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MARINE TRANSPORTATION ON OIL AND GAS PROJECTS IN BONNY ISLAND, RIVERS STATE NIGERIA

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ABSTRACT

The study evaluated marine transportation on oil and gas projects in Bonny Island, Rivers state Nigeria. The specific objectives are to; determine the effect of water depth on the project completion time and ascertain the effect of hinterland connections on the project viability of oil and gas projects in Bonny Island, Rivers state Nigeria. The study adopted the survey method and the sample size for the study was determined using Treks formula and sample size of 277 was selected from a population of 977. The study made use of primary and secondary data sources while primary data were collected through copies of structured questionnaire on a 5 point Likert Scale format while analyses were presented in tables and percentages. The hypotheses were tested using simple linear regression analyses. The study concludes that the importance of marine transportation on oil and gas projects performance justified their importance as a tangible asset in optimizing the upstream, midstream and downstream sectors of oil and gas projects in Nigeria. The findings revealed that water depth to a large extent affected the project completion date ($r = 0.31$; $F = 6.66$; $t = 4.34$; $p < 0.05$) and that hinterland connections to a large extent affected the project viability ($r = 0.48$; $F = 20$; $t = 4.20$; $p < 0.05$) of oil and gas projects in Bonny Island, Rivers state Nigeria. The study recommends among others that project team managers in oil and gas projects should adopt a holistic approach in increasing productivity when the water depth is operationally friendly because of its positive effect on the project completion time of oil and gas projects while Engaging of stakeholders in citing oil and gas projects in locations with multimodal transport facilities should be encouraged because of its positive effect on the infrastructural development of the oil producing communities and overall benefit to oil and gas projects viability.

KEYWORDS: Marine Transportation, Water depth, Project Completion time, Hinterland Connections, Project Viability.

INTRODUCTION

The issue of globalization which has increased interdependence and integration of global economic activities have increased in recent years and it has challenged the various sectors of the economy including the transportation sector to constantly continue to evolve and adapt to obvious changes in the movement of goods and services. This process manifests itself mainly at the national and intercontinental levels especially in the marine transport and distribution of oil and gas products over long distances more efficiently in terms of duration and costs of transport and, at the same time, with reduced negative implications on the environment. The transportation mode for which a balance is achieved in relation to the limitations above mentioned is shipping, but it requires very good connections with continental modes, namely road transport and rail transport while major attention is given to the development of transport corridors (Sorin, Gabriela and Viorel, 2014).

The issue of maritime transportation of goods and services with the risks they pose has gained more attention in comparison with recent past and it has become one of the most important issues in today's environmental and transportation literature, which requires close scrutiny with great emphasis on sound and proactive risk management, mostly due to increasing global demand for crude oil and petroleum products as well as a consequent worldwide increase of tanker traffic (Iakovou 2011). Marine transport of goods and services has shared a percentage of accidents with fatalities compared to other modes of transport, especially when the goods and services involve the subject of oil and gas (Romer, Haastrup et al. 2005).

The relation between transport costs and transport speed especially, should receive serious consideration when choosing a suitable transport modality. From the European point of view, the goal is to reduce the road transport congestion, for transport to become less polluting and to have low energy consumption. A few examples of modern transport types therefore are: large scale transportation (carrying) of containers by rail or by inland water (shuttles); combination of Rhine ships, suitable for container transport, container shipment via inland terminals, for combined transport, Roll in /Roll out (Ro/Ro) operations over inland waters to transport motor vehicles, agricultural vehicles and heavy loads; also in combination with ferry operations over sea, carrying of trailers and so-called "swap-bodies" (freight unit, not to be piled) via railway and combined transport and launching of coastal trade liners for door to door carrying over sea and inland waters for oil and gas operational projects (CRFFN, 2012).

A critical assessment of our environment in Nigeria and the Niger Delta region show various uncompleted, abandoned and aborted projects in various forms, shapes and sizes belonging to the oil and gas industry affected by poor marine transport logistics. Some have lasted for years while such sites are now very environmentally unsafe with their consequential hazard to their environment. Scarce financial resources that have been invested continue to decay with no hope of

completion and no specific completion date or hope of resuscitation in view. This study intends to find solution to this trend that is negatively affecting the oil and gas industry in Nigeria.

CONCEPTUAL REVIEW

Concept of Marine Transportation

Marine transportation is an important support system for national and international movement of goods and services through the sea and waterways which supports industrial production materials, promoting economic development, guaranteeing military security as well as source of movement of logistics in the oil and gas sector of the economy. The international transportation of crude oil is anchored on marine transportation which is the framework for the large volume and long distance transportation of oil and gas which has tremendously improved international economic cooperation in crude oil resources (Wan and Chen, 2018).

The United Nations has issued an estimation of 1.8749 billion tons of seaborne trade of crude oil Worldwide in 2017. Baltic Exchange Dirty Tanker Index (BDTI) is one of the foremost indicators reflecting the existing circumstance and tendency of the crude oil marine transport system. The longtime effect is a combination of external environment and internal supply/demand relationship. BDTI fluctuates intermittently depending on circumstances and economic situation globally. The aftermath of the global financial crisis of 2008 affected the BDTI of marine transportation. BDTI of the ship route from Middle East to the United States of America dropped from 174.23 in January to 47.29 at the end of that year. The oil spill accidents that occurred in the Gulf of Mexico in 2010 and the Bohai Gulf of China in 2011 attracted great social attention which contributed to an increased demand for imported crude oil in the United States of America and China thereby indirectly increasing BDTI (UNACTAD, 2018). A few examples of modern maritime transport types therefore are: large scale transportation (carrying) of containers by rail or by inland water (shuttles); combination of Rhine ships, suitable for container transport – trucks – railways, container transshipment via inland terminals, for combined transport, Ro/Ro operations over inland waters to transport motor vehicles, agricultural vehicles and heavy loads; also in combination with ferry operations over sea, carrying of trailers and so-called “swap-bodies” (freight unit, not to be piled) via railway and combined transport, launching of coastal trade liners for door to door carrying over sea and inland water (Lam, and Wong, 2018).

Maritime Industry in Nigeria

The social needs for maritime transport has to do with how it helps in solving human problems, especially with regard to operational industry modalities, recreational transformational Linkages and business transactional exchanges, as well as the movement of goods and services across African Continental borders within the operational confines of the law that has to do with fraudulent sharp practices, industry negative vices syndrome narratives and operational abuses that are second to none as the case may be, of which Nigeria cannot be insulated from it. This is because; the industry lacks the fundamental intellectual and knowledge-based skills of needed workforce that can obviously matching the ever-increasing demanding tasks of the industry at Large. Inland waterways are made up of navigable rivers, lakes, creeks, lagoons and canals (Ekpenyong 2018).

The movement of goods and services along inland waterways is one of the oldest means of transporting goods and services from one point to another. This was largely since inland water transportation offers the most economical, energy efficient and environmentally friendly means of transporting all types of cargoes from place to place. It also offered safe and cheaper transportation in areas with watercourses. Obviously, the economic development of most developing nations of Africa, Nigeria inclusive, should reflect in the development, organization, coordination and management of this sea-borne trade, which is critical and cardinal to the development of international trade with other nations of the world. This is because, maritime transport services duly serve as the propelling anchor and evolving force for the survival, hence, the formulation of execution of policies that disrupt the efficient running of this vital sub-economic system globally, will affect the efficiency and well-being of the enlarged society as well as the people (Ndikom et al, 2017).

Nigeria is a major international trading nation in Africa, exporting large quantities of hydrocarbons to earn substantial revenue which accrue from crude oil export and are used mainly to fund huge trade in imports. Maritime transportation in Nigeria represent a complex structure in the country's transportation system in many ways for it provides a number of inter related and inter connected activities such as ship- harbor that is pilotage, dredging, provision of berth, maintenance of navigable channels, stevedoring etc., there is also ship port interface loading and unloading of cargoes, freight and services and port land interface delivering cargo to and from the connected hinterland. These different functions require different strategies, approaches and organizations. However, their relationship must be seriously considered in Maritime Transportation Policy and Planning responses (Chijioke, 2014).

Hence, the efficiency or inefficiency of the maritime sector affect profoundly the cause of import as well as the competitiveness of export. Furthermore, directly and indirectly, the maritime transport sector is a large employer of labour both skilled and unskilled. However, if indirect employment generated through the maritime sector such as insurance, customs, haulage, clearance and logistics, storage, free zones activities, sorting out the incoming and outgoing cargo, industrial and other value-added activities are considered. In view of the above, Nigeria has a great potential for an extremely buoyant maritime industry and to enjoy these benefits, it is vital that the Nigerian maritime transport system operate efficiently and resourcefully (Badejo, 2014).

Prospects of Maritime Industry in Nigeria

Government Establishment of Maritime University Institutional Programmes: Government recent effort in funding establishments of four departments of maritime technological programmes in Universities in Nigeria is a welcome development and something of commendation. Some of the Universities that benefited from this recent government intervention (through the grace of Nigerian Maritime administration and Safety Agency-NIMASA), in maritime programmes are University of Lagos, University of Nigeria, Nssuka, Niger Delta University Bayelsa and Babangida University of Technology. This type of intervention by government will enhance the development of maritime studies and also improve man power development in this critical and all-important industry (Ekpenyong 2018). It will also raise the operational performance and efficiency of the industry and the economy at large. Obviously, the recent and current efforts of governments through the

instrumentality of office of both the Senate and house of Representatives in passing at both chambers the bill for an Act to establish and subsequently passed into Law and confirmed the former Maritime Academy Oron as a Federal University on Maritime technology Oron and that of Maritime University of Technology Okerekeko in Delta State is a very right steps in ensuring a sustainable developments of quality and credible Manpower that will help in moving the industry forward and elicit clear developments strides as marching the yening of the industry demands at the end of the day (Ndikom, 2015).

Water depth

Water depth is of utmost importance to a sea port, considering in particular the possibility to accommodate the ever enlarging vessels. All the major sea ports in the world, without exception, either enjoy natural deep water, or undertake the deepening of channels on a regular basis by dredging or by constructing the locks. It is also obvious among the sea ports that water depth is becoming the decisive element in the port competition. For example, the port of Rotterdam is a natural deep sea port. The 1150 meters of deep sea quay, at a depth of 20 meters water allows it to accommodate the largest container vessels to date. The quay that was specially constructed for inland shipping and short sea transport is 550 meters in length and 11 meters deep. With its own rail terminal, the facility is connected to the Betuwe Route. The port of Shanghai, limited by the water depth in the city area, has invested billions of dollars in constructing a deep sea port that is 33km away from the mainland, which is connected only by a cross-ocean bridge (CRFFN, 2017).

Hinterland Connections

Hinterland connection is another important element that determines the competitiveness of a sea port. Hinterland connections mean the possibilities of sea cargoes arriving from the sea-going vessels being further transported to destinations by another mode of transport, i.e. road, rail or inland waterway, or vice versa. When speed and reliability is a major concern in the competition among sea ports, and between sea transport and other modes of transport, the competitiveness of the port is often, and to a large degree, subject to the availability and efficiency of the hinterland connections (UNACTAD, 2018).

Theoretical Framework

Performance Theory of Organizations

The Performance theory of Organizations was propounded by Don Elgar at the University of Idaho in 2007 was initiated to form a framework that can be used to explain performance improvements. Elgar (2007) submits that for organizations to perform optimally, it must involve the production of valuable results to all stakeholders. In line with the theory, a performer can be an individual or group of people engaging in a collaborative effort. Organizations that crave for improved performance must initially seek for valuable information and generate competitive intelligence on those organizational variables that are rationally related to performance.

The theory of performance has a high value and worth for organizations that engage in the act of competitive intelligence that brings about an increased organizational performance. In the view of Elgar, worthy accomplishments are produced from high level performance. The theory of performance is very useful in exploring a manager who advances in his level of achievements. As a

manager enhances level of performance, he is able to organize people and resources more effectively and achieve high quality results in a shorter time with a positive effect and influence on the attainment of organizational set goals.

The study is anchored on the performance theory of organizations by Elgar (2007). The theory submits that organizations that attains a higher level of performance produces results such as; increase in the quality of products and services, decrease in operational and production costs, increase in capability, increase in knowledge, increase in skills, increase in identity, influential among competitors and motivation. The theory re-affirms that the performance of an organization is largely dependent on its ability to optimally utilize human skills and abilities.

METHODOLOGY

The study adopted the survey method and the sample size for the study was determined using Treks formula and sample size of 277 was selected from a population of 977 workers that were selected using purposive non probability random sampling of workers in the two Nigeria Liquified Natural Gas trains and three Engineering, Procurement and Construction (EPC) contractors located in Bonny Island Rivers State, South-South, Nigeria. The study made use of primary and secondary data sources while primary data were collected through copies of structured questionnaire on a 5 point Likert Scale format while analyses were presented in tables and percentages. The hypotheses were tested using simple linear regression analyses while the Cronbach Alpha reliability test was utilized to conduct the reliability test where Cronbach Alpha reliability coefficient of 0.70 and above was considered acceptable.

Analyses and Findings

Distribution and Return of Questionnaire

Samples of 277 copies of questionnaire were administered to the workers of the two NLNG Limited trains and three EPC contractors. Two hundred and sixty five copies (265) representing (95 %) were completed and returned while 12 copies representing five percent (5%) of the copies of questionnaire were not returned or dully completed.

Descriptive Analyses of Research Questions

Research Question One

To what extent does water depth affect the project completion date of oil and gas projects in Bonny Island, Rivers State?

Analysis of research question one revealed that out of 265 respondents, 241 (90%) of the respondents indicated strongly agreed, 24 (10%) of the respondents indicated agreed, none of the respondents indicated undecided while none of the respondents indicated strongly disagree or disagree. This proves that water depth positively affects the project completion date of oil and gas projects in Bonny Island, Rivers State.

Research Question Two

To what extent does hinterland connection affect the project viability of oil and gas projects in Bonny Island, Rivers State?

Analysis of research question two revealed that out of 265 respondents, 210 (79%) of the respondents indicated strongly agreed, 53 (20%) of the respondents indicated agreed, 2 (1%) of the respondents indicated undecided while none of the respondents indicated strongly disagree or disagreed. This proves that hinterland connections positively affect the project viability of oil and gas projects in Bonny Island, Rivers State.

Hypotheses Testing

The hypotheses proposed in the chapter one were tested with appropriate test statistics with the help of a computer based application known as Statistical Package for Social Sciences (SPSS). Hypotheses 1 and 2 were tested using linear regression analysis.

Hypothesis one

H₀: Water depth does not positively affect the project completion date of oil and gas projects in Bonny Island, Rivers State

H₁: Water depth positively affects the project completion date of oil and gas projects in Bonny Island, Rivers State

Table 4.8: Descriptive Statistics

	Mean	Std. Deviation	N
Deep water depth aids the sailing of large vessels	4.68	.46618	265
Shallow water depth distorts flow of Very large sea going vessels	4.65	.47574	265
Tidal waves affects project critical path analysis	4.80	.41010	265
Water depth is a critical success factor in project delivery in the oil and gas sector.	4.52	.52957	265

Table 4.8.1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of The Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig.F Change	
1	.305 ^a	.093	.079	1.03114	.093	6.661	4	260	.000	.311

a. Predictors: (Constant), item4, item2, item 1, item3

b. Dependent Variable: Project completion date

Table 4.8.2: ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	28.330	4	7.083	6.661	.000 ^b
1 Residual	276.447	260	1.063		
Total	304.777	264			

a. Dependent Variable: Project completion date

b. Predictors: (Constant), item4, item2, item1, item3

Interpretation

Hypothesis one was tested using linear regression analysis to determine the effect of water depth on the project completion date of oil and gas projects in Bonny Island, Rivers State. The regression sum of squares (28.330) is less than the residual sum of squares (276.447), which indicates that more of the variation in the dependent variable is explained. The significance value of the F statistics (0.000) is less than 0.05, which means that the variation explained is not due to chance. R, show the degree of relationship between independent variable water depth and dependent variable project completion date. The result shows that water depth to a large extent affects the project completion date of oil and gas projects in Bonny Island, Rivers State. Since the p value 0.00 is < 0.05 we reject the null hypothesis. Hence; Water depth positively affects the project completion date of oil and gas projects in Bonny Island, Rivers State.

Hypothesis two

H₀: Hinterland connections do not positively affect the project viability of oil and gas projects in Bonny Island, Rivers State

H₁: Hinterland connections positively affect the project viability of oil and gas projects in Bonny Island, Rivers State

Table 4.9: Descriptive Statistics

	Mean	Std. Deviation	N
Multiple transport access aids oil and gas project infrastructural development.	4.41	0.50	265
Multiple transport access improves host community economy	4.44	0.54	265
Abandoned projects are reactivated and completed with unhindered hinterland connections	4.90	0.30	265
Project viability of oil and gas projects prosper with efficient hinterland connections	4.20	0.49	265

Table 4.9.1: Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig.F Change	
1	.700a	.490	.482	.77340	.490	62.384	4	260	.000	.660

a. Predictors: (Constant), item 12, item1 1, iteml0, item9

b. Dependent Variable: Project Viability

Table 4.9.2: ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	149.259	4	37.315	62.384	.000 ^b
1 Residual	155.519	260	.598		
Total	304.777	264			

a. Dependent Variable: Project Viability

b. Predictors: (Constant), iteml2, iteml 1, iteml0, item9

Interpretation

Hypothesis two was tested using linear regression analysis to explore the effect of hinterland connections on the project viability of oil and gas projects in Bonny Island, Rivers State. The regression sum of squares (149.259) is less than the residual sum of squares (155.519), which indicates that more of the variation in the dependent variable is explained. The significance value of the F statistics (0.000) is less than 0.05, which means that the variation explained is not due to chance.

R, show the degree of relationship between independent variable hinterland connections and dependent variable project viability, indicates that there is a significant relationship between hinterland connections and project viability. The result shows that hinterland connections positively affect the project viability of oil and gas projects in Bonny Island, Rivers State. Since the p value 0.00 is < 0.05 we reject the null hypothesis and accept the alternate hypothesis. Hence; Hinterland connections positively affect the project viability of oil and gas projects in Bonny Island, Rivers State

CONCLUSION AND RECOMMENDATIONS

The conclusion of the study is that the objective of the research which was aimed at examining marine transportation on oil and gas projects in Bonny Island, Rivers state Nigeria was achieved at the completion of the study. Though there could be some other issues that were not revealed that

could be analyzed on the effect of marine transportation on oil and gas projects, the data from the questionnaire were explicitly in favour of the two objectives that were studied. It has become imperative to highlight the role of marine transportation as a key success factor for the sustainability of oil and gas projects in Nigeria. The study justified the imperatives of marine transportation on oil and gas projects which is a tangible asset in managing the upstream sector of the oil and gas industry in Nigeria. The variables of marine transportation studied include; water depth and hinterland connections, were positive and significant in the oil and gas projects induced proxies of project completion date and project viability of the oil and gas projects studied.

Based on the findings, the study hereby recommends that project team managers in oil and gas projects should adopt a holistic approach in increasing productivity when the water depth is operationally friendly because of its positive effect on the project completion time of oil and gas projects. Finally, engaging of stakeholders in citing oil and gas projects in locations with multimodal transport facilities should be encouraged because of its positive effect on the infrastructural development of the oil producing communities and overall benefit to oil and gas projects viability.

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