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Improving West Africa s Coastal Security Management: An Analytical Model

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Abstract

Maritime security strategies adopted by the navy and coastguards were reviewed in the work with a view to determining spatial coverage of acquired maritime domain in the new legal regime of the exclusive economic zone. Variables applied in the assessment include the coastal resources of the state such as renewable resources like fishes and non renewable under water resources such as oil. Others include the freedom sectors such as marine traffic, pipelines, underwater cables and air traffic. In the course of the research, regression analytical tools were applied to ascertain the quality of security. Recommendations for improvement on the quality of security were then made for the region based on research output. The concepts of sea base and the sea shield concepts were reviewed as a security strategy in Nigeria's maritime domain. Analyses of reported maritime security problems in the region were made considering the two frameworks of sea shield and sea bases. Further recommendations were then made to the advantage of the entire system.

Introduction

Nigeria in 2013 together with the Gulf of Guinea and other West African states were assessed as world's most pirated waterfront by International Maritime Bureau, IMB. Out of the 51 attacks recorded in the region, the record states that Nigerian pirates were responsible for 31.The report further states that Nigerian pirates ventured into Gabon, Ivory Coast and Togo during the period assessed. This poses a real agenda for the entire West Africa to upgrade her coastal security especially by instituting a joint security platform with sufficient combatant infrastructure to address the rising menace of piracy. The signing into law of a joint cooperative security agreement to address the issue is only but a starting point as necessary operational logistics that will offer the required tactical superiority in several sectors of new pirate breeding grounds are necessary.

A model of maritime security that will thus address this new negative trend is thus necessary if the problem is to be effectively treated.

Objective

The research sets out to discover means by developing strategies and models that will result in the entire elimination of Nigeria and West Africa's piracy problem applying the sea shield and sea base naval operating concept. As such the work intends to improve the region's quality of maritime security.

Literature review

Joint logistics has been defined as the deliberate or improvised sharing of service logistics resources to enhance synergy and reduce both redundancies and costs [1]. In the maritime sector, this concept is relevant in combating piracy occurring in several maritime domains with high commercial significance. The central theme in any joint logistics operation is to accomplish the joint force commander's objective [1,2]. The later also surveyed the dimensional contributions of the air force to joint naval operations. Maritime superiority in the marine environment is achievable through the effects made by air force working in concert with naval forces.

A joint anti-piracy operation off the waters of Somalia by Russia and India aimed at enforcing maritime laws and countering piracy, terrorism and drug smuggling was carried out at the North East African Coast of Somalia.

The operation then in its fourth year known as INDRA-2009 involved Russia's Pyotr Veliky missile cruiser, and the Indian guided missile destroyer INS Delhi in its first stage in year 2009. The above maritime operations were further strengthened with the addition of the vessel Udaloy.

Class destroyer tug boat and two fuel tankers dispatched from the Gulf of Aden. The presence of these logistics maritime vehicles reduced successful private attacks from 12 in the month of November 2008 to 4 in December.

The number of ships involved in anti- piracy operations off the coast of Somalia exceeds 20 drawn from the Navies of at least 10 countries. Indra 2009 ended February 12, 2009.

The Naval Operating Concept (NOC) visualizes an integrated effort between the Navy, marine force and air force in combating the enemy thus creating a virile joint force. The purpose is to create better fighting

capabilities. Concepts adopted is the approach includes Sea shield, sea basing and sea strike concepts. While the sea shield concept demands American presence in world oceans just for the sake of providing peace, and freedom of the seas, the sea strike concept achieves the same objective via necessary strikes against terrorist groups on threatened maritime domains. The sea base on its part acts as foundation platforms from which offensive and defensive actions are taken.

Methodology

The method of research applied includes the naval operating concepts of sea shield and sea base, applying the joint operational strategy. Also, an analytical model of justification was derived using the region's highest cluster of oil terminals to determine the location of a sea shield jointly operated by the entire West Africa's joint force. Sea bases were advocated for port security in the region

Joint operations security model of Nigeria and West Africa's maritime domain

The objective function for a coastal zone's anti-piracy security model of Nigeria and West Africa's maritime domain can be stated as follows:

Objective: Maximize naval coastal security at relevant vulnerable points across West Africa.

Locally translated, the objective function will be written as:

Maximize naval security at West Africa's most vulnerable points.

The above objective function will be subject to the following constraints.

- Naval ship availability in the channels leading to the immediate port environments of the above port districts.
- Joint naval operations available at the exclusive Economic zone of the Nigeria and West African waters.

Generalized joint operations strategy for threatened maritime domains

A joint operations approach to military operations envisages the involvement of the three tiers of the forces namely army, navy and air force employed in combating the enemy.

In view of the high logistics requirements, this approach may presently be deemed as excessive. However, given the continuous increase in the level of pirate activities in certain water region of the world with high commercial ship presence, this approach has become welcome in such waters regions.

The patrol of Russian and Indian naval ships, off the coast of Somalia has helped in those seasons to reduce the level of piracy in such threatened maritime domains. However, the withdrawal of naval ships from the region arising from the completion of such patrols has left the domain subject to further attacks by ship hijackers domiciled in Somalia.

To ensure permanent peace in the world's most troubled water, the following measures must be applied

- Areas subject to piracy and ship attacks must first be declared threatened maritime domains by the United Nations. In trying to do this, certain thresholds or limits of threats to world commercial shipping should be set. When piracy activities in a water region

exceed such limits, then actions by the joint forces should be spelt out first at the regional level and next, at the global level.

- Actions set to mitigate piracy activities at threatened maritime domains must comprise of joint operations supported by the joint forces (maritime, air and land forces) of the affected region. These forces should be on patrol in water regions declared as threatened maritime domains.
- At very high levels of piracy threat in major commercial shipping routes, joint forces of first world countries should be involved in organizing joint anti-piracy activities in such water regions.

Agile operations system must be part of the tool kits of the joint forces to enable them control diverse situations, and thrive in a continuously changing unpredictable environment [3-5].

Data presentation

Table 1 shows data on global and Nigeria piracy number of attacks as well as cost of attacks collected from International Maritime Bureau. Data on global piracy attacks for the years 2007 to 2013 were collected and compared with Nigeria's piracy attack data and regressed.

Year	Nigeria Attacks	Global Attacks	Local Human Cost	Global Human Cost
2007	42	263	97	433
2008	40	293	66	1011
2009	29	410	116	1166
2010	43	445	191	1270
2011	47	439	203	895
2012	87	297	437	662
2013	106	264	330	373

Table 1: Number of piracy attacks in Nigeria.

Source: International Maritime Bureau [6].

From Table 2 the Global versus Nigeria cost data results, R-Sq was found to be 49.7% while R-Sq(adj) came out as 37.1%. Though not extremely significant, the outcome is quite embarrassing to a third world nation that is highly dependent on oil for her survival. Nigeria's government thus has cause to worry about her coastal security issues. An investment in the direction of reducing insecurity in her coastal worries is thus necessary at this stage.

The residual probability plot shows the problem is on the rise. A variance inflation factor of 1.00 was arrived at showing absence of multiple collinearity. The regression made an R Sq of 49.7% and an adjusted R-Square (adjusted) of 37.1%. This shows the problem in Nigeria is a substantial component of the global attacks.

Logistics security model for threatened maritime domains

The components of a logistics security model designed to mitigate the problems of threatened to maritime domains should produce maritime superiority, to the security outfit of the affected marine domains.

A joint model has been designed and applied in the waters of Somalia carrying out war games on the seas thereof. A United Nations

Policy on Somalia has been issued on the subject matter thus empowering nations to proffer solutions to Somalia's problems and the affected regions.

Predictor	Coef	SE Coef	T	P	VIF	
Constant	469.13	61.91	7.58	0.002		
42	-1.8943	0.9534	-1.99	0.118	1	
Analysis of Variance						
Regression	1	16699	16699	3.95	0.118	
Residual Error	4	16917	4229			
Total	5	33616				
Obs	**42**	**263**	**Fit**	**SE Fit**	**Residual**	**St Resid**
1	40	293	393.4	32	-100.4	-1.77
2	29	410	414.2	38.8	-4.2	-0.08
3	43	445	387.7	30.5	57.3	1
4	47	439	380.1	28.8	58.9	1.01
5	87	297	304.3	37.9	-7.3	-0.14
6	106	264	268.3	52.4	-4.3	-0.11

Table 2: Analysis result: Global versus Nigeria cost data.

The regression equation was $263 = 469 - 1.89 \cdot 42$

The level of military effect realized in the coast of Somalia can only be ascertained by the number of attacks on ships passing the region. There is no doubt that a quick solution to the war conditions in Somalia will produce greater effects in achieving maritime superiority of the security operators in the region. This is because both the source and the targets of the pirates will be subjects of attacks by a well constituted joint task force operation. This approach has been adopted in the case of Nigeria with better results.

Regression analysis: global cost versus Nigeria cost

From Table 3, the global cost versus Nigeria piracy attack cost data result, the regression equation was found to be $c3 = 1047 – 1.056c4$. From the same Table 3, the global versus Nigeria cost data, R-Sq was 16.4% while RSq(adj) amounted to 0.0%. This might look insignificant but perfectly gives cause to worry considering that Nigeria is but a very small economy of the entire globe. Thus said designing a maritime logistics framework that that ensures maritime superiority of the Nigerian and West African nation makes sense. We thus focus on the design of this logistics frame work.

Predictor	Coef	SE Coef	T	P	VIF
Constant	1047.1	256.4	4.08	0.01	
C4	-1.056	1.066	-0.99	0.368	1.000

Table 3: Global cost versus Nigeria's cost equation.

The design of a logistics model aimed at producing maritime superiority of the coastal anti-piracy security force will be focused at achieving two objectives.

The first is to gain coastal zone superiority at the hinterland which is of course the breeding ground of pirates operating along major maritime trade routes.

The second is to maintain maritime superiority along the major maritime routes and points of possible attacks of civilian ships by pirates such as choke points, anchor points and vulnerable ports. Table 4 the residual plot of Global versus Nigeria piracy cost data shows substantial positive value for the years 2008 up to the year 2012. The meaning being that the piracy forces showed substantial activity in Nigeria's and West Africa's coastal waters. Thus said, an improvement in the region's security capacity becomes very necessary.

Obs	C4	C3	Fit	SE Fit	Residual	St Resid
1	97	433	945	176	-512	-1.68
2	66	1011	977	200	34	0.12
3	116	1166	925	164	241	0.78
4	191	1270	846	134	424	1.31
5	203	895	833	133	62	0.19
6	437	662	586	280	76	0.36
7	330	373	699	188	-326	-1.1

Table 4: Residual plot: Global versus Nigeria piracy cost2007-2013.

Figure 1 the normal probability plot shows a linear growth during the period under review 2007 to 2013 showing the pirates was having a good time with their activities all through these years undisturbed. However, the histogram shown in Figure 2 tends to reveal something additional. The additional visible impact being that in the middle of the period 2010 precisely, the activities of the pirates was most worrisome. An improvement in the security tactics of the coastal forces thus needs modification at this point for superior effects in the region.
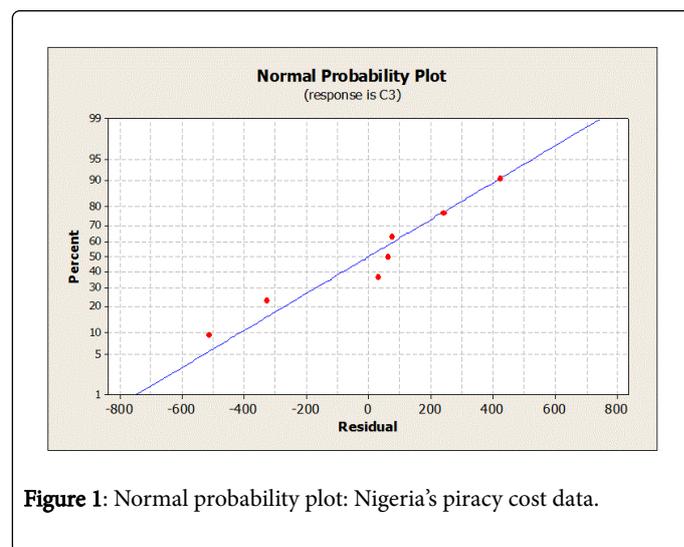

Figure 1: Normal probability plot: Nigeria's piracy cost data.

Components of an Anti-Piracy

Joint logistics unit: Rather than outright computation of physical logistics units, a rather philosophical approach is taken in this work. The right approach is first to detect a threatened maritime domain. After an area has been declared a threatened maritime zone, the next phase would then be to determine methods of entrenching maritime superiority of the security operatives using the joint international logistics method. The international presence can be maintained through exhibitions of war gaming at predetermined threatened maritime domains. A joint task force can also be constituted by the coastal zone country to fight piracy operations. However, where the results do not produce visible effects on the control of piracy activities, possible cooperation options along major maritime routes can be surveyed.
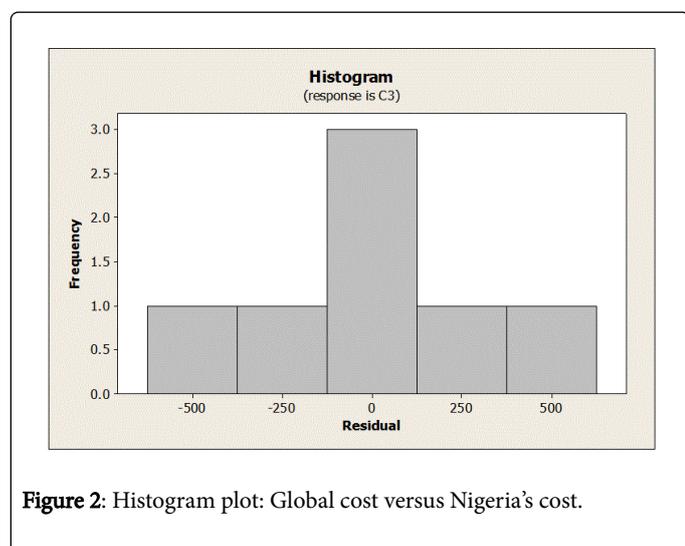

Figure 2: Histogram plot: Global cost versus Nigeria's cost.

The objective is to create maritime superiority along the chosen maritime trade route. This will usually require the presence of naval fleets with attached air base that constitutes a sea-shield in the given area. With such re-enforcements, joint logistics equipment re-engineering sponsored from international cooperative sources, the issue of threatened maritime domains will soon be eliminated. By joint equipment re-engineering, we refer to technology, transfers from the world's most advanced nations to coastal countries classified as worst affected threatened maritime domains. The forms of technology transfer will range from naval equipment transfer to naval logistics training in the area of joint logistics operations.

Anti piracy operational design: capturing achille's ship

The vessels / boats used by pirates in their surprise attacks on innocent merchant fleets plying the Somalia maritime domain form the Achilles' ship in our operational design. The striking powers of these vessels or crafts are critical capabilities that must be overcome by any anti-piracy operation put in place in the region. They are thus a source of strength to the enemy (i.e. pirates). This time around, and as such can be regarded as a centre of gravity. A potential threat or C.G. can be turned into a C.V through direct attack of the C.G, through a decisive act. The decisive act in this case should be joint operations attack on the pirates. In such an operation, use should be made of long range air strikes against a detected enemy (pirate vessel). Again the enemy's food and logistics resupply channel should be attacked or captured. This will crush the capability of the enemy (pirates). A

superior joint operations water vessel with air and sea fighting capabilities should be deployed for anti-piracy operations in this region [7].

Anti-piracy operational design: maritime domain surveillance: Nigeria and west africa

Appropriate electronic monitoring through satellite, of the activities on the affected maritime domain with a view to identifying and stopping pirate operations is hereby recommended for Nigeria and West Africa's maritime domain. This should be extended to Nigeria and other threatened maritime domains where piracy and stealing from mariners take place. Safe maritime domain should be made to exist in the Gulf of Guinea, through joint effective maritime surveillance by a regional coastguard. Nigeria operates a joint task force in the hinterland. Extended help should be given to this joint task force to give them maritime capability. This way, they will be useful in crushing the enemy's (pirate's) critical capabilities.

Anti piracy operational design: destroying the enemy's will power

The will power of the pirates, form a source of strength to their several vices. In this sense if this strength source is diminished, the pirates will be forced to submit without giving a fight. Instruments used in destroying the will power of the enemy in this sense ranges from the offer of amnesty or forgiveness of previous offenses preaching of the Christian gospel, to reform the character of the pirates while passing through reformatory activities, provision of free training to those who accept government's offer of amnesty and payment of monetary stipends to these fellows. This approach has worked successfully in Nigeria against Niger Delta militants.

The sea shield model for Nigeria's and the entire West Africa's coastal security

This model is drawn from the United States sea shield model which emphasizes America's presence in coastal waters. A good example is the Gulf Cooperation Council Peninsula shield created in 1986.his type of shield is being proposed in this paper for Nigeria and the entire West Africa's waterfront. Just like the GCC peninsula shield a joint force comprising of tripod forces of the Army, Navy and Air force from all West African states should be pulled together as a joint force to shield a common West Africa's waterfront beginning from Nigeria. Nigeria being the state with the richest offshore zone should serve as base for this joint force.

In support of the proposal for Nigeria to serve as base for West Africa's joint water patrol force, we have presented a terminal facility cluster of Nigeria's oil terminals. Nigeria's onshore and offshore terminal facilities are the largest in Africa. Besides Nigeria is also the leading subsea investment market in the whole world. With all this in mind, leaving West Africa's exclusive economic zone unprotected remains a global security risk. This model therefore seeks to improve Nigeria and West Africa's security rating in the world just as West Africa has just been rated as the world's richest subsea sector. Table 5 shows Nigeria's oil terminal facilities together with their export values in million tons for the year 2003. The values were used as a proxy for the creation of cluster relationships in Nigeria's export facility sector.

The development of the cluster relationship using the data from Table 5 is represented in Figure 3. Thus said, Figure 3 shows the cluster
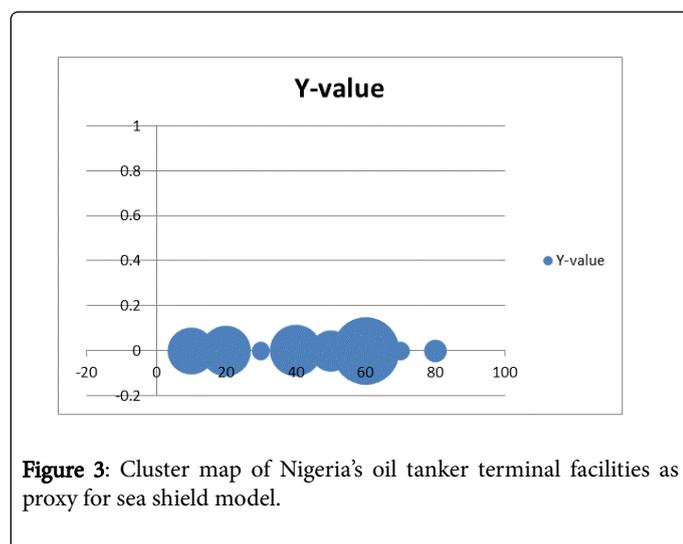
map of Nigeria's oil tanker terminal facilities applied as proxy for the development of an active sea shield in West Africa's geopolitical zone.

X-Values	Y-value	Size
10	Escravos13	13
20	Forcados15	15
30	Pennington 1.9	2
40	Bonny 16	16
50	Brass 9.7	10
60	Qua Iboe 27	27
70	Antan 1	2
80	Odudu 3	3

Table 5: 2003 Oil terminal crude export from Nigeria in million metric tonnes from terminals.

From the cluster map presented, Qua Iboe terminal in Nigeria operated by ExxonMobil, Nigeria stands out as the largest offshore base in Nigeria. This is followed by Bonny in Portharcourt Nigeria constituting the second largest cluster.

Next in line is the Escravos–Forcados cluster a combination that almost equals the Qua Iboe cluster. Building West Africa's security shield from these bases will make sense considering the new spate of piracy and crude stealing in the region. This paper therefore calls for an outright formation of West Africa's Sea shield starting from these locations.

Figure 3: Cluster map of Nigeria's oil tanker terminal facilities as proxy for sea shield model.

In addition to handle incident port security requirements of the merchant port sector, a mobile sea base force should be constituted in three separate sectors of West Africa's exclusive economic zone beginning from Nigeria. These should be named in the following order, West Africa, Central West Africa and East West Africa, each serving different frontiers of West Africa's port gateways.

Conclusions

A security model for threatened maritime domains applying the joint logistics approach has been suggested in this work. A sea shield model was suggested applying cluster analysis of the region's largest oil terminal location for three highest concentrations of oil terminals in the region using a combined West African joint force. Also suggested is the institutionalization of a three tier sea bases to be located in the east, central and most west parts of West Africa to handle port security issues, hot pursuit issues together with the sea shield.

A re-engineering of the present logistics operations methodology was suggested for world's most advanced nations involved in anti-piracy activities in the world's maritime domains.

Superiority of the security outfits of nations involved in anti-piracy activities was emphasized. A joint sea and air logistics combination was deemed to produce superior maritime effects.

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