns policies and regulations across sectors to ensure that economic activities do not compromise environmental sustainability ([Nzeadibe & Mbah, 2015](#)). This alignment is crucial for balancing economic growth with the protection of natural resources, especially in a country like Nigeria where regulatory enforcement is often weak.

The integration of blue, green, and grey economic principles is essential for Nigeria to achieve its SDGs, particularly those related to poverty reduction (SDG 1), zero hunger (SDG 2), clean water and sanitation (SDG 6), sustainable cities and communities (SDG 11), and climate action (SDG 13). Promoting sustainable fishing practices can contribute to food security and poverty alleviation while protecting marine ecosystems. Similarly, expanding renewable energy projects under the Green Economy framework can support affordable and clean energy access (SDG 7), reducing Nigeria's dependence on fossil fuels and decreasing greenhouse gas emissions ([Adewuyi, 2020](#)). The Grey Economy, with its focus on informal employment and resource recovery, can be instrumental in achieving decent work and economic growth (SDG 8) and responsible consumption and production (SDG 12). Formalizing the informal sector, improving working conditions, and integrating sustainable practices can enhance the sector's contribution to inclusive and sustainable economic growth ([Echendu, 2020](#)).

One of the most promising strategies for integrating these three economic models is through the adoption of a circular economy approach. A circular economy focuses on reducing waste, reusing materials, and recycling resources to create a closed-loop system that minimizes environmental impacts. This model can bridge the principles of blue, green, and grey economies by promoting resource efficiency across different sectors. For example, waste materials from agricultural processes (Green Economy) can be repurposed for energy production or as raw materials for other industries, aligning with the Grey Economy's recycling initiatives. In coastal areas, circular principles can be applied to manage plastic waste, protect marine biodiversity, and promote eco-friendly tourism, thus integrating Blue and Grey economic strategies ([Kehinde et al., 2020](#)).

The potential for a circular economy model in Nigeria is significant, given the country's resource-rich environment and the need to transition toward more sustainable development pathways. By adopting circular economy practices, Nigeria can reduce its environmental footprint, create new economic opportunities, and enhance resilience to external shocks such as climate change and global market fluctuations. For instance, developing a circular economy in the construction sector can minimize waste and improve the sustainability of building materials, benefiting both the green and gray economies ([Ogunsanwo & Ayo-Balogun, 2020](#)). Similarly, integrating circular principles in the fisheries and aquaculture sectors can enhance the sustainability of marine resources, contributing to the goals of the Blue Economy.

Despite the potential benefits, several challenges must be addressed to realize the integration of these economic models in Nigeria. Key challenges include weak policy coordination, lack of investment in sustainable infrastructure, and limited awareness of circular economy principles. Overcoming these barriers requires

targeted policy interventions, capacity building, and fostering partnerships between government, private sector, and civil society. Effective implementation of integrated strategies will also depend on improving data collection and monitoring to assess progress towards sustainability targets, which is currently a significant gap in Nigeria's economic planning processes ([Ogunsanwo & Ayo-Balogun, 2020](#)).

8. Case Studies of Successful Implementation

The exploration of successful implementations of Blue, Green, and Grey economies in various regions around the world can provide valuable insights for Nigeria. Understanding these global and regional case studies offers lessons that can be adapted to Nigeria's unique socio-economic and environmental context.

One notable case study in the realm of the Blue Economy is that of the Seychelles. The Seychelles government has effectively leveraged its marine resources through innovative approaches such as the Blue Bond initiative, which focuses on sustainable fisheries and marine conservation. By issuing a Blue Bond, the Seychelles secured funding for sustainable fisheries, enabling the country to invest in projects that reduce overfishing and protect marine biodiversity ([Christ et al., 2020](#)). This model demonstrates how financial instruments can be used to support the sustainable use of marine resources, an approach that Nigeria could explore given its rich coastal and marine environment. The successful implementation of such an initiative in Nigeria could bolster its fisheries sector, promote sustainable aquaculture, and enhance marine conservation efforts, contributing to food security and economic growth in coastal communities.

In the area of the green economy, Costa Rica stands out as a leader in promoting sustainability. The country has achieved significant success in reforestation, renewable energy, and eco-tourism. Costa Rica's Payment for Environmental Services (PES) program incentivizes landowners to preserve forests, thereby enhancing biodiversity and combating climate change ([Brownson et al., 2020](#)). The country has invested heavily in renewable energy, achieving nearly 100% reliance on renewable sources—primarily hydroelectric, geothermal, and wind power. For Nigeria, emulating Costa Rica's approach to eco-friendly energy and land management could help address deforestation, promote sustainable agriculture, and increase the share of renewables in its energy mix. The lessons from Costa Rica's commitment to sustainability can guide Nigeria in formulating policies that support green infrastructure and eco-friendly practices, especially in the agricultural and energy sectors.

The grey economy, particularly the informal sector, plays a crucial role in many developing economies. One exemplary case is that of Brazil's waste management and recycling programs. In Brazil, informal waste pickers (known as "catadores") have been integrated into formal waste management systems, significantly improving waste collection and recycling rates. This integration has been facilitated by policies that recognise the contribution of waste pickers, provide social protection, and promote the establishment of cooperatives ([Miranda et al., 2020](#)). The success of Brazil's approach underscores the potential benefits of formalizing Nigeria's informal waste management sector. By adopting similar strategies, Nigeria can improve waste management, enhance recycling rates, and reduce environmental degradation while also providing better livelihoods for those engaged in the informal sector.

Another case that holds relevance for Nigeria is South Africa's integration of sustainability in its construction and urban planning sectors. The country has made strides in promoting green buildings and sustainable urban development through policies that mandate energy efficiency and resource conservation in new construction. The Green Building Council of South Africa has played a pivotal role in certifying green buildings, which have been shown to reduce energy consumption, water usage, and waste production ([Moghayedi et al., 2022](#)). Applying similar principles in Nigeria could support sustainable urbanization, especially in rapidly growing cities like Lagos and Abuja. By adopting green construction practices, Nigeria can mitigate the environmental impact of urban growth, improve energy efficiency, and contribute to the reduction of carbon emissions.

Lessons learned from this global case study emphasize the importance of strong policy frameworks, public-private partnerships, and community engagement in achieving sustainability. For Nigeria, the challenge lies in adapting these strategies to its local context, which includes unique socio-economic conditions, regulatory environments, and resource constraints. Effective adaptation would require a focus on capacity building, awareness creation, and financial investment in sustainable projects ([Okon et al., 2021](#)).

Incorporating successful strategies from these case studies can also aid Nigeria in achieving its Sustainable Development Goals (SDGs). The integration of blue, green, and grey economic strategies can contribute to goals related to poverty reduction, sustainable cities, climate action, and responsible consumption ([Khoshnava et al., 2019](#)). The case studies highlight that with the right mix of policies, investment, and community involvement, it is possible to transition to more sustainable economic models that not only protect the environment but also promote social and economic well-being.

Adopting these successful practices would require Nigeria to overcome several challenges, including policy implementation gaps, a lack of infrastructure, and limited access to green finance. However, the examples of the Seychelles, Costa Rica, Brazil, and South Africa demonstrate that with a clear vision, strategic partnerships, and a commitment to sustainability, significant progress can be made. By learning from these models, Nigeria has the opportunity to craft its own path toward sustainable economic growth, leveraging the potential of its Blue, Green, and Grey economies.

9. Policy and Regulatory Framework

The Nigerian government has made significant strides in developing policies that support the Blue, Green, and Grey economies. However, the effectiveness of these policies varies across sectors, with notable gaps that need to be addressed to foster a more sustainable economic future.

In the realm of the Blue economy, Nigeria has initiated several policies aimed at harnessing its coastal and marine resources. The National Policy on the Environment and the Nigerian Maritime Administration and Safety Agency (NIMASA) regulations focus on sustainable maritime practices, marine pollution control, and the management of coastal ecosystems ([Osuji & Agbakwuru, 2022](#)). The Blue Economy initiatives under the Ministry of Transportation are geared toward promoting sustainable fisheries, aquaculture, and maritime trade. However, despite these efforts, challenges such as illegal fishing, overexploitation of marine resources, and inadequate enforcement of marine conservation laws persist. The lack of a comprehensive Blue Economy strategy limits Nigeria's ability to maximize the benefits of its vast coastal resources ([Adepoju et al., 2023](#)). To address these gaps, there is a need for a cohesive national framework that integrates coastal management, maritime security, and sustainable fisheries. Strengthening maritime law enforcement and investing in marine research and data collection could also enhance the sustainable use of marine resources.

The green economy in Nigeria is supported by several policies focusing on environmental protection, sustainable agriculture, and renewable energy. The National Renewable Energy and Energy Efficiency Policy (NREEEP) aims to diversify the energy mix by promoting renewable sources like solar, wind, and hydropower ([Adetiloye et al., 2021](#)). Additionally, the Nigerian Agricultural Promotion Policy (APP) emphasizes sustainable agricultural practices, while the National Forest Policy targets reforestation and biodiversity conservation. Despite these policy frameworks, Nigeria faces significant challenges in implementation due to inadequate infrastructure, limited funding, and weak regulatory enforcement ([Babu et al., 2018](#)). The country's reliance on fossil fuels continues to hamper progress toward a green transition. To overcome these barriers, there is a need for stronger regulatory mechanisms, enhanced financial incentives for renewable energy projects, and increased investment in sustainable agricultural technologies. Furthermore, promoting green finance through public-private partnerships can help mobilize the resources needed to support eco-friendly initiatives.

The Grey Economy, which encompasses Nigeria's vast informal sector, presents unique regulatory challenges. Informal economic activities such as waste management, recycling, and small-scale construction are often overlooked in national policies. The National Waste Management Policy provides some guidelines for sustainable waste disposal and recycling, but enforcement remains weak, especially in urban areas ([Ogunmakinde et al., 2019](#)). Informal waste pickers play a critical role in recycling but often operate without legal recognition or social protection. To better integrate the Grey Economy into sustainable development, Nigeria could consider formalizing informal sector activities through supportive legislation and capacity-building programs. This could involve providing incentives for informal businesses to register, access credit facilities, and adopt sustainable practices. Urban planning policies should incorporate sustainable construction guidelines to reduce environmental degradation caused by informal building activities.

A critical review of the current regulatory frameworks reveals several gaps that hinder the effective implementation of blue, green, and grey economic initiatives. One major issue is the lack of coordination among government agencies, which leads to overlapping mandates and inefficiencies. For example, environmental policies are managed by multiple agencies, including the Federal Ministry of Environment, NIMASA, and the National Environmental Standards and Regulations Enforcement Agency (NESREA), often resulting in fragmented enforcement ([Haladu & Bin-Nashwan, 2021](#)). To address these issues, Nigeria needs to adopt an integrated policy approach that aligns the objectives of different sectors under a unified sustainable development agenda. This could be achieved through the establishment of an interministerial task force dedicated to the implementation of Blue, Green, and Grey economic strategies.

Collaboration between the government, non-governmental organizations (NGOs), and the private sector is essential for the successful implementation of sustainable economic policies. NGOs play a significant role in advocacy, capacity building, and community engagement, particularly in promoting environmental awareness and conservation. The private sector, on the other hand, can drive innovation and investment in sustainable technologies ([Idemudia, 2016](#)). For instance, companies in the renewable energy sector can benefit from government incentives and partnerships with international organizations to scale up clean energy projects. Strengthening the regulatory framework to encourage corporate social responsibility (CSR) and sustainable business practices can further enhance private sector contributions to the Blue, Green, and Grey economies.

To bridge the policy gaps, Nigeria could also benefit from learning from international best practices. Countries like South Africa and Kenya have successfully integrated sustainability into their economic policies through comprehensive legal frameworks and multi-stakeholder collaborations. By adopting similar strategies, Nigeria can improve its regulatory environment to support sustainable development. Recommendations for improvement include the establishment of clear policy guidelines for each sector, the promotion of green finance initiatives, and the introduction of monitoring and evaluation mechanisms to track the progress of sustainable economic projects.

10. Challenges to Implementation in Nigeria

Economically, Nigeria relies significantly on oil revenue, which has led to an overdependence on fossil fuels, limiting diversification into more sustainable sectors, such as agriculture, renewable energy, and marine resources. This dependency restricts investments in alternative energy, impedes green industry growth, and maintains a volatile economic structure heavily impacted by fluctuating oil prices ([Anyachie & Areji, 2015](#)). The fossil fuel sector's dominance continues to influence economic policies, overshadowing investment in essential infrastructure like renewable energy, green technologies, and waste management facilities that are crucial to a sustainable economy.

Socially, a lack of awareness and understanding of sustainable economic principles among the Nigerian populace hampers progress. Many Nigerians view sectors such as agriculture, fishing, and waste management traditionally, not recognizing their potential for environmental and economic sustainability ([Ezeudu & Ezeudu, 2019](#)). For example, practices like recycling, eco-tourism, and sustainable fishing are not widely embraced due to limited public education on their benefits. Nigeria's extensive informal sector, which operates largely outside the formal economy, is less regulated and remains unintegrated into formal sustainable practices. The lack of public education, environmental awareness, and formal regulations in this sector stifles the adoption of sustainable practices and technologies, as many workers remain unaware of their advantages.

Politically, corruption and weak governance structures challenge Nigeria's efforts to develop Blue, Green, and Grey economies. Corruption, widespread in government, affects the allocation of resources meant for environmental protection and sustainability projects. Funds earmarked for renewable energy, waste management, and coastal protection projects often fall prey to mismanagement or diversion ([Jacob & Umoh, 2017](#)). Furthermore, political instability and frequent leadership changes disrupt policy continuity, resulting in delays or even reversals in sustainable development progress. When political leaders prioritize short-term economic benefits from the oil industry, environmental sustainability initiatives lose prominence and support. Poor coordination between Nigeria's federal, state, and local governments further complicates policy implementation. Policies supporting sustainable economic models often lack local enforcement, creating inconsistencies across regions with varying infrastructure and awareness levels. Rural areas, in particular,

struggle with limited infrastructure and lower policy awareness, resulting in policies that are more effective in urban centers being difficult to replicate in these regions.

Nigeria's infrastructure deficit poses a considerable barrier to sustainable economic transformation. Limited access to reliable electricity hampers green industry growth, such as solar and wind energy, and obstructs the adoption of eco-friendly technology (Jacob & Umoh, 2022). Inadequate transportation networks and maritime facilities limit Nigeria's Blue Economy potential, especially in the fishing and maritime transport industries (Jacob et al., 2022). Waste management remains a critical issue, as urban centers struggle with growing waste volumes and insufficient recycling or waste-to-energy facilities. Without substantial investments in sustainable infrastructure, these economic sectors will continue to lag behind. Climate change significantly impacts the viability of the Blue, Green, and Grey economies in Nigeria. Vulnerable to climate effects like rising sea levels, extreme weather, and water scarcity, Nigeria's agriculture, fisheries, and coastal areas face threats that destabilize food security and community livelihoods. Informal sectors like waste management and construction are equally susceptible to environmental degradation and natural disasters but often lack the resources for climate adaptation, leaving workers and businesses exposed.

11. Strategic Recommendations for a Sustainable Economic Transition

Nigeria's transition to a sustainable economy requires a strategic framework that integrates the principles of the blue, green, and grey economies. This approach aims to address existing economic and environmental challenges while promoting inclusive growth and long-term resilience, in line with Nigeria's Vision 2050, which focuses on achieving diversified, sustainable, and inclusive development.

First, Nigeria should develop a cohesive national policy that supports the integration of blue, green, and grey economies. This policy should harmonize sector-specific strategies, emphasizing sustainable management of marine resources, renewable energy, sustainable agriculture, and waste management. For the blue economy, the government can implement regulatory frameworks that support sustainable fishing, coastal protection, and investment in blue energy sources like offshore wind. Meanwhile, incentivizing businesses to adopt renewable energy and sustainable waste management can stimulate the green and grey economies. Strengthening environmental laws and ensuring compliance are crucial for sustainable resource utilization. To advance the green economy, Nigeria should prioritize renewable energy and sustainable land use. Investments in solar, wind, and biomass projects, particularly in rural areas, can reduce fossil fuel dependence, lower emissions, and create green jobs. Policies that promote organic farming, soil conservation, and agroforestry can boost food security and climate resilience. Green finance initiatives, like green bonds, can attract private investments for sustainable projects, supported by public-private partnerships.

For the grey economy, which includes informal activities like waste recycling, the government should formalize this sector to improve economic resilience. This can be achieved through microcredit schemes, training programs, and sustainable urban planning. Encouraging waste-to-energy projects and recycling initiatives can reduce environmental degradation while generating jobs.

A multi-sectoral approach aligned with the Sustainable Development Goals (SDGs) is essential for Nigeria's sustainable economic transition. Strengthening institutional capacities and leveraging digital technologies for data monitoring can improve policy implementation and resource allocation. Public awareness campaigns and environmental education should promote sustainable practices across communities. Achieving Vision 2050 involves setting clear targets and action plans for transitioning to a sustainable economy, focusing on sectors like agriculture, fisheries, and renewable energy. Establishing a national task force to coordinate efforts across government levels can ensure effective policy execution. Collaboration with international partners, like the African Development Bank, can provide technical expertise and funding to support sustainable initiatives.

12. Conclusion

This review has examined the transformative potential of Blue, Green, and Grey economies as sustainable development models for Nigeria. By leveraging untapped resources, Nigeria can achieve sustainable growth if these models are strategically managed. The Blue Economy focuses on sustainable marine resource use, offering avenues for diversification through fisheries, aquaculture, maritime transport, and eco-tourism. The Green Economy provides a framework for sustainable land management, renewable energy, and eco-friendly

agriculture, which are critical for climate change mitigation, food security, and rural development. Meanwhile, the Grey Economy, typically informal and associated with environmental challenges, holds potential for economic inclusion, especially in waste management and recycling sectors. However, several barriers impede progress, including policy gaps, weak governance, inadequate infrastructure, and limited financing. The lack of public awareness and stakeholder engagement also hinders effective implementation of sustainability initiatives. Overcoming these challenges is essential to fully harnessing the Blue, Green, and Grey economies' potential. From a policy standpoint, an integrated approach aligning economic development with sustainability is needed. Policymakers should develop comprehensive frameworks for sustainable resource management, incentivize green technology investments, and formalize informal sector activities. Strengthening regulations and encouraging private sector involvement can accelerate Nigeria's transition to a sustainable economy. Public-private partnerships and international collaborations are vital for scaling successful projects and attracting foreign investment. Practically, Nigeria should utilize its natural resources, demographic advantages, and technological advancements to build a resilient economy. Promoting renewable energy, sustainable agriculture, and waste-to-energy projects can drive diversification and job creation. Sustainable tourism and responsible fishing can boost the Blue Economy, while integrating sustainability into urban planning can mitigate environmental degradation. Future research should explore innovative financing like green bonds and assess the socio-economic impacts of these economic models in different Nigerian regions. Embracing Blue, Green, and Grey economies will enable Nigeria to align with global sustainability goals, achieve economic resilience, and set a benchmark for sustainable development in Africa.

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