FROM OCEAN TO ECONOMY: A REVIEW ON GROSS MARINE PRODUCTION IN RELATION TO THE GROSS DOMESTIC PRODUCT

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Abstract

The study aims to analyses the impact of gross marine production in relation to the gross domestic product, focusing on the economic contributions of marine industries, sustainability challenges, and integration of environmental metrics into economic analysis. Based on previous literature and reports of 2023-2024, the study has calculated the GMP, and formulization has been done. The evaluation method used at the initial stage consisted of screening titles and abstracts. The research unveiled that gross marine production contributes to the national GDPs appreciably, especially for countries located in coastal or sea line areas. However, sustainable management is also important so that economic development can occur and the physical environment is not destroyed. Marine industries can only be fitted into these broader economic development frameworks for long-term gains while tackling ecological questions. The study has recommended that the government encourage and support environmentally responsible marine activities, support the development of new marine technologies and industries, and enhance the coherence of regulatory systems.

Keywords: Gross Marine Production, Gross Domestic Product, Ocean, Economy, Sustainability

INTRODUCTION

The global economy is a dynamic, interconnected system in which different sectors contribute to national and international economic growth. Gross Domestic Product (GDP) has long been a cornerstone for measuring a country's economic performance. Gross Domestic Product reflects the net output of the economic activities within a territory during a given time and illustrates economic health (Li, 2023). This means that it supplies a holistic overview of how good or bad the economy of a particular country is performing, affecting the policy-making processes, trading activities, investments, and even the world's estimated economic potential for the near future. Nevertheless, as the global community becomes more conscious of the environment and sustainable living, new and more sophisticated economic indicators are being created suited to particular segments of the economy, particularly those in the natural resource sector (Nham, 2023). Gross Marine Production (GMP) is one indicator that encapsulates the utilitarian value of marine and coastal biosphere. The significance of GMP is rising because of the steadily rising dependence on marine products and services in the areas of food, transportation, tourism, and energy and the need to resolve some of the global issues such as overfishing and pollution as well as climate change (Hatta et al., 2023).

It is stated that the measure that is used most frequently when it comes to the evaluation of the performance of an economy of a particular country is the gross domestic product, or GDP, for short. It calculates the economic value of all the finished goods and services produced in a certain country within a given period, usually a quarter or a year.

GDP can be calculated using three main approaches: The production approach, the income

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approach, and the expenditure approach (Ahammed et al., 2024). Gross Marine Production (GMP) is relatively newer in concept than GDP and pertains solely to industries with operational connections to the sea. GMP comprises associated industries like fisheries, coast tourism, sea transportation, marine biotechnology, and ocean-generated power like offshore wind and tidal electric power. Similar to what we saw in GDP, GMP can be computed based on the production, income, and expenditure methods. However, in this case, GMP specifically relates to economic activities in marine ecosystems (Phang et al., 2023).

Marine industries' value chain for the production of GMP analyses the value added at various stages of production. For example, the contribution of the fishing industry to GMP can be given by the total sales of fish rest to realize the total revenue minus the value of inputs such as fishing gears and fuel (Fernández-Palacios et al., 2023). Adding up wages, profit, and rent generated by industries related to sea and water, including fishermen, shipping companies, and coastal hotels, form the income approach. The expenditure approach covers the purchases of marine-related products and services, marine construction spending, spending on marine conservation and protection by the government, and the marine product trade, which comprises seafood exports and imports (Islam et al., 2024).

The GMP is one of the best markers indicating the growth of nations with long shorelines or natural resources of marine origin. For example, Japan, Norway, and some Caribbean nations depend on marine sectors to develop their economy and the job market. Nevertheless, GMP also exposed the conflict between growth and development and sustainable development. These challenges include unsustainable fishing activities, losses of coastal structure, marine pollution, and impacts of climate change, which can be detrimental to GMP's future growth and development (Gudka et al., 2023).

However, the evaluation of GMP faces the major problem of determining the monetary values of Marine ecosystems. Comparing industries like fisheries to tourism or shipping fleets for which value can be measured in traditional economic terms is easier, although other industries, such as ecosystem services like carbon sequestration by the oceans, take on a different set of valuation approaches (Phang et al., 2023). Also, external costs like pollution and overfishing are typically excluded from mainstream economic analysis of the marine sectors, thus giving an erroneous impression of the long-term sustainability of marine sectors. Another major threat that affects GMP is climate change, as Hossain et al. (2024) described. The increasing sea levels, the ability of the Ocean to absorb CO2, and rising temperatures affect the lives of marine organisms, fish, and structures within the coastal regions. Again, the economic costs and implications of these environmental changes are sometimes not fully factored into GDP or GMP totals, which means that the associated policies often seek immediate economic returns and benefits that do not consider the long-term hazards (Gudka et al., 2023).

The rationale for focusing on the relationship between GMP and GDP lies in the increasing recognition of the oceans' role in global economic systems and the growing need for sustainable development practices. As populations grow and demand for natural resources increases, there is a pressing need to understand better how marine sectors contribute to GDP and how they can be managed sustainably to ensure long-term economic viability (Li, 2023).

Fisheries, shipping enterprises, and coastal tourism directly on their own and through their effects on other industries, including food security, trade, and renewable energy (Nham, 2023). However, these industries are also sensitive to environmental degradation, depletion of resources, and climate change. Studying GMP reveals these issues' economic consequences and shows how to reduce their effects with improved government and sustainability (Hossain et al., 2024).

Moreover, as the world transitions from a gross global economy to a sustainable and inclusive

one, GDP cannot go unaccompanied by an instrument such as GMP, which quantifies the worth of natural resources and products. This research will assist in formulating policies that will promote sustainable economic return and sustainable use of marine resources to benefit future generations economically, socially, and ecologically (Islam et al., 2024).

METHODOLOGY

The methodology of this systematic literature review involves several structured steps to ensure a comprehensive and unbiased exploration of relevant literature on Gross Marine Production (GMP) and Gross Domestic Product (GDP). Based on previous literature and reports of 2023-2024, the study has calculated the GMP, and formulization has been done. Keywords such as "Gross Marine Production," "GDP and marine industries," "marine economy," "sustainability in marine resources," and "economic impact of marine sectors" were used (Butt et al., 2024). Titles and abstracts were initially screened for relevance. Full texts were retrieved for further examination if they met the inclusion criteria. The findings were categorized based on the relationship between GMP and GDP and the sustainability challenges.

LITERATURE REVIEW

Concept of Gross Marine Production (GMP)

Gross marine production (GMP) is the total potential economic return of the sustainable utilization of marine and coastal resources. This involves fisheries, aquaculture, shipping industries, beach and ocean tourism, drilling and generation of energy onshore and sea, and using products from marine organisms in the biotechnology industry (Li, 2023). It is an index of what these industries have contributed to a nation's economy and oceans' central role in the overall development of the world and regions. Therefore, GMP tends to single-handedly capture how optimally a given country or a geographical region taps into its marine resources to generate income (Jana, 2023).

GMP, divided into several components, is the primary sector of the blue economy based on the principles of sustainable usage of marine resources for economic development in the long run without the deterioration of the aquatic environment. Some key players include fisheries and aquaculture, whose contribution is significant as they play a major role in providing food to the world (Hatta et al., 2023). Eco-friendly fishing techniques and the proper rearing of fish should be conducted for the continued existence and supply of fish foods to humanity and for conserving the Ocean's natural resources. This sector remains open for development through the implementation of quotas and closed seasons, but our oceans will also be protected for future generations.

Importance of GMP in the Global Economy

According to research, GMP plays an essential role in the global and sustainable economy, especially within the context of the blue economy. Being a measure of the total economically retrievable value of marine resources, GMP embraces sectors such as fishery, aquaculture, maritime shipping, marine tourism, oil and gas, and marine biotechnology. These industries serve as sources of income, sectors for production and gross domestic product, and food security in different countries, mainly coastal and island countries (Fernández-Palacios et al., 2023). However, the real value of GMP is in its contribution to the sustainable growth of the economy, particularly in the sustainable exploitation of natural resources, mainly marine resources, within the limits of the blue economy (Mohsin et al., 2024).

Despite that, the food issue is one of the critical issues affecting the world, and GMP solves it.

Fisheries and aquaculture are food sources for billions of individuals around the globe, especially as they pertain to protein sources. Maritime products are vital to food security and income in most developing countries. To ensure that they are sustained for the maximal dependency by the generations to come, GMP supports the Blue Economy policies of sustainable fishing and responsible aquaculture (Jeevitha et al., 2023).

Concept of Gross Domestic Production (GDP)

Gross Domestic Product (GDP) is one of the most straightforward economic concepts. It refers to the total value of all the goods and services produced in a country in a given time, primarily fiscal year or a financial quarter. It measures the flow of money and the economic well-being of a nation. It includes most sectors of the economy, like farming and production, trade and services, and even minerals. GDP considers both the onshore and offshore industries, demonstrating a variety of production activities of a nation's economy (Ahammed et al., 2024).

Similarly, GDP refers to the total value of the final output of a country, which is the total value of all final goods and services produced for consumption, investment, and government and net exports. It is also used as an aggregate measure of a country's economic production and whether the economy is expanding or shrinking. A higher GDP implies sound economic activities, higher output, per-capita income, and a better quality of life. In contrast, a declining GDP implies a sick economy and all the symptoms of the ailing economy, like low demand and output (Hossain et al., 2024).

Whereas GDP tends to focus on industries operating on land, such as manufacturing, agriculture, and service, the marine industry is vital to many countries' economies. Fishing and aquaculture, shipping and other marine transport, marine tourism, and marine-derived energy production, including oil, gas, and renewable energy, are components of the GDP, especially in these nations whose economies are highly dependent on seafood, shipping, tourism, and offshore energy (Adepoju et al., 2023). For instance, in sealine economies such as those in the African continent, the fisheries and sea tourism industries contribute mainly to the economy in gross domestic product. The blue economy that advocates for the sustainable use of the Ocean also supports the need to consider the marine sectors in the GDP computation as this way, people in the sectors will have an opportunity to take advantage of the resources in the Ocean without having to harm or destroy the Ocean in the long run (Ahammed et al., 2024). Overall, GDP is the total costs of all final goods and services produced in a country, including the terrestrial and marine industry, and gives an overall picture of a country's economic health (Hossain et al., 2024).

Components of GDP

GDP is one of the most important indicators that reflect the performance of a country's economy. It is comprised of several main sectors. First, consumption is the most significant share of GDP and shows how much money people spend on different things, such as food, medicine, traveling, etc. This latter involves spending, which stimulates the economy due to the development of demand for produce (Phang et al., 2023). Likewise, investment refers to purchasing capital assets, including machinery, infrastructure, and research and development (R&D). Investment also increases productivity by supporting long-term economic growth resulting from increased productivity from infrastructure projects such as transport and energy (Hossain et al., 2024). Public expenditure comprises government spending on education, health, and other amenities. This spending generates employment, calls for different services, and initiates community project development (Martínez-Vázquez et al., 2023). Also, net exports differ in the amount

and quantity of imports within the same country. Moreover, a positive balance on the nation's net exports also increases the GDP, while a negative balance, on the other hand, can decrease it (Gove et al., 2023).

However, marine industries are becoming more critical in implementing a blue economy in the coastal and island nations. These sectors include fishing fleets, fish farms, ocean-going vessels, marine recreation and leisure, and oil and gas (Li, 2023). Fishing and farming of fish and aquatic animals and creatures are significant for food security and job creation. Marine tourism is a source of enormous income since it contributes to income through tourists visiting beaches, thereby supporting the marine economy. Wind and tidal energy both fall under offshore energy production and can be taken as renewable as they are preferred worldwide to control the overuse of fossil fuels (Adepoju et al., 2023).

Considering their contribution to GDP, the increased significance of these marine sectors is essential. There have been increased discussions about the blue economy concept, which seeks to utilize marine resources sustainably. Incorporating these sectors in economic development strategies aims to grow economics and sustainably utilize aquatic ecosystems in coastal and island nations (Hossain et al., 2024).

Importance of GDP in National and Global Contexts

GDP is the most basic and essential parameter of economic activity. It expresses the total value of products and services within a particular state and constitutes the overall economy. Performance is informative in determining the correct direction for economic policy and investment and gaining insight into the nation's growth (Ather et al., 2023). Pakistan's GDP includes many sectors, such as agriculture, manufacturing, and service. In the distant past, sectors such as fisheries and aquaculture, shipping, agriculture, and marine tourism have assumed a more prominent status owing to the blue economy (Mahmood & Ali, 2023).

This movement focuses on the sustainable utilization of ocean resources and incorporating these marine industries into the computation of GDP aid in evaluating the contribution of these sectors and relevant sustainable development (Alam & Azam, 2023). Similarly, GDP is an assessment tool for measuring activity and shaping economic policies in the global arena. The focus of sectors in the blue economy frameworks has increased, showing how valuable those sectors are to the sustainability of international economies. Governments are slowly appreciating the importance of marine resources and the benefits that can be accrued from sustainable exploitation hence incorporating it into their GDP (Butt et al., 2024).

Blue education is established to promote marine science, environmental management, and sustainable development by providing future generations with the knowledge that will enable them to advance and support these sectors (Mahmood & Ali, 2023). Pakistan is the only institution offering specialized marine education, so the need for more frequent education organized to build a competent workforce for the blue economy could not be emphasized enough. The nations, including Pakistan and other states, cannot effectively utilize their marine resources and do not have appropriate human capital for sustainable economic development in the absence of effective blue education (Butt et al., 2024).

The incorporation of marine education enhances the impact of globalization by providing future leaders and professionals with knowledge and skills to manage the existing and emerging challenges in climate change and resource depletion while at the same time preserving and enhancing the marine resources for economic growth and sustenance in the long run (Alam & Azam, 2023).

Comparison of GMP and GDP

Scope of GDP vs. GMP

As for the definitions and the similarities that can be found between Gross Domestic Product (GDP) and Gross Marine Production (GMP), one must consider the fact that both concepts are fundamentally different. GDP is a more comprehensive measure of a country's yearly production capacity. It includes players from all fields, including agriculture, manufacturing, service sector, and construction (ALshubiri, 2018). It works as a general barometer of a country's economic well-being and efficiency in contributing towards the national agenda on growth and development. GDP is an overall picture; it defines the management of resources and workforce throughout sectors of the economy (Fernández-Palacios et al., 2023).

Unlike GMP, the company is principally established for marine and maritime industries such as fisheries, shipping, coastal tourism, and offshore energy. Integrated into the concept of the blue economy, GMP focuses on the rational utilization of the Ocean's potential for economic development, the well-being of people, and the conservation of the environment (Alam & Azam, 2023). While GDP helps understand an economy's performance, GMP helps estimate the potential of the economy that is closely related to marine industries for countries with coastlines and rich resources in the sea (ALshubiri, 2018).

Therefore, the principal difference between GDP and GMP can be said to lie in their economic impact. GDP tends to comprise the overall picture of a nation's financial status, but GMP specifically focuses on marine activities and their effect on the GDP. In countries with long sea frontage and wealth in sea products, GMP assumes a central position in a country's gross income and development (Fernández-Palacios et al., 2023). In this way, by supporting GMP policies, political decision-makers can better coordinate the integration of the marine sectors into the overall economic policy and guarantee the efficient usage of available resources. In other words, GDP embodies total economic activity. In contrast, GMP is concerned with the efficiency of the marine sectors, which are strategic for coastal economies and intends to boost the concept of blue growth (ALshubiri, 2018).

Sectorial Contributions

The contributions of the sectors to GMP and GDP show that marine industries are essential in improving the overall economy, especially for the nations with abundant coastal resources. Blue enterprises are an extensive category of business activities connected with sea and water resources that play an essential role in the blue economy and are becoming significant sources of GDP in many countries (Fernández-Palacios et al., 2023). They offer tangible and substantial product and service value. They are responsible for millions of direct employment, trade balances, and foreign exchange earnings, especially in export-dependent countries, particularly marine products and coastal tourism (Nham, 2023). They are all significant contributors to a country's economy. As global exports expand and the demand for aquaculture products for human consumption and industrial use continues to rise, these two industries will become even more critical to economic development (Alam & Azam, 2023).

While GMP considers only those sectors associated with the marine industry, GDP considers sectors like agriculture, manufacturing, construction, service, and energy production rooted in terrestrials. Most of these land-based industries contribute significantly to the GDP, especially in countries with relatively more developed inland economies. However, with the growing focus on the blue economy, there is an increasing appreciation that marine-based contribution can significantly boost national GDP. Maritime sectors can be part of a coastal nation's economy and help it become more diverse and sustainable by developing offshore wind energy, sustainable fishing, and marine bioscience industries (Li,

2023).

The idea of blue growth, which is a strategy of utilizing the oceans to sustain economic growth for the benefit of the marine ecosystem, is at the core of this endeavor. It reiterates that specific blue education prerequisites must be in place for developing influential marine industries, which leads to GMP development (Jeevitha et al., 2023). This education equips the necessary knowledge and skills to lead, operate, strengthen, and create marine-based industries. Further, there is insufficient human capital to support the blue economy in developing nations like Pakistan. Bahria University is the only institution offering marine education in the country. Thus, without more widespread and specialized 'blue education,' the growth of the human capital required for the advancement and exploitation of 'blue growth' opportunities in Pakistan will be seriously constrained (Zahra et al., 2023).

Blue education is required to produce competent human resources ready to create and sustain the systems that define the use of marine resources and the oceans in general. Without it, measures to scale up GMP and ensure the blue economy as a component of the national GDP remain unachieved, restraining the diversification of the economy and sustainable development of marine sectors (Fernández-Palacios et al., 2023).

Economic Multipliers and Linkages

Shipping, fishing, aquaculture, and coastal tourism are important wealth-creating enterprises that stimulate the growth of technology, employment creation, and development of other supporting sub-sectors. For instance, the marine industry depends on different sectors, such as shipbuilding, ports, and transportation, which create employment opportunities and other economic activities. Likewise, fish and aquaculture help develop marine biotechnology, fish processing, supply chain techniques, and so on, which will likely affect the overall economy (Zahra et al., 2023).

In the blue economy, industries generate multiplier impacts that drive innovations in such products as renewable marine energy, including offshore wind farms, tidal energies, and marine-based biofuels (Nham, 2023). Such renewable energy technologies help reduce the over-reliance on oil resources and, at the same time, encourage investment in other fields like engineering industries, manufacturing industries, and renewable energy industries (Kumar et al., 2024). It establishes broader associations that support the addition to the GDP and the strength of the economy in general. Marine industries create knock-on effects on the associated services and industries onshore, including transport, logistics, and tourism (Jeevitha et al., 2023). Marine-based and land-based industries have the strong connection required by modern economies. For instance, the shipping industry is highly interrelated with intrazonal transport and supply chain systems since the seaborne cargo is delivered through various transport modalities, including road, rail, and air. There is also a demand for hospitality and retail facilities and construction companies, making the benefits multiply (Alam & Azam, 2023).

In addition, the blue economy fosters economic activities such as science and technology, manufacturing of ships, and construction services for the seas, among others, hence benefiting the economy through generating employment and enhancing research in areas such as robotics, environment, and sustainable fishing (Kumar et al., 2024). Such developments enable marine industries to improve performances and support long-term economic revival in affected countries. Finally, the results suggest that marine industries not only contribute to employment and financial value but also facilitate technology development and positive interaction with the non-marine sectors, thus enhancing the role of GMP in GDP and emphasizing the importance of supporting marine industries in the future (Zahra et al., 2023).

Sustainability and Resource Management

Therefore, regarding the resource sustainability of Gross Marine Production and Gross Domestic Product, there is a fundamental distinction in how each measure looks at the sustainable economic future of the country and the relationship between the economy and natural resources (Hatta et al., 2023). The blue economy, which is at the core of GMP, focuses on the efficient use of marine resources for the respective sectors, including fisheries, aquaculture, shipping, and offshore energy, to support the growth of the economy without overexploiting the aquatic resources and the ecosystems that support them. This balance of current consumption of living resources and conservation for future generations serves as the focal point of maintaining the health of the oceans and marine businesses (Kumar et al., 2024).

Ocean resources are limited in the blue economy, necessitating the proper utilization of available resources. Industry collapse is caused by overexploitation, mainly in fishery, and thus, solutions such as sustainable fishing quotas, marine protected areas, and cleaner shipping technologies are applied to preserve the resource (Jeevitha et al., 2023). This guarantees marine sectors can enhance their contribution to GMP and GDP within a knowledgeable and effective setting in replenishing their central assets. Blue growth also indicates more innovations and policies within growth that enhance the economy's growth and conservation of the environment (ALshubiri, 2018).

On the other hand, the conventional GDP perspectives focus on short-term economic improvement even though it endangers environmental intactness. Agricultural, mining, and manufacturing sectors can lead to deforestation, pollution, and resource degradation with long-term ecological impacts. These sectors contribute to the GDP but have difficulties in achieving goals of economic production with simultaneous conservation of resources, hence over-exploitation of resources (Hatta et al., 2023).

The blue economy, therefore, provides a more constructive approach to the problem by coming up with practices that are sustainable for marine habitats while at the same time nurturing economic growth. Strategies including proper fishing management, restricting sea pollution, and moving to green energy through offshore wind and tidal energy do not harm the Ocean as they contribute to GMP (Jeevitha et al., 2023). Therefore, by contrasting GMP and GDP, it is possible to determine the numerous vital factors that concern sustainable resource management. Unlike many conventional industries that still grapple with issues related to growth and sustainability, the blue economy shows the world how economic growth can be viable and sustainable for both economies and the natural environment (Hatta et al., 2023).

Role of GMP in National and Regional Economies within the Blue Economy

Marine-Dependent Economies

In marine-dependent economies, GMP takes a central position in national and regional development, where sectors such as fisheries, shipping, tourism, and offshore energy significantly contribute to the economy (Li, 2023). Coastal and maritime nations with abundant fishing and other marine assets integrate their blue economy policies into their macroeconomic frameworks, aiming to utilize marine resources sustainably and enhance economic growth. Countries like Norway, Indonesia, Seychelles, and New Zealand are the best examples showing how the blue economy can bring wealth and sustainable development (Aanesen et al., 2023).

Marine industries, especially the oil and gas, fishing, and shipping industries, are well-developed in Norway and crucial to the country's economy. The government is a leader in blue economy strategies, moving to renewable marine energy, particularly offshore wind farms (Jana, 2023). Like most of

Norway's policies on the marine environment, current and prospective policies focus on technological advancement and protecting the marine environment to support tremendous contribution to its GDP. This balance between economic development and sustainability demonstrates that GMP's sustainable economic growth can be used for long-term environmental goals (Li, 2023).

Aquaculture and fishery products are essential, especially since Indonesia has an extensive coastline and marine tourism significantly contributes to the country's economy. To control overfishing and coral degradation, Indonesia has embraced blue economy strategies that address sectorial sustainability in the sea. By signing agreements with countries globally, the country mainstreams conservation approaches into its economic frameworks for supporting blue growth and protecting marine life (Aanesen et al., 2023).

Likewise, Seychelles is a small island state that is actively developing the blue economy sector today. Indeed, Seychelles has a scarce amount of land and is therefore very limited in meeting the population's needs; the Ocean is the source of fisheries and tourism (Seth & Tche, 2023). A positive example of this is the blue bonds through which the country has been able to finance sustainable marine projects that will aid the protection of natural aquatic resources while at the same time supporting GMP. This innovative approach guarantees the sustainable future of the marine sector and the economies of the affected countries (Jana, 2023).

Contribution of GMP to Developing Economies

The GMP plays a vital role in emerging economies' development since countries with extensive coastlines and large Exclusive Economic Zones (EEZs) stock can significantly rely on this activity (Jana, 2023). These are mainly the developing nations that have the potential to harness marine resources for their development in fishery, tourism, navigation, and renewable energy resources. Therefore, they can help diversify economies, generate employment, and nurture sustainable growth through their marine resources (Nham, 2023).

Most developing countries, such as Bangladesh, Vietnam, and the Philippines, rely much on fisheries because they are a source of income, adding a substantial portion to the GDP (Islam et al., 2024). By implementing measures including fishing quotas and marine protected areas, these nations can conserve fish stocks for longer and sustainably, thus keeping the coastal communities' income alive while increasing GMP (Nham, 2023).

Challenges Facing Marine-Dependent Economies

Marine-dependent economies are confronted by severe challenges to the sustainability of their GMP due to overfishing, pollution, and climate change. Idle fishing practices due to overfishing can deplete indispensable key species, threatening the livelihood of communities dependent on coastal waters and, in turn, the sustainability of a vital economic contributor (Li, 2023). Countries like Indonesia and Peru are among the most vulnerable, yet blue economy initiatives can secure sustainable fishing by establishing quotas and marine protected areas to rebuild fish populations (Alam & Azam, 2023).

Marine ecosystems are adversely impacted by pollution from plastics and agricultural runoff, decreasing Biodiversity and threatening sectors such as tourism and aquaculture. Thailand and Brazil have high pollution epidemics. The blue economy can address such issues more practically by emphasizing waste management and producing eco-friendly technology (Jana, 2023).

With rising sea levels and ocean acidification, climate change endangers coastal communities and marine industries. Nations such as the Maldives are especially at risk. Blue economy strategies advocate

for climate adaptation through coastal resilience projects and investments. In renewable marine energy. By adopting these sustainable practices, marine-dependent economies can address these challenges and secure long-term growth while protecting their aquatic environments and industries (Alam & Azam, 2023).

Marine Governance and Economic Policies

Marine governance and economic policies are crucial for promoting the Blue Economy and maximizing Gross Marine Production (GMP). Effective governance ensures the sustainable use of marine resources while fostering economic growth in fisheries, shipping, and marine energy sectors. International frameworks like the United Nations Convention on the Law of the Sea (UNCLOS) provide a legal basis for managing marine resources, mainly through the establishment of Exclusive Economic Zones (EEZs), granting countries control over marine assets within 200 nautical miles of their coastlines (Klein, 2023).

National policies complement these frameworks, with countries like Norway, China, and Australia implementing comprehensive marine governance strategies that balance environmental protection with economic growth (Chang, 2023). These policies promote sustainable fisheries, renewable energy, and marine tourism while regulating overfishing, pollution, and climate change impacts. International treaties like the Convention on Biological Diversity (CBD) and regulations from the International Maritime Organization (IMO) further reinforce sustainable marine management (Alam & Azam, 2023).

National blue economy strategies for developing nations are increasingly vital. These strategies integrate marine resources into broader economic plans while prioritizing conservation. Countries like Indonesia and Kenya exemplify this approach by investing in marine industries while protecting ecosystems. Through global and national governance, marine-dependent economies can unlock the full potential of GMP and ensure long-term sustainability (Islam et al., 2024).

Researching GMP and its role in the global economy is crucial due to the increasing reliance on marine resources for food security, renewable energy, and economic growth, particularly for coastal and island nations. The rapid exploitation of marine industries has raised concerns about sustainability, overfishing, pollution, and climate change. By exploring GMP, this research highlights the economic potential of marine industries while emphasizing the need for sustainable practices. Understanding GMP's contribution to national GDP can guide policy development, promote sustainable marine governance, and ensure the long-term viability of marine ecosystems for future economic and environmental stability (Klein, 2023).

Policy Implications

Need for Comprehensive Economic Frameworks

Therefore, it would only be right that GMP and Blue economy indicators are integrated into the national accounts to reckon the value of Ocean and coastal assets. For instance, GDP has consistently excluded the use of marine resources and the availability of ocean resources. This incorporation would give a better perspective of a country's status of development since it would include another factor – the marine factors affecting food security, income, and welfare of the people. (Butt et al., 2024).

Argument for Including GMP and Blue Economy Metrics in National Accounting Systems

Policies that improve the understanding of the role of the marine environment can be achieved by integrating GMP and Blue economy attaches into national accounts. Fish and other marine wildlife serve

as food and recreational, as well as transport facilities, and also help combat climate change by reducing carbon absorption and safeguarding coastal regions that are customarily omitted from GDP calculations. The recognition of GMP assists nations in understanding the economic value of such services better and overcoming the hurdles to making correct decisions and putting the right resources into effective management of the oceans (Hossain et al., 2024).

Holistically, integrating blue economy metrics would also capture cross-linkage of maritime and land-based economic economies to define the sectors that benefit from favorable marine management. Bio-diverse coasts build fish stocks, tourism, and coastal property assets apart from supporting human health and feed security (Adepoju et al., 2023). It is thus essential to note these connections to facilitate the formulation of sound economic policies that will enable sustainable utilization of marine resources, reduction of environmental impacts, and control of climate change (Hossain et al., 2024). Therefore, incorporating GMP and Blue economy metrics into national accounting systems reveals a better approach to understanding what constitutes a nation's economic asset and stock and boosts resource investment in sustainable practices or the conservation of the natural resource base that supports the enhancement of GMP in the long-run (Ather et al., 2023).

Importance of Integrating Blue Education in Fostering Marine Sustainability and Innovation

Incorporating Blue Education into policies plays a central role in shaping a generation capable of raising awareness of marine conservation and developing a sustainable blue economy. Blue Education integrates ocean literacy/marine science and sustainable development in schools, workplaces, and communities. It seeks to develop the knowledge, skills, and attitudes required for individuals and companies to appreciate and protect the ocean environment (Butt et al., 2024).

This way, Blue Education aims to create human capital for the sustainable and responsible use of seas and oceans in fisheries, management of marine renewable energy, and development of ecological tourism or modern aquaculture. It also supports future generations of leaders and business people who can create and develop, given the problems associated with environmental pollution, global climate change, and resource depletion. In particular, such knowledge can positively contribute to the creation of new technologies regarding further reduction of marine pollution, better habitat rehabilitation, and optimization of the carbon sequestration process in the context of Blue Education (Alam & Azam, 2023).

Sustainable Economic Growth Strategies

Managing blue economy strategies for promoting sustainable economic growth entails harnessing economic development without affecting its negative impact on marine habitats. These strategies seek to embrace the sustainable use of resources in the aquatic subsectors and encourage the application of innovation and education to create a workforce for sustainable development. These strategies include increasing the number and scale of blue education, developing and improving resource-efficient products and services, boosting the capacity of marine industries, and implementing and developing friendly blue policy systems (Ather et al., 2023).

Expanding Blue Education Programs

Blue Education plays a central role in promoting sustainable economic growth within the blue economy by preparing future professionals with the knowledge and skills required for sustainable marine management and innovation. Blue Education programs should be integrated into national and regional educational systems, focusing on marine sciences, oceanography, fisheries management, marine

engineering, and sustainable tourism (Hossain et al., 2024).

Promoting Sustainable Resource Management

Sustainable resource management is vital for ensuring the long-term health and productivity of marine ecosystems, which are the foundation of the blue economy. Strategies to promote sustainable management include implementing science-based policies and regulations that prevent overexploitation of aquatic resources, protect critical habitats, and maintain Biodiversity. This involves setting catch limits for fisheries, establishing MPAs, and enforcing rules to control pollution and habitat destruction (Alam & Azam, 2023).

Encouraging Marine-Based Innovation

Innovation is critical to unlocking the full potential of the blue economy. Promoting marine-based innovation involves fostering research and development (R&D) in marine sciences, technology, and engineering. Governments and private sector stakeholders can support innovation through funding, partnerships, and incentives for research institutions, startups, and businesses focused on sustainable marine solutions (Hossain et al., 2024).

Creating Supportive Policy Frameworks

Effective policy frameworks are essential for promoting sustainable economic growth in the blue economy. These frameworks should integrate economic, environmental, and social objectives, ensuring that all sectors involved in the blue economy operate sustainably. Governments should develop policies that incentivize sustainable practices, such as providing subsidies or tax breaks for businesses that adopt eco-friendly technologies or practices, establishing blue bonds to finance ocean conservation projects, and promoting public-private partnerships to drive investment in sustainable marine industries (Ather et al., 2023).

CONCLUSION

All in all, this section gave detailed studies on GMP and its roles and functions in both national and international economies. However, by explicating what GMP means and reviewing the many aspects of this concept – fisheries, shipping, coastal tourism, and renewable marine energy – the section was able to underscore the importance of this factor to future development and sustainable growth. The comparison between GMP and GDP drew attention to the fact that marine sector industries were a vital driver of a nation's economic performance. In addition, the section stressed the importance of properly managing seas and ocean resources with the Blue Economy as a recipe for sustainable utilization of resources for income generation without polluting the environment. The analysis also recognized obstacles to the employment of marine resources, including overexploitation, pollution, climate change, and the need for instruments like UNCLOS. Integrating blue education was critical to producing an educated workforce to drive a sustainable blue economy. Finally, the section concluded with the need for all-around policies that enshrine marine resources in national development policies to warrant sustainable use of the oceans and achieve economic development for the future population. It concludes over all research study.[4]

[4]***Note:*** *This research paper is derived from the PhD dissertation of Ms. Urooj Aijaz.*

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