A Business Ecosystem's Model for Harnessing Nigeria's Ocean Economy

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Abstract: The reassessment of ocean economy contribution of nations has become a new strategy for frontier states adjacent to the coastal region for the improvement of their position in the efficiency frontier curve. The continuity of a coastal state to remain a leader in the production and efficiency frontier curve of modern day development will thus depend on their ability to sustainably develop their most strategic economic resource base such as the ocean economy. The major economic bases include sustainable fishing, offshore oil field developments, offshore biodiversity development and marine biotechnology, offshore mining of manganese nodules, offshore wind farm potentials, international shipping (marine transport) and adjoining corridor development, ship dry docking potentials, marine renewable energy as well as other potentials outlined in the definition of African Union strategy for the development of her blue economy. Adopting the regression analysis and analysis of variance analytical tools, the study found that about 90% association exist between the GDP (gross domestic product) of the West African state (Nigeria) and her GDP. It equally found that offshore oil and gas energy sector more significantly impact on the GDP of Nigeria than other ocean economy business clusters. Given the various contributing marine environment business cluster used in the work, the model depicting the influence of the ocean economy of Nigeria is: $Y = 2295334779895 - 29473X_1 + 3436995749 - 5927686X_2 + e$.

Key words: Blue economy, diamond cluster model, exclusive economic zone, strategic management, sustainable fishing, offshore oil and gas.

1. Introduction

Africa as a continent constitutes of states divided into hinterland and coastal states. Surrounding these states from the water side is the Atlantic coastline by the west, the Indian ocean by the east and the Mediterranean ocean by the north. Adjacent to the north by the north east lies the Red Sea which connects to the Mediterranean waters via the Suez canal, world's longest lockless canal situated along the trans oceanic sea trade route, a major international sea route. Thus said, the decision of the African Union to develop a blue economy strategy for year 2050 has a meaningful economic sense. South Africa occupying the southern horn of Africa has a singular opportunity of researching for the preservation of the Antarctica icebergs based on the southern continent of Antarctica. With the passage of the exclusive economic zone EEZ (exclusive economic zone) rule in 1982 based on United Nations Convention on the Law of the Sea UNCLOS III 1992, it means Africa as a continent has acquired by law an additional 200 nautical miles for further economic development. If she takes advantage of the rule on continental shelve and decides to claim a 350 nautical mile continental shelf, the added acquired water mass will be added to her developable economic frontier.

Coastal governance index scores of world coastal economies place South Africa ninth and Nigeria nineteenth of world's 20 best economies. This implies

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that only two African countries appeared in the world's analysis carried out by Economist Intelligence Unit [1]. A study of the contribution of the ocean economy to the advancement of these two countries in Africa is thus paramount to improving the income of these two nations derivable from the ocean economy. Moreover, a study on the economy of West and Central Africa will contribute to economic prosperity of the entire region.

The marine economy of Nigeria is dependent on the marine environment of Nigeria comprising the coastal rivers, the oceans and their seas and the adjacent coastlines, over the years has remained a very rich economic zone, supplying the global economy with varied forms of marine resources; ranging from crude oil and gas and other forms of ocean energy resources, diamond, gold, fisheries, marine biotechnology, marine tourism, to the use of the seas as means of transportation. The socio-economic and political importance of the oceans remains very vital to both coastal and hinterland states economic life, leading development of coastal ecosystem business clusters to engender economic development. Thus, there existed a serious effort by most coastal states to optimize their socio-economic and political interest and grip on the seas and coastal zones with regards to ownership and use of the oceans and her resources with a view to optimize the economic contributions of the component maritime business clusters [2].

A broad view of the ocean economy of Nigeria, for example, presents varied coastal and marine based economic operations which contribute to the Nigerian gross domestic product. Offshore oil and gas exploration and production constitute major contributor to national income with duties generated from shipping import and export trade constituting the second largest revenue earner to the nation. Fishing, marine transport, coastal crude oil refining and exploitation of other kinds of marine resources constitute economic variables of the ocean economy which drives the economic engines of Nigeria as a coastal state. While the shipbuilding and dry docking

sector of the ocean economic of Nigeria still lie dormant, contributing almost nothing to national output as current statistics indicate, marine transport, shipping export and seaborne import trade, offshore energy drilling and refining and fishing subsectors yield robust economic contributions. It is therefore important to develop an integrative relationship and synergy among the various current contributing ocean economy variables of fishing, marine transport and offshore energy while seriously working to secure the development of shipbuilding and dry docking subsector of the ocean economy. Also, the rate of contribution of the maritime training and education subsector of the marine business clusters to national output is yet to be gauged even though there exists few government funded private sector driven recognized maritime education and training institutes, which majority of the maritime stakeholders view as inadequate in training, educating the manpower need of local marine industry and impacting the requisite knowledge in the right capacity to drive the much needed development in the West African ocean economy. However, it is important to understand that differences at the level at which each of the ocean economic variables contributes to national output, this is equally affected by the level of investment and/or development each [3]. For purposes of economic knowledge aimed at guiding interest and investment in each economic activity area of the ocean economic, understanding the difference in contribution rates and overall impact of the cumulative ocean economy is necessary for investment decision purposes and development of the West African Nigerian and Marine industry.

1.1 Objective

This work thus sets out to achieve the following objectives:

(1) To model the influence of the oceans on the economic development of West and Central Africa;

(2) To compare the GDP contributions of coastal

business operations of fishing, offshore energy drilling and marine transport Africa and as such determine current major drivers of progress and growth in Africa's ocean economy;

(3) To compare the significance of the average GDP contributions of fishing and marine transport, fishing and offshore energy, as well as offshore energy and marine transport coastal business ecosystem operations in the West African ocean economy sector.

2. Literature Review

One area of focus in oceans development is the blue economy developed by the third world and island nations. The blue economy tends to extend the green economic blueprint to a blue economy imbibing the concepts of ocean preservation for the benefits of the whole mankind. The focus is on the sustainable development of the ocean resources, including biotechnology, shipping, ocean thermal, energy, fish exploitation, aquaculture, ocean mining, etc., in such a way as to preserve the oceans for future generation with a view to developing a socio economic blueprint of ocean governance for the preservation of the oceans for the entire mankind and island nations.

3. Methodology

Objective 1 of the study requires secondary data of the GDP and revenue contributions of the fishes, oil and gas energy, marine transportation, marine tourism, maritime education and training and shipbuilding and dry docking marine business clusters to be achieved. The method of multiple regression analysis was used determine the influence of the ocean economy of Nigeria and the coastal business operations on the GDP and economy of Nigeria. Using the same secondary data as above, Objective 2 will be achieved and/or determined using the analytical tool of ANOVA (analysis of variance) for comparison of the contributions of the different maritime business operations and determining the major significant economic drivers of the ocean economy in particular

and national output in general. The number 3 objective requires the determination of the trend of contribution of each of the three identified maritime business operations to provide knowledge and understanding of the significance of the difference in average GDP contributions of the various ocean economy business variables for investment decision purposes and more importantly, decision for further investment in more areas of the ocean economic that is currently underexplored such as shipbuilding and repairs, marine tourism and maritime education and training; since there exists a relationship among the different contributing variables of the ocean economy such that an upward push in demand for one marine business operation type may cause a rise in demand for another. The significance of the variance in terms of contribution to the ocean economy was tested using t-test while F-test was used to determine significance of the difference of the variables in driving the ocean economy of the west African state.

4. Presentation of Results and Discussion of Findings

Table 1 above shows that the multiple R depicting the degree of the association between the GDP (gross domestic product) and the GDP contribution of the ocean economy within the period covered in the study is 0.901. This reveals that there exists 90% degree of association between the national output measured by the GDP and the ocean economy, thus the ocean economy serves as a major predictor of the GDP of Nigeria. The R square is 0.812. The R square value proves that 81.2% of variation in the GDP of Nigeria over the years covered by the study is explained by the ocean economy business operations. Thus, the ocean economy is a highly significant variable in determining the directions of economic growth and development of Nigeria's GDP.

From Table 2, the model showing the influence and contributions of marine transport, offshore oil and gas energy and fishing sub-sectors of the ocean economy

Table 1   Modeling the impacts of the Nigeria ocean economy, GDP.

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
1	0.901ª	0.812	0.700	140,784,764,479.90372	0.812	7.220	3	5	0.029

Note: predictors: constant, fishing, offshore oil and gas energy, marine transport.

Source: authors' computation.

Table 2   Coefficients of term.

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	Constant	-2,295,334,779,895.065	641,268,085,210.061	-	-3.579	0.016
	Marine transport	-29,473.416	33,732.665	-0.509	-0.874	0.422
	Offshore oil & gas	3,436,995,749.962	1,110,696,137.873	3.495	3.094	0.027
	Fishing	-5,927,686.978	3,131,287.733	-2.300	-1.893	0.117

Note: dependent variable: GDP.

Source: authors' computation.

Table 3   Descriptive statistics of GDP contributions of various coastal business operations to national output.

	N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Fishing	9	264,001.3122	99,731.13014	33,243.71005	187,341.1794	340,661.4451	130,116.50	428,229.01
Marine transport	9	1,239.6133	261.32546	87.10849	1,038.7408	1,440.4859	909.92	1,736.27
Oil and gas	9	9,637,762.2644	4,439,288.03494	1,479,762.67831	6,225,423.4091	13,050,101.1197	4.25E+006	1.60E+007
Total	27	3,301,001.0633	5,189,244.86023	998,670.63898	1,248,204.1654	5,353,797.9613	909.92	1.60E+007

Source: authors' calculations based on data collected.

on the GDP is $Y = 2,295,334,779,895 - 29,473X_1 + 3,436,995,749 - 5,927,686X_2 - e$. Considering the significance of the impacts of the contributing variables of the ocean economy indicates a t-stat of -0.87 and t-critical of 1.86 for marine transport. Since -0.87 < 1.86, we infer that there is no significant impact of marine transport on the GDP. The t-stat for offshore oil and gas energy is 3.09 and t-critical is 1.86. Since t-stat is greater than t-critical, we infer that offshore oil and gas energy sub-sector has a significant influence on the GDP. Similar, with t-stat of -1.89 and t-critical of 1.86, fishing sub-sector has no significant impact on the economy.

The results show that the fishing, marine transport and oil and gas offshore energy sectors of the ocean economy contribute a mean average GDP of 3,301,001.0633 billion naira per annum to the national output. The result further indicates that the mean GDP contribution of fishing as a maritime business

operation over the nine (9) years covered in the study amounts to 264,001.3122 million naira with standard deviation of 99,731.13014 thousand naira per annum. Marine transport as an ocean economic business variable contributes 1,239.6133 million naira per annum with a standard deviation of 261.32 while oil and gas (energy drilling) maritime business operations contributes the maximum of 967,762.2644 naira and standard deviation of 4,439,288.03. Thus by comparison, the offshore oil and gas energy drilling maritime business operation makes more contributions to national output than fishing and marine transportation. This is in agreement with the current realities in Nigeria where the nation seems to have whole dependency on revenue from offshore energy business operations following the skewing of public investment in favour of development of the offshore oil and gas energy sector with negligible public investment in marine transport and fishing operations.

The case is worse for the shipbuilding and dry docking, marine tourism sectors of the ocean economic which have over the years had a zero or near zero public investment to harness the potentials for greater contribution s to national output. Apart from the funding or the maritime academy at Oron and the oceanography instate in Lagos as specialized maritime training schools, investment in the maritime training and education sector in Nigeria is almost zero. Thus as depicted by the result of the study above, offshore energy stands out with a greater GDP contribution than other ocean economy variables having had robust public and private sector investments over the years. The implication is that there is a serious need for investment in fishing and maritime transport ocean economy variables to harness them for greater contribution to the GDP in the future. The F-stat has a value of 41.263 while the F-table or F-critical is at $n-1$ degrees of freedom is 3.25 and at 0.05 level of significance. Thus we infer that there is a significant difference between the GDP contributions of the identified marine ecosystem business operations used in the research.

Table 3 above shows the multiple comparisons statistical result of the variables used in the study. Comparison of GDP contribution of fishing and marine transport marine ecosystem business operations indicates a mean difference of 262,761.69889 naira with a standard error of 1,208,526.02674. This shows that the fishing sector contributes more than the marine transport in terms of output over the period. The p-value of 0.974 at 0.05 level of significance (0.97 > 0.05) shows that there is no significant difference existing between the two. Similarly, comparing the GDP contributions of the offshore oil and gas energy and fishing marine ecosystem, business operations show a mean difference of 9,373,760.95222 naira with standard error of 1,208,526.02674; indicating that offshore energy operations contributes a mean average of 9,373,760.95222 naira greater that fishing operations. The p-value is 0.000 at 0.05 level of significance (0.000 < 0.05); thus, there exists a significant difference between the contributions of offshore energy and fishing marine ecosystem business operations. Furthermore, the mean difference between the GDP contributions of the offshore oil and gas energy sector and the marine transport sector is 9,636,522.65111 naira with a standard error of 1,208,526.02674. Table 4 on multiple comparisons equally shows that the offshore energy sector has over the period made more average GDP contributions. The difference is the average contributions of the offshore oil and gas subsector and the marine transport subsector is significant having a p-value of 0.000 at 0.05 levels of significance. The policy implication is that both fishing and marine transport coastal business operations need strategic improvement in investment pattern (private and public) as well robust management

Table 4 Multiple comparisons.

Dependent variable: GDP						
(I) Group	(J) Group	Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
Fishing	Marine transport	262,761.69889	1,208,526.02674	0.974	-2,755,274.7817	3,280,798.1795
	Oil and gas	-9,373,760.95222[*]	1,208,526.02674	0.000	-12,391,797.4329	-6,355,724.4716
Marine transport	Fishing	-262,761.69889	1,208,526.02674	0.974	-3,280,798.1795	2,755,274.7817
	Oil and gas	-9,636,522.65111[*]	1,208,526.02674	0.000	-12,654,559.1317	-6,618,486.1705
Oil and gas	Fishing	9,373,760.95222[*]	1,208,526.02674	0.000	6,355,724.4716	12,391,797.4329
	Marine transport	9,636,522.65111[*]	1,208,526.02674	0.000	6,618,486.1705	12,654,559.1317

*: the mean difference is significant at the 0.05 level.

Source: authors' calculation.

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strategies to push the GDP contributions to increase significantly as offshore energy contributions.

5. Conclusion

The study has been able to achieve its objectives by modeling the significance of the impact of the ocean economy of the GDP. The result of the study indicates that the ocean economy of Nigeria contributes significantly to the economy development as it explains about 90% of changes in the GDP. Moreover, offshore oil and gas energy sub-sector was found to be the major significant contribute to the GDP while fishing and marine transport did not show significant effects.

6. Recommendation

Strategic local and private lump-sum investment is recommended in the marine transport and fishing sub-sectors in order to improve the contributions.

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