

MATHEMATICAL ANALYSIS OF GOVERNMENT BUDGETARY ALLOCATION TO DEFENSE SECTOR ON ECONOMY GROWTH IN NIGERIAN FROM 1999 TO 2021 WITH REFERENCE TO IMF AND WORLD BANK 1.5% BENCHMARK

BY

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Abstract

The paper presents a systemic trend of budgetary activities in Nigeria with a particular focus on the allocation to the defense sector using time's series approach from

Three research questions were answered using secondary data gathered from the Central Bank of Nigeria's Statistical Bulletin, International Monetary Fund and World Bank. The data collected were analyzed using descriptive statistics. The results of the analysis showed that, the total budget to defense sector in Nigeria from 1999 – 2021 is \$36.9 billion. It also revealed a difference of \$71.4 billion between International Monetary Fund and World Bank benchmark 1.5% and the actual budget to defense sector. It further showed that the average percentage of 0.55% budget and the annual growth change of 0.02% were observed for the same period. The results also indicate that Nigerian and Bangladesh allocation were 0.95% and 0.24% far below the benchmark 1.5% as prescribed and Morocco allocation was far greater than twice of the benchmark by 0.34%. It was concluded that, the total budgetary allocation made to the defense sector within the period of this study in Nigeria is generally far less than the International Monetary Fund and World Bank benchmark by 0.95%. Based on the findings, it was recommended amongst others that, Nigeria government should adequately fund the defense sector by allocating at least 1.5% of her budget to defense sector as prescribed by International Monetary Fund and World Bank benchmark.

Keywords: Mathematical analysis, Nigerian budget, IMF and World Bank Benchmark, Defense sector, Allocation to Defense, Economic growth.

Introduction

Government expenditure remains an important instrument that utilized the process of development and plays a pivotal role in the functioning of any economy at almost all stages of growth and development in every country. Most developing and developed countries today use public expenditure to improve income distribution to direct the allocation of resources in desired areas and influence the composition of national income (Assi, 2019 and Vtyurina, 2020). In

developing countries for instance, the variation in government spending pattern is not only projected to guarantee stabilization but also to spur economic growth and expand employment opportunities (World Bank, 2015). Nigeria spends far less on defense than is stipulated by organizations such as the International Monetary Fund and World Bank who advised that countries even without security challenges can spend at least 1.5% of their GDP on security as a

prerequisite for sustainable development (Stiftung, 2020). Today Nigeria, Bangladesh and Morocco were ranked as 36th, 40th and 61th out of 145 countries in global military strength, but Nigeria was ranked as 8th out of 35 similar ranking countries in the world for defense spending and it also positioned as 4th country with military strength in African continents (Fire Power, 2023). The government has been saddled with two major functions to ensuring that the law and order are maintained and making available to the desired social infrastructure. But these activities have taken a different shift in this modern time to include ensuring there are economic growth, inflation control, and equilibrium in balance of payments, full employment, and equitable distribution of income. For the government to achieve either of these macroeconomic goals, fiscal policy must stand tall. In this regard, Nigeria can use its defense spending on social infrastructure to address the issue of growing deficit in provision of social goods and by extension to reduce the rising pace of unemployment and poverty rate (Simeo, 2021). Nigeria has witnessed more than ninety cases of violent ethnic-religious, communal, and socio-political conflicts of various magnitude (Elaigwu, 2005). Beside the cases of insecurity experienced, there had been increasing cases of attacks by the Niger-delta militant on the crude oil and gas industry in country too. It observed that, from a height of 2.6 million barrels produce per day in 2006, the activities of Movement for the Emancipation of the Niger Delta (MEND) reduced oil production to 1.6 million barrels per day by April 2009.

The unrest has turned into a criminal movement that feeds on massive theft of crude oil. The insecurity in the Niger-delta area forced many multinational oil companies to vacate their operational bases in country (Simeo, 2021). Today, the rising cases of criminal activities in the country seems unabated and taken a strange dimension to the extent that many of economic activities are not carryout which poses a danger to the overall unity and

economic of Nigeria at large. The defense sector has allocated a share of the federal budget since independence in 1960. This is due to the perception that the armed forces protect the populace and are important for securing the territorial integrity including economic, socio-cultural, and political interests (Omede, 2012).

Mathematics is the most comprehensive education area of the world that could be used in various ways in areas and topics that is not related to it. Mathematics is always used outside itself, in a covered manner or clearly especially in cases of problems, situations or areas including mathematical models and modeling (Arseven, 2015). The defense sector adds nothing tangible to the national coffers in terms of generating investment since its establishment in 1964. Nigeria's Defense Industries Corporation of Nigeria is yet to actualize its mission statement that, it's to maximize output toward National Defense and Enterprise (Stiftung, 2020).

Research Questions

The study is set to answer the following questions

1. How much fund has been allocated to the defense sector in Nigeria from 1999-2021?
2. What is the difference between International Monetary Fund and World Bank 1.5% benchmark and what were actually allocated to the defense sector from 1999-2021?
3. What is the difference between Nigeria's defense allocation and other countries in the world like Bangladesh and Morocco, with similar Gross Domestic Product (GDP) ranking?

Methodology

The study adopted a longitudinal survey research design with a specific focus on the trend research design. A longitudinal design was considered here for this study since data across different time period were collected and were compared. Trend approach was used, particularly the type of longitudinal

design, to show the existing activities and to ease human understanding of the phenomena under focus.

Data for this study were mainly collected from secondary sources such as the Central Bank of Nigeria, International Monetary Fund and World Bank. The collected data were analyzed by the researchers in line with the direction and purpose of the study. Descriptive statistical tools such as tables, percentages are used. Bar chart and descriptive graphs are plotted using

MATLAB R2015a software package which were used to analyzed data and answering the research questions.

Results

Research Question 1: How Much Has Been Allocated to The Defense Sector in Nigeria from 1999 2021?

This research question was answered using the budgetary data source from Central Bank of Nigeria Statistical Bulletin (2018) and World Bank (2021).

Table 1: Nigeria's Budget and Allocation to The Defense Sector from 1999 To 2021

Specification	GDP (Billions of US \$)	Defense budget (Billions of US \$)	% GDP Allocated to defense	Annual change on %GDP allocated to defense
Min	59.37	0.37	0.35	-0.38
Max	574.2	4.47	0.97	0.34
Mean	313.9	1.605	0.5504	0.0187
Median	367	1.62	0.5	0.02
Mode	59.37	1.62	0.43	0.02
Standard dev.	162.8	0.9626	0.1759	0.1671
Range	514.8	4.1	0.62	0.72
Sum	7220.1	36.9	12.7	0.4

(Authors' computation)

The data presented in Table 1 indicated that the total allocation to defense in Nigeria between 1999 2021 was \$36.9B (thirty-six billions and nine hundred million dollars). This figure implies that on the average, only \$1.61B (one billion, six hundred and ten million dollars) was allocated to defense between the period of this study annually. Meanwhile, the total GDP estimated by the Federal Government during this period sum up to \$7220.1 billion (seven thousand, two hundred and twenty billion, one hundred million dollars) with an average annual budget of \$313.9 billion (three hundred and thirteen

billion, nine hundred million dollars). The results also indicate that, in this period Federal Government of Nigeria has been allocating only 0.55% of the nation's budget each year averagely to defense and experienced the annual change of 0.02%. This is far below 1.5% percent prescribed by International Monetary Fund and World Bank.

In specific terms, the results showed that 0.97% of Nigeria's government GDP was the highest percentage allocated to defense. The figures further showed that an allocation of 0.35% was made to be the smallest and 0.43

were made to be the common percent allocated to defense in the period of the study respectively. In this way, at a glance the trend shows that budgetary allocation to defense by the Federation of Nigeria is below 1.5% benchmark prescribed by International

Monetary Fund and World Bank for developing country. In understanding the growth pattern as well as growth rate, the descriptive graph and bar chart below was used as shown in Figure 1.

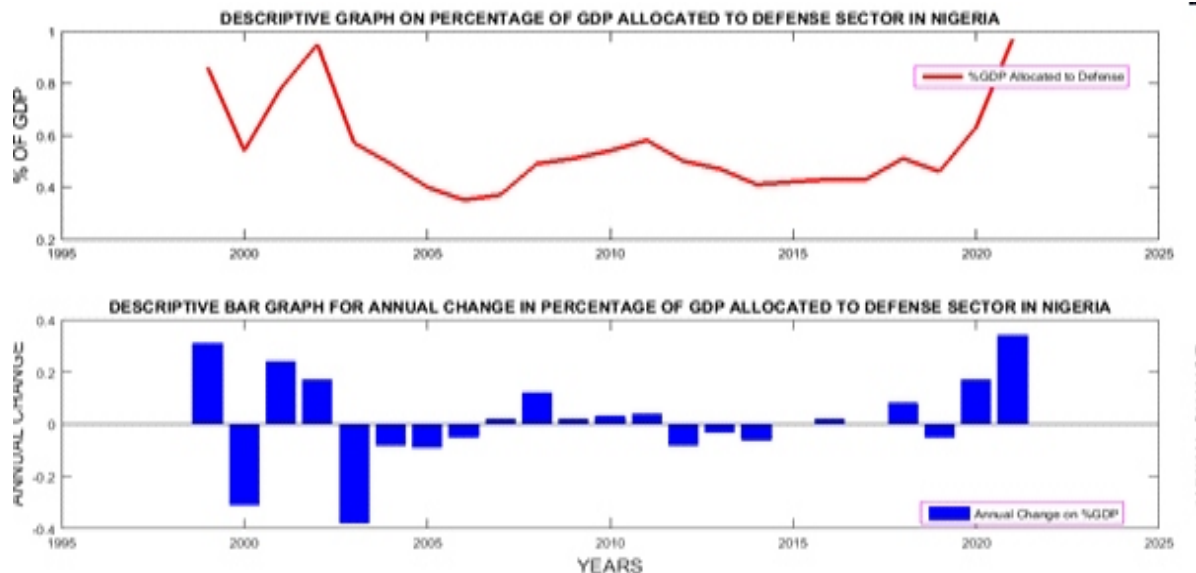


Figure 1: Bar Chart and Descriptive Graph Showing Nigeria's Defense Budget as A Percent of the Total Budget and Annual Growth Rate Change Occurred from 1999 to 2021. (Source: Authors' Computation)

From Figure 1, the descriptive graph shows clearly that the defense budget by the Federation of Nigeria has been highly unstable and fluctuated in the percentage of the total GDP allocated to defense from 0.86 percent in 1999 to 0.95 percent in 2002. Thus, the fluctuations in the budgetary allocation have been systemic and have existed even before the time of this study. In this study, a little stability was only witnessed in two occasions from 2009 to 2012 and 2013 to 2017. It was also shown that the highest allocation to defense was recorded in 2021 where approximately 1 percent (0.97% in real terms) was allocated to defense within this period. This is followed by 2002 (0.95%), 1999 (0.86%), 2001 (0.78%), 2020 (0.63%), 2011 (0.58%), 2003 (0.57%), 2000 (0.54%), 2011 (0.54%), 2010 (0.51%), 2018 (0.51%), 2012 (0.50%), and 2014 (0.49%), in that order. All these figures were relatively below 1.5 percent benchmark advocated by International Monetary Fund and World Bank.

On the bar graph, it can be seen that from 1999 to 2000, there was a decline of 0.31% growth in the defense budget. In 2001, there was 0.24% increase in the budget from the previous year, where as in 2002 there was a dropped to 0.17%, then follow by a decline of 0.38% in 2003. The decline maintained stable growth and continuity in 2004, 2005, and 2006, with growth rate decrease by 0.08%, 0.09%, and 0.05% respectively; this was followed by an increase in 2007, 2008, 2009, 2010 and 2011, with growth rate of 0.02%, 0.12%, 0.02%, 0.03% and 0.04% respectively. It continues in this order. There was a rise in the defense budget in 2021 with a growth rate of 0.34%. However, the budget experienced the average growth rate of 0.02% throughout the period of this study.

Research Question 2: What is the difference between International Monetary Fund and World Bank 1.5% benchmark and what were actually allocated to the defense

sector from 1999 -2021?

The research question was answered

using the data presented in Table 2.

Table 2: Federal Government of Nigeria allocations computed based on International Monetary Fund and World Bank specification and actual allocations to the defense sector from 1999 -2021.

Specification	Budget based on International Monetary Fund and World Bank 1.5% in (Billions of US \$)	Nigerian Defense Budget (Billions of US \$)	Difference of Nigeria and International Monetary Fund and World Bank in (Billions of US \$)	% Difference of Nigeria and International Monetary Fund and World Bank 1.5% Benchmark
Min	0.89	0.37	0.4	32.4
Max	8.61	4.47	6.25	78.19
Mean	4.709	1.605	3.104	63.94
Median	5.5	1.62	3.47	67.75
Mode	0.89	1.62	0.4	32.4
Standard dev,	2.441	0.9626	1.746	12.18
Range	7.72	4.1	5.85	45.79
Sum	108.30	36.90	71.40	1470.60

(Source: Authors' computation)

In answering research question two, 1.5% of each year's budget was computed based on International Monetary Fund and World Bank benchmark to show the allocation that would have been agreed to defense sector had International Monetary Fund and World Bank prescription been followed. The results as presented in Table 2 indicated that, the total amount that would have been allocated to the defense in Nigeria if International Monetary Fund and World Bank benchmark was calculated as **\$108.3B** (one hundred and eight billions, three hundred millions dollars); as opposed to the **\$36.9B** (thirty-six billions, nine hundred millions dollars) that was eventually allocated. At glance, the figures also show a clear difference of **\$71.4B** (seventy-one billion, four hundred million dollars) between International Monetary Fund and World Bank benchmark and what was used to allocated to the defense from 1999-2021.

On the average, the sum of **\$4.7B** (four billion, seven hundred million dollars) would have been allocated to the defense sector each year, supposing the International

Monetary Fund and World Bank benchmark had been followed. This figure is different from the average annual allocation of **\$1.6B** (one billion, six hundred million dollars) that was particularly allocated to the defense within the same period. In this way, within the time period, there is also an annual average difference of **\$3.1B** (three billion, one hundred million dollars) between the International Monetary Fund and World Bank annual average and the actual average computed from the GDP data, it marked at difference of 63.94% averagely **each year** from 1999 to 2021. This difference is shown pictorially using the descriptive graph in Fig 2.

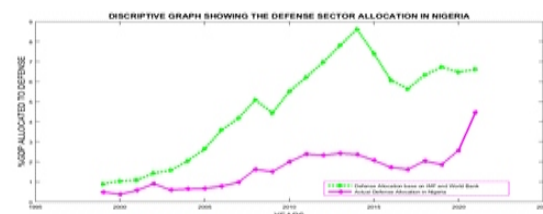


Figure 2: descriptive graph showing the difference between International Monetary Fund and World Bank 1.5% benchmark that would have been allocated and what was actually allocated to defense sector in Nigeria from 1999 – 2021 (Source: Authors' computation)

Fig.2 Illustration showed the descriptive graph for government defense allocation as a percentage of GDP allocated to defense and based of International Monetary Fund and World Bank 1.5% benchmark are follows were very closed but since then, the percentage of GDP allocated by Nigerian government is always far less than, if International Monetary Fund and World Bank 1.5% benchmark adopted. This has a

negative effect on general security and seriously affects the economics activities in Nigeria because the military capacities could not able to actualize its mission in the economics section of the country.

Research Question 3: What is the difference between Nigeria's defense allocation and other countries in the world, like Bangladesh and Morocco, with similar Gross Domestic Product (GDP) ranking from 1999 2021?

Table 3: The Nigeria's, Bangladesh's and Morocco's GDP and Their Allocation to The Defense Sector from 1999 To 2021

Specification	NIGERIA			BANGLADESH			MOROCCO		
	GDP (Billions of US \$)	DEF. ALLOC. (Billions of US \$)	% GDP	GDP (Billions of US \$)	DEF. ALLOC. (Billions of US \$)	% GDP	GDP (Billions of US \$)	DEF. ALLOC. (Billions of US \$)	% GDP
Min	59.37	0.37	0.35	51.27	0.68	1.06	38.86	1.01	2.42
Max	574.2	4.47	0.97	416.3	4.88	1.58	142.9	5.38	4.28
Mean	313.9	1.605	0.55	159.6	1.983	1.26	89.09	2.914	3.34
Median	367	1.62	0.50	115.3	1.62	1.27	93.22	3.16	3.26
Mode	59.37	1.62	0.43	51.27	0.74	1.11	38.86	1.47	3.18
Standard dev.	162.8	0.9626	0.18	117.4	1.389	0.12	32.48	1.165	0.41
Range	514.8	4.1	0.62	365	4.2	0.52	104	4.37	1.86
Sum	7220.10	36.92	12.66	3670.60	45.62	28.89	2049.10	67.03	76.91

(Authors' computation)

The data presented in Table 3 indicated that the total allocation to defense in Nigeria, Bangladesh and Morocco between 1999 2021 were \$36.92B (thirty-six billion, nine hundred and twenty million dollars), \$45.62B (forty-five billion, six hundred and twenty millions dollars) and \$67.03B (sixty-seven billions, thirty millions dollars). This figure implies that on average they were only \$1.605B (one billion, six hundred and five million dollars), \$1.983B (one billion, nine hundred and thirty-three million dollars) and \$2.914B (two billion, nine hundred and fourteen million dollars) they allocated to defense between the period of this study annually. Meanwhile, the total GDP estimated by their Federation during this period were amounted at \$7220.1B (seven

thousand, two hundred and twenty billions, one hundred millions dollars), \$3670.60B (three thousand, six hundred and seventy billions, six hundred millions dollars) and \$2049.10B (two thousands and forty-nine billions, one hundred millions dollars) with an average annual GDP of \$313.9B (three hundred and thirteen billions and nine hundred millions dollars), \$159.6B (one hundred and fifty-nine billions, six hundred millions dollars) and \$89.09B (eighty-nine billions, ninety millions dollars). The results also indicate that, in this period the government of Nigeria, Bangladesh and Morocco has been allocating 0.55%, 1.26% and 3.34% of their country GDP each year averagely to defense. In this regard, the Nigerian and Bangladesh allocation were

0.95% and 0.24% far below the benchmark 1.5% as prescribed, while Morocco allocation was far greater than twice of the prescribed percent of International Monetary Fund and World Bank by 0.34%.

As shown in Table 3, the country with highest defense allocation was recorded within the period of the study is 4.28% of Morocco follows by Bangladesh and Nigeria with 1.58%, 0.97% respectively. The standard deviation of defense allocation in Morocco is among the highest, showing high variation in defense amongst these similar ranking country in the world over time, where

the standard deviation in Nigeria were observed to be lower than that of Morocco and Bangladesh. The standard deviation of GDP which presents an exciting feature for any country also, the highest GDP country in the period of the study is Nigeria with \$162.8B, follows by Bangladesh and Morocco with \$117.4B, \$32.48B. However, Nigeria with very huge GDP variation, has allocated fewer amounts for defense sector during this study. In understanding the growth pattern among these similar ranking countries in term of defense, the descriptive graph below was used as shown in Figure 3.

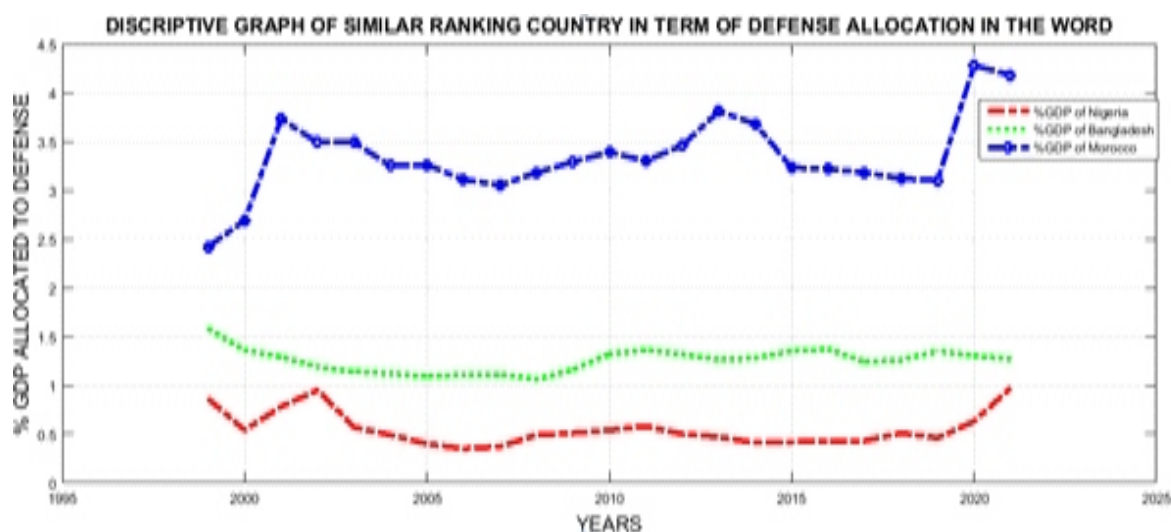


Figure 3: descriptive graph showing the Percentage of GDP was actually allocated to defense sector in Nigeria, Bangladesh and Morocco from 1999 2021 (Authors' computation)

Figure 3 showed the descriptive graph for governments percentage of GDP allocated to defense among the similar ranking country for defense. From 1999 to 2021, the %GDP allocated to defense in Nigeria is fluctuated from 0.35 to 0.97, where Bangladesh is fluctuated from 1.06 to 1.58 and Morocco is fluctuated from 2.42 to 4.28, by considering the International Monetary Fund and World Bank 1.5% benchmark the only country has fulfilled the prescribed benchmark is Morocco and the one with poor allocation to defense sector is that of Nigeria of which has to allocated less than two-third of the prescribe benchmark of 1.5%. This has a serious impact on the economics activities in Nigeria and Some West African country as it positioned as the leading African country.

Conclusion

The study concluded that the total allocation made to the defense sector from 1999 2021 is generally low and it's below the International Monetary Fund and World Bank benchmark. The defense sector is not given a serious attention in Nigeria. The average allocation during this period was 0.55%, which is 0.95% less than the recommendation made by International Monetary Fund and World Bank. It follows that approximately 37 percent of International Monetary Fund and World Bank benchmark is what the defense sector is getting every year as an allocation, between 1999 and 2021 with 63 percent kept away for other purposes. Such low figures might be

responsible for the for the country's security challenges and the unstable economic growth. Defense in the entire nation, and indeed across all levels, have been managing this paltry sum for sustainability of security. There is a wide gap between the specification made by International Monetary Fund and World Bank and what the Nigerian Government has been allocating to defense. The fluctuations in the allocation to defense have contributed to the backwardness currently being faced by our security system specifically, and slow economic growth of the country generally.

Recommendations

Based on the issues raised in the paper, the study, therefore recommended that;

i. The Federal Government of Nigeria should adequately fund the defense sector by allocating at least 1.5% of her budget to the

defense sector as prescribed by International Monetary Fund and World Bank.

ii. There should be adequate supervision and placement of qualified and experienced individuals with credible integrity to heading the defense sector and oversee the implementation of defense policies in Nigeria.

iii. There should be stability and consistency in the budgetary allocation to the defense sector. This will help in eliminating the problem of instability and poor sustainability of policies in the security system.

iv. The similar ranking country in defense should institute condition to provide adequate funding for defense sector and in doing so they should be guided and committed to the International Monetary Fund and World Bank benchmark.

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