

PETROLEUM SERVICE PROJECTS IN THE GULF OF GUINEA

A Record of Study

by

KENNETH CHUKWUMEKA KEN-WORGU

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF ENGINEERING

August 2011

Major Subject: Engineering

Petroleum Service Projects in the Gulf of Guinea

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August 2011

Major Subject: Engineering

ABSTRACT

Petroleum Service Projects in the Gulf of Guinea.

(August 2011)

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The goal of this record of study is to examine the major facets involved in managing several petroleum service projects located in three different countries in the Gulf of Guinea simultaneously, while effectively engaging in business development activities for the Oil and Industrial Services Group (OIS). This work also furnishes adequate background on related subject matters to enable understanding of the projects presented. The petroleum services sector is the back bone of the oil and gas industry. Services companies are vital to the success of all petroleum and energy producers in the USA, the Gulf of Guinea and the world. There is a need and demand for these service companies because they play various roles such as logistics, drilling, construction, dredging, pipe laying, procurement, food supply, human resource supply, etc.

The Gulf of Guinea comprises of countries from west and central Africa. This project was limited to Nigeria, Equatorial Guinea and Cameroon. This area holds the largest petroleum reserves in Africa and plays a vital role in the global supply of petroleum. The

Oil and Industrial Services Group (OIS), plans to establish herself as one of the leading petroleum service companies in this gulf. To manage this expansion, I have taken the role of Gulf of Guinea manager to apply my background as a petroleum engineer as well as my business skills to build a successful division of the company.

This work provides a record of study of the management of services, projects and contracts carried out by the OIS group in the gulf of Guinea. The following are the specific projects in the Gulf of Guinea that I participated in: Managing delivering, maintenance and marketing of offshore vessels, Offshore pipe laying project, Integrated pipeline maintenance project, Development a petroleum technical training facilities, Agbami pipe insulation project, Engineering lift project and Capital budgeting analysis for potential investments.

The details of the specific tasks of the job, including objectives, description, managerial role, nontechnical aspects, approaches, information sources, discussions and contributions are projected in the body of this literature.

DEDICATION

I dedicate this work and all future efforts to God. I hope that God will accept my record of study. I pray that God blesses me, my family and loved ones through this record of study. I also pray for the favor of God in all related activities. God bless all the readers of this project.

ACKNOWLEDGEMENTS

First, I thank God, who has enabled me to succeed in all my life endeavors, especially the challenges of graduate work.

This research is a part of my learning experience in Petroleum Engineering. This process was facilitated, largely by the valuable counsel, support and guidance of my academic advisor, Dr. John W. Lee, to whom I am especially grateful.

I would also like to thank Dr. Maria Barrufet, Dr. Jerome Schubert, Dr. Larry Gresham, and Raymond Kasper for their valuable input in this project. I would also like to thank Matthew Pariyothorn and Dr. Robin Autenrieth for their input in my academic development. I am grateful for the constructive discussions of my class mates and work colleagues.

I would not be where I am today without the love and support of my parents, Ken and Betty Worgu, my brother, Donald, my sisters, Victory and Winnie and the rest of my extended family.

I also would like to appreciate Admiral Inocensio Ngomo Ondo, Oscar Ondo Ngomo and family, Valentin Ela Maye Mba and family for all their love and support.

Lastly, I appreciate my friends and loved ones, I have you all in my heart and I am thankful for your love, help and support.

NOMENCLATURE

ADV	Annual Depreciating Value
BOP	Blow Out Prevention
CAM	Cameroon
CEO	Chief Executive Officer
CNL	Chevron Nigeria Limited
D	Day
DPR	Directorate of Petroleum Resources
DWT	Dead Weight Tonnage
E&P	Energy and Petroleum
EG	Equatorial Guinea
EGLNG	Equatorial Guinea Liquefied Natural Gas Company
FPSO	Floating Production Storage and Offloading Vessel
GMD	Group Managing Director
GOG	Gulf of Guinea
KRW	Korean Won
KW	Kilowatts
LNG	Liquefied Natural Gas
TAMU	Texas A&M University
MMIE	Ministry of Mines, Industry and Energy
NIG	Nigeria

NNPC	Nigerian National Petroleum Corporation
NPV	Net Present Value
OIS	Oil and Industrial Services Company / Group
P	Pressure
PB	Payback Period
PEE	Petroleum Economic Evaluation
PTDF	Petroleum Technological Development Fund
PV	Present Value
ROV	Remotely Operated Vehicle
SPDC	Shell Petroleum Development Company
T	Time
USA	United States of America
USD	United States Dollar
VP	Vice President

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CHAPTER I

INTRODUCTION

The petroleum services sector is the back bone of the oil and gas industry. Services companies are vital to the success of all petroleum and energy producers in the USA, The Gulf of Guinea and the world. There is a need and demand for these service companies because they play various roles such as logistics, drilling, construction, dredging, pipe laying, procurement, food supply, human resource supply, etc. The goal of this record of study is to examine the major facets involved in managing several petroleum service projects located in three different countries in the Gulf of Guinea simultaneously, while effectively building a successful division of the Oil and Industrial Services Group (OIS) and engaging in important business development activities for the company.

This work provides a record of study of the management of services, projects and contracts carried out by the OIS group in the Gulf of Guinea. This record of study reiterates the final objectives of the job of Gulf of Guinea manager. This chapter provides a brief background of the petroleum industry and the industrial sectors, the importance of the service industry, Oil and Industrial Services group as an oil service group and the significance of the Gulf of Guinea.

This record of study follows the style of *SPE Journal*.

1.1 The Petroleum Industry

Oil and Natural gas serve as the main fuel source and chemical raw materials used by people, companies, firms, institutions and governments around the world. The petroleum industry includes all the steps and facets used to discover, produce, process, transport and market oil and natural gas. The industry can be divided into five main branches; upstream, downstream, pipeline, marine and service & supply (API, 2011).

1. Upstream

The upstream petroleum industry includes the geology activities, exploration activities, drilling activities and production activities of oil and natural gas. From the point of discovery of the petroleum reserve to the point where the oil is transferred by the exploration and production company to the new owner of the crude oil or natural encompasses the upstream petroleum industry.

2. Downstream

The downstream petroleum industry includes the refining, transportation and marketing of petroleum and petroleum products. From the point where the oil is transferred by the exploration and production company to the new owner, to the point where the petroleum product reaches the customer or consumer encompasses the downstream petroleum industry.

3. Pipeline

The pipeline industry includes all the pipelines, pipe related activities that move crude oil and natural from well heads and platforms to collection terminals where the assets are released to their new owners.

4. Marine

The marine industry includes port operations, offshore fire fighting, sea and ocean transportation and oil spill response. Oil tankers, ships, boats, barges, vessels, etc are included in this industry (API, 2011).

5. Service and supply

The service and supply industry includes engineering, equipment, supplies, support and design for oil production, exploration, drilling, refining, and operations. The role of an oil service company is to provide a full complement of services, equipment, personnel, support and technology within their area of expertise to the operating oil and gas companies on a worldwide basis (Maier, 1988).

1.2 Importance of the Petroleum Service Industry

There has been exponential growth in the petroleum demand over the last one hundred years. In this present century, a greater number of production investments will be needed to satisfy increasing worldwide demand for oil and gas. Petroleum service companies are set up to satisfy the needs of the oil and gas industry. Service companies offer engineered, cross disciplinary and integrated solutions, customized to fit the specific needs of the oil company (Solberg and Grijalva, 2000). The Petroleum Service Industry encompasses all the related activities that enable upstream companies to discover oil, transport it through pipelines or marine vessels to the downstream companies and divisions, who then deliver it to the consumer. Oil companies are increasingly efficient in their activities by making use of contractors and outsourcing specialized task to service companies who are specialized in those areas. In the petroleum industry, about ninety percent (90%) of the work needed are executed by service companies and contractors. Almost seventy percent (70%) of the personnel in the petroleum industry work with or for service companies (Hou et al., 2009). The following are included in the activities of the services companies:

1. Construction
2. Provide services for geology operations.
3. Design of petroleum facilities, processes, equipment, machinery and assets.
4. Problem solving through engineering.
5. Providing, selling or leasing equipment to oil companies or other service companies.

6. Procurement and supplies for the industry.
7. Providing personnel, equipment, technical and marine support to companies operating in the industry.
8. Drilling for oil and natural gas.
9. Providing technical expertise for oil production and exploration.
10. Building, maintenance and enhancing refineries.
11. Supporting oil company operations.
12. Providing human resources for the petroleum industry.
13. Providing health, safety and environmental services to the industry.

Service companies are the pillars of the petroleum industry. In present day, oil companies need service companies during every step of their operation. It is impossible to produce petroleum without service companies.

1.3 Oil and Industrial Services Group (OIS)

The Oil and Industrial Services group was founded in 06 August 1986 as Oil and Industrial Services Limited in Port Harcourt, Rivers State, Nigeria with the goal of total customer satisfaction while preserving the health and safety of people, assets and the environment (OIS_Group et al., 2007). The company was primarily set up as a petroleum service company, with the aim of getting contracts, projects and jobs from all the companies in the oil industry. The company is privately owned, the management is dedicated to the company and employees are technically equipped to handle their work task. The company experienced sizable growth over the years, due to their excellent track record and service quality.

OIS has grown to a group of several companies and divisions that service the petroleum and energy industry, marine industry, sea ports, construction, government institutions, military institutions and any other companies that will hire OIS to execute a project or job. The international nature of the petroleum and energy industry presented the opportunity for OIS to work in several African countries, Europe and the United States of America. The OIS group maintains offices in the United Kingdom, United States of America, Nigeria and Equatorial Guinea. The group is made up of seven different entities that are classified under the following:

1. Marine division
2. Oil and Gas division
3. OIS ports
4. Africa

5. Europe
6. USA & Overseas
7. Gulf of Guinea

The company plans that the Gulf of Guinea division will start out as a subdivision under the USA & Overseas division until there is a reasonable size of business for OIS in the Gulf of Guinea. The Marine division, Oil & Gas division, OIS ports and Africa division have their offices in Warri, Port Harcourt, Lagos and Abuja, Nigeria. The European division has her office in Suffolk, United Kingdom. The USA & Overseas division has her office in Morrisville, PA, USA.

The youth of the Gulf of Guinea division make it a fragile and significant part of the present activities of OIS. The division created a need for the company to hire a well educated manager, who understood business development and petroleum engineering to lead OIS into the Gulf of Guinea and create more business opportunities for the company and expand her operations. I was hired to take on this responsibility and I executed OIS projects successfully. My activities were evaluated and I received positive feedbacks. Figure 1.1 shows the corporate structure of OIS.

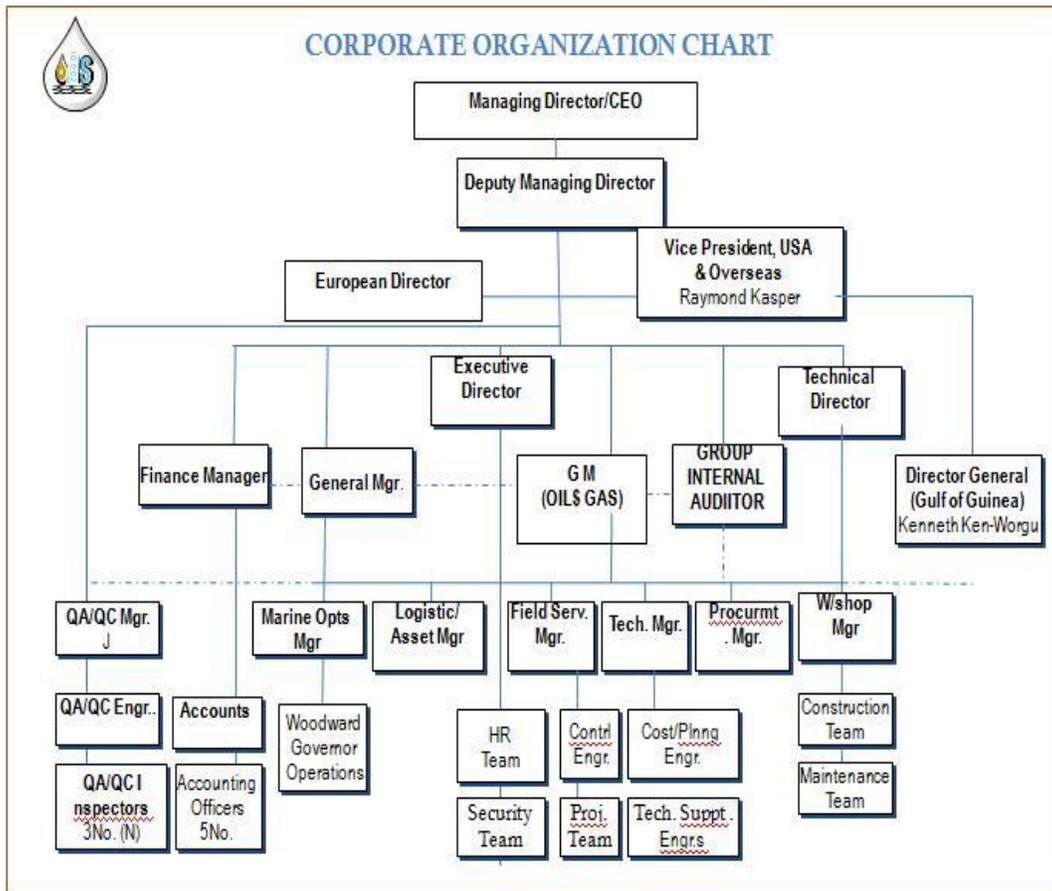


Figure 1.1: OIS Corporate Organizational Chart. (OIS, 2010).

OIS owns modern fabrication workshops, storage depots, heavy machinery, various equipments and a fleet of offshore vessels. A large portion of the company's activities are offshore. OIS vessels convey anchor handling, towing, offshore supply, crew transfer, pipe lay barges, offshore accommodation barges and offshore crane barges. OIS offers several products and services to her customers; which includes field engineering, construction & fabrication, pipe line, offshore services, engine controls, oil & gas institutional services, plant hire, machine shop, Woodward governor services and marine services. The company employs over 400 staff worldwide and services all the major petroleum and energy companies (OIS et al., 2010).

The Oil and Industrial Services group is in a challenging industry where technological advancements and big capital intensive projects dominate the atmosphere. In the presence of these difficulties, OIS performs above the expectations of her board of directors by exceeding profit margins and project volumes. The company plans to expand its operations to attract more business and revenue. The first phase of this expansion is the Gulf of Guinea.

1.4 Gulf of Guinea

The Gulf of Guinea includes the deep waters off countries from west and central Africa: Angola, Benin, Cameroon, Central African Republic, Ivory Coast, Democratic Republic of Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea-Bissau, Liberia, Nigeria, Republic of Congo, Sao Tome and Principe, Senegal, Sierra Leone and Togo (Mane, 2005). This is a large part of the deep waters around the continent. This project was limited to Nigeria, Equatorial Guinea and Cameroon.

The Gulf of Guinea has a tremendous potential to create investment and development opportunities because of its vast wealth of natural resources. The Gulf has an approximate gross domestic product of well over a hundred billion dollars, with exports of over fifty billion and imports of close to forty billion dollars (Mane, 2005). This gulf holds the largest petroleum reserves in Africa and plays a vital role in the global supply of petroleum. This gulf is also significant because a key number of the reserves are considered proved reserves and there are numerous development activities in the area. The recovery ratio in this gulf is believed to be approximately sixty percent (60%) as opposed to about ten percent (10%) in the USA (Dieterich, 2004). Due to the vast amounts of development and projects in the Gulf of Guinea, there is a need for petroleum service companies who can effectively solve various problems for the producing companies in the region.

The oil from this gulf is important because of the following reasons:

1. The shipping routes around the area are absent of shipping blockades and narrow canals. Easy and less costly shipping.
2. The Middle East is continuously unstable.
3. The API gravity of the crude oil in the area exceeds 30 and is often close to 40 degrees.
4. The regions oil contains little sulfur by international standards.
5. Most of the exploration and production in this region are offshore.

(Mane, 2005)

Due to these favorable conditions and vast petroleum resources, OIS predicts that this gulf would be a center point for petroleum investment in Africa. OIS is positioning herself a prominent service company in the region with the formation of her new gulf of guinea division. One advantage for OIS is the proximity of the gulf of Port Harcourt to Malabo and Duala; these are commercial cities where OIS could launch operations, house employees and store her assets.

1.5 OIS Service Projects

OIS has a vast portfolio of contracts being executed by the company for her numerous clients. From May 2010 to May 2011, I worked on seven projects for the company. The following are the specific services contracts in the Gulf of Guinea:

1. Managing delivering, maintenance and marketing of offshore Vessels: Tug Boats, Pipe lay / work / 184 Man Accommodation barge, Brand new Pipe lay / work / 300 Man Accommodation barge and a 4 – point mooring / 50 Man / multipurpose offshore vessel.
2. Offshore pipe lay project
3. Integrated pipeline maintenance project (Niger Delta, Nigeria)
4. Development petroleum technical training facilities in Bonny and Kaduna
5. Agbami pipe insulation project.
6. Lift and engineering job, EGLNG, Equatorial Guinea
7. Capital budgeting analysis for potential investments

These projects are considered successful by OIS. The details of these projects, challenges, and successes are projected in the body of this literature.

By 2008, the Gulf of Guinea had approximately eight hundred (800) fixed platforms, thirteen (13) floaters and over twenty (20) storage and offloading vessels. The region rose from production levels of 3.8 million barrels per day in 2001 to about 6.8 million barrels per day in 2008 (Yates, 2010). These present a great market for a service company to get jobs from the oil companies operating in the region. At the center of this work and the service projects listed above is the Gulf of Guinea manager. I occupy this management role in OIS. The following chapters of this record of study will demonstrate that the objectives of the job were met.

This record of study has nine additional chapters; ten in total. Chapter II shows the two jobs I occupied in OIS from May 2010 to May 2011 and the responsibilities that came with the position of Project Development Manager and Manager of the Gulf of Guinea. The next seven chapters talk about the seven projects I participated in.

Chapter III presents the variety of offshore vessels that work in the petroleum industry and the task of the Gulf of Guinea division is to receive the vessels, make sure they are properly maintained and source work for these vessels to increase the revenue stream. Chapter IV talks about my role in a pipe lay project where OIS uses a pipe lay barge from her fleet of vessels to complete a offshore pipe laying exercise in Cameroon deep waters that lasted from mobilization on the first week of June, 2010 and demobilization on the second week of December, 2010 after the pipe string was abandoned and handed over to the client. Chapter V reiterates the successful project scope analysis and procurement responsibilities for an integrated pipeline maintenance project executed in the Niger Delta. Chapter VI talks about the procurement activities

necessary for the components needed to equip two petroleum training facilities in Bonny and Kaduna, Nigeria. Chapter VII talks about the successful installation of the Envirocage pipe installation test run on the Agbami FPSO. Chapter VIII describes the sources and bidding process involved in an upcoming lifting and engineering project for EGLNG. Chapter IX give the capital budgeting analysis for a pipe lay vessel, a drill ship, an oil tanker and an offshore floating crane.

Chapter X summarizes the entire record of study, concludes the record of study and gives some recommendation for the future. Also the references, showing all the sources of information in this record of study are included. Lastly included are the appendix sections showing additional material and job implications.

CHAPTER II

JOB PROPOSAL AND FINAL OBJECTIVES

This chapter explains my job in detail. On April 15th 2010, I was offered a position in Oil and Industrial Services group (OIS). The job title was Project Development Manager. I reported directly to Raymond Kasper, the vice president in charge all OIS operations in the USA and overseas. I worked in this position from the 15th day of May, 2010 to the 30th day of August 2010.

While I worked as Project Development Manager, OIS was finalizing plans to establish a new division. This division will be called the OIS Gulf of Guinea division and will span the deeps waters in the gulf of guinea. The area is very promising and abundant with deep water reserves. The group is positioning for the future potential increase in petroleum activities in the gulf. Upon creating this new division the company needed a bright and capable manager to lead to new division to success.

I applied for the new job of Gulf of Guinea division manager, interviewed and was selected for the job. On the 30th day of August 2010, my first job was over. My role as Gulf of Guinea division manager began on the same day.

This chapter also highlights the descriptions of the two engineering management roles I occupied in OIS. The first section is the initial job proposal submitted to the office of graduate studies. The second section is revised final job objective as required by the program.

2.1 Job Proposal

The following is a description of the first job of Project Development Manager. The job is offered by Oil & Industrial Services Group. The company is all about services, quality and great talent. The job requires a well qualified engineer to effectively blend engineering and management in the oil service industry. The job gives great opportunities to develop and work on international projects. This position provides risk and valuation assessments and reports to the Vice President of OIS with functional support from the OIS global team.

This section contains the following:

1. Job details
2. Accountabilities of the job
3. Key dimensions of the job
4. The key relationships that exist with the job
5. The qualifications necessary to perform the job

2.1.1 Job Details

The following are the details of the job. The title of the job, sector, location and job supervisor are listed below. The job type says worldwide because I worked with the Nigerian office of the company and the job entailed a lot of traveling.

Job Title:	Project Development Manager
Company:	Oil & Industrial Services Group
Sector:	Petroleum
Business / Project:	Development
Job type:	Full Time Regular (WORLDWIDE)
Location:	USA, Nigeria, Cameroon, Equatorial Guinea
Supervisor:	Raymond Kasper (Vice President)

2.1.2 Accountabilities of the Job

The following are my key responsibilities and accountabilities of the job. This section acted as a guideline for my activities during the first four months on the job. I reported directly to Raymond Kasper; who made sure that paid attention to my responsibilities.

Below is a list of my responsibilities as the Project Development Manager in OIS:

- Participated in petroleum and natural pipe network design.
- Participated in managing integrated pipeline project.
- Participated in managing Chevron Nigeria Limited (CNL) offshore platform upgrade.
- Participated in managing Chevron Nigeria offshore contracts.

- Participated in refurbishment and upgrade of marine vessels.
- Supervised equipment procurement and fitting.
- Managed supply and procurement contracts.
- Identified and pursued new project and engineering opportunities.
- Located and modified or build appropriate economic models.
- Ensured that all corporate policies were followed as appropriate to the job task.
- Ensured that the project schedule and cost assumptions used in the economic model were consistent with that reported by the functions.
- Worked with the pre-development Evaluation team to narrow development concepts.
- Ensured that all appropriate technical and commercial risks were addressed in the evaluation for the current stage of project understanding.
- Prepared the evaluation in a format that was consistent with global OIS evaluation standards to ensure all projects were measured on an equal basis.
- Present output results in a clear and concise manner to convey the key valuation drives.
- Contribute to documentation and reporting.
- Manage teams and staff

2.1.3 Key Dimensions

To achieve high performance, I coordinated with all disciplines to ensure all data submitted by the other disciplines are consistent with the development scenarios chosen. In addition, evaluation engineers analyzed the results in collaboration to help ensure project optimization. I provided risk and evaluations assessments for projects located in different international locations within OIS's global exploration and appraisal portfolio. I used my knowledge of engineering systems, know-how, and experience of the in-house engineering community.

2.1.4 Key Relationships

This subsection describes the people and team I had to work with in OIS. The company is made up of several departments, teams and division. In many projects we all worked together to get the job done. I was responsible for the following:

- I worked on projects stewarded by a pre-development evaluation lead (coordinator), who will be selected from the engineering disciplines within the team.
- I engaged and managed functional support for all needed additional internal resources: (Marketing, Legal, Tax, and Land and Upstream Agreements).
- When building new economic models, I worked with senior negotiators to ensure all aspects of the operating agreement and fiscal terms are included in the economic model.

- When assuming the evaluation lead role, I worked with all team supervisors as well as engineering team leadership.
- I worked with the assigned project coordinator or Exploration group planner to prepare information for the yearly strategic plan.
- I worked with the Global Petroleum Economic Evaluations (PEE) team to improve global evaluation processes and evaluation tools. I interacted with multi-disciplined team members to deliver an integrated project plan for project development.
- I worked with central engineering and project management to share important lessons learned and to ensure that company policies, practices and standards are applied and maintained.
- I had frequent contact with the Fabrication and Marine departments.

2.1.5 Job Qualifications

This section portrays the qualifications needed for the job. My qualifications enabled me to be effective in the job as an engineer and as a manager. The following attributes qualified me to perform the job of Project Development Manager in the Oil and Industrial Services group:

- 4 plus years of experience within the petroleum industry.
- Experience preparing international economic evaluations with the remainder of the experience in one or more of: reservoir engineering, production engineer, drilling engineering, or deepwater facility planning/construction.
- Masters level and higher education in petroleum engineering
- Graduate business and management education
- Expert Excel spreadsheet user/programmer.
- Ability to convert international fiscal term documents into accurate, efficient and user-friendly economic models.
- Ability to work efficiently on several projects simultaneously.
- Team player with strong personal drive to lead small multi-discipline evaluation teams to deliver high quality and timely evaluations.
- Ability to leverage current industry experience to ensure evaluation scope is fit for purpose and at a level of detail that is consistent with available input data and time schedule.
- Desire to teach/assist younger engineers your acquired skills within petroleum evaluations as well as your core petroleum expertise.

- Previous supervisor/trainer experience is a plus.
- Ability to blend engineering and management.

In summary, this section above described the OIS Project Development manager job in detail, accountabilities of the job, key dimensions of the job, the key relationships that exist with the job and the qualifications necessary to perform the job. The job required me to effectively manage engineering the oil service industry. The job gave me the opportunity to learn and development my project management skills. I reported to the vice president of OIS, Raymond Kasper.

2.2 Final Job Objectives

The following contains the final objectives of the job of Project Development Manager and Manager of the Gulf of Guinea (2nd role) in Oil & Industrial Services Group (OIS). The job started in May, 2010 and I assumed a new role in at the end of August of the same year. My task included, but not be limited to project management, procurement, participating in engineering design, managing offshore platform corrosion management, managing offshore platform upgrade in the Gulf of Guinea, set up an office for OIS for the Gulf of Guinea division, source for contacts for Oil & Industrial Services and deal with all government and regulatory issues. I would be participating in the integrated pipeline maintenance contracts and the development technical training facilities in Nigeria.

The job involved a lot of traveling. I traveled to the USA and UK for procurement, meetings and conferences, Equatorial Guinea to begin operations, Cameroon for projects there and Nigeria to participate in contracts with E&P companies and the government. The company has a lot of opportunities to grow as an engineer and a manager.

2.2.1 Job Background and Details

Job Background

From the 15th day of May 2010 to the 30th day of August 2010, I worked as the Project Development Manager. On the 30th day of August I assumed the role of Manager of the Gulf of Guinea. Since the beginning of the job in May, 2010, I have actively participated in petroleum service contract jobs for the company. I have procured petroleum pipes, grid blasters, cranes, dozers, pipe cutters, swamp buggies, tug boats and barges for the company. I have negotiated a development agreement between Oil & Industrial Services Group and two vital partner companies to enable OIS participate in more federal petroleum contacts. I have also actively made preparations that would allow Oil & Industrial Services Group move into the Gulf of Guinea market. Finally, I have participated in the design of a pipe line networks for the Oil & Industrial Services Group.

Several opportunities have been presented since I began my employment in May, 2010. These opportunities and my performance encouraged the company to present the new role. This new position of Manager of the Gulf of Guinea was a promotion from the job of Project Development Manager. I reported to the Vice President, Raymond Kasper.

The changes in the jobs were as follows: I was focused on the Gulf of Guinea, I managed all staff and projects, and I participated in fewer contracts in Nigeria and Cameroon. For the last eight months, my participation in Nigeria was limited to the Integrated pipeline maintenance contract for Shell Petroleum Development Company in Nigeria, pipe insulation project in the Chevron Agbami field and the development a

technical training facilities in Bonny and Kaduna. I participated in an offshore pipe lay project in Cameroon. These responsibilities make up the final responsibilities of my job.

The description of the job is below.

Job Details

The following are the details of the job. The title of the job, sector, location and job supervisor are listed below. The job type says worldwide because the job required a lot of traveling.

Job Title:	Director General, Gulf of Guinea
Company:	Oil & Industrial Services Group
Sector:	Petroleum
Business / Project:	Development
Job type:	Full Time Regular (WORLDWIDE)
Location:	USA, Nigeria, Cameroon, Equatorial Guinea
Supervisor:	Raymond Kasper (Vice President)

2.3 Main Responsibilities of the Job

The section provides my key responsibilities and accountabilities of the job. This section acted as a guideline for my activities during the last eight months on the job. I reported directly to Raymond Kasper; who made sure that I carried out my responsibilities. The following were my responsibilities as the Gulf of Guinea Manager in OIS:

1. Manage offshore pipe lay project in the Gulf of Guinea.
2. Manage OIS office.
3. Deal with all government and regulatory issues in the Gulf states
4. Participate in the integrated pipeline maintenance contract for Shell.
5. Participate the development a technical training facilities in Bonny and Kaduna.

The details of these objectives are explained in the subsequent pages.

2.3.1 Offshore Pipe Laying Project

The Oil and Industrial Services Group (OIS) acts as a general contractor to the major oil companies in the Gulf of Guinea. The fields and facilities owned by these companies need to be upgraded periodically. The hydrocarbons extracted from these fields are transported to collection zones by pipeline. There are numerous miles of pipe in the ocean transporting oil, gas and condensate from well heads to oil and gas manifolds of gathering centers for transfer. Oil service companies are usually contracted to lay these pipes in deep water. One of OIS's primary operations is pipe laying. My role included, but was not limited to reviewing the contract and working with the technical director and

general manager (Oil and Gas) to determine what was needed to execute the job, procuring materials, working with the engineers on creating concepts, improving drawings, approving designs and general project management.

Pipeline installation is one of the most important oil service activities. The offshore fields would not be able to harness their resources without pipes. These pipes will not be there if an oil service contractor does not install them in the petroleum offshore field. There is a need for oil service companies to offer pipe laying jobs. OIS solves this problem by offering offshore pipe laying services to exploration and production companies that have offshore assets in the Gulf of Guinea. My role includes, but is not limited to procure the machines, components and pipes, oversee the rotation of staff, maintain the schedule.

2.3.2 OIS Gulf of Guinea Division

The Oil & Industrial Services Group plans to grow their operations worldwide. In line with the goal of expansion, the company wants to establish a presence in the Gulf of Guinea. The base for the new division will be Malabo. I have negotiated the terms of a joint venture between OIS and a local company in Malabo. I will manage the operations in the country and participate in other OIS activities with Malabo as my base. The office is scheduled to open in the first week of September. The main objective of the office in Equatorial Guinea would be to participate in the region's petroleum opportunities at the beginning and expand operations in a scale proportional to the amount of work coming from the country.

2.3.3 Integrated Pipeline Maintenance Project

Shell has many pipeline networks running through the Niger Delta. These pipelines are old and need to be replaced. A lot of the sections of the pipes are corroded. The pipes have been damaged by the environment and thieves who try to steal from the pipeline network for financial reasons. Shell needs this pipeline network used in transporting crude oil from their assets in this particular field rebuilt without disrupting inflow into the surface production facility. My role includes participating in design, pump fitting and procuring the pipe cutters, swamp buggies, cranes and barges needed for the job. I also helped in the sensitive dealings with the locals and political groups to prevent attacks, sabotage and to encourage goodwill towards OIS during this job.

2.3.4 Development of Technical Training Facilities

One of OIS's projects was the development of two training facilities, institutes and laboratories. The first one would be in Kaduna; this is a city in Northern Nigeria and it would house training courses of all the senior staff of local companies and other senior government officials that require petroleum training or education. The second facility would be Bonny; an island city rich in Natural gas reserves, located in the southern Niger Delta region. The facility would train junior to middle level staff of local companies, and government. My job is to support to project manager and the group managing director of Oil and Industrial Services, who was directly involved in this project in procurement and course evaluations. I have also helped finalize an agreement

between OIS and some partner companies that would enable OIS take on similar projects around West Africa.

In summary, I have worked as the Project Development Manager for Oil & Industrial Services since May, 2010. In August, 2010, I assumed the role of Manager of the Gulf of Guinea after my role as the Project Development Manager was complete. My main objectives during this job were to manage offshore platform corrosion management, manage offshore pipe lay projects in the Gulf of Guinea, set up an office for OIS in the Gulf of Guinea, source for contacts for Oil & Industrial Services and deal with all government and regulatory issues. I will also participate in the integrated pipeline maintenance contract for Shell and the development technical training facilities in Bonny and Kaduna.

The above responsibilities gave a sufficient mix of both management and engineering. I am pleased at the opportunities to learn a great deal in a limited amount of time. Also, there is a high probability of being retained by the company as a permanent employee. The Oil & Industrial Services Group is expanding and it would be a perfect match for me during this experience and long term.

My goal is to learn as much as possible. I would also prepare myself for a long lasting career in petroleum engineering that enables me to participate in challenging projects in many locations around the world. I am confident that working in OIS would give me the management and engineering experience needed to achieve my goals.

The rest of the record of study will focus on the actual OIS Gulf of Guinea petroleum service projects. The specific task, challenges and successes of the projects will also be projected. All the objectives of the job were achieved to the satisfaction of OIS.

CHAPTER III
DELIVERY, MAINTENANCE
AND MARKETING OF OFFSHORE VESSELS

The Oil and Industrial Services Group (OIS) owns and operates a large fleet of boats, ships, barges and offshore vessels. The office in the United Kingdom constantly buys sells and leases marine vessels to and from the marine and petroleum industry. In light of the expansion plans of OIS into the Gulf of Guinea, the company plans to initially station six (6) marine vessels in the area to be ported in Malabo and Duala, depending of their work schedule.

The task of the Gulf of Guinea division is to receive the vessels, make sure they are properly maintained and source work for these vessels. In the immediate future, OIS plans to send three (3) inshore / port push tugs to work in port operations, one (1) multipurpose ship and two (2) work barges. This would be the first major investment by OIS in the new division, more vessels will be included if these present vessels are successful in creating revenue for the company. As the head of the division, my goal is to manage these vessels, the projects they are involved in and ensure success.

These vessels can be used by major oil operators, drilling companies, services companies and any other companies operating offshore for a lot of activities. They are very versatile and flexible vessels. They can serve as working vessels in OIS projects or leased out to other companies including our competitors for their projects.

3.1 Background on Offshore Vessels

Offshore reserves are very important in the global petroleum industry. Numerous offshore petroleum assets are continuously discovered and developed. These offshore assets are in Africa, the Americas, Europe, the middle east, Australia, etc. All the major petroleum companies have offshore assets and operation in their portfolio. In addition, all the major petroleum services companies have offshore services in their product line up.

Offshore operations emerged in the twentieth century and brought with it many challenges for petroleum exploration and production. At the center of these operations are offshore vessels which are used for every petroleum related operations offshore (Silcox et al., 1987). Offshore vessels are used for drilling, offshore field operations, offshore production operations and offshore pipeline installation.

All vessels used for offshore petroleum activities can be used in the Gulf of Guinea. OIS plans to expand her vessel line up to meet the market needs of the Gulf.

3.2 OIS Vessels for the Gulf of Guinea

These OIS vessels would make an excellent addition to the Gulf of Guinea division. They are especially important to the success of the division because they can potentially start constantly working and creating revenue for OIS. The Gulf of Guinea division will break away from OIS USA & Overseas to stand independently as a major part of the global petroleum services group once the revenue stream is sufficient.

The vessels to be delivered to the Gulf of Guinea division are “Victory Barge J316”, “MV Delta Sky”, “Inshore Pusher Tug DP07”, “Inshore Pusher Tug DP22”, “Inshore Pusher Tug DP28”, and a brand new Pipe laying vessel being built and will be delivered soon. The full specification and technical capabilities of these vessels can be found in the Appendix of this record of study. The Appendix contains more pictures and technical specifications of these vessels. The more detailed description of these vessels is included below.

3.3 OIS Victory Barge

The “Victory Barge J 316” is the first barge that was delivered. She is a pipe laying / work / Accommodation barge. She was delivered to the OIS Gulf of Guinea division in the first week of June, 2010. The vessel was used to complete a pipe lay project in Cameroon deep waters. OIS is sourcing other jobs and projects for the barge.

Victory Barge is an offshore pipe laying barge with a lot of successfully executed jobs offshore Nigeria on her resume. She can also be used for maintenance jobs and as a multipurpose work and accommodation barge. She has the capacity to accommodate 184 workers. Victory Barge is a versatile working vessels and I am confident that she will make an excellent addition to my division. Images of this vessel are shown in Figure 3.1 and Figure 3.2.

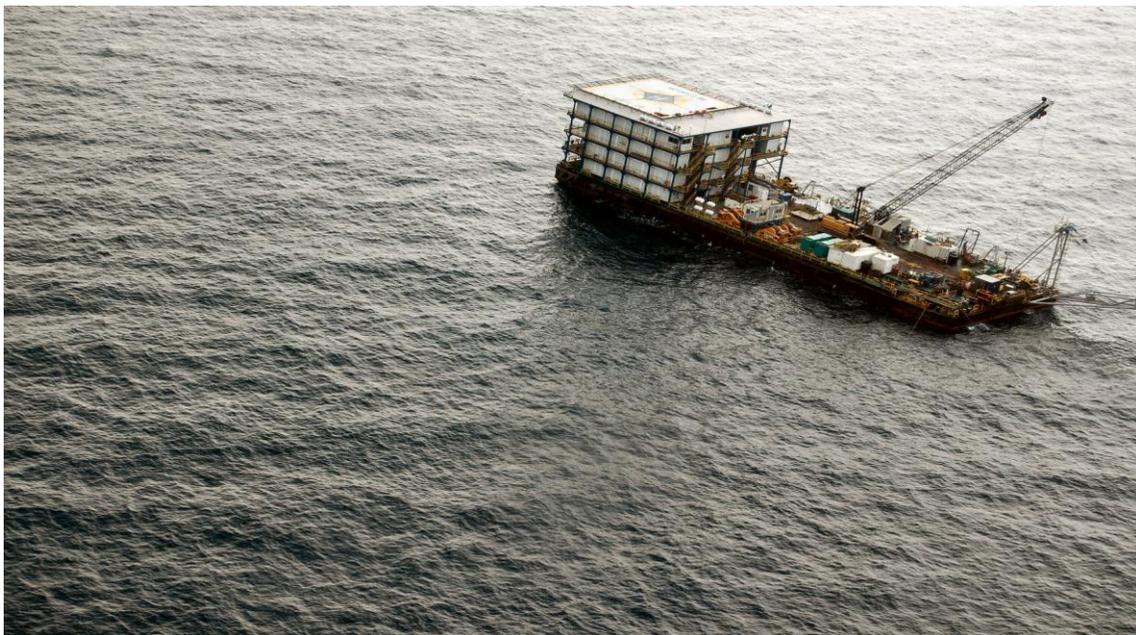


Figure 3.1: Aerial Shot of OIS Victory Barge.



Figure 3.2: OIS Victory Barge on a Work Site.

3.4 OIS MV Delta Sky

The “MV Delta Sky” is a multipurpose 4-point mooring offshore vessel. She is a brand new, just built vessel and was available in February, 2011. She was delivered to the OIS Gulf of Guinea division in the first week of March, 2011. She can accommodate 50 workers. She can also serve as a 4 – point mooring multipurpose offshore vessel.

She can be used for:

1. Towing (bollard pull 70mt)
2. Anchor handling activities
3. Crew supply
4. External fire fighting
5. Transfer of men and materials between platforms
6. Safety and rescue operations
7. 24 hrs/day continuous operation, remaining on station
8. Offshore work platform with accommodation
9. Diving platform
10. Survey platform.

Delta Sky is equipped with the latest technology. This ship is an excellent addition to my division. We have presented the specifications of this vessel to the industry and she is in demand. Images of this vessel are shown in Figure 3.3 and Figure 3.4.



Figure 3.3: OIS MV Delta Sky 1.



Figure 3.4: OIS MV Delta Sky 2.

3.5 OIS New Pipe Laying and Work Vessel

The brand new work barge being built presently will be the last vessel delivered to the division because she is still in the ship yard. She is an offshore pipe lay barge equipped technology advanced pay laying equipment. She also has the capacity to accommodate 300 workers. Similar to the Victory Barge, she can also be used for maintenance jobs and as a multipurpose work and accommodation barge.

She has not been named and it is the responsibility of the Gulf of Guinea to name the vessel. The potential name for the vessel will be “MV Praise”. I chose this name because of the neutrality of the word. The word praise is also positive and not a common vessel name. The vessel will stand out in the gulf as one best to use in service contracts. Figure 3.5 is an image of this vessel.

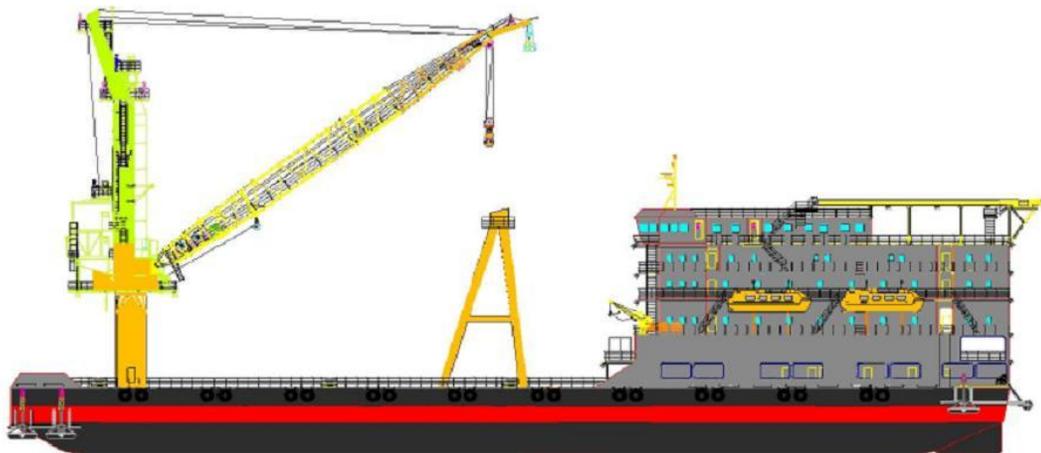


Figure 3.5: OIS New Pipe Laying and Work Vessel.

3.6 Inshore Pusher Tugs

The “Inshore Pusher Tug DP07”, “Inshore Pusher Tug DP22”, “Inshore Pusher Tug DP28” are tug boats meant for port operations. They can serve are vessels for parking ships, barges, ferries boats and other vessels. They can also serve as tow vessels if needed. The Inshore Pusher Tug DP07 can accommodate 5 crew members, while the Inshore Pusher Tug DP22 and Inshore Pusher Tug DP28 can accommodate 4 crew members. An image of the tug boat is shown in Figure 3.6.



Figure 3.6: Inshore Pusher Tug DP07

3.7 Technical Challenges

This is a marine project. The Gulf of Guinea division has to make sure the vessels are in full operating condition when they are in our possession or working for a client. This involves constant maintenance and safety. Listed below are the challenges involved:

1. **Marine Challenges:** The main components are marine vessels. The big vessels need to be towed by tug boats. The challenge here is not only making sure that the vessels and their components are in smooth running condition. We experienced a tow boat failure when moving the Victory Barge; a replacement tug boat had to be brought to relieve the bad tug boat. The tow and support vessels that work with the larger vessels would also have to be working properly.
2. **Facilities:** These components of these vessels all work together like a facility on shore. They have engines, generators, machines, parts, etc. Similar to their land counterparts, they will break down and need to be fixed. This will require adequate engineering and mechanics to get the vessels back into working condition. In January, 2011, after the victory barge finished a pipe lay project, she had to go in for service to keep her working smoothly.
3. **Client Specification:** A challenge is this project is examining the technical specifications of the client and determining if one of the OIS vessels will be appropriate for the job. Improper matching of the vessels could lead to failures on the job. This will be detrimental to our clients and bad for the reputation of the company. The victory barge is scheduled for a lift job in May and we had to look

at all the drawings and specification from the client to make sure that Victory Barge is a good fit for the job.

4. Technical drawing and design: Certain jobs require that the engineers at OIS draft designs and drawing to meet the need of our clients. These drawings are technical in nature and must be accurate. All the calculation must be accurate before the bid is sent out. Getting this right and avoiding costly mistakes during this process is challenging.
5. Environmental conditions: There are technical challenges in incorporating environmental conditions when performing sensitive task with offshore vessels. An example of such operation is lifts. In situations where there is turbulence from the water or the winds, the lift would have to be delayed and properly calculating by the lift engineers before the lift is made.
6. Load challenges: All the vessels have their load capacities. Putting loads on the vessels that exceed their specified loads can damage them. During jobs, the loads are constantly calculated to make sure that the capacities of the vessels are not exceeded.

3.8 Administrative Duties

The project location is Gulf of Guinea. This covers three countries; Nigeria, Cameroon and Equatorial Guinea. It is my duty to deal with all the clients and governments in these countries. The goal is to make sure that all the OIS tools were used to satisfy the client. I performed the following administrative duties on this project:

1. Scheduled jobs for vessels.
2. Managed marketing activities.
3. Schedules service and maintenance for the vessels and their components.
4. Managed and schedules staff rotations on the vessels.
5. Work with the European Director and the General Manager (Marine).
6. Managed helicopter and crew boat drop offs.
7. Deal with all government agencies that may affect the entry and exit of vessels into Cameroon.
8. Managed arrangements for crew feeding.
9. Managed procurement and delivery of welding materials, pipes and other materials needed for the project,
10. Represent OIS in all discussions with the Client.
11. Represent OIS in all government related exercises.
12. Coordinated with OIS finance department to release financial resources as needed for the project.
13. Coordinated with OIS Human resources department to provide staff, engineers, technicians, welders, general workers and cooks as needed for the project.

3.9 Nontechnical Challenges

The aspects involved in the projects are delivery, maintenance and marketing. The primary aim of this exercise is to create revenue for the company. In this case the non technical aspect of the project is more important as the technical aspect. To successfully maintain and operate these vessels in the Gulf of Guinea profitably, we had to overcome the following challenges:

1. **Marketing:** These vessels can be classified under unconventional products. There are a few people and companies that are in the market for marine vessels. Out of those in the market, each customer has a special need and required specification. In marketing these vessels to our client, we not only had to satisfy their need, but we also had to convince that that our vessels are capable of serving them efficiently and economically. The oil industry is a challenging market. The prices for these vessels as compared to other product are significant. We had to convince our clients that the money they spend on our vessels will make them more money from their project. I overcame this challenge by applying a direct customer contact approach to maintain a personal relationship with our clients. This increases their confidence in OIS and made us on of their preferred service providers.
2. **Procurement:** A lot of materials were bought for these vessels; they include engine part, pipes, hoses, winches, etc. I was the primary procurement staff for the project. A few were bought in Nigeria, Cameroon and the rest were imported. This involves dealing with customs and transport companies to get the materials

from the ports to the vessels. We experienced a lot of delays from the port administration, but these had no effects on the project performance.

3. Contractor and Client Management: We hire subcontractors when the vessels are working. These contractors supplied materials or services; such as paint, food, parts, etc. It was difficult to manage the expectations of our client, because these are separate companies. We set early deadline for our contractors and sources the market for substitute goods and services. This made our contractor deliver early and we had time to exercise alternatives if needed.
4. Staff rotations: Rotations are a necessary facet of working offshore. Workers work temporarily on vessels for the duration of the project. In OIS, expatriates and technical staff work one month on the job and one month off, while non technical staff work two months on and one month off the job. It was my job to constantly coordinate with our human resource department and logistics to efficiently manage this schedule. We use crew boats or helicopters to drop off and pick up staff. This presented scheduling and human resource challenges those were overcome through efficient coordination and constant communication between me, the logistics and human resources departments.
5. Conflict Resolution: OIS likes to maintain a happy and pleasant work environment on shore and off shore especially. Supervisors complained about their workers and vice versa. The reports flooded my desk in a continuous manner. I resolved most of the complaints by face to face meetings and conferences that encourage tolerance and compromise on the job.

6. **Safety:** Safety is key in all OIS operations. During this offshore vessels operations, lives and material are lost easily. All staff are kept alert and focused on the job was key to avoid loses. Alcohol, drugs or other chemical enhancements are not permitted on any of OIS vessels. Safety signs, precaution signs and notices are present in numerous barge areas and work site to remind everyone of the project. I maintained regular meetings and discussions with the safety engineers to maintain a safe work environment on all our vessels.
7. **Managing People:** Vessels need crews. Projects need engineers, technicians and general staff. These are all human resources. Managing people was a challenge. We had expatriate from many countries and some of them did not speak English fluently. I had to employ my training on cross cultural work environment to cope with my staff. I respected their individual cultures and procedure and encouraged them to incorporate OIS activities to the best of their abilities.

3.10 Method, Consequences and Potential Improvement

This is a continuous exercise. As our activities increase in the Gulf of Guinea, OIS will transfer more vessels to the division. We will have to constantly watch the market and continuously perform feasibility studies for potential needs of the oil industry. In cases where opportunities present themselves, we will bring in vessels to the gulf to satisfy those clients and their needs

This experience has reinforced my knowledge on marine engineering. I have also acquired skills in marketing, scheduling and management. I have established better connections with many oil and gas companies in Gulf of Guinea.

OIS needs to increase their fleet of lift boats; there is a market for lift boats in the Gulf of Guinea. We also need to create a helicopter transportation products line to satisfy the need for client who want their staff transported via helicopters. We need to strive to be the main contractor on most of our jobs; we have the vessels and the staff to execute these projects.

In summary, the Oil and Industrial Services Group (OIS) owns and operates a large fleet of boats, ships, barges and offshore vessels. In light of the expansion plans of OIS into the Gulf of Guinea, the company plans to station six (6) marine vessels in the area. The task of the Gulf of Guinea division is to receive the vessels, make sure they are properly maintained and source work for these vessels to increase the company's revenue stream.

The vessels to be delivered to the Gulf of Guinea division are "Victory Barge J316", "MV Delta Sky", "Inshore Pusher Tug DP07", "Inshore Pusher Tug DP22", "Inshore Pusher Tug DP28", and a brand new Pipe lay vessel with 300 Man accommodation being built and will be delivered soon. These vessels can be used by major oil operators, drilling companies, services companies and any other companies operating offshore for a lot of activities. They are very versatile and flexible vessels. They can serve as working vessels in OIS projects or leased out to other companies including our competitors for their projects.

The Victory Barge, Delta Sky and the three tug boats have been delivered, we will receive the new pipe lay barge when it is completed and delivered by the ship yard. The company constantly considers new vessels to be added to her fleet. Potential vessel types were also illustrated in this chapter.

CHAPTER IV

OFFSHORE PIPE LAYING PROJECT

One of the main activities of the Oil and Industrial Services Group (OIS) is offshore pipe laying for petroleum producing companies who have assets in shallow and deep waters. OIS owns a fleet of pipe lay vessels along with the support vessels and tow vessels that are needed to complete the offshore pipe laying exercise. One of my main responsibilities was to serve as a project and procurement manager for a pipe laying project handled by OIS as a subcontractor to our client, who is the primary / main contractor on the field development project.

As a petroleum engineer with project experience in designing of pipe line networks, I jumped at the opportunity to be part of an offshore pipe lay and installation exercise. OIS has a lot of offshore pipe laying experience offshore Nigeria. The company had done projects in Cameroon in the past. With the company's assets, vessels and qualified staff, OIS presented us with the winning formula needed to make this contract a success.

Safety is paramount in OIS; this project was successful with no accidents. The staff and equipment were mobilized on the first week of June, 2010 and demobilized on the second week of December. The pipe string was abandoned and handed over to the client. The client was satisfied with the work and OIS was efficient in her operations.

4.1 Background on Offshore Pipe Laying

When petroleum discoveries moved from dry land to marches and eventually to the sea, the pipelines that transport the crude oil and natural gas had to move with them (Dwyer, 1968). Pipe lines are a key component of any offshore petroleum operation. Pipes enable crude oil and natural gas to be transferred over varying distances.

Historically the pipe lay barge has been the most acceptable method for installing offshore pipeline (Brown and Hirsch, 1977). The pipe lay barge has dominated the offshore pipe laying market for over five decades (Borelli and Perinet, 1997). The pipe lay barges are usually profitable for their owner because in addition to charging for the project installations and engineering components, the barges are invoiced separately. The barges are billed for on a daily rate basis not on a lump sum basis (Brown and Hirsch, 1977).

The preferred mode of installation of these pipes is the pipe lay barge. The installation of pipe using barges started in shallow waters. Presently service companies can lay pipe in both shallow and deep waters (Bankston and Lee, 1967). Pipe lay barges usually possess large diameter trunk lines and multi pipe laying capacities. These barges have deck space to carry corrosion fluids, machines, pipes and other necessary materials for the project. These barges have the ability to lay flexible, rigid pipes, conventional pipes and dual pipe. The pipes are usually welded on the barge as they are laid in the ocean by the pipe fitters and welders.

During the pipe lay project, some associative works may be executed simultaneously. These works include, but are not limited to activities such as stringer handling, pipe initiation, and installation of risers, installation of subsea facilities and installation of other offshore components.

4.2 Project Scope and Objectives

The main task for Oil and Industrial Services was to lay a pipe string in the ocean. The pipes would connect an offshore platform located offshore Cameroon to a collection manifold. OIS's portion of the contract was to lay the offshore pipe and perform pipe lay barge abandonment of the pipe string. The client had hired another contractor to handle the rest of the pipeline activities.

Phase 1 (Gas Sales)

Project Type:	Pipe laying
Location:	Cameroon Deep waters
Length:	51 Miles
Pipe outer Diameter:	12 Inchers
Water Depth:	1200 Feet
Subsea Piping:	Yes
Duration:	75 +/- 15 Days
Start Date:	03 June 2010

Phase 2 (Oil Sales)

Project Type: Pipe laying
Location: Cameroon Deep waters
Length: 51 Miles
Pipe outer Diameter: 8 Inches
Water Depth: 1200 Feet
Subsea Piping: Yes
Duration: 75 +/- 15 Days
Start Date: 03 June 2010

Project Summary

Length: 102 Miles
Pipe outer Diameter: 8 & 12 Inches for Oil and Gas Sales
Duration: 150 +/- 15 Days
Staff: 102 Expatriate + 70 Local

4.3 The OIS Pipe Laying Procedure

This section explains the procedure used by the Oil and Industrial Services Group to lay pipelines offshore. As an engineering manager in the company, part of my responsibilities included supervising some of these activities. OIS mainly uses the S-Lay method of pipe laying offshore. The S-Lay is the preferred method for pipe laying operation for water depths of up to 1500 Feet (Gernon et al., 1995). The pipe welding and inspections are done on the barge main deck; the pipes are fed into the curved pontoon stinger and laid on the ocean floor.



Figure 4.1: Aerial Shot of an OIS Pipe Laying Barge.

Figure 4.1 shows the launch way that houses the stinger on the left at the edge of the barge. This is used to lay the fabricated pipe feed from the welding and inspection stations on the ocean floor. This image also show a crawler crane, necessary for making lifts and handle material during the pipe lay process.



Figure 4.2: OIS Pipe Laying Barge on Work Site.

Figure 4.2 shows the barge on the work site. The assembly way; where the pipe is aligned and joined to form a continuous string is shown on the left. Tension is applied to the pipe in this section. This image also shows assembly way houses the welding and inspection stations.

The barge has a large horizontal deck. This space acts are a work and storage zone. Pipe, welding equipment, inspection tools can be place on the barge and used in the work site. The deck is also used as a diving platform for divers to launch their activities. The divers play an important role in the project. They serve as the companies eyes under

water. They can also ensure that the pipe sting is positioned properly according to the specifications of the client. I received the results of the diving exercises and shared the relevant information with the project engineers, job supervisors and the client.



Figure 4.3: OIS Pipe Laying Barge Stringer Laying Pipe in the Ocean.

Figure 4.3 shows the stringer on the right at the edge of the barge. The pipe string is fed from the assembly way to the launch way and finally to the stringer. The stringer is laying pipe on the ocean floor.

4.4 Technical Challenges

This is a purely pipe line engineering and installation project. Every day of the project presented unique challenges for OIS and her staff. Keeping the operations running smooth, involved constant monitoring of the activities and the following:

1. **Marine Challenges:** The main tool used to execute this project is a pipe lay barge. The barge was towed in place by a tug boat and positioned. The OIS tug boat was out of commission for maintenance. A tug boat was hired from a marine contractor. During the tow from Nigeria to Cameroon, the tug boat was replaced due to engine malfunctioning of the first tug. We tried to fix the problem, but I made the judgment call to replace the tug because we were operating based on daily rates and it was cheaper to hire another tug to tow the barge to the worksite.
2. **Welding Challenges:** We had to weld the pipe together to fabricate them into a string. We had welding criteria, inspection guidelines and quality compliance standards. The welding quality was a key component of project success. Each pipe and weld was inspected thoroughly by the quality engineers and inspection staff.
3. **Pipe String Positioning:** The position of the pipe string was also a challenge that was solved by employing the use of diver and a remotely operated vehicle that constantly monitored the pipe string and ensured accurate positioning.
4. **Deep water Mooring:** The pipe lay barge was positioned and moored using anchor handling vessels. These vessels had enough capacity to handle 5000 Dead weight tonnage; enough to handle the OIS pipe laying barge and keep her stable.

5. Pipe String Abandonment: OIS used divers and ROVs to achieve this. This was a challenge because the waters are deep and the ROV was affected by water turbulence. Also, special hooks and ROV deployable tools were made to hedge against the risk of pipeline lose over board.
6. Lift and Crane Challenges: Operating a crane can be very challenging in deep waters because of turbulence. In the process of performing lifts, we had to be careful because it was easy to lose control of the load and eventually the whole crane. This may lead to loses in assets and even lives. The crane and lift engineers where especially alert during lifts. Radios were used for constant communication between the engineers, technician, workers and the crane operator. The engine of the crane and parts were constantly inspected to ensure optimum operating of the equipment.

4.5 Administrative Duties

The project location was Cameroon deep waters. This falls under the OIS Gulf of Guinea division. It was my duty to make sure that all the OIS tools were used to satisfy the client. I performed the following administrative duties on this project:

1. Represented OIS in all discussions with the Client.
2. Managed and scheduled staff rotations.
3. Worked with the European Director and the General Manager (Marine) during the project.
4. Managed helicopter and crew boat drop offs.
5. Dealt with all government agencies that affected the entry and exit of vessels into Cameroon.
6. Coordinated with OIS finance department to release financial resources as needed for the project.
7. Coordinated with OIS Human resources department to provide staff, engineers, technicians, welders, general workers and cooks as needed for the project.
8. Managed arrangements for crew feeding.
9. Managed procurement and delivery of welding materials, pipes and other materials needed for the project,

4.6 Nontechnical Challenges

The nontechnical aspect of the project is as important as the technical aspect. Both aspects have their unique challenges. To safely this project in Cameroon deep water, we had to overcome the following challenges:

1. **Safety:** Safety is key in all OIS operations. During this offshore pipe lay project it is easy for materials and human beings to fall over board. Keeping the staff alert and focused on the job was key to avoid loses. Safety signs, precaution signs and notices are present in numerous barge areas and work sites to remind everyone on the project. I maintained regular communication with the safety engineers to ensure that the project was operating under safe conditions.
2. **Staff rotations:** In OIS we rotate staff during offshore projects. The environment offshore is secluded and isolate. Workers cannot work permanently on the barge for the duration of the project. In OIS, expatriates and technical staff work one month on the job and one month off, while non technical staff work two month on and one month off the job. Most of the staff were transported in by crew boats or helicopter depending on their size. They were usually picked up from Duala. Several inspectors and other staff are flown in by helicopter as needed on a more temporal basis. It was my job to constantly coordinate with our human resource department and logistic to efficiently manage this schedule.
3. **Staff transportations:** Transportation is the key to staff rotations. Its was my responsibility to manage crew boat transports and helicopter drop offs. This involved constant communication with helicopter pilots, crew boat captains and

logistics staff. We experienced several transportation some delays that lasted no more than 24 hours. These delays had no effect on project performance; however the temperaments of some of the staff affected by the delays were not positive.

4. **Conflict Resolution:** I constantly received complaints from staff work on the project. Supervisors complained about their workers and vice versa. OIS likes to maintain a happy and pleasant work environment on shore and off shore especially. I had several conference and meeting to smooth conflict down to discussions and urges minor compromises in behavior to solve most of the problems.
5. **Managing People:** The main asset in this project was human resources. These are people. People need to be effectively managed to achieve efficiency. As a project manager on this project, engineers and other staff reported to me. I had to set goals and make sure that they performed as expected. Managing the engineers was the easy part of the job, however managing the general workers and operators posed a challenge. The general staff and operators include the welders, laborers and machine operators. They worked the hardest physically and they were prone to mental and physical stress. They tend to often get frustrated and they had short tempers for their colleagues. I managed this enforcing a zero tolerance on threats and aggressive behavior; culprits were followed with a suspension and immediate removal of the individual via helicopter. This was a costly solution, but it eliminated time delays, extra conflicts and bad behavior by the general staff.

6. Contractor and Client Management: On this project we had some contractors working for OIS. These contractor supplied materials or services to the company. Because these are different entities, it was difficult to manage the expectations of our client, when we often had to depend on a contractor working for us. To solve this problem, we set early deadline for our contractors and sources the market for substitute goods and services. This enables us to have buffers between companies working for us and the company we were working for.
7. Food Challenges: Feeding the staff was challenging. We initially under estimated food amounts. The staff, especially the general staff ate more that the technical staff because they performed more physically demanding task. Initially we estimated that all the staff will have similar appetites. This was solved by sourcing addition food suppliers in Duala and delivering extra food as needed during crew rotations.
8. Procurement: A lot of materials were bought for this project. I was the primary procurement staff for the project. A few were bought in Nigeria, Cameroon and the rest were imported. This involves dealing with customs and transport companies to get the materials from the ports to the barge. We experienced a lot of delays from the port administration, but these had no effects on the project performance.

4.7 Method, Consequences and Potential Improvement

In this case, the offshore pipe lay project came on the market on January 2009. OIS aggressively pursued, presented a competitive bid and was the best company for the job. The bid was accepted by the client, the contract was signed and OIS was financially mobilized. After financial mobilization, OIS moved her vessels to the job site on the first week of June 2010 and started the project.

This experience has reinforced my knowledge on pipe line engineering. I have also improved on my project management skills. Through the procurement activities, I have established better connections with many oil and gas vendors in Nigeria, Cameroon and the USA.

OIS needs to increase their fleet of tug boats. The tug boat meant for this barge was in maintenance, causing us to hire one that malfunctioned. This additional tug boats will enable the company control all marine aspects of her operations. The food estimation needs to be more accurate in future projects to avoid food shortages and staff discomfort.

In summary, the client required Oil and Industrial Services (OIS) to use a pipe lay barge from her fleet of vessels to complete a offshore pipe laying exercise in Cameroon deep waters that lasted from mobilization on the first week of June 2010 and demobilization on the second week of December 2010, after the pipe string was abandoned and handed over to the client. The Phase 1 of the project involved laying 51 miles of 12 inch diameter gathering pipes for gas sales in 1200 feet deep waters. The Phase 2 of the project involved laying 51 miles of 8 inch diameter gathering pipes for oil sales in 1200 feet deep waters. I acted as a project manager and procurement staff on this project.

My background as a petroleum engineer with project experience in designing of pipe line networks prepared me for this offshore pipe lay and installation exercise. The project was executed successfully with no recorded accidents. By working on this project, I improved my engineering skills, people management skills, project management skill and establish more viable business contacts.

CHAPTER V

INTEGRATED PIPELINE MAINTENANCE PROJECT

There are a lot of pipeline in the swamp regions of the Nigeria Delta. These pipes move petroleum from well head to surface production facilities and gathering stations. Some of these pipes have been there for decades and they need to be replaced. Some of these pipes have been damaged by vandals, who try to steal the resources from the pipes. To ensure efficient and effective transportation of resources the pipe line system will need to be maintained.

This project was published by Shell in late 2005. The Oil and Industrial Services group (OIS) submitted our intent to tender. We received and submitted our technical/un-priced tender in late 2006. We were called for the commercial specifications of the above tender by Shell on a letter dated September 2007. The commercial bid was submitted on November 2007 to Shell. The contract for the work that would be mobilized and begin in May, 2010 was awarded to OIS.

Work to be covered under this project generally consists of all works incidental and necessary to the successful completion of pipeline maintenance and repairs works involving manifold piping works, pipeline civil structure maintenance, valves maintenance, low/intermediate emergency pipeline repairs, manifolds protection systems installations/repairs, composite repairs, cathode protection repairs/upgrades and planned pipeline upgrades/rehabilitations in Shell's Land and Swamp Areas of Eastern and Western Divisions. This chapter will focus on the procurement activities of the project.

5.1 Background on Shell in the Niger Delta

The Niger region is an oil rich zone, located south of Nigeria. The region is characterized by the delta formed as the river Niger meets the Atlantic ocean. The area is characterized by swamp and marsh lands. The Niger Delta is a deltaic system with very high sedimentations (Okorodudu et al., 2006). Before offshore oil exploration and production, the Niger Delta region was the most important source of petroleum in Nigeria.

Shell's Oil wells are spread over land areas and remote swamp areas in the Niger Delta (Vlaardingerbroek and Emelle, 2006). Shell has numerous wells and assets in the region. Shell is the largest operator in the region.

Shell is the oldest energy company in Nigeria. The company has been operating in Nigeria since 1936. Shell Petroleum Development Company of Nigeria (SPDC) is the operator of a Joint Venture Agreement involving the Nigerian National Petroleum Corporation (NNPC), which holds 55 per cent, Shell 30 per cent, EPNL 10 per cent and Agip 5 per cent. SPDC's operations in the Niger Delta are spread over 30,000 square kilometers. They include a network of more than 6,000 kilometers of flow lines and pipelines, 90 oil fields, 1,000 producing wells, 72 flow stations, 10 gas plants and two major oil export terminals at Bonny and Forcados (Shell, 2011).

5.2 Project Scope and Objectives

The activities for OIS in this project are pipeline maintenance and repairs involving manifold piping works, pipeline civil structure maintenance, valves maintenance, low/intermediate emergency pipeline repairs, manifolds protection systems installations/repairs, composite repairs, cathode protection repairs/upgrades and planned pipeline upgrades/rehabilitations. The project covers Shell's Land and Swamp Areas of Eastern and Western Divisions. I was responsible the procurement part of this project and project management. In this chapter, I will give details on the procurement activities for this project. This involves working with the project team to determine exactly what the client needs and what material will be need to satisfy those needs.

Project Type:	Integrated maintenance
Region:	Niger Delta
Environment:	Swamp
Subsea Piping:	Yes
Duration:	1 yr
Start Date:	Fourth week of May 2010

5.3 Project Specifications

As mentioned above, my responsibility in this project was procurement and project management. I was given the task of looking at the detailed description and needs of the project, recommending items to be bought and buying the items for the project on behalf of OIS. I will detail the procurement process in this section of the record of study. The procurement experience was vital. I had five main tasks:

1. Look at the client's needs and break them down into workable sections for the project managers.
2. Recommend staff necessary for the project.
3. Recommend machines, equipment and materials for the project.
4. Recommend the needed facilities for the project.
5. Procure needed machines, equipment and materials for project.

During this process, I reported directly to the vice president (USA & Overseas) and the group managing director. All my recommendations were scrutinized by the two members of management listed above and approved.

5.4 Integrated Pipeline Project Task 1

The first task is to break down the client's needs into workable sections or individual activities for the project OIS managers. Tables 5.1-5.4 give a more detailed view of the subsections of the project. The needs of the client were examined thoroughly. Based on our client's needs, the activities for the project were broken down into the following:

Table 5.1: Integrated Pipeline Maintenance Project Details 1

ACTIVITY	SCOPE SUMMARY	DIMENSION
Manifold piping works	<ol style="list-style-type: none"> 1. Manifolds Paintings [blasting and painting of manifolds]. 2. Scraper trap repairs / upgrades. 3. Installation of sampling points/ other specialized points. 4. Manifolds piping supports repairs/ replacements 5. Manifold piping repairs/upgrades 	<p>Up to 28” diameter pipelines max on land terrain</p> <p>Up to 24” diameter pipelines max in Swamp terrains</p>
Civil & Structural Works	<ol style="list-style-type: none"> 1. Upgrade/maintenance of existing access roads. 2. Dredging works 3. Land Manifold [M/F] civil works [hard standing areas, drains, saver pits, pipe supports]. 4. Pipeline Repairs supports. 5. Construction/repairs of Warning signs, valve operating platforms 6. Construction/ maintenance of swamp manifold guard huts 	<p>All manifold civil works</p> <p>Small size cofferdams [12 m long x 6 m wide x 12 m deep max]</p> <p>All Swamp M/F extensions</p>

Table 5.2: Integrated Pipeline Maintenance Project Details 2

ACTIVITY	SCOPE SUMMARY	DIMENSION
Manifolds Protection Systems	<ol style="list-style-type: none"> 1. Design, install and repair enhanced manifold cages. 2. Design, install and maintain pipeline facilities intruder detection/remote monitoring systems 3. Design, manufacture, installation and maintenance of valve anti-tamper systems 	All scope [enhanced cages, anti-tamper locks etc] for all land and swamp manifolds.
Valve replacements	<p>Replacement of flanged valves</p> <p>Replacement of welded valves</p>	<p>28" Diameter max on land and 24" Diameter max in Swamp</p> <p>14" diameter max land and swamp</p>
Valve maintenance	<ol style="list-style-type: none"> 1. In-situ valve maintenance 2. Major offline valve repairs 	All scope land and swamp [1/2" - 40" valves ranging from Class 150LB to 1500 LB]
Gas lines Repairs	<ol style="list-style-type: none"> 1. Repairs by installation of bolted split sleeve clamps. 2 Repairs by screwed plugs 3. Repairs by Composites 4. Repairs by sectional replacements [using mechanical connectors 	Clamping and composites [4" - 40"] excluding major cofferdams and river crossings. Optional – wet gas lines sectional replacement [up to 8" diameter max]
Major sectional replacements of oil lines including welded valves	<ol style="list-style-type: none"> 1. Sectional replacements using line flushing 2. Sectional replacements using freeze plug isolations, mechanical plugs etc 3. Sectional replacements using hot tap and stopple isolations 	Delivery lines [14" max] excluding hot tap and stopple greater than 12"

Table 5.3: Integrated Pipeline Maintenance Project Details 3

ACTIVITY	SCOPE SUMMARY	DIMENSION
Riser burials	<ol style="list-style-type: none"> 1. Removal of existing riser system and replacement with completely buried system. 2. Replacement of existing corroded/damaged risers 	4" to 14" Diameter pipelines land and swamp
River crossings	<ol style="list-style-type: none"> 1. River crossing sectional replacements 2. River crossing emergency repairs 	Crossings 100m wide max and up to 14" diameter pipelines
Road crossings	<ol style="list-style-type: none"> 1. Casing replacements/repairs 2. Construction of new road crossings 3. Repairs to existing road crossings 	Up to 14" pipeline diameter max and open cut
Emergency Pipeline Repairs for Oil and Condensate Pipelines	<ol style="list-style-type: none"> 1. Repairs by installation of bolted split sleeve clamps. 2 Repairs by screwed plugs 3. Repairs by Composites 4. Repairs by sectional replacements [mechanical connectors] 	<p>Clamping + screwed plugs on all pipeline sizes [4" to 40"] except where major cofferdams required</p> <p>Sectional replacements on 4" – 14" diameter pipelines max</p>
Composites Repairs / Upgrades	Application of composite repairs	All sizes [4" to 40" diameters] except where major cofferdams required

Table 5.4: Integrated Pipeline Maintenance Project Details 4

ACTIVITY	SCOPE SUMMARY	DIMENSION
Decommissioning / Abandonment of disused pipelines and manifolds	<ol style="list-style-type: none"> 1. Removal of stagnant oil including provision of water and water supply lines 2. Excavation and removal of pipelines and end facilities 3. Disposal of effluents / provision of flushing chemicals. 4. Purging of disused gas lines. 	4" to 40" diameter pipelines Land and Swamp
CP Systems Upgrade / Repairs		All scope [ground beds, surveys, test posts, solar systems, sacrificial anodes]
Coating repairs	<ol style="list-style-type: none"> 1. Repairs to damaged/deteriorated coatings 2. Supply of coating materials 	All diameters except where major cofferdams are required

I accomplished the first task successfully with help from the OIS projects department.

The tables above divide the project into activities. Each activity is followed by a scope summary and dimension needed.

5.5 Integrated Pipeline Project Task 2

The second task is to recommend the needed employees to execute the contract.

Using the activities as a bases and a historical examination of OIS past projects, I was able to match skill sets to the project and recommend appropriate staff for the job. The following are the needed human resources to sufficiently execute this integrated pipeline maintenance contract:

Senior Managers (2)

- Director General, Gulf of Guinea
- General Manager, Oil & Gas

Middle level Manager (2)

- Manager, Projects
- HSE Manager

Managers (6)

- Engineering Manager
- Logistics Manager
- Finance Manager
- Protection systems Manager
- Planning Manager
- Corrosion Manager

Project Engineers (7)

- Manifold Engineer
- Civil Engineer
- Planning Engineer
- Valve Engineer
- Pipe Engineer
- Corrosion Engineer
- General Engineer

Quality Engineers (4)

- Pipe Quality Engineer
- Civil Quality Engineer
- Emergency repairs Quality Engineer
- Protection Quality Engineer

Site Engineers / Supervisors (10)

- Manifold Supervisor
- Protection Supervisor
- Valve Supervisor
- Civil Supervisor
- Pipe Supervisor
- Planning Supervisor
- Emergency repairs Supervisor
- Cathode Supervisor
- Project Surveyor
- Logistic Coordinator

Health, Safety and Environment Coordinators (3)

- Piping HSE Coordinator
- Civil HSE Coordinator
- Corrosion HSE Coordinator

Health, Safety and Environment Officers (9)

- Pipe HSE Officer
- Manifold HSE Officer
- Valve HSE Officer
- Civil HSE Officer
- Planning HSE Officer
- Emergency HSE Officer
- Corrosion HSE Officer
- Site Nurses (2)

The above are OIS specialized staff. A total of 43 specialized staff are needed to executive this project. In addition to this, the project needed approximately 60 general staff. These general staff filled in the roles of laborers, machine operators, welders, etc. Lastly two community relations officer were recruited from the local communities to avoid any community aggression and vandalism. These officers were preferable popular respected figures in the community; whose role is to convince the community citizens that we are a friendly engineering company here to complete a project and exit peacefully.

5.6 Integrated Pipeline Project Task 3

The third task is to recommend the materials, machines and equipments needed to execute the contract. Using the activities as a bases, engineering research tools and a historical examination of OIS past project, I developed an appropriate list of items. The following are materials, machines and equipment needed to execute this integrated pipeline maintenance contract successfully. Tables 5.5-5.8 show all the items needed, the quantity needed and their availability. In the case of availability; “in stock” means that OIS has those items while “out of stock” means that they need to be bought. The tables below also show the recommended list of materials, machines and equipment needed.

Table 5.5: Pipe Maintenance Project Items 1

ITEM	MINIMUM REQUIRED	IN / OUT OF STOCK
++ 4WD VEHICLES	3	IN
CREW BUS	2	OUT
++ LOW BED TRAILER	2	IN
++ SELF LOADER	2	IN
VACUUM TRUCK	2	OUT
++ AIR COMPRESSOR	4	IN
++ HIGH BED TRAILER	2	IN
++ SWAMP BUGGY BACKHOE (SWAMP EXCAVATOR)	2	IN
++ SWAMP CRANE	1	IN
++ SWAMP CARRIER	1	IN
++ FLUSH PUMP WITH POLY PIGS	2	IN

Table 5.6: Pipe Maintenance Project Items 2

ITEM	MINIMUM REQUIRED	IN / OUT OF STOCK
++ MOBILE CRANE 45T	2	IN
++ MOBILE CRANE 60T	2	IN
++ ENVIRONMETAL BARGE 500T MIN	2	IN
++ RVX PULLING BARGE WITH WINCH	1	IN
UT INSPECTION EQUIPMENT	2	IN
++ WELDING MACHINES	12	IN
++ OXY-ACETYLENE SETS	4	IN
++ COLD-CUTTING MACHINE [6" - 24"]	12	IN
++ AIR COMPRESSOR	2	IN
++ PRESSURE TEST PUMP WITH ACCESSORIES	20	IN
++ X-RAY UNIT	1	IN
++ LIGHTING TOWERS 8KVA	4	IN
++ GENERATORS - 100KVA MIN	8	IN
++ EQUIPPED CONTAINER (SITE OFFICES)	3	IN
++ GRIT BLASTING SET	2	IN
++ CP TOOLBOX COMPLETE WITH ALL EQUIPMENT	4	IN
++ SURVEY SET	1	IN
++ TORQUE RANGE	2	IN

Table 5.7: Pipe Maintenance Project Items 3

ITEM	MINIMUM REQUIRED	IN / OUT OF STOCK
++ VALVE MAINTENANCE TOOL BOX	4	IN
++ PIPE LOCATOR	2	IN
++ HOUSE BOAT 40 MAN	2	IN
++ WORK BARGE	2	IN
++ RAMP BARGE	2	IN
++ MUSTER BARGES	6	IN
++ BUCKET DREDGE [BARGE WITH 60T CRAWLER CRANE + BUCKET]	1	IN
++ FORK LIFT [BASE MATERIAL TRANSFERS]	2	IN
++ POWER BARGES	2	IN
++ MATERIALS BARGES	4	IN
++ FUEL BARGE / WATER BARGE	2	IN
++ TUG BOATS [600 HP MIN]	4	IN
++ CREW BOATS [300HP MIN WITH DIESEL INBOARD ENGINES]	6	IN
++ SPEEDBOATS	3	IN
++ HOVERCRAFT	1	IN
++ PILING HAMMER	2	IN
++ CONCRETE MIXER	2	IN
++ LANDING CRAFT	2	IN

Table 5.8: Pipe Maintenance Project Items 4

ITEM	MINIMUM REQUIRED	IN / OUT OF STOCK
DRILLING RIG	1	OUT
++ COMMUNICATION SETS [SSB RADIOS]	3	IN
++ COMMUNICATON SETS [THURAYA SETS]	6	IN
++ COMMUNICATION SETS [VHF RADIOS]	10	IN
++ HOT TAP EQUIPMENT [2" - 14"]	1	IN
++ ELECTRODE BAKING OVEN	4	IN
++ WELDING QUIVERS	14	IN
D-6 LGP BULLDOZER	3	OUT

The tables above show the machines, equipments and materials needed for the integrated pipeline maintenance project in the Niger Delta. The list was reviewed by the project department and approved by top management. The asset managers and warehouse staff confirmed the items in OIS possession. The rest were procured.

5.7 Integrated Pipeline Project Task 4

The fourth task is to recommend the needed facilities and fixed assets needed to execute the contract and support the staff in their activities. I developed the recommendations using historical examination of OIS past projects. The following facilities are needed to execute this integrated pipeline maintenance contract successfully. Tables 5.9-5.10 show all the facility, the specification and the quantity needed.

Table 5.9: Facilities Needed for Pipeline Maintenance Project 1

FACILITY	SPECIFICATION	QTY REQUIRED
++ OFFICE SPACE	ACCOMMODATE 60 PERSONS MIN WITH PCS AND PHONE/INTERNET FACILITIES	1
++ FABRICATION WORKSHOP	FAB WORKSHOP SUFFICIENT TO FABRICATE A 24" SCRAPER TRAP AND MANIFOLD FENCE.10M WIDE X 20 M LONG. FULLY COVERED	1
++ MATERIALS STORAGE SPACE	SUFFICIENT FOR PROPER STORAGE OF SHELL ISSUED MATERIALS. COVERED SPACE OF 6M WIDE X 15 M LONG WITH OPEN SPACE OF 20 M WIDE X 40 M LONG	1

Table 5.10: Facilities Needed for Pipeline Maintenance Project 2

FACILITY	SPECIFICATION	QTY REQUIRED
++ JETTY AREA	WATER FRONT AREA [20 M LONG X 10 M WIDE X 1 M DEEP AT LLWS] PLUS AN ADJOINING LAND AREA [20 M LONG X 10 M WIDE]	1
++ EQUIPMENT STORAGE SPACE	50 M LONG X 30 M WIDE SPACE	1

The table above show facilities needed for the integrated pipeline maintenance project for Shell. OIS has all these assets. None of the items in the above list needed to be purchased, rented or acquired.

5.8 Integrated Pipeline Project Task 5

The list from task 3 was adjusted because OIS already machines and equipments. Some of the existing equipments and machines are working on other projects. The table below shows the procurement list for machines, equipments and materials needed for the integrated pipeline maintenance project in the Niger Delta. The list was reviewed by the project department and approved by top management.

All the items were successfully procured for the project. Due the large capital expenditure needed to purchase a drilling rig, I recommended that one was leased from a drilling contractor in Warri, Nigeria and a sub contract was awarded to that same company to complete the drilling aspect of the project. The other items in the list above were successfully purchased.

Task 5 was successfully completed. All the items were successfully procured with exception of the drilling rig. The entire items shipped were cleared from customs without any major damage or delay to the project.

Table 5.11: Procured Items for Integrated Pipeline Maintenance Project

ITEM	MINIMUM REQUIRED	ACTION
VACUUM TRUCK 15TON	2	PURCHASED
SWAMP BUGGY BACKHOE (SWAMP EXCAVATOR)	2	PURCHASED
MOBILE CRANE 60TON	2	PURCHASED
COLD-CUTTING MACHINE [6" - 24"]	12	PURCHASED
PRESSURE TEST PUMP WITH ACCESSORIES	20	PURCHASED
DRILLING RIG	1	LEASED
D-6 LGP BULLDOZER	3	PURCHASED
SWAMP CRANE 60TON	1	PURCHASED

I accomplished the five tasks successfully with help from the OIS projects department. We looked at the client's needs and broke them down into workable sections for the project managers. We recommend staff necessary for the project. I recommend machines, equipment and materials for the project. We recommend the needed facilities for the project. Lastly, I procured needed machines, equipment and materials for project.

This project was largely a team effort. I worked with the project team and several departments in OIS to do the job. Working as a team made the process easier and more efficient because we could draw from every one's knowledge and experience and channel those resources into the project.

There were two leads in this project; the vice president (USA & Overseas) and the group managing director. They were very pleased with the results. I will continuously serve OIS in similar projects.

5.9 Technical Challenges

This is a purely pipe line maintenance project. I dealt with a specific section of the project. Considering my responsibilities in the project I faced and overcame the following challenges:

1. **Marine Challenges:** The project required the use of swamp barges. These vessels had to be towed into site by a tug boat. A challenge was determining the specific horse power needed to tow the vessels and match them with the appropriate vessels. This was solved by discussing with the OIS marine department and matching the specs of the tug boats with the tonnage of the barges and the loads they carried.
2. **Lift and Crane Challenges:** This project involved using one Terex HC60 as a land crane and as a swamp crane, by putting it on a barge. Operating a crane can be very challenging in swamps because they are not often stable. Lifts had to be done with precision. The crane and lift engineers were especially alert during lifts. Radios were used for constant communication between the engineers, technician, workers and the crane operator. The engine of the crane and parts were constantly inspected to ensure optimum operating of the equipment.
3. **Welding Challenges:** We had to weld the pipe together when they are installed.. We had welding specifications, inspection and quality compliance criteria. The welding quality was a key component of project success. Each pipe and weld was inspected thoroughly by the quality engineers and inspection staff.

4. Client Specification: A challenge in this project is examining the technical specifications of the client and determining the specific activity breakdown required to meet the client's needs. OIS strives to satisfy all her clients. I looked over the project scope, contracts and all related paper work to make sure that we do not omit any part of the job and that we do not do anything that is not within the scope of what we were paid to do.
5. Environmental conditions: The swamps in the Niger Delta can be a bad place for machines. The area is very humid and transportation in the swamps and out is difficult. Due to these facts, all the items procured for this job were those made for swamp regions. It was a challenge finding these items because they were scares and often more expensive than the regular machines, equipments and materials.

5.10 Administrative Duties

The project location was the Nigerian Niger Delta. I reported to the top management of the company and I had people reporting to me. In carrying out my responsibilities, I performed the following administrative duties on this project:

1. Represented OIS in all discussions with the Vendors.
2. Managed shipping schedules.
3. Worked with the Group Managing Director and the Vice President (USA & Overseas) during the project.
4. Dealt with all local communities
5. Coordinated with OIS finance department to release financial resources as needed for the project.
6. Coordinated with OIS Human resources department to provide staff, engineers, technicians, welders, general workers and cooks as needed for the project.
7. Managed arrangements for crew feeding while on the job.
8. Managed procurement and delivery of items needed for the project.

5.11 Nontechnical Challenges

The nontechnical aspects of the project are very important. This project was mainly a management and procurement project as well as an engineering project. To safely execute this project in the Niger Delta, we had to overcome the following challenges:

1. **Safety:** Safety is important in all OIS operations. During swamp operation in the Niger Delta, OIS staffs were exposed to danger from their work and from the surrounding community citizens. Having the staff alert and focused on the job was key to avoiding losses. Encouraging the staff to confine themselves to the work area helped keep them safe. I maintained regular communication with the safety engineers and HSE staff onsite.
2. **Transportations:** Transportation of machines in an out of the swamps is difficult. It was my responsibility to make sure that the machines, equipments and materials needed for the job got to the work site. This involved a lot of coordination with the logistic department to ensure safe and timely arrival of the expected items.
3. **Conflict Resolution:** Supervisors complained about their workers and vice versa. Conflict resolution was a regular activity on this project. OIS likes to maintain a happy and pleasant work environment. This challenge was solved by encouraging the staff to be more understanding, accepting and compromising in the work environment.

4. Vendor Management: On this project we had some vendors working for OIS to supply needed items. Vendors are different entities that we often had to depend on. To avoid any delays, we set early deadlines for our vendors and sourced the market for substitute goods and services.
5. Procurement: Equipments, machines and materials were bought for this project. I was the primary procurement staff for the project. The items were mainly imported. I dealt with customs and transport companies to get the materials from the ports to the work site. We experienced a lot of delays from the port administration, but these had no effects on the project performance.

5.12 Method, Consequences and Potential Improvement

In this case, the integrated pipeline maintenance project came on the market in 2005. OIS aggressively pursued, presented a competitive and was the best company for the job. The bid was accepted by the client, the contract was signed OIS was financially mobilized. After I was given the responsibility of breaking down the activities, recommending staff and machines and procuring needed items for the project. After breaking the activities and recommending staff. I worked with those staff to recommend the items needed for the project. Once the recommendations were approved, I procured all the needed equipments, machines and materials for the project.

I have also improved on my project management skills. This experience has reinforced my knowledge on pipe line engineering. Through the procurement activities, I have established better connections with many oil and gas vendors in the USA and drilling contractors in Nigeria.

OIS needs to have more staff trainings on cross cultural training and tolerance. The company also needed to make sure their work environments are a key determining factor when procuring machines. The procurement department of the company should be expanded to cope with the buying activities worldwide.

In Summary, this OIS project involved pipeline maintenance and repairs works involving manifold piping works, pipeline civil structure maintenance, valves maintenance, low/intermediate emergency pipeline repairs, manifolds protection systems installations/repairs, composite repairs, cathode protection repairs/upgrades and planned pipeline upgrades/rehabilitations. The area is the swamp regions of the Niger Delta. My responsibility was procurement and project management. I had to determine exactly what the client needs and recommend the items needed for the project..

I accomplished the following five tasks successfully with help from the OIS projects department:

1. I looked at the client's needs and break them down into workable sections for the project managers.
2. We recommended staff necessary for the project.
3. We recommended machines, equipment and materials for the project.
4. We recommended the needed facilities for the project.
5. I procured needed machines, equipment and materials for project and subcontracted the drilling portion of the project to a drilling contractor.

My responsibilities were carried out successfully. The project was successful. We had no fatalities. A lot of the staff fell ill, due to swamp conditions. In the case of ill staff they were relieved and replacement employees were brought in. We did not experience any major delay.

CHAPTER VI

DEVELOPMENT OF PETROLEUM TRAINING FACILITIES

One of the key activities of the Oil and Industrial Services Group (OIS) is developing technical and general training facilities for companies, governments, institutions and other clients. These training facilities are developed to equip individual with the vital skills that benefits themselves, their families and the organizations they belong to. These training facilities include petroleum training facilities, vocational training facilities, business training facilities, human resource training facilities, chemical training facilities, civil training facilities, computer training facilities, industrial training facilities and general training facilities.

OIS was contracted to develop two petroleum training facilities. The first one would be in Kaduna; this is a city in northern Nigeria and it would house training courses of all the senior staff of local companies and other senior government officials that require petroleum training or education. The second facility would be Bonny; an island city rich in petroleum reserves, located in the southern Niger Delta region of Nigeria. This facility would train junior to middle level staff of local companies, and the government.

My job is to procure training materials, models, machines and equipment needed to develop these facilities. I have also helped finalize an agreement between OIS and some partner companies that would enable OIS take on similar projects around the countries in the Gulf of Guinea.

6.1 Background on Petroleum Training Facilities

Education in a formal sense or informal sense is the background needed for skills. All employees need to be trained to a certain extent to enable them perform their job duties. This training can be gotten from the organization, schools, training facilities, past jobs, etc.

The petroleum industry is technical and technologically advanced in nature. Cutting edge technology is present in most of the daily activities. Examples of this cutting edge technology are offshore facilities, drilling equipment, simulation tools, process facilities, marine transportation, etc. The financial stakes are also high in petroleum related activities. These technologies help stake holders hedge their risk by being as accurate as humanly possible. Because of the technological advancements in the industry and the financial implications of petroleum projects, it is necessary that people working in the industry are properly trained on how to apply technology and develop new ones in the petroleum industry.

Training facilities are at the center of the educational component of the industry. These facilities are developed and owned by companies, governments and educational institutions. The facilities are used to training people and equip them with a range of skill that are relevant to their jobs or to the industry. Training centers usually have several courses and modules designed to give the trainee certain skill sets.

Petroleum training facilities usually have their courses broken into the following sections:

1. Petroleum fundamentals
2. Petroleum management and economics
3. Geology
4. Drilling
5. Production
6. Crude oil & natural gas
7. Production technology
8. Instruments and controls
9. Refining
10. Health, safety and the environment
11. Electricity & electronics fundamentals
12. Completions and work over
13. Automation technology
14. Pipeline technology
15. Petroleum measurement
16. Offshore operations

The list above shows the different facets of the industry. The skills gotten from training in the above skill can enable an employee to function in many desired roles in the industry. Training facilities exist to service governments, companies and schools (Kruse, 1979).

Several professors and training facility staff were hired as consultants on this project from the USA, Canada, the UK and Nigeria. It was my responsibility to review the course description created by these consultants and recommend an approval or rejection of their work. In many cases I worked with the consultants to improve the course structures in cases of deficiencies

Manufactures and distributors of lab and training equipments were also used as vendors on this project. I worked with engineers from these vendors to select and develop some of the training equipment for these facilities. I was responsible for accepting or rejecting their designs on behalf of OIS and out client. In many cases I gave them feedback that enabled them produce acceptable products.

Several engineers and managers in the Nigerian oil industry; potential trainees were interviewed and surveyed for their expectations from a training facility. I reviewed the results of this exercise and used the constructive ideas in the development of the project plan for these facilities. The results of these surveys and interviews were also sent to our vendors and staffs to enable them develop their courses and products to best suite the trainee.

6.2 Bonny Project Scope and Objectives

The main task for OIS in this project is to provide all the modules, equipment, machines and education materials for the training facility. The construction of the building that will house the facility was to be handled by a separate contractor. The details below show the project details.

The training facility will be equipment to train pupils in all necessary petroleum disciplines. The facility would train junior to middle level staff of local companies, and government. The Bonny training facility will be similar to the Kaduna facilities; however the Kaduna facilities will house management training and petroleum economics.

Project Type:	Training facility development
Core activity:	Training
Industry:	Petroleum
Location:	Bonny Island
Environment:	Delta zone
Duration:	18 Months
Start Date:	01 August 2010

The island of Bonny is situated at the edge of River State close to Port Harcourt in the Niger delta region of Nigeria. The location of the island puts Bonny at the heart of the Niger Delta. This location is especially important as the petroleum industry and the Nigerian government increases efforts to develop the Niger Delta and empower the local citizens.

In addition to the location, Bonny Island is industrially significant. The most important industry in Nigeria is petroleum. Bonny Island has been the recipient of major foreign petroleum investment and development. The island also contains significant petroleum resources. Bonny is the home of the following:

1. Bonny light crude oil
2. Bonny export terminal
3. Nigeria Liquefied Natural Gas Limited (NLNG)
4. Bonny Non Associated Gas plant
5. Bonny oil terminal
6. A wealth of petroleum reserves and other petroleum assets

(Gardiner et al., 2010).

6.3 Kaduna Project Scope and Objectives

The main task for OIS in the development of the Kaduna training facility is to provide all the modules, equipment, machines and education materials for the training facility. The training facility will be equipped to train management staff in all necessary disciplines on petroleum. This facility will have all the capabilities of the Bonny facility. The Kaduna training facility will place an emphasis on management and petroleum economics. The details below show the project details.

Project Type: Training facility development

Core activity: Training

Industry: Petroleum

Location: Kaduna city

Environment: Dry land

Duration: 18 Months

Start Date: 01 August 2010

Kaduna city is the capital of Kaduna State. Kaduna is located in the northern part of Nigeria. Kaduna is an old and ancient city that has a lot of historical significance for Nigeria. Kaduna is home to the Kaduna Refining and Petrochemical Limited, one of the few refineries in Nigeria.

6.4 Project Description

The items, models and educational equipment for the two facilities were essentially identical. The difference between the Kaduna and Bonny training facilities is that the courses in Kaduna will be designed for management level employees and government officials while the courses in Bonny will be designed for general staff and civil servants. A list of needed items was compiled and approved by the client. The list below was compiled jointly by OIS staff, consultants and me.

To furnish the two facilities, the following items were needed:

Table 6.1: Table Showing Items Needed for Training Facilities 1

NO.	Item	Kaduna	Bonny
1	AC Variable Speed Drive Trainer Extended PowerFlex 40	50	50
2	Air Cooled Fin Fan Exchanger Model	50	50
3	Ancillary Device Control Application	50	50
4	ANSI Pump Cutaway	40	40
5	API Pump Cutaway	40	40
6	Axial Compressor Model	50	50
7	Back Pressure Regulator Cutaway Oil Field type 1	30	30
8	Back Pressure Regulator Cutaway Oil Field type 2	30	30
9	Bulk Storage Tank Model Fixed Head	30	30
10	Bulk Storage Tank Model Floating Head	30	30
11	Calibration Workstation Portable1	30	30
12	Calibration Workstation Portable	30	30
13	Centrifugal Compressor Model	50	50
14	Clip Valve Cutaway	50	50
15	Compound Cumulatively Wound DC Motor Trainer	50	50
16	Compressor Inlet Unloader Valve Replica 1	30	30
17	Compressor Inlet Unloader Valve Replica 2	30	30
18	Continuous Distillation Operations Demonstrator 1	30	30
19	Continuous Distillation Operations Demonstrator 2	30	30
20	Control Valve Characteristics Trainer	50	50

Table 6.2: Table Showing Items Needed for Training Facilities 2

NO.	Item	Kaduna	Bonny
21	Diaphragm Type Dump Valve Cutaway	50	50
22	Dissectible Pump Series	50	50
23	Distillation Column Model	50	50
24	Electrical Generation Fundamentals Trainer	50	50
25	Electricity Electronics Trainer	50	50
26	Electromechanical Bench Package	50	50
27	Fire Tube Boiler Model	50	50
28	Fired Heater Model	50	50
29	Flange Bolt Torquing Demonstrator	50	50
30	Flange Bolt Torquing Fixture Set	50	50
31	Flare System Model	50	50
32	Foot Valve Cutaway 1in 2in	50	50
33	Gas Turbine Model	50	50
34	Hammer Wing Nut Union Cutaway	50	50
35	Heat Exchanger Principles Demonstrator	50	50
36	Hose and Coupling Sample Board Set	50	50
37	HVAC R Motors Training System	50	50
38	Hydraulic Component Cutaway Set	50	50
39	Hydraulics Trainer Advanced	50	50
40	Hydraulics Trainer Fundamentals	50	50
41	Hydraulics Trainer Fundamentals 2	50	50
42	Hydraulics Trainer Fundamentals Extended	50	50
43	I P Current to Pressure Converter Cutaway	50	50
44	Journal and Fluid film Bearing Trainer	50	50
45	Kettle Type Reboiler Heat Exchanger Training Model	50	50
46	LACT Measurement Skid Mock	50	50
47	Level Measurement Trainer	50	50
48	LNG Spherical Storage Tank Model	50	50
49	Low Temperature Separator LTX System Model	50	50
50	Material Handling Application Module	50	50

Table 6.3: Table Showing Items Needed for Training Facilities 3

NO.	Item	Kaduna	Bonny
51	Motor Control Training System Series	50	50
52	Motor Fundamentals Training System	50	50
53	Multi Pass Fixed Tube Sheet Heat Exchanger Training Model	50	50
54	Multi Stage Horizontally Split Pump Trainer	50	50
55	Orifice Assembly Cutaway 2in	50	50
56	Permanent Split Capacitor Start PSC AC Motor Trainer	50	50
57	PID Controller Application	50	50
58	PID Controller Application Level Control	50	50
59	PID Controller Application LEVEL CONTROL	50	50
60	PID Process Control Trainer	50	50
61	Piping System Model	50	50
62	Piston Type Check Valve Cutaway	50	50
63	Plate	50	50
64	PlateType Heat Exchanger Training Model	50	50
65	PLC Application Trainer Traffic Light	50	50
66	PLC Trainer Fundamentals	50	50
67	Pneumatic Component Cutaway Set	50	50
68	Pneumatic Robot Accessory	50	50
69	Pneumatics Trainer Advanced	50	50
70	Pneumatics Trainer Fundamentals	50	50
71	Process Control PLC Application Module	50	50
72	Process Control Trainer Basic	50	50
73	Process Control Trainer Downsize1	50	50
74	Process Control Trainer Downsized	50	50
75	Process Equipment Cutaway Series	50	50
76	Process Trainer Advanced 1	30	30
77	Process Trainer Advanced 2	30	30
78	Process Trainer Analytic	50	50
79	Production Regulator Big Joe Cutaway	50	50
80	Pump Maintenance Trainer Extended	50	50

Table 6.4: Table Showing Items Needed for Training Facilities 4

NO.	Item	Kaduna	Bonny
81	Reciprocating Compressor Demonstrator	30	30
82	Reciprocating Compressor Dissectible Extended	30	30
83	Relief Valve Cutaway Oil Field Type	50	50
84	Rotary Drilling Bit Replica Set 9 Piece	50	50
85	Sensors Trainer Fundamentals	30	30
86	Sensors Trainer Advanced	30	30
87	Split Phase Capacitor Start AC Motor Trainer	50	50
88	Steam Trap Cutaway Assortment	30	30
89	Steam Turbine Dissectible Mechanical Drive	30	30
90	Temperature Regulator Cutaway	50	50
91	Three Phase Squirrel Cage Rotor AC Motor Trainer	50	50
92	Transformer Connections Trainer	50	50
93	U Tube Heat Exchanger Training Model	50	50
94	Valve Cutaway Assortment	30	30
95	Valve Cutaway Assortment Downsized	30	30
96	Valve Cutaway Assortment Extended	30	30
97	Valve Packing Demonstrator	30	30
98	Vertical Cross flow Separator Model	50	50
99	Vertical Thermosyphon Reboiler Heat Exchanger Training Model	50	50
100	Water Tube Boiler Model	50	50

These same items have been used in training facilities in the use to train petroleum industry staff. These items will enable the educational consultant design course to train people in those facilities. All the orders have been placed and are scheduled to arrive in Nigeria in June 2011.

6.5 Technical Challenges

This is an educational project. I dealt with the procurement section of the project. In my responsibilities I encountered and overcame the following challenges:

1. Design: Most of the modules and machines were designed or adjusted for this project. This involved working with the design engineers from our vendors. After the designs were drafted, they were submitted to our client for approval. Orders for these items were place after the designs were approved.
2. Client Specification: A challenge is this project is examining the educational specifications of the client and determining the specific activity breakdown required to meet the client's needs. OIS strives to satisfy all her client. I looked over the project scope, contracts and all related paper work to make sure that we satisfy our clients.
3. Environmental conditions: Bonny is an island. There are no roads that lead to the island from the main land of River State; Bonny is accessed by water or air. Kaduna is in the north, the land is dry. Delivering the items will require sufficient planning and logistics. This is a challenge that the logistic department in OIS and I have solved by scheduling the transportation and delivery of these items to the client. The items will arrive on time and they are no predicted delays.

6.6 Administrative Duties

The project location was the Bonny and Kaduna. As one of the top managers, I performed the following duties:

1. Represented OIS in all discussions with the Client.
2. Represented OIS in all discussions with the Vendors.
3. Managed transportation schedules.
4. Worked with the group managing director during the project.
5. Dealt with other contractors on the project.
6. Coordinated with OIS finance department to release financial resources as needed for the project.
7. Coordinated with OIS Human resources department to provide staff, engineers, technicians, welders, general workers and cooks as needed for the project.
8. Managed procurement and delivery of items needed for the project.

6.7 Nontechnical Challenges

This project was mainly an educational project as well as an engineering project. The nontechnical aspects of the project are very important. To successfully execute this project in the Kaduna and Bonny, we had to overcome the following challenges:

1. **Safety:** We incorporated safety in all our designs. Safety is a key factor in all OIS operations. I consulted with the HSE departments of OIS and our client regularly to incorporate their safety requirements.
2. **Conflict Resolution:** There were minor disagreements in the design phases. These were quickly resolved in short periods of time. All the minor conflicts were resolved without causing any delays to the project.
3. **Vendor Management:** On this project we had design vendors and consultants working for OIS to supply needed items. There were some minor changes in thoughts of our staff and those of our vendors. We were able to agree on the final designs and products after consultations with our client.
4. **Procurement:** I was the primary procurement staff for the project. All the items were bought from vendor. The items were mainly imported. I dealt with customs and transport companies to get the materials from the ports to the work site. We experienced a lot of delays from the port administration, but these had no effects on the project performance.

In Summary, My job was to support the project manager and the GMD as the procurement lead and a design engineer in the development of training facilities in Bonny and Kaduna. These training facilities will be equip individuals with the vital skills that benefits themselves, their families and the organizations they belong to. The first one would be in Kaduna; this is a city in northern Nigeria and it would house training courses of all the senior staff of local companies and other senior government officials that require petroleum training or education. The second facility would be Bonny; an island city rich in Natural gas reserves, located in the southern Niger Delta region of Nigeria. This facility would train junior to middle level staff of local companies, and government.

The facilities will train people in petroleum management and economics, petroleum fundamentals, geology, drilling, production, crude oil & natural gas, production technology, instruments & controls, refining, HSE, electricity & electronics fundamentals, completions& work over, automation technology, pipeline technology, petroleum measurement and offshore operations. The courses will be designed by the educational consultants working on the project. All the items have been ordered and are scheduled to arrive in Nigeria in June 2011.

CHAPTER VII

INSULATION PROJECT ON AGBAMI FPSO

In June 2010, I was approached by the chief executive officer of Pijott Engineering. He presented the Envirocage to me. He approached the Oil and Industrial Group because his company had just acquired the sole distribution rights to the product in Africa and he was looking an oil service company with an impressive reputation to handle the Envirocage installation in Africa. The Envirocage is an innovative technology developed by Obetego that provides an economical insulation for components in a refinery or process facility. This insulation also protects workers from burns and thermal hazards in the work place (Okpalanne, 2010).

After the meeting with Pijott, I followed up by discussing the project with the vice president of OIS (USA & Overseas). He instructed me to request for photos, prototypes, designs, drafts and specifications from Pijott. I forwarded all the information and data I gathered to the OIS Africa offices. They were willing to assist Pijott in the installation as a sub contractor for the first few runs before the decision to have a formal shared working agreement.

The first project was an insulation job on the Agbami FPSO. The Agbami field is a large asset producing in Nigeria operated by Chevron. They gave the contract to Pijott and Obetego. These companies do not have facilities or staff in Nigeria. OIS contributed to the installation of the Envirocage on behalf of Pijott on the Agbami FPSO.

7.1 Background on Envirocage

Envirocage is an innovative patented technology that provides a cost-justifying, completely effective way of protecting workers from injuries, burn hazards in addition to many other benefits. Some of these injuries include burns incurred when a worker accidentally touches a pipe or equipment containing hot fluids. In addition to worker injury and discomfort, refinery and chemical plant management/owners face serious costs from these injuries in the form of worker sick time and liability claims (Okpalanne, 2010). Pipe insulation is very vital to every processing facility. Insulations help conserve heat and energy while protecting staff and other assets from heat.

The product is catching on to the market in a very fast rate. Many refineries in the north eastern part of the USA have Envirocage installed in their facilities to protect their pipes and heat exchangers. Envirocage is successful because it is a good product and it satisfies the insulation needs of the chemical and petroleum industry.

Envirocage eliminates the potential for burn to the workers by encasing hot process equipment/piping with a cage-like wire or mesh that acts as a physical barrier between the workers and the equipment/piping. This eliminates the potential for any physical contact with the hot equipment/piping personnel thereby eliminating the chances of personnel injury due to burn. Envirocage can be used to provide the necessary worker protection in lieu of traditional insulating material (calcium silicate, fiberglass, etc.), while it provides many additional benefits as elaborated below that the traditional insulation does not (Piorkowski, 2010).

The Envirocage is easy and simple to install. A well trained team of between two and ten men is a sufficient. The products are held into the pipes by clips that are manufactured to fit the pipe. The Envirocage can be installed with simple readily available tools. Figure 7.1 shows the Envirocage installed on a heat exchanger in a refinery.



Figure 7.1: Envirocage on a Heat Exchanger. (Okpalanne, 2010).

Envirocage has succeeded as an insulation product in the USA. My goal is to contribute in the success of the product in the Gulf of Guinea. There are many refineries, process plants, floating production facilities and float production storage and offloading vessels in the gulf that may need the product.

7.2 Background on Agbami

The Agbami field is a large asset in the Gulf of Guinea. The field is one of the largest in the region. It is a revenue builder for Chevron and the company's partners. Also the field is good opportunity for service companies to offer their products and services to Chevron.

The field occupies two oil blocks. The oil from the field is very light (47 degrees API and 0.23cp). 38 subsea wells are planned for the field, however the Agbami currently has 12 oil wells, 3 gas injectors and 4 peripheral water injection wells (Nwogu et al., 2010).

7.3 Project Scope and Objectives

The main task for OIS was installing the Envirocage on the Agbami FPSO. The product was fabricated in the USA and shipped to OIS projects department's office in Port Harcourt. This is a test run to see the performance of the product.

Project Type:	Pipe insulation
Location:	Nigerian Deep waters
Length:	55 Feet & 35 Feet
Pipe outer Diameter:	6 Inchers & 24 Inchers
Operating Temp.:	97 degrees C & 80 degrees C
Duration:	1 Week
Start Date:	1 st Week of October, 2010

Figure 7.2 shows the design for Envirocage installed on the Agbami FPSO pipe.

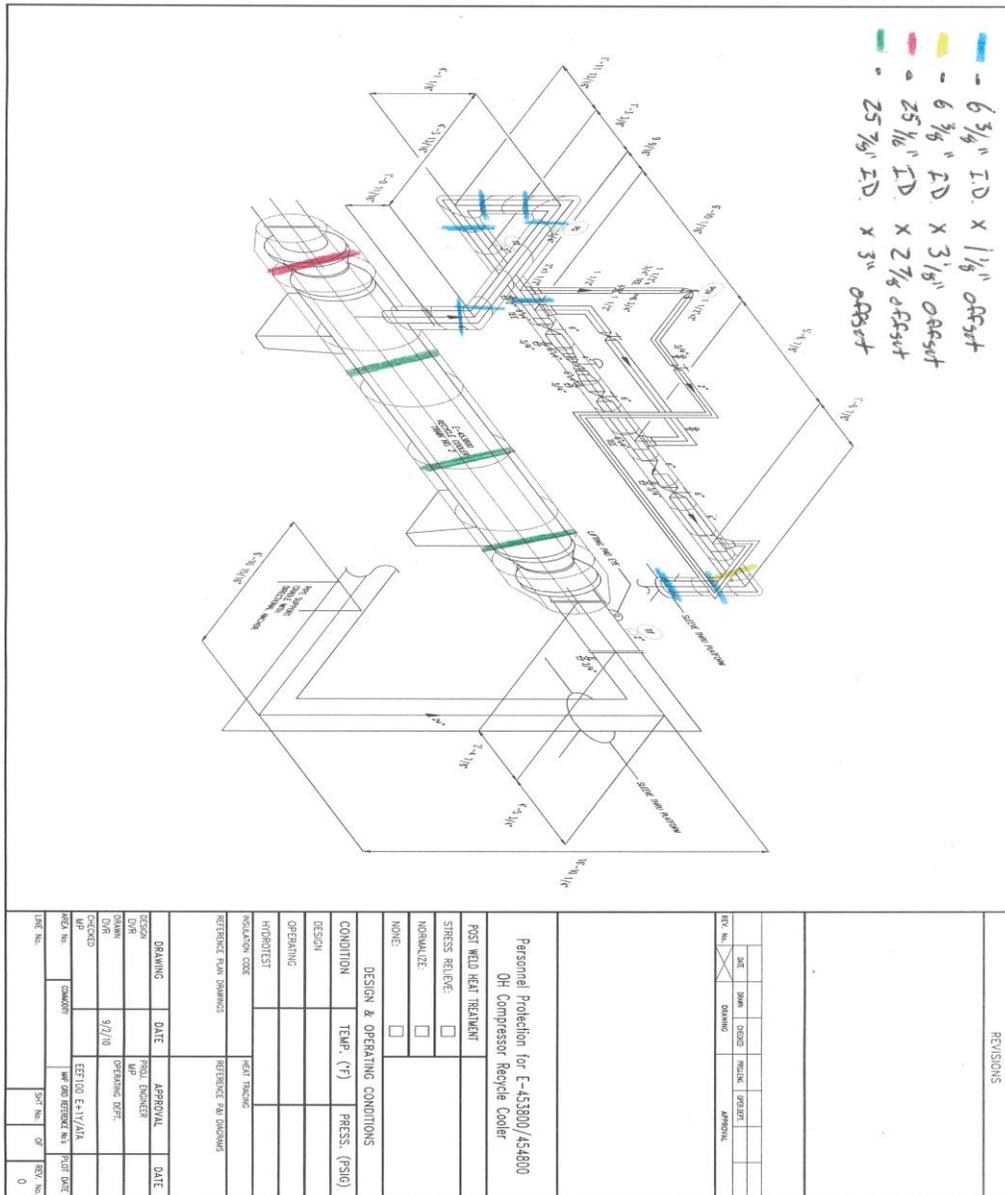


Figure 7.2: Envirocage Design for Agbami FPSO Pipe.

7.4 Results

Chevron is pleased with the test run of Envirocage. They plan to monitor the product for a period of time (may be one year) for the performance and durability. If the product performance is satisfactory, more of the Envirocage will be installed on the Agbami FPSO and other process facilities. The results of the test run have been forward to other companies and potential clients and they have all responded positively.

7.5 Administrative Duties

The project location was Nigerian deep waters. This falls under the OIS Gulf of Guinea division. It was my duty to make sure that all the OIS tools were used to satisfy the client. I performed the following administrative duties on this project:

1. Represent OIS in all discussions and negotiations with the Pijott.
2. Managed and schedules staff transportation to the FPSO.
3. Work with the Technical department during the project design.
4. Coordinated with OIS Human resources department to provide staff, engineers, technicians and installers as needed for the project.
5. Managed arrangements for crew feeding and accommodation.

7.6 Technical Challenges

This project has a pipe engineering, project management and installation components in it. To achieve success, I have to overcome all the technical difficulties of the project.

We experienced two technical barriers:

1. Design: The Envirocage was manufactured for this particular job. The specs were provided by Chevron. The engineers in OIS and Pijott worked together to draft a design. The client approved the design before the product was shipped to Port Harcourt. The project design had to be altered a few times to satisfy the client. The challenge was to take instruction from Chevron and translate it into an Engineering drawing. We overcame this huddle by paying attention to our client's specifications and working solely of their need to produce a satisfactory design.
2. Installation: The installation of the project had to done the right way. If the product fails because of poor installation, our client may assume that the product is inferior. To solve this problem, an engineer from Pijott's office in the USA was sent to the Agbami FSPO to supervise the installation and ensure that it was performed properly.

7.7 Nontechnical Challenges

The nontechnical aspect of the project is as important as the non technical aspect. Both aspects have their unique challenges. To safely execute this project in the Agbami field, we had to overcome the following challenges:

1. **Managing People:** I managed the project team assembled for this project. The team was comprised of the CEO of Pijott, a Pijott engineer, an OIS project engineer and three OIS installation staff. The main asset in this project was human resources. These are people. People need to be effectively managed to achieve efficiency.
2. **Safety:** The safety of our staff, assets and that of our client is paramount in all our activities. During the insulation of the pipe, staff can suffer thermal damage. All safety procedures were strictly enforced by the Pijott engineer to prevent any accidents.
3. **Staff transportations:** The OIS staff had to be transported from Port Harcourt to the Agbami FSPO. This involved buying airline tickets to Lagos and chartering a helicopter to take them from Lekki to the FSPO. The helicopter charter was challenging because there is a greater demand for them than the supply. We got a helicopter by using a maritime transportation agency to hire the helicopter.
4. **Budget concerns:** OIS and Pijott did not make any profit from this project. The two companies broke even. This project is considered as an investment in the future with Chevron and with the other process facilities and refineries in the Gulf of Guinea.

7.8 Method, Consequences and Potential Improvement

In this case, Chevron approached Pijott and asked for the Envirocage. They agreed to test the product to determine if they will move forward with a more significant project. Pijott approached OIS to help with the installation of the product. The project was scheduled for the first week of October 2010. The project was executed successfully. The exercise is continuous because the main aim to install Envirocage in significant volume on Chevron's process facilities.

This Envirocage project has reinforced my knowledge on product development. I have improved my marketing and management skills. I have established a relationship between OIS and Pijott.

OIS needs to increase their activities in process plant maintenance and services. There are a lot opportunities in installations and shut down activities. The company also needs to pay more attention to new products on the market like the Envirocage and similar new advances in the industry.

In summary, this project was a test run to see the performance of the product. The main task for Oil and Industrial Services was installing the Envirocage on the Agbami FPSO. The product was fabricated in the USA and shipped to OIS projects department's office in Port Harcourt. OIS now sent her staff with the product to the Agbami FPSO to perform installation. If Envirocage is successful, the project may be used in a large scale on the Agbami FPSO and potentially other process facilities in the region. Chevron is pleased with the test run of Envirocage. They plan to monitor the product for a period of time for the performance and durability. The results of the test run have been forwarded to other companies and potential clients and they have all responded positively. This may mean an increase in revenues for Pijott and OIS.

CHAPTER VIII

EGLNG LIFT PROJECT

In November, 2010, Oil and Industrial Services received an informal alert that EGLNG may be in the market for vessels without any specific information pertaining to the type, use or need for these vessels. OIS followed up aggressively, but was unsuccessful in getting more information on the project. The next best option was to alert our local partner in Malabo about this development and compel him to seek out the necessary information and contacts.

In late December, 2010, he had successfully gotten the project and linked the engineers and project staff of EGLNG with me, the managing representative of OIS in the country. EGLNG discussed with OIS and shared details, expectations and scope of the project. EGLNG requires a vessel with lifting capacities to move sections of their loading arms in the new marine jetty.

Oil and Industrial Services (OIS) is qualified to handle the project. The company followed up with EGLNG, but did not get the job. The project was awarded to another company because of the crane capacity of the barge we presented to the job. This was not a challenging problem. OIS could have easily provided a vessel with a larger crane, but our competitor was awarded the contract.

8.1 Background on EGLNG

The Equatorial Guinea LNG Holdings LTD (EGLNG), located in Malabo, Bioko Norte, and Equatorial Guinea is a world class supplier of natural gas from the Atlantic basin. This first delivery of gas was in 2007. The company plans to sell 3.4 million tons per annum of LNG. EGLNG plant sits on 230 acres located in the Punta Europa complex in Malabo (EGLNG, 2011).

The exiting LNG Train 1 was built to monetize the gas from the Alba gas and condensate field operated by Marathon Oil Company in Equatorial Guinea deep waters (EGLNG, 2011). This train is the only one in the world that utilizes a suspension bridge, three hundred and fifty meters (350m) long for loading LNG (Chernosky and McGhie, 2006). Figure 8.1 gives a pictorial view of the EGLNG train 1 and facilities.



Figure 8.1: EGLNG Suspended Bridge Train 1. (Chernosky and McGhie, 2006)

8.2 Project Scope and Objectives

The main task for OIS in this project is to assist in the construction activities with a marine vessel or barge that is big enough and flexible enough to act as a work site in the water. The marine vessel is also required to be equipped with a crane; preferably a crawler crane for flexibility or the vessels should be a lift boat. The construction will be located in the EGLNG marine jetty located in the Punta Europa complex in close proximity to the suspended LNG train 1.

Project Type:	Lifting
Load:	72 Ton
Distance:	10 Feet
Height:	115 Feet
Water Depth:	73-82 Feet
Pick Radius:	68 Feet
Set Radius:	89 Feet
Subsea Piping:	None
Duration:	15-30 Days
Start Date:	April 2011 +/- 15 days

EGLNG provided some pictures and engineering drawing of the work area. These drawing were examined by me and the marine engineering team to OIS. The images are shown below.

8.3 Technical Challenges

This project has a few technical challenges that need to be taken into consideration and overcome for the job is to be successful. The fact that we are dealing with marine vessels and structure further complicated the project. The barge has equipments and machines attached to it that need to be working efficiently to get the job done. The EGLNG Marine Jetty has structure that need to be preserved and not be impacted by the barge or the towing vessel during the transportation to the work site. There are environmental factors that may affect the equipments.

The following challenges needed to be overcome before the EGLNG lift project can be a success:

1. Navigation of the vessels from Duala to Malabo
2. Avoiding an impact between one of the vessels and jetty structures
3. The working condition of Victory Barge must be optimum.
4. The Crawler Crane required for the lift must be in excellent working condition.
5. The tow vessel required to move the barge around during the project must be effective and efficient.
6. The depth of the water in the work site is relative shallow and that may pose a challenge when moving the vessels.
7. Strong winds and fast speeds may jeopardize the vessels.
8. The Crane engineers and lift personnel must adhere to strict lift procedures to avoid tipping of the load and damages.

8.4 Administrative Duties

The project location is Equatorial Guinea. As the managing representative of Oil and Industrial Services in the country, it is my responsibility to manage the project and achieve total customer satisfaction. The following are the specific administrative duties required for this project:

1. Represented OIS in all discussions with EGLNG.
2. Performed feasibility study of the project.
3. Worked with the European Director and the General Manager (Marine) to prepare for the project.
4. Managed the staff.
5. Dealt with all government agencies that may affect the entry and exit of vessels into Equatorial Guinea and Cameroon.
6. Lead the arrangement for staff arrival, accommodation, feeding and general well being.
7. Maintained project goals, guidelines and timeline.
8. Monitored the budget and reduced cost estimates where possible.

8.5 Nontechnical Challenges

In this project the non technical challenges have more on an impact that the technical challenges. Equatorial Guinea is a complex environment and business is challenging. The government is very bureaucratic. These can pose some complications and simple things may become more difficult than they should, if OIS does not pay close attention to the non technical challengers. This project experienced the following non technical challenges:

1. Getting the information needed for the project.
2. Competing with other companies that want the job.
3. Gaining the trust of our local partner.
4. Gaining the confidence and trust of EGLNG.
5. Dealing with customs when the vessels enter Equatorial Guinea and leave Cameroon and vice versa.
6. Getting permits and government related approvals.
7. Avoiding unnecessary taxes.
8. Maintaining profitability.
9. Upholding the image of OIS as the work progresses.

Most of these challenges are similar to previous one faced by OIS in similar jobs. The company is confident that she will execute the job effectively. In the midst of these challenges, I will manage them.

8.6 Method, Consequences and Potential Improvement

In this case, the information was not readily available. Persistence by OIS and her local partner opened the information sources and linked the company to EGLNG. The next step was communication and a presentation of the excellent track record of the company; our equipment and vessels were presented to the client. We have put in our bid for the job. The job was lost to a competitor.

This experience has enabled me learn more about the marine industry. I have also learnt more about EGLNG, a potential long term big client of OIS. I am also having discussions with our local partner on how to serve EGLNG in many ways by providing them our goods and services. I am a better marketer of engineering services because I had to convince our client that we are capable and the best option to take on this task.

OIS needs to establish a direct line of communication with EGLNG. The company also needs to source new projects from EGLNG and other companies in Equatorial Guinea. The company needs to perform detailed market researches and studies to identify the needs of the Gulf of Guinea petroleum service market and cater to those clients and their needs.

In summary, EGLNG required a marine company to assist in the Punta Europa construction activities with a marine vessel or barge equipped with a crawler crane that is big enough and flexible enough to act as a work site in the water. The lift is a load of 72 Ton, a distance of 10 Feet, height of 115 Feet, water depth of 73-82 Feet, pick radius of 68 Feet, set radius of 89 Feet. The project lasted for approximately 30 days and started in the first week of April 2011. OIS Victory Barge J 316 was not chosen for the EGLNG lift project. OIS was qualified to handle the project, but the lift portion contract was awarded to a competitor. OIS was awarded the supporting and associated works portion of the contract. I managed the project and delivered excellent results. By working on this project, I improved on my marine engineering, project management, negotiating, financial management, marketing and scheduling skills.

CHAPTER IX

CAPITAL BUDGETING

One of the core business units for the Oil and Industrial Services Group is Marine Services. This involves providing vessels of numerous capabilities to her clients on charter. These vessels are owned by OIS, but are used by other companies to execute and complete their projects. OIS is constantly studying the needs of the petroleum offshore industry. In cases where the company discovers a marine need, vessels are acquired by OIS and made available to her clients.

The aim of this chapter to identify some of the vessels that may satisfy the needs of clients in the Gulf of Guinea and the capital budgeting process involved in the investment decisions. When a need is identified by OIS, a comprehensive study of the market is carried out. This study include market analysis, feasibility study, financial study and capital budgeting. The capital budgeting decision is considered the most important.

My main task was to receive the potential vessel list identified by the group managing director (GMD) or the vice president (VP) of OIS and perform the capital budgeting process. These vessels include barges, ships and work vessels. After capital budgeting, the results are sent to the group managing director; who makes the final decision to invest or not.

9.1 The OIS Capital Budgeting Process

The Oil and Industrial Services Group (OIS) owns and operates a fleet of marine vessels. These are boats, ships, barges and offshore vessels. OIS constantly buys, sells and leases marine vessels to and from the marine and petroleum industry. In light of the expansion plans of OIS into the Gulf of Guinea, vessels will be needed for projects in the area. All the potential purchases must pass through the OIS capital budgeting process before they are purchased.

Capital budgeting helps companies systematically analyze potential business opportunities, investments, facilities, equipment, etc in order make the decision whether they are worth undertaking. Capital budgeting decisions are the most important investments decisions made by the management of a company. The goal of capital budgeting is to select investments that will create revenue and increase the value of the company. Value is created when investments and assets are worth more than they cost or they bring in more revenue that was used to acquire them (Parrino and Kidwell, 2008).

There are five processes involved in OIS capital budgeting:

1. Determining asset life
2. Establishing minimum company break even time
3. Estimation of future cash flows
4. Determination of the required rate of return
5. Calculating the present value of the project

In capital budgeting decision, the asset life, break even time, finance charges, discount rates, all cost, contingencies, income of the asset and salvage cost are needed. OIS has established standard constants that were required to be used on this project. These constants include the following:

1. In the case of marine asset life used for capital budgeting decisions is 10 years.
2. The minimum company break even time is 7 years
3. The standard finance charge is 12.5%
4. OIS opportunity cost is 12.5%
5. OIS Discount rate is 16%
6. Finance pay back is 90% of income on bank facility principle until payoff
7. Original maintenance is 1% of the value of a new vessel. The estimated yearly maintenance cost increase by 5% each year for the first 10 years
8. The administrative cost is 5.5% of asset value
9. The yearly contingencies are 7.5% of asset value (customs, transportation, fees, duties, etc)
10. The estimated insurance cost is 3% of asset value
11. Average marine downtime is 20% of the year
12. The annual decline in marine asset income is 5% of the preceding year
13. The salvage cost after asset life is 10% of the asset value.
14. Tax rate is 35% of income

The Net Present Value (NPV) method is used to calculate the value of the project in present day dollars. The Present Value (PV) of the asset's future cash flows and cost are calculated. The NPV is the difference between PV (cash flows) and PV (cost). The equation below shows how the NPV is calculated in OIS.

$$NPV = \sum PV(\text{Asset's future cashflows}) - \sum PV(\text{Asset's cost})$$

Equation 9.1

where:

t= Time in years
 PV= Present Value
 NPV= Net Present Value

All the values are discounted to the original time (year "0"). The PV of all value are calculated at year "0". The following equation is used to calculated PV in OIS.

$$PV_x = (\text{Value @ } t) \frac{1}{(1+i)^t}$$

Equation 9.2

where:

Value @t = Money spent or receive at a particular time
 t= Time in years
 i= Discount rate
 PV= Present Value

Vessels are machines and equipments. These assets have a certain life span. After their life, they will have a salvage value. For accounting purposes, these vessels will need to be devalued in the books based on their depreciated value. OIS uses the straight line depreciation method for all assets.

$$\text{Annual Depreciating value} = \frac{\text{Original Value} - \text{Salvage Value}}{\text{Life of Vessel}} \quad \text{Equation 9.3}$$

After the NPV is calculated, OIS will accept the project if it is above 30% of the original asset investment. If the NPV is below 30% of the asset investment or down payment, the project is rejected and vice versa. After the project is accepted or rejected, the group managing director make the ultimate final decision. Equation 9.4 shows OIS Capital budget acceptance criteria.

$$\begin{aligned} \text{If, } NPV > 30\%(\text{Asset}), \text{ Accept} \\ \text{If, } NPV < 30\%(\text{Asset}), \text{ Re ject} \end{aligned} \quad \text{Equation 9.4}$$

where:

NPV= Net Present Value

The minimum break even time for OIS on marine assets is 7 years. After the NPV is acceptable, the Payback Period (PB) is calculated. The equation below shows the criteria for PB.

$$PB = t @ NPV = 0$$

Equation 9.5

$$PB = \text{Years before recovery} + \frac{\text{Remaining capital to recover}}{\text{Cash floe during the year}}$$

Equation 9.6

Where:

t=	Time in years
NPV=	Net Present Value
PB=	Payback Period

The project is rejected if the PB is more that 7 years. If the PB is less than 7 years, the project is analysis is forwarded to the group managing director make the ultimate final decision. All final decisions are made by the GMD.

9.2 Potential Vessels

OIS is constantly checking the market for Vessels. When these vessels are identified, studies are conducted. If a vessel passes all the criteria and there is capital available for the investment, the group managing director will make the final decision on the investment. If bought, these vessels are delivered to OIS jetties and ports where they station and are made ready to serve clients.

The vice president of OIS (USA & Overseas) and group managing director provided numerous vessels for capital budgeting analyses. For the purposes of this record of study, I will include four capital budget studies in this chapter. The vessels that failed OIS criteria were rejected and the GMD was notified. In cases where the vessels passed, the results are pending the decision of the GMD. This chapter presents the capital budget analysis for a Pipe lay barge with 3000Ton/2000Ton crane. This analysis gives an illustration of the capital budgeting activities in OIS.

9.3 Potential Pipe Laying Barge

One of the key activities of OIS is pipeline installation. Pipe laying barges are the key component of any offshore pipeline installation process. OIS is continuously checking the market for available pipe laying vessels to be added to her fleet of vessels used to service the oil industry.

The asking price for this vessel is \$180,000,000.00 (USD). My job is to estimate the total and periodic cost, estimate revenue and perform the capital budgeting analysis. After my analysis, I submitted the results to the group managing director.

This is a new pipe laying barge designed by Shanghai Bestway Marine Engineering Design Co., Ltd. She possesses an ABS (American Bureau of Shipping) Classification. The vessel was designed as a non self-propelled shallow water pipe laying barge (Brokers, 2011).

This vessel is equipped, and capable of laying submarine line in 300 m depth water. Operating line for pipe laying is situated on the starboard side of main deck. The store area for pipeline is situated on the port side of main deck. The stern is provided with fixed type stinger. The main deck is capable of storing about 5,000 Ton pipes. The loading, unloading and transfer of pipes is to be carried out by the pipe crane, roller and transport unit. One (1) 3,000 Ton (fixed type)/2,000 Ton (full revolving type) marine heavy crane is fitted on stern (Brokers, 2011). An image of the vessel is shown below. More images and technical specification are included in the appendix (Appendix O).



Figure 9.1: Potential Pipe Lay Barge. (Brokers, 2011).

Figure 9.1 shows the potential pipe lay barge with 3000Ton/2000Ton crane. This is very capable vessel. If purchased it will increase the pipe laying capabilities of OIS, allowing the company to bid for more challenging offshore pipeline installation contracts.

The potential pipe lay barge is equipped with capable machineries, including cranes of 3000Ton/2000Ton capacity. Lift operations are important during offshore projects. If purchased, this vessel will be able to make any needed lifts offshore easily and efficiently.

OIS has an in house market research department. Their main responsibility during this project was providing an industrial average income for this vessel. They estimated that this vessel will earn a daily income approximately \$239,000.00 (USD) /day when working. This is based on the going day rates of similar vessels in the area. Using the OIS constants below, the revue, depreciation and cost and profits were calculated:

1. Vessel cost of \$180,000,000.00 (USD)
2. Total investment needed for deliver vessel is \$200,000,000 (Vessel cost, insurance, fees, etc)
3. OIS will put a down payment of 20%
4. Daily income approximately \$239,000.00 (USD) /day when working
5. Average marine asset life before major refurbishment is 10 years.
6. The minimum company break even time is 7years
7. The standard finance charge is 12.5%
8. OIS opportunity cost is 12.5%
9. OIS Discount rate is 16%
10. Finance pay back is 90% of income on bank facility principle until payoff
11. Original maintenance is 1% of the value of a new vessel. The estimated yearly maintenance cost increase by 5% each year for the first 10 years
12. The estimated administrative cost is 5.5% of asset value, annual contingencies are 7.5% of asset value, insurance cost is 3% of asset value
13. This vessels has a potential long term charter contract for the first 5years
14. After year 5, average marine downtime is 20% of the year

15. Approximately 73 days, down time. 292 working days.
16. The annual decline in marine asset income is 5% of the preceding year
17. The salvage cost after asset life is 10% of the asset value.
18. Tax rate is 35% of income; taxes are not based on USA tax laws.

Tables 9.1-9.4 show the financial calculations necessary for the capital budget analysis.

Table 9.1: Estimated Revenue, Depreciation and Value (Pipe Laying Vessel).

Year	Revenue (USD)	Purchase Cost (USD)	Annual Depreciation (USD)	Value of Vessel (USD)
0	0.00	180,000,000.00	0.00	180,000,000.00
1	90,885,000.00	0.00	16,200,000.00	163,800,000.00
2	86,340,750.00	0.00	16,200,000.00	147,600,000.00
3	82,023,712.50	0.00	16,200,000.00	131,400,000.00
4	77,922,526.88	0.00	16,200,000.00	115,200,000.00
5	74,026,400.53	0.00	16,200,000.00	99,000,000.00
6	56,260,064.40	0.00	16,200,000.00	82,800,000.00
7	53,447,061.18	0.00	16,200,000.00	66,600,000.00
8	50,774,708.12	0.00	16,200,000.00	50,400,000.00
9	48,235,972.72	0.00	16,200,000.00	34,200,000.00
10	45,824,174.08	0.00	16,200,000.00	18,000,000.00

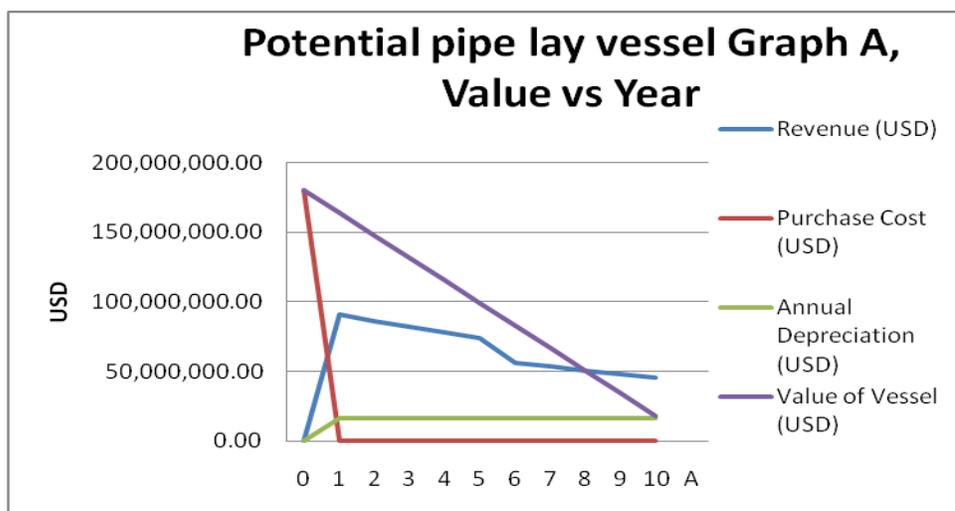


Figure 9.2: Potential Pipe Laying Vessel Graph A.

Table 9.2: Estimated Total Cost (Pipe Laying Vessel).

Year	Maintenance Cost (USD)	Admin Cost (USD)	Insurance (USD)	Contingency (USD)	Total Cost (USD)
0	0.00	0.00	5,400,000.00	13,500,000.00	18,900,000.00
1	1,800,000.00	8,190,000.00	4,914,000.00	12,285,000.00	27,189,000.00
2	1,890,000.00	7,380,000.00	4,428,000.00	11,070,000.00	24,768,000.00
3	1,984,500.00	6,570,000.00	3,942,000.00	9,855,000.00	22,351,500.00
4	2,083,725.00	5,760,000.00	3,456,000.00	8,640,000.00	19,939,725.00
5	2,187,911.25	4,950,000.00	2,970,000.00	7,425,000.00	17,532,911.25
6	2,297,306.81	4,140,000.00	2,484,000.00	6,210,000.00	15,131,306.81
7	2,412,172.15	3,330,000.00	1,998,000.00	4,995,000.00	12,735,172.15
8	2,532,780.76	2,520,000.00	1,512,000.00	3,780,000.00	10,344,780.76
9	2,659,419.80	1,710,000.00	1,026,000.00	2,565,000.00	7,960,419.80
10	2,792,390.79	900,000.00	540,000.00	1,350,000.00	5,582,390.79

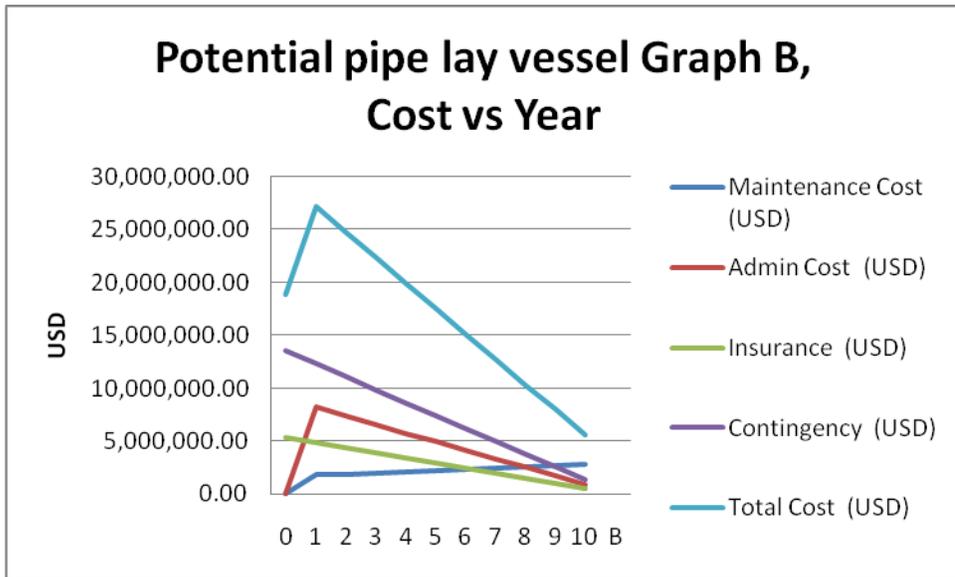


Figure 9.3: Potential Pipe Laying Vessel Graph B.

Table 9.3: Estimated Income before Interest (Pipe Laying Vessel).

Year	Revenue (USD)	Total Cost (USD)	Income before interest (USD)
0	0.00	18,900,000.00	-18,900,000.00
1	87,235,000.00	27,189,000.00	60,046,000.00
2	82,873,250.00	24,768,000.00	58,105,250.00
3	78,729,587.50	22,351,500.00	56,378,087.50
4	74,793,108.13	19,939,725.00	54,853,383.13
5	71,053,452.72	17,532,911.25	53,520,541.47
6	54,000,624.07	15,131,306.81	38,869,317.25
7	51,300,592.86	12,735,172.15	38,565,420.71
8	48,735,563.22	10,344,780.76	38,390,782.46
9	46,298,785.06	7,960,419.80	38,338,365.26
10	43,983,845.81	5,582,390.79	38,401,455.02

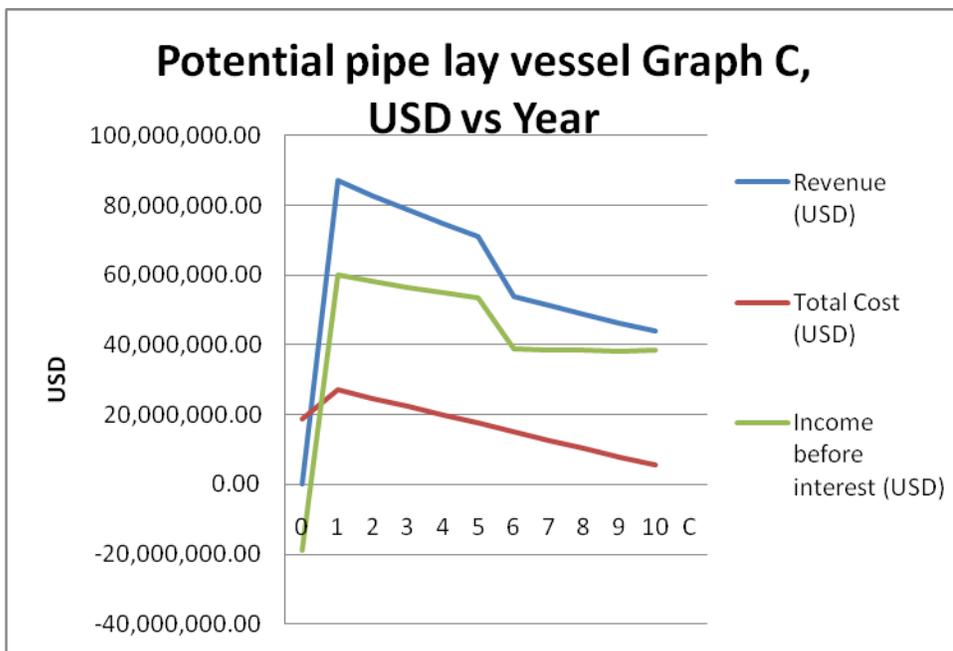


Figure 9.4: Potential Pipe Laying Vessel Graph C

Table 9.4: Estimated Profit before Tax (Pipe Laying Vessel).

Year	Financial Facility (USD)	Interest Paid (USD)	Income after interest charge (USD)	Payment on principle (USD)	Profit before Tax (USD)
0	160,000,000	0.00	0.00	0.00	0.00
1	123,958,600	20,000,000	40,046,000	36,041,400	4,004,600
2	85,609,217	15,494,825	42,610,425	38,349,383	4,261,042
3	44,499,975	10,701,152	45,676,935	41,109,242	4,567,693
4	0.00	5,562,497	49,290,886	44,499,976	4,790,910
5	0.00	0.00	53,520,541	0.00	53,520,541
6	0.00	0.00	38,869,317	0.00	38,869,317
7	0.00	0.00	38,565,420	0.00	38,565,420
8	0.00	0.00	38,390,782	0.00	38,390,782
9	0.00	0.00	38,338,365	0.00	38,338,365
10	0.00	0.00	38,401,455	0.00	38,401,455

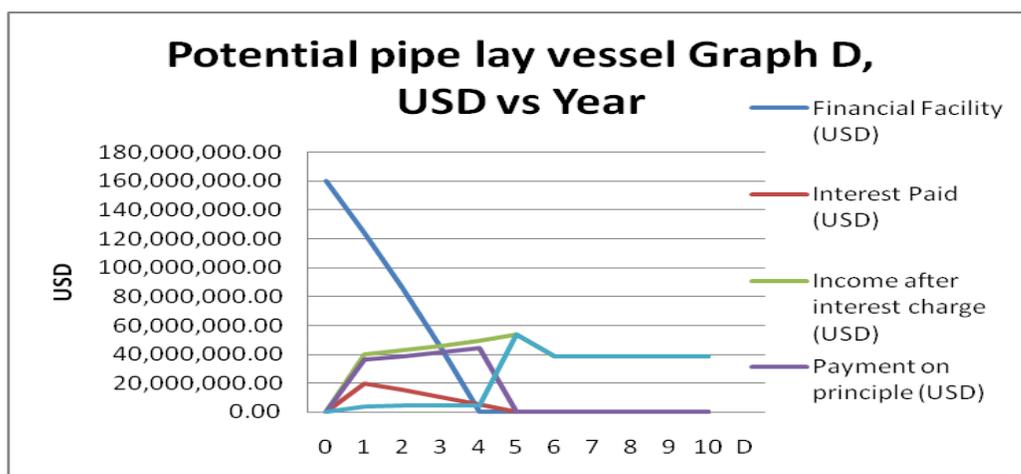


Figure 9.5: Potential Pipe Laying Vessel Graph D

OIS will make a down payment of 20% (USD 40,000,000) towards the cost of this pipe lay vessel. The total financed amount is estimated to be USD 160,000,000. This calculations show the loan facility being paid back in 4years.

Table 9.5: Estimated Profit after Tax (Pipe Laying Vessel).

Year	Profit before Tax (USD)	Approximate Tax (USD)	Profit after Tax (USD)
0	0.00	0.00	0.00
1	4,004,600.00	1,401,610.00	2,602,990.00
2	4,261,042.50	1,491,364.88	2,769,677.63
3	4,567,693.53	1,598,692.74	2,969,000.80
4	4,790,910.44	1,676,818.65	3,114,091.79
5	53,520,541.47	18,732,189.51	34,788,351.95
6	38,869,317.25	13,604,261.04	25,265,056.21
7	38,565,420.71	13,497,897.25	25,067,523.46
8	38,390,782.46	13,436,773.86	24,954,008.60
9	38,338,365.26	13,418,427.84	24,919,937.42
10	38,401,455.02	13,440,509.26	24,960,945.76

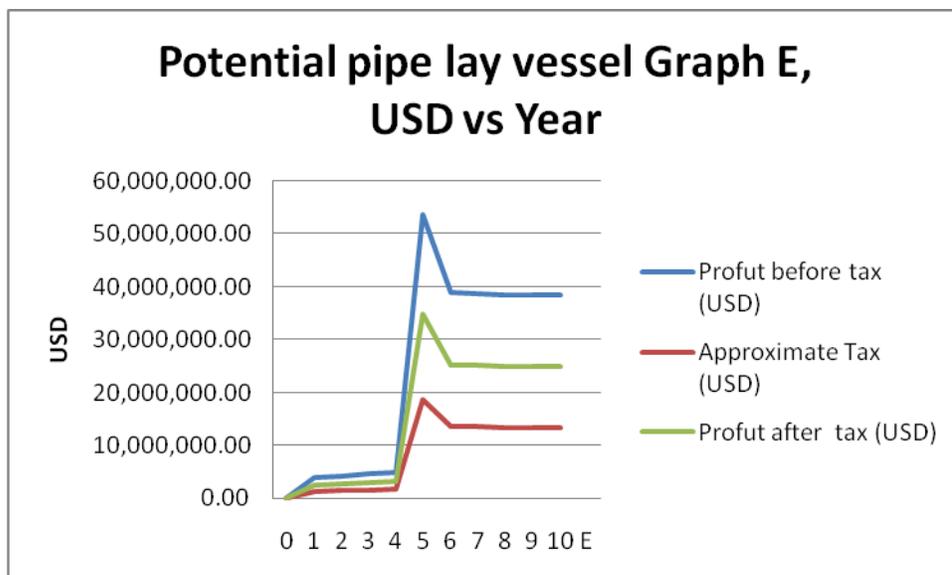


Figure 9.6: Potential Pipe Laying Vessel Graph E.

Table 9.5 and Figure 9.6 show the estimated real profits that may be gained from investing in this pipe lay vessel. These estimated profits are used in the capital budget analysis. The comparison capital will be the down payment made by OIS.

Table 9.6: Estimated Net Present Cash Flow (Pipe Laying Vessel)

Year	Initial Capital (USD)	Inflows (USD)	Salvage Value (USD)	Present value of Inflows (USD)	Net present cash Flow (USD)
0	40,000,000	0.00	0.00	0.00	-40,000,000
1	0.00	2,602,990	0.00	2,243,956	2,243,956
2	0.00	2,769,677	0.00	2,058,321	2,058,321
3	0.00	2,969,000	0.00	1,902,113	1,902,113
4	0.00	3,114,091	0.00	1,719,885	1,719,885
5	0.00	34,788,351	0.00	16,563,187	16,563,187
6	0.00	25,265,056	0.00	10,369,846	10,369,846
7	0.00	25,067,523	0.00	8,869,630	8,869,630
8	0.00	24,954,008	0.00	7,611,607	7,611,607
9	0.00	24,919,937	0.00	6,552,771	6,552,771
10	0.00	24,960,945	18,000,000	5,658,237	23,658,237
					41,549,557

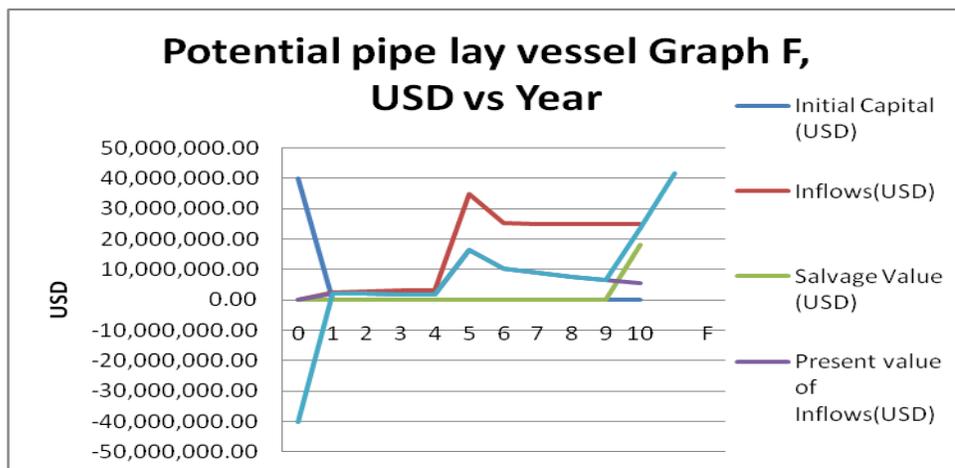


Figure 9.7: Potential Pipe Laying Vessel Graph F.

Table 9.6 and Figure 9.7 show that this potential investment has a positive cash flow over the life of the vessel. The present values of the inflows were calculated using a discount rate of 16% per annum. The net present cash value after the loan has been paid off is approximately over USD 41.5 Million. This project passes the capital budget requirements for OIS.

Table 9.7: Estimated Payback (Pipe Laying Vessel).

Year	Capital (USD)	Present value of Inflows (USD)	Capital Balance (USD)	Amount of Capital Repaid (USD)
0	40,000,000.00	0.00	40,000,000.00	0.00
1	0.00	2,243,956.90	37,756,043.10	2,243,956.90
2	0.00	2,058,321.66	35,697,721.44	4,302,278.56
3	0.00	1,902,113.14	33,795,608.30	6,204,391.70
4	0.00	1,719,885.17	32,075,723.13	7,924,276.87
5	0.00	16,563,187.15	15,512,535.98	24,487,464.02
6	0.00	10,369,846.64	5,142,689.34	34,857,310.66
7	0.00	8,869,630.04	-3,726,940.70	43,726,940.70
8	0.00	7,611,607.87	-11,338,548.57	51,338,548.57
9	0.00	6,552,771.81	-17,891,320.38	57,891,320.38
10	0.00	5,658,237.13	-23,549,557.51	63,549,557.51

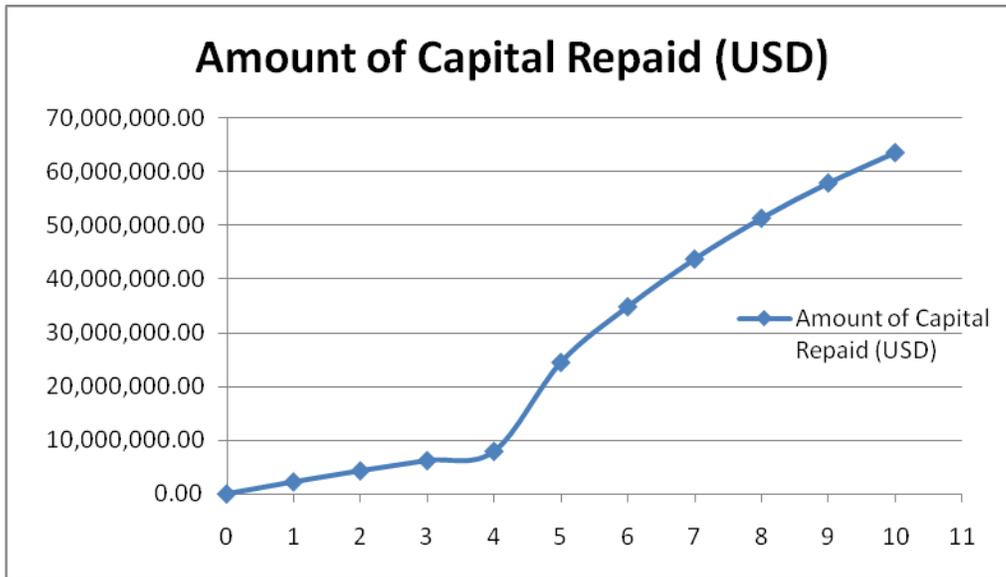


Figure 9.8: Potential Pipe Laying Vessel Capital Repayment Graph

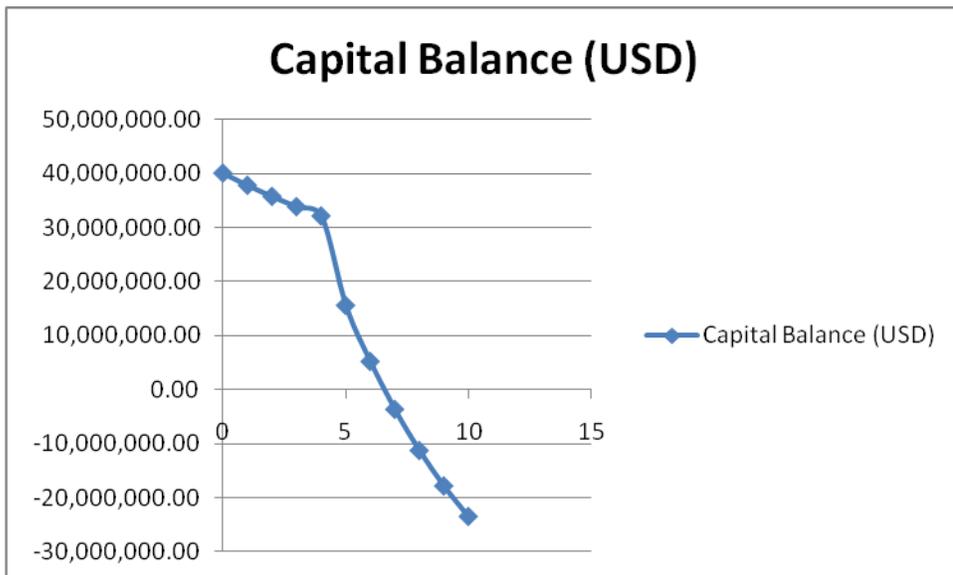


Figure 9.9: Potential Pipe Laying Vessel Capital Balance Graph

Table 9.7 shows the payback analysis for the new potential pipe lay barge with 3000Ton/2000Ton crane. The table shows that the asset payback after year 6. Using the equation for Payback Period (PB) shown above

$$PB = t @ NPV = 0$$

$$PB = 6.58 \text{ years}$$

The payback period for this pipe lay vessel is 6.58 years. The bank facility was estimated to be paid back on the fourth year after purchase. The project is accepted because the PB is less than 7 years. The net present cash value after the loan has been paid off is approximately over USD 41.5 Million. The NPV is greater than 30% of the original down payment. This potential pipe laying vessels has passed all the capital budgeting criteria. The project analysis was forwarded to the group managing director make the ultimate final decision.

In summary, OIS is constantly studying the needs of the petroleum offshore industry and satisfying some of those needs by providing offshore vessels to the oil industry. The aim of this chapter was to show the capital budgeting process involved in the investment decisions. My main task was to receive the potential vessel list identified by the group managing director (GMD) or the vice president (VP) of OIS and perform the capital budgeting process. On behalf of OIS, I considered work crane barges, drill ships, oil tankers and pipe lay barges.

The best asset considered was a 3600Ton floating crane; the payback period for this vessel is 4.42 years and the net present cash value after the loan has been paid off is approximately over USD 26.6 Million. The pipe lay vessel was the next attractive investment; the payback period for this pipe lay vessel is 6.58 years and the net present cash value after the loan has been paid off is approximately over USD 41.5 Million. The least attractive potential investment for OIS was the oil tanker; the payback period for this vessel is 7.80 years and the net present cash value after the loan has been paid off is approximately over USD 13.6 Million. The Drill ship failed the capital budget analysis. All the results of the capital budget analysis have been submitted to the group managing director. The GMD makes the final decision on OIS investments.

CHAPTER X
SUMMARY, CONCLUSION
AND RECOMENDATIONS

In summary, this work provides a record of study that shows the process and challenges in managing services, projects and contracts carried out by the Oil and Industrial Services (OIS) group in the gulf of Guinea from the perspective of an engineering manager. All the projects were considered successful. The details and specifics were included in the chapters of this work.

This chapter summarizes the entire record of study, concludes the record of study and gives some recommendation for the future. This section gives details of this chapters included in this work. This can serve as a guide when specific topics and references are needed.

The first chapter introduces the petroleum service industry and highlights the importance of service companies. A background of the Oil and Industrial Services group (OIS) was also included. This chapter also provides a base to discuss the projects that were carried out by OIS during the period represented in this study.

The job proposal and final objectives chapter shows the two jobs I occupied in OIS from May 2010 to May 2011. The chapter includes the responsibilities that came with the position of Project Development Manager and Manager of the Gulf of Guinea. The transition between the two jobs was also explained.

The third chapter presents the variety of offshore vessels that work in the petroleum industry and the task of the Gulf of Guinea division when receiving the vessels. The division makes sure that the vessels are properly maintained and sources for work and projects for these vessels to increase the company's revenue stream. The OIS Victory Barge, Delta Sky and the three tug boats have been delivered. The new pipe lay barge will be received when it is completed and delivered by the ship yard.

The offshore pipe laying chapter shows my role in a pipe lay project where OIS uses a pipe laying barge from her fleet of vessels to complete a offshore pipe laying exercise in Cameroon deep waters that lasted from mobilization on the first week of June, 2010 and demobilization on the second week of December, after the pipe string was abandoned and handed over to the client. The Phase 1 of the project involved laying 51 miles of 12 inch diameter gathering pipes for Gas Sales in 1200 deep waters. The Phase 2 of the project involved laying 51 miles of 8 inch diameter gathering pipes for Oil Sales in 1200 deep waters. The project was executed successfully with no recorded accidents.

The fifth chapter reiterates the successful project scope analysis and procurement responsibilities for an integrated pipeline maintenance project executed in the Niger Delta. This OIS project involved pipeline maintenance and repairs works involving manifold piping works, pipeline civil structure maintenance, valves maintenance, low/intermediate emergency pipeline repairs, manifolds protection systems installations/repairs, composite repairs, cathode protection repairs/upgrades and planned pipeline upgrades/rehabilitations. The project was successfully executed and all the needed items purchased, with exception of a drill rig that was leased.

The training facilities development chapter talks about the procurement activities necessary for the components needed to equip two petroleum training facilities in Bonny and Kaduna, Nigeria. The facilities will train people in petroleum management and economics, petroleum fundamentals, geology, drilling, production, crude oil & natural gas, production technology, instruments & controls, refining, HSE, electricity & electronics fundamentals, completions & work over, automation technology, pipeline technology, petroleum measurement and offshore operations. The procurement of all the items needed to furnish these facilities was successful.

The pipe insulation chapter talks about the successful installation of the Envirocage pipe installation test run on the Agbami FPSO. This project was a test run to see the performance of the product. If Envirocage is successful, the project may be used in a large scale on the Agbami FPSO and potentially other process facilities in the Gulf of Guinea.

The eighth chapter describes the sourcing and follow up process involved in an upcoming lifting and engineering project for EGLNG. EGLNG requires Oil and Industrial Services to assist in the Punta Europa construction activities with a marine vessel or barge equipped with a crawler crane that is big enough and flexible enough to act as a work site in the water.

The ninth chapter gives the capital budgeting analysis for a pipe lay vessel, a drill ship, an oil tanker and an offshore floating crane. The best asset considered was the 3600Ton floating crane; the payback period for this vessel is 4.42 years and the net present cash value after the loan has been paid off is approximately over twice the initial down payment. The next best asset considered was pipe laying vessel; the payback period for this pipe lay vessel is 6.58 years and the net present cash value after the loan has been paid off is approximately above 100% of the initial down payment. The least attractive potential investment was the oil tanker; the payback period for this vessel is 7.80 years and the net present cash value was positive. The drill ship did not pass the capital budget analysis.

Also included are the Appendices and the references. The references, shows all the sources of information in this record of study. The Appendices show additional material, information and images that could not be included in the main body of the record of study. Appendix A-I supports the chapters in the record of study. Appendix A gives my job implication and evaluations of me by OIS. This subsection also contains the final job report written by the job sponsor.

10.1 Conclusion

The petroleum and energy industry has a pressing need for the products and services of additional petroleum service companies in the Gulf of Guinea. Service companies play key roles in the petroleum process from the point when the resource is discovered to when the final finished products reaches the consumer and it is used to satisfy their needs or provide energy for their activities. Service companies play important roles in the success of all petroleum and energy producers; these roles include logistics, drilling, construction, dredging, pipe laying, procurement, food supply, human resource supply, etc. This study examined the procedures and challenges involved in managing several oil service projects located in three different countries in the Gulf of Guinea simultaneously.

This work also shows the responsibilities that came with the position of Project Development Manager and Manager of the Gulf of Guinea. The study presents a variety of offshore vessels and the delivery of the OIS Victory Barge, Delta Sky and three tug boats. The OIS offshore pipe laying process is explained. The procurement process for a swamp integrated pipeline maintenance project and the development of technical training facilities was included in the literature.

A product test run for the Envirocage pipe insulation product was also included in this study. In addition, this work included an upcoming lifting and engineering project for the EGLNG Company. Lastly capital budgeting analysis for marine assets, including a pipe lay vessel, a drill ship, an oil tanker and an offshore floating crane are part of this record of study.

The services, projects and contracts carried out by the OIS group in the gulf of Guinea during the time of this study were successful. The vessels were delivered, the pipe laying contract was completed and the pipe string handed over to the client, the Niger Delta maintenance and training facilities projects are ongoing, the Agbami pipe insulation test run was a success and EGLNG will update us on their needs. This work can be applied to diverse cases in other regions and gulfs with petroleum reserves. More challenging projects, similar in nature can be broken down and executed with the materials in this record of study.

10.2 Recommendations

The marine industry presents a wide range of vessels. This study presents the different types of vessels and their uses. Through this study, petroleum service companies can potentially increase their fleet of vessels to match the need of the industry and locations they operate in.

The offshore petroleum industry is growing and expanding to deeper waters. This deep water assets and fields will need pipelines installed to enable transferred of hydrocarbon. The pipe laying experience highlighted in this record of study can be applied to pipe lay contracts being executed in similar environments and in deeper waters.

The petroleum industry is technologically advanced. Engineers and scientist invent new products for the industry to meet the needs of companies and solve engineering problems. The product test run of Envirocage explained in this study can serve as a basis for other products tests in the industry.

The projects in this work show that the petroleum service industry is international in nature. To execute a project, staff may have to work with people from different cultures and countries and travel to different countries. Companies should implement cross cultural and language training for their employees to enable staff work more efficiently in multi cultural situations.

Lastly, the petroleum industry is characterized by large capital expenditures. The vessels, facilities, drilling, exploration and other facilities are expensive. Before companies engage in this investments, a proper capital budget analysis is needed to

estimated the income, potential losses, payback period and net present value of the potential asset. The capital budgeting procedure used in this work can be applied to any vessel, facility or asset in the oil industry that earns income of a daily basis.

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APPENDICES

This section of the record of study presents the additional materials that may be helpful in additionally understanding the record of study. The materials in the body of this project are sufficient in illustrating the projects and the activities that were necessary to make the job a success. Each subsection presents additional materials related to the chapters in this work.

The following are the subsections of this appendix:

1. APPENDIX A: JOB IMPLICATIONS AND OBSERVATIONS
2. APPENDIX B: MAPS
3. APPENDIX C: OIS VICTORY BARGE
4. APPENDIX D: OIS MV DELTA SKY
5. APPENDIX E: OIS NEW PIPE LAYING WORK BARGE WITH 300 MAN
ACCOMODATION
6. APPENDIX F: OIS TUG BOATS
7. APPENDIX G: AGBAMI
8. APPENDIX H: POTENTIAL PIPE LAY BARGE WITH 3000TON/200TON
CRANE
9. APPENDIX I: PETROLEUM TRAINING FACILITY ITEMS

The appendix subsections listed above are contained in the following pages

APPENDIX A

JOB IMPLICATIONS AND OBSERVATIONS

This subsection of the appendix gives the job implications and observations for the position of Project Development Manager and Manager of the Gulf of Guinea, occupied in OIS from May 2010 to May 2011. This subsection also includes my quarterly evaluations and a final evaluation report by my job supervisor.

This subsection contains the following:

- A.1: Final Job Report
- A.2: OIS Employee Evaluation (2nd Quarter 2010)
- A.3: OIS Employee Evaluation (3rd Quarter 2010)
- A.4: OIS Employee Evaluation (4th Quarter 2010)
- A.5: OIS Employee Evaluation (1st Quarter 2011)

A.1: Final Job Report



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FINAL JOB REPORT

This is a report evaluating Kenneth Ken-Worgu. The evaluation is based on his employment in the Oil and Industrial Services Company. Included in the pages after this report are quarterly evaluations. These evaluations give a direct representation of his performance on the job.

The Doctor of Engineering job requirement consisted of twelve consecutive months of employment, working for Oil and Industrial Services. The responsibilities of the job comprised of feasibility studies, engineering, design, procurement, project management, financial analysis, market assessments, negotiations and extensive traveling. The job gave a chance for principles in engineering and business to be applied in OIS activities.

The job of Project Development Manager and Gulf of Guinea Manager were occupied by Kenneth Ken-Worgu from May 2010 to May 2011. He was the Project Development Manager from 17 May 2010 to 31 August 2010. He occupied the role of Gulf of Guinea Manager (Director General) on the same day his old job ended.



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Both jobs are managerial level positions. The second job is a promotion from the first. Even though he still worked on some of the projects he started with, his position in the company was elevated to the director level. This was largely due to the fact that he is a hard worker and is widely seen in OIS as a “practical, get the job done” engineer.

The job gave Kenneth a chance to work on seven projects. Out of the seven projects, one was a vessel management project, one was a new product test run, one was a financial project, one was contract sourcing and bidding project and three were project management and procurement projects.

The vessel management project required Kenneth to manage all aspects and arrangements for OIS marine vessels delivered to the Gulf of Guinea division. He was tasked with assessing the marine needs of the area and recommending appropriate marine vessels. He was also responsible for marketing the vessels to petroleum and offshore operating companies.

The new product development project required Kenneth to negotiate fully with the distributors and inventors of the product. He represented OIS in all arrangements. He participated in the original designs.

The capital budgeting project required Kenneth to perform extensive financial analysis on marine vessels considered for purchase. He was required to estimate future revenue, cost, profits, net present values and payback periods. His analysis will be the basis for the acceptance or rejection of those purchases.



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The lifting project exposed Kenneth to the beginning of a project. He was involved in the sourcing and initial phase. OIS did not get the project. If the project was executed, it would have given him the chance to experience a petroleum service project in totality from the very beginning to the very end.

There are three procurement and project management projects. These projects are an offshore pipe lay project, an integrated pipeline maintenance project and a petroleum technical training facilities development project. This involved a lot of scheduling, engineering, design, negotiating, managing of staff, etc.

Originally, Kenneth was scheduled to work on five projects. He added the Agbami Envirocage product test run and the lift project to his work load, looking at the qualification of an engineer like Kenneth and the fact that he has worked with OIS in the past, we were confident to load all those responsibilities on him. Kenneth has always rose to the challenge in the past and he did the same during this process.

Kenneth is a skilled project manager and procurement engineer. He has demonstrated this in the past. These skills came in handy when he was assigned to work on the integrated pipeline maintenance project for Shell, the offshore pipe laying project in Cameroon and the training facility development projects. He used his experience to serve as a team player on the project management teams and save the company money while performing purchases.



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Upon examining Kenneth's qualifications, we discovered that he had learned finance and marketing in his previous studies. This knowledge led the company to recommend him to market our vessels in the Gulf of Guinea and perform capital budgeting on our potential marine investments. We were impressed at his business analysis skills. His capital budgeting analyses were preferred to those produced by our finance department who neglected the time value of money in their calculations. The company previously used the bank interest rate as our discount rate; based on the advice of Mr. Ken-Worgu, we now use 2% - 5% above the bank rates as our discount rates on projects.

Kenneth also has many qualities. He has good technical skills, diplomacy, business acumen, political skills, shows good judgment, has good ethics, gets involved, is a good team player, is a good leader, responsible and he has good interpersonal skills. All these qualities made him the candidate for a promotion in August 2010 and give him a very bright future in the company.

In the midst of his talents, Kenneth has some work to do. There is always room for improvement. A key improvement required from him in the near future is in his language skills. He needs to get a good grasp on Spanish and French. We work in an international industry and those linguistic skills will be a plus to him and an advantage to the company.



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In all the responsibilities handed to Kenneth Ken-Worgu, he was performed successfully above expectations of the company. He has been offered a permanent position and a bright future in the Oil and Industrial Services Group. I am confident that the job occupied by Kenneth Ken-Worgu for 12 months from May 2010 to May 2011 is sufficient to satisfy the requirements for the Doctor of Engineering.

I affirm that Kenneth Ken-Worgu's Doctor of Engineering work requirement has been successfully completed.

Raymond W. Kasper

A handwritten signature in black ink that reads "Raymond W. Kasper". The signature is written in a cursive style with a horizontal line under the first name.

Oil and Industrial Services USA

A.2: OIS Employee Evaluation (2nd Quarter 2010)**OIL & INDUSTRIAL SERVICES****OIS Employee Evaluation Form**

Name of Employee: Kenneth Ken-Worgu
Department: Overseas Projects
Date of Review: 05 July 2010
Reviewer: Raymond Kasper
Period: 2nd Quarter 2010 (May, June)
Last Review Date: NA

Rating System

- A: Exceeds Expectation
- B: Good
- C: Satisfactory
- D: Needs Improvement
- E: Unsatisfactory

Projects

1. Training
2. Managing delivering, maintenance and marketing of offshore Vessels
3. Offshore pipe lay project
4. Integrated pipeline maintenance project
5. Capital budgeting analysis for potential investments



OIL & INDUSTRIAL SERVICES

1. Quality of Employee's work _____ A

 Comments: Kenneth produces very good quality work for an engineer who is two months old on the project development manager job.

2. Exercise of good judgment _____ A

 Comments: Kenneth has made good judgment calls concerning OIS marine vessels and procured items.

3. Attendance _____ A

 Comments: Kenneth shows up all the time.

4. Employee involvement _____ A

 Comments: Kenneth gets involved in his activities in a sufficient manner.

5. Participation in team effort _____ A

 Comments: Kenneth has shown signs of being a good team player.



OIL & INDUSTRIAL SERVICES

6. Attention to company policies and procedures

_____ A

—

Comments: Kenneth does not violate company policy.

—

7. Interpersonal relationships and communication with co-workers

_____ B

Comments: Kenneth gets along with his co-workers. He can improve by more after work or out of office interactions. Like company picnics, dinners, happy hour, etc.

8. Taking initiative to achieve goals and complete assignments

_____ A

—

Comments: Kenneth is a very driven individual and he achieves the goals the company sets for him.

9. Responsiveness to changing work requirements

_____ A

—

Comments: The job of project development manager involves a lot of travel. Kenneth is doing fine.



OIL & INDUSTRIAL SERVICES

10. Work ethic _____ A
—

Comments: Kenneth is an ethical engineer.

11. Overall performance rating _____ A
—

Comments: In less than two months, Kenneth has shown that he is a great employee and I look forward to working more with him.



OIL & INDUSTRIAL SERVICES

Areas of Strength:

Technical skills, diplomacy, Business acumen, Judgment, Ethics, Attendance, Employee involvement, Team work, Adherence to company policies, initiative, responsiveness to change.

Areas of Improvement:

Interpersonal interaction with co-workers.

Date: 05 July 2010

A handwritten signature in black ink that reads 'Raymond W. Kasper'. The signature is written in a cursive style with a horizontal line drawn through the middle of the letters.

Reviewer: Raymond W. Kasper

A.3: OIS Employee Evaluation (3rd Quarter 2010)**OIL & INDUSTRIAL SERVICES****OIS Employee Evaluation Form**

Name of Employee: Kenneth Ken-Worgu
Department: Overseas Projects / Gulf of Guinea
Date of Review: 04 October 2010
Reviewer: Raymond Kasper
Period: 3rd Quarter 2010 (July, August, September)
Last Review Date: 05 July 2010

Rating System

- A: Exceeds Expectation
- B: Good
- C: Satisfactory
- D: Needs Improvement
- E: Unsatisfactory

Projects

1. Managing delivering, maintenance and marketing of offshore Vessels
2. Offshore pipe lay project
3. Integrated pipeline maintenance project
4. Capital budgeting analysis for potential investments
5. Development petroleum technical training facilities in Bonny and Kaduna



OIL & INDUSTRIAL SERVICES

1. Quality of Employee's work _____ A

 Comments: _____ Kenneth's job quality is continuously increasing over time. _____

2. Exercise of good judgment _____ A

 Comments: _____ Kenneth's decisions are well thought out and calculated. _____

3. Attendance _____ A

 Comments: _____ Kenneth shows up all the time. _____

4. Employee involvement _____ A

 Comments: _____ Kenneth is very involved with his job. _____

5. Participation in team effort _____ A

 Comments: _____ Kenneth is a good team player. He has also shown signs of being a good team leader. _____



OIL & INDUSTRIAL SERVICES

6. Attention to company policies and procedures

_____ A

Comments: Kenneth follows company policy and procedures.

7. Interpersonal relationships and communication with co-workers

_____ A

Comments: Kenneth has a good relationship with all his co-workers.

8. Taking initiative to achieve goals and complete assignments

_____ A

Comments: Kenneth completes his entire task to in an excellent fashion.

9. Responsiveness to changing work requirements

_____ A

Comments: Kenneth was promoted from the job of Project Development Manager to Director General, Gulf of Guinea. He has adjusted adequately to his new role.



OIL & INDUSTRIAL SERVICES

10. Work ethic _____ A

Comments: Kenneth is ethical in his work.

11. Overall performance rating _____ A

Comments: In seven months, Kenneth has shown leadership, hard work and excellent technical skill. As a result he was chosen to head a the new Gulf of Guinea division.



OIL & INDUSTRIAL SERVICES

Areas of Strength:

Technical skills, diplomacy, Business acumen, Judgment, Ethics, Attendance, Employee involvement, Team work, Adherence to company policies, initiative, responsiveness to change, Interpersonal interaction with co-workers.

Areas of Improvement:

There is always room for improvement.

Date: 04 October 2010

Reviewer: Raymond W. Kasper

A.4: OIS Employee Evaluation (4th Quarter 2010)**OIL & INDUSTRIAL SERVICES****OIS Employee Evaluation Form**

Name of Employee: Kenneth Ken-Worgu

Department: Gulf of Guinea

Date of Review: 10 January 2011

Reviewer: Raymond Kasper

Period: 4th Quarter 2010(October, November, December)

Last Review Date: 04 October 2010

Rating System

- A: Exceeds Expectation
- B: Good
- C: Satisfactory
- D: Needs Improvement
- E: Unsatisfactory



OIL & INDUSTRIAL SERVICES

Projects

1. Managing delivering, maintenance and marketing of offshore Vessels
2. Offshore pipe lay project
3. Integrated pipeline maintenance project
4. Capital budgeting analysis for potential investments
5. Development petroleum technical training facilities in Bonny and Kaduna
6. Agbami pipe insulation project.
7. Lift and engineering job, EGLNG, Equatorial Guinea



OIL & INDUSTRIAL SERVICES

1. Quality of Employee's work _____ A

 Comments: _____ Kenneth produces good quality work.

2. Exercise of good judgment _____ A

 Comments: _____ Kenneth's decisions are well thought out and calculated.

3. Attendance _____ A

 Comments: _____ Kenneth is there when he is needed.

4. Employee involvement _____ A

 Comments: _____ Kenneth lives his job.

5. Participation in team effort _____ A

 Comments: _____ Kenneth is a good team player and leader.



OIL & INDUSTRIAL SERVICES

6. Attention to company policies and procedures _____ A

—

Comments: Kenneth follows company policy and procedures.

7. Interpersonal relationships and communication with co-workers

A

Comments: Kenneth has good relationships at work.

8. Taking initiative to achieve goals and complete assignments

_____ A

—

Comments: Kenneth achieves all his set goals.

9. Responsiveness to changing work requirements

_____ A

—

Comments: The job of OIS Gulf of Guinea Director General involves a lot of travel. Kenneth is doing fine.

**OIL & INDUSTRIAL SERVICES**

10. Work ethic _____ A

—

Comments: Kenneth is an ethical manager.

11. Overall performance rating _____ A

—

Comments: Kenneth is an excellent manager and I expect him to perform excellently in his role.



OIL & INDUSTRIAL SERVICES

Areas of Strength:

Technical skills, diplomacy, Business acumen, Government relations, Judgment, Ethics, Attendance, Employee involvement, Team work, Adherence to company policies, initiative, responsiveness to change, Interpersonal interaction with co-workers.

Areas of Improvement:

Languages.

Date: 10 January 2011

Reviewer: Raymond W. Kasper

A.5: OIS Employee Evaluation (1st Quarter 2011)**OIL & INDUSTRIAL SERVICES****OIS Employee Evaluation Form**

Name of Employee: Kenneth Ken-Worgu

Department: Gulf of Guinea

Date of Review: 04 April 2011

Reviewer: Raymond Kasper

Period: 1st Quarter 2011(January, February, March)

Last Review Date: 10 January 2011

Rating System

- A: Exceeds Expectation
- B: Good
- C: Satisfactory
- D: Needs Improvement
- E: Unsatisfactory

Projects

1. Managing delivering, maintenance and marketing of offshore Vessels
2. Integrated pipeline maintenance project
3. Capital budgeting analysis for potential investments
4. Development petroleum technical training facilities in Bonny and Kaduna
5. Lift and engineering job, EGLNG, Equatorial Guinea



OIL & INDUSTRIAL SERVICES

1. Quality of Employee's work _____ A

 Comments: _____ Kenneth produces excellent reports and well articulated presentations. _____

2. Exercise of good judgment _____ A

 Comments: _____ Kenneth shows good judgment. _____

3. Attendance _____ A

 Comments: _____ Kenneth is always in attendance. _____

4. Employee involvement _____ A

 Comments: _____ Kenneth is very involved. _____

5. Participation in team effort _____ A

 Comments: _____ Kenneth is a team leader. _____



OIL & INDUSTRIAL SERVICES

6. Attention to company policies and procedures

_____ A

Comments: Kenneth follows company policies and procedures appropriately.

7. Interpersonal relationships and communication with co-workers

_____ A

Comments: Kenneth has good interpersonal relationships at work. He is a good communicator.

8. Taking initiative to achieve goals and complete assignments

_____ A

Comments: Kenneth complete his assignment well before their deadlines.

9. Responsiveness to changing work requirements

_____ A

Comments: Kenneth travels and occupies different roles. Kenneth is doing fine.



OIL & INDUSTRIAL SERVICES

10. Work ethic _____ A

—

Comments: Kenneth is ethical.

—

11. Overall performance rating _____ A

—

Comments: Kenneth is an A+ employee of OIS with a bright future in the company.



OIL & INDUSTRIAL SERVICES

Areas of Strength:

Technical skills, diplomacy, Business acumen, Government relations, Judgment, Ethics, Attendance, Employee involvement, Team work, Adherence to company policies, initiative, responsiveness to change, Interpersonal interaction with co-workers.

Areas of Improvement:

Languages.

Date: 04 April 2011

Reviewer: Raymond W. Kasper

APPENDIX B

MAPS

This subsection of the appendix shows maps that could not be included in the introductory chapter of this record of study. These maps give a pictorial view of Africa. These maps also show Nigeria, Cameroon and the Gulf of Guinea.

This subsection includes the following images:

Figure B-1: Map of Africa

Figure B-2: Map of Nigeria

Figure B-3: Gulf of Guinea Rectangle



Figure B-1: Map of Africa. (UPENN, 2011)



Figure B-2: Map of Nigeria. (Commonwealth_Secretariat, 2011).



Figure B-3: Map of Gulf of Guinea. (blogspot.com, 2011).

APPENDIX C
OIS VICTORY BARGE

This subsection of the appendix shows specifications and images that could not be included in the vessel delivery section of this record of study. This subsection gives some technical specifications of the Victory Barge. Engineering schematics and pictures of the barge at work are below.

This subsection includes the following images:

Figure C-1: Side View of Victory Barge

Figure C-2: Victory Barge Preparing for corrosion management activities

VICTORY BARGE SPECIFICATIONS

MULTI PURPOSE OFFSHORE WORK BARGE
ACCOMMODATION BARGE
PIPE LAYING CAPACITY

AVAILABLE

BUILT: 1979
REBUILT: 2006

CLASS: BUREAU VERITAS
FLAG: NIGERIAN

BARGE SPECIFICATIONS

MAIN PARTICULARS

LENGH: 77.0METERS
BREADTH: 26.0METERS
DEPTH: 6.0METERS
DRAFT (MAX): 3.4 METERS
CLASS: BUREAU VERITAS
ACCOMODATION: 184 BERTHS
G.R.T: 2907 TONNES
D.W.T: 5000 TONNES
DECK CRANE: CRAWLER CRANE

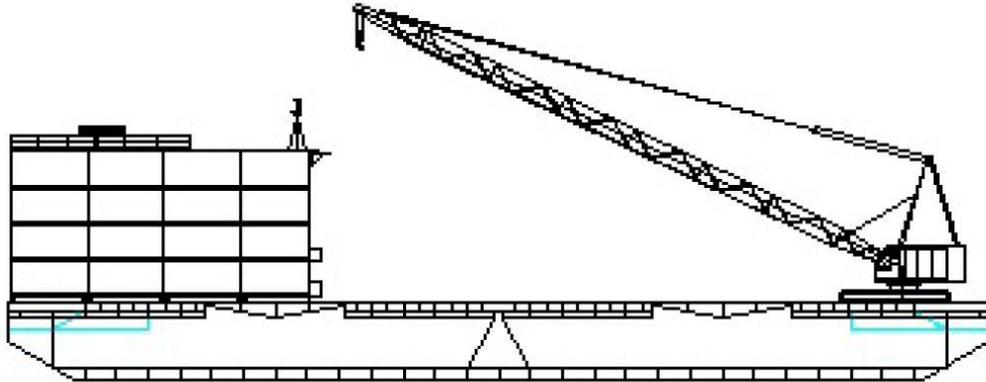


Figure C-1: Side View of Victory Barge

MOORING SYSTEM

WINCHES:	4 X DOUBLE DRUM AMHOIST AM77EF
CAPACITY:	1000M X 38MM WIRE ROPE, 8 MOORING
LINES	
ANCHORS:	8 X 3.5 FLIPPER DELTA
ENGINES:	CUMMINS 6CTA 8.3C
LINE PULL:	77 TONNES

ACCOMODATION

184 PERSONS IN DOUBLE & FOUR BERTH AND EIGHT BERTH CABINS	
BARGE CREW:	30 BERTHS
CATERING CREW:	20 BERTHS
CHARTERERS:	134 BERTHS
BARGE SUPER:	EN SUITE
CHARTERERS REP:	EN SUITE

CAPACITIES

PORTABLE WATER:	470 TONNES
FRESH WATER:	1080 TONNES
BALLAST WATER:	1240 TONNES
FUEL OIL:	288 TONNES
DRY CARGO UNDERDECK:	1850 CU. METERS
CLEAR DECK SPACE:	1000 CU. METERS
HATCH DIM:	26 X 8.0 METERS
MAX LENGTH:	77 METERS

HELIDECK

CERTIFIED FOR USE BY TYPICAL 6-8 PERSON HELICOPTERS OF
THE BELL 202 TYPE

SAFETY BOAT

8 METRE GRP SAFETY BOAT COMPLETE
WITH 2 X YAMAHA 50HP OUTBOARD
ENGINES AND CERTIFIED QUARTERMASTER

HANDLING EQUIPMENT

MAKE:	AMERICAN HOIST	:	PALFINGER
TYPE:	CRAWLER CRANE	:	CRANE
MODEL:	HC 100	:	PK 8000T
BOOM LENGTH:	120 FEET		
LIFT CAPACITY:	123 TONNES		

AUXILIARY EQUIPMENT

INDEPENDENTLY DRIVEN VESSEL
GENERATING SETS COMPRISING
2 X 350 KVA
2 X 625 KVA

PIPE LAYING FACILITIES

PIPE CONVEYORS
HYDRAULIC TENSIONER 2 X 8 TONS @ 15M/MIN
10' LEAD CHAMBER FOR X RAY
ADJUSTABLE OUTRIGGER 20M
4 DAVITS 5 TONS EQUIPPED WITH AIRTUGGERS 1.5T
3 GENERATORS 400KVA @ 50HZ
2 COMPRESSORS 7000 LTR./MIN

PIPE LAY STATION

ALIGNMENT AND 1ST WELDING STATION
2ND WELDING STATION
3RD WELDING STATION
CONTROL AND REPAIR (10' LEAD CHAMBER)
COATING

ANCILLIARY EQUIPMENT

COMPRESSORS:	2X 1100 CFM
	2 X 900 CFM
	4 X 600 CFM
	3 X 400 CFM
BLASTING POTS:	15 X 6 CFM
PAINT SPRAYING:	9 X AIRLESS TYPE
	11 X COVENTIONAL TYPE
PRESSURE WASHING:	5 X HOT WATER
SAND HOPPERS:	2 X 15 TONNE
WELDING MACHINE:	2 X ELECTRIC
SCAFFOLDING:	8000 SCAFFOLDING PIPES
	6000 SCAFFOLDING CLAMS
	1500 SCAFFOLDING BOARDS
BLASTING HOSES:	4000 METRES
AIR HOSES:	2500 METRES
PAINT HOSES:	2000 METRES

**NOTE: ANCILLIARY EQUIPMENT IS AVAILBLE ON REQUEST
AND AT EXTRA COST**



Figure C-2: Victory Barge Preparing for corrosion management activities

APPENDIX D
OIS MV DELTA SKY

This subsection of the appendix shows specifications and images that could not be included in the vessel delivery section of this record of study. This subsection gives some technical specifications of the Delta Sky. Engineering schematics and pictures of the ship at work are below.

This subsection includes the following images:

Figure D-1: Side and Top View of Delta Sky

DELTA SKY SPECIFICATIONS

New building 4- point mooring multipurpose offshore vessel

Available early
Feb 2011

Built: 2011

Class and Flag

Class: ABS

Flag: Marshall Islands

Principle particulars

Length overall: 58.70m

Length waterline: 56.30m

Breadth moulded: 14.60m

Depth moulded: 5.50m

Draft scantling (assigned): 4.75M

Deadweight @4.5m draft: 1250mt

Gross tonnage: 1450t~

Complement

2 x 1 man cabins 2 men

2 x x2 man cabins 4 men

11 x 4 man cabins 44 men

Total 50 men

Hospital 1 man

Cabin berths can be increased by extra 8 berths

Tankage

Fuel oil:	590m ³
Fresh water:	300m ³
Water ballast/Drill water:	460m ³
Foam:	13m ³
Detergent:	13m ³
Sewage treatment plant::	tba

Deck/Speed/Bollard Pull

Deck loading:	7.0mt/m ³
Clear deck area:	300m ²
Trial speed (@100% MCR):	13.5 knots
Static bollard pull:	70mt

Machinery

Main engine:	2 x 1960KW GE Engines
Propulsion system:	Fix pitch propeller in kort nozzles with cable cutters
Generating set::	3 x 350 KW CAT Gen sets
Bow thrusters:	6.0mt fixed pitch type
Fuel oil cargo pump:	1 x 150m ³ /hr @75m head
Fresh water cargo pump:	1 x 100m ³ /hr @75m head
Drill water pump:	1 x 100m ³ /hr @75m head

Deck machinery

Capstans:	2 x 5 mt @15m/min
Windlass:	2 x 9mt @12m/min

4 Point mooring system

Mooring winches (800m x 32mm dia):	4 x 30mt @ 8.5m
Anchors:	4 x Delta flipper, 4mt each

Deck crane

Deck crane positioned Stbd aft::	1 x 6.0mt @ 15m
----------------------------------	-----------------

MV Delta Sky is designed for the following offshore activities:

- Towing (bollard pull 70mt)
- Anchor handling activities
- External fire fighting
- Transfer of men and materials between platforms
- Safety and rescue operations
- 24 hrs/day continuous operation, remaining on station for 50 days minimum
- Offshore work platform with accommodation
- Diving platform
- Survey platform

All details are believed to be correct but are without guarantee—subject to alteration and improvement

APPENDIX E

OIS NEW PIPE LAYING WORK BARGE WITH 300 MAN ACCOMODATION

This subsection of the appendix shows specifications and images that could not be included in the vessel delivery section of this record of study. This subsection gives some technical specifications of the new pipe laying work barge. An engineering schematic of the barge is shown below.

This subsection includes the following images:

Figure E-1: Side and Top View of New 300 Man / Accommodation / Pipe Lay / Work Barge

**OIS NEW PIPE LAY WORK BARGE WITH 300 MAN ACCOMODATION
SPECIFICATIONS**

OFFSHORE WORK BARGE
ACCOMMODATION BARGE
PIPE LAYING CAPACITY

AVAILABLE : TBA

CLASS : ABS, MALTESE CROSS + A1 BARGE,
(Notation - "Work Barge built to MODU and SPS
2008 code for
Unrestricted Service in regard to Accommodation
and Helipad")

FLAG : Marshall Islands

BARGE SPECIFICATIONS

MAIN PARTICULARS

LENGTH : 111.00M

BREADTH : 31.70M

DEPTH : 7.30M

DRAFT : 5.00M (Scantling)
: 3.80M (Operating)

GRT : TBA

DWT : TBA

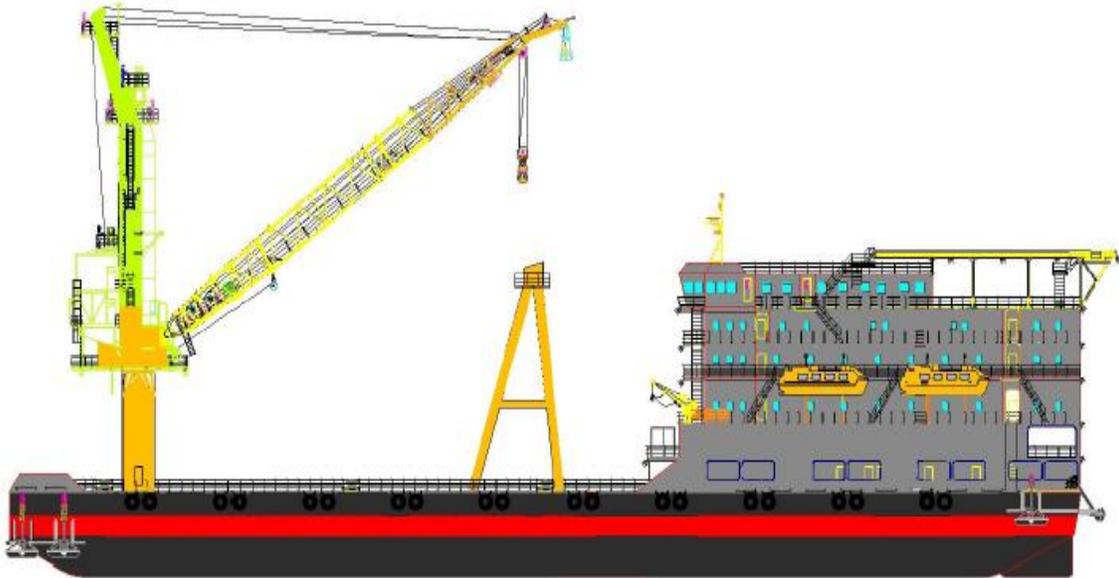


Figure E-1: Side and Top View of New 300 Man / Accommodation / Pipe Lay / Work Barge

8 POINT MOORING SYSTEM

WINCHES	: 8 X ALL ELECTRIC WINCHES BREADTH
CAPACITY	: 1500M of 60mm Dia.
ANCHORS	: 8 X FLIPPER DELTA, 10 TONS DRAFT
LINE PULL	: 90 TONS

ACCOMMODATION:

300 MEN COMPRISING 310 BEDS
 31 X 4 BERTH CABINS – DECK 3
 22 X 4 BERTH CABINS – DECK 4
 15 X 4 BERTH CABINS – DECK 5
 14 X 2 BERTH CABINS – DECK 5

8 X 1 BERTH CABINS – DECK 5
 2 X 1 BERTH CABINS – DECK 6
 1 X HOSPITAL/1 X CLIENT ENG. OFFICE/1 X CLIENT INSP. OFFICE
 11 FURTHER OFFICES/1 X CREW CINEMA/1 X CLIENT CINEMA
 2 X CONFERENCE ROOMS/HELICOPTER RECEPTION ROOM

CAPACITIES

FRESH WATER (POT) : 1090M3 (Inc. D.B.Tanks)
 1200M3 (Excl. D.B.Tanks)

SEA WATER (NON POT) : 11800M3

FUEL OIL : 1630M3

CLEAR DECK SPACE : 2100M2 abt + 410M2

DECK STRENGTH : 15T/M2

HELIDECK

CERTIFIED FOR SIKORSKY S61 IN ACCORDANCE WITH MODU
 REGULATIONS

SAFETY / LIFESAVING

BARGE TO BE FITTED WITH 4 X 150
 PAX LIFEBOATS (2 PORT
 2 STARBOARD) PLUS LIFE RAFTS –
 ACCOMODATION TO SPS 2008 CODE

LIFTING EQUIPMENT

MAKE : KPMC / ABB
 TYPE : KINGPOST / PEDESTAL

MODEL : KP-87HD
 MAIN HOOK : 500T
 BOOM LENGTH : 50.00M
 MAX LIFT HEIGHT : TBA
 DYNAMIC LIFT : 500 t
 STATIC LIFT : 500 t

PIPELAY EQUIPMENT (OPTIONAL)

SAS OFFSHORE PIPE LAY SYSTEM
 2 X 60 T HORIZONTAL PIPE TENSIONERS
 4" – 52" OD PIPE HANDLING CAPACITY
 1 X A & R WINCH
 NOMINAL TENSION CAPACITY X 2 TENSIONER
 120 KGF @ APPROX. 20 M/MIN (PAYING –OUT)
 MAXIMUM PIPE JOINT WEIGHT 25,000 KG

AUXILIARY EQUIPMENT

8 X INDEPENDENTLY DRIVEN DIESEL GENERATING SETS COMPRISING
 : 5 X CAT 590Kw + 2 X CAT 850Kw + 1 x150
 Kw
 TOTAL : 4800Kw

NOTES :

BARGE HAS BEEN PREPARED FOR INSTALLATION OF PIPELAY SPEAD, INCLUDING RE-INFORCEMENT FOR STINGER AND BUILT IN PIPE RAMP BELOW MAIN DECK WITH CANTILEVERED ACCOMMODATION BLOCK ALLOWING CLEAR RUN FOR PIPE TRAIN.

**ALL DETAILS ARE BELIEVED TO BE CORRECT BUT ARE WITHOUT
GUARANTEE – SUBJECT TO ALTERATION AND IMPROVEMENT**

APPENDIX F
OIS TUG BOATS

This subsection of the appendix shows specifications and images that could not be included in the vessel delivery section of this record of study. This subsection gives some technical specifications of the OIS pusher Tug Boats. Images of the Tug Boats are shown below.

This subsection includes the following images:

Figure F-1: OIS Pusher Tug DP07

Figure F-2: OIS Pusher Tug DP22

Figure F-3: OIS Pusher Tug DP28

OIS TUG BOATS SPECIFICATIONS

PUSHER TUG DP07



Figure F-1: OIS Pusher Tug DP07

LENGTH:	68FT (20.7M)
BEAM:	22FT (6.7M)
DRAFT:	7FT (2.1M)
BOLLARD PULL:	5.82 TONS
MAIN ENGINES:	2 X CAT 3406BTA (TOTAL HP 760)
GENERATORS:	2 X CUM.6B (2 X 45KVA)
FUEL CAPACITY:	26,500 LTRS
WATER CAPACITY:	1,000 LTRS
WINCHES:	2 X MECHANICAL MANUAL
AIR CONDITIONER:	INDIVIDUAL CABIN UNITS
COMMUNICATION:	MARINE VHF RADIO + SSB RADIO
ACCOMODATION:	5 BERTHS

**ALL DETAILS ARE BELIEVED TO BE CORRECT BUT ARE WITHOUT GUARANTEE –
SUBJECT TO ALTERATION AND IMPROVEMENT**

PUSHER TUG DP22



Figure F-2: OIS Pusher Tug DP22

LENGTH:	55FT (16.8M)
BEAM:	20FT (6.1M)
DRAFT:	5FT (1.5M)
BOLLARD PULL:	8 TONS
MAIN ENGINES:	2 X GM 12 V 71 (TOTAL HP 800)
GENERATORS:	1 X GM 271 1 X GM 371 (TOTAL 50KW)
FUEL CAPACITY:	33,000 LTRS
WATER CAPACITY:	3,500 LTRS
WINCHES:	2 X MECHANICAL MANUAL
AIR CONDITIONER:	INDIVIDUAL CABIN UNITS
COMMUNICATION:	MARINE VHF 55 CHANNELS
ACCOMODATION:	2 CABINS, 4 BERTHS

**ALL DETAILS ARE BELIEVED TO BE CORRECT BUT ARE WITHOUT GUARANTEE –
SUBJECT TO ALTERATION AND IMPROVEMENT**

PUSHER TUG DP28



Figure F-3: OIS Pusher Tug DP28

LENGTH:	57FT (17.4M)
BEAM:	24FT (7.3M)
DRAFT:	5.5FT (1.7M)
BOLLARD PULL:	10 TONS
MAIN ENGINES:	2 X GM 16 V 71 (TOTAL HP 1000)
GENERATORS:	2 X GM 371 (TOTAL 60KW)
FUEL CAPACITY:	72,000 LTRS
WATER CAPACITY:	14,000 LTRS
WINCHES:	2 X MECHANICAL MANUAL
AIR CONDITIONER:	CENTRAL AIR CONDITIONING
COMMUNICATION:	MARINE VHF RADIO + SSB RADIOS
ACCOMODATION:	2 CABINS, 4 BERTHS

**ALL DETAILS ARE BELIEVED TO BE CORRECT BUT ARE WITHOUT GUARANTEE –
SUBJECT TO ALTERATION AND IMPROVEMENT**

APPENDIX G

AGBAMI

This subsection of the appendix shows specifications and images that could not be included in the Agbami pipeline insulation chapter of this record of study. This subsection shows maps, geological images and pictures of Agbami.

This subsection includes the following images:

Figure G-1: Agbami field layout, FPSO on left, drill rig on right

Figure G-2: Agbami FPSO in deep water

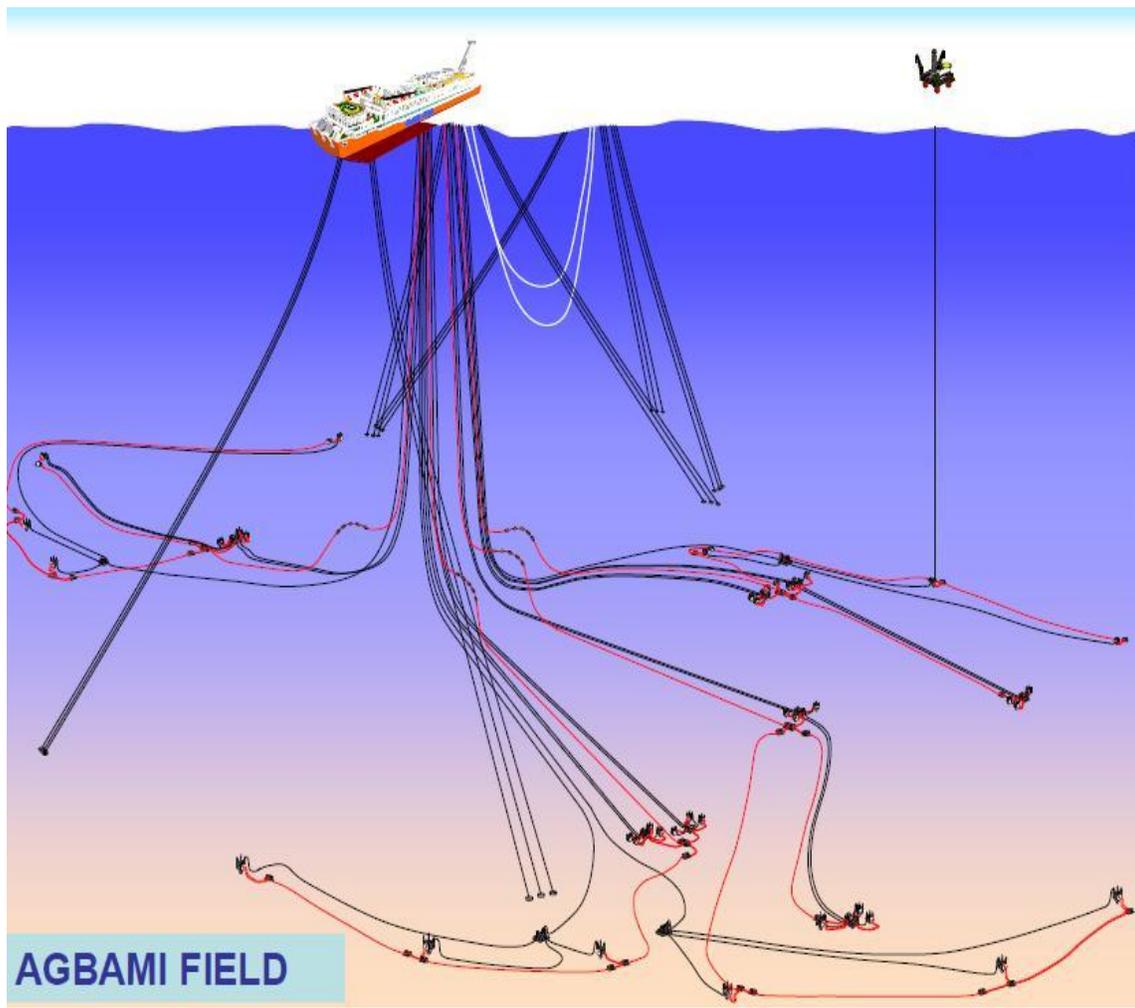


Figure G-1: Agbami field layout, FPSO on left, drill rig on right. (Bloomer, 2009)



Figure G-2: Agbami FPSO in deep water. (Sanders and Chauvin, 2009)

APPENDIX H

POTENTIAL PIPE LAY BARGE WITH 3000TON/200TON CRANE

This subsection of the appendix shows specifications and images that could not be included in the capital budgeting section of this record of study. This subsection gives some technical specifications of the pipe lay barge considered by OIS. Pictures of the ship at work are below.

This subsection includes the following images:

Figure O-1: Prospective Pipe laying barge with 3000T/2000T crane bottom views

TECHNICAL SPECIFICATION OF THE PROSPECTIVE PIPE LAY BARGE

SPECIFICATIONS

Principal Dimensions and Characteristics

Length Over All:	169 m	554 feet
Molded Beam:	46.00 m	151 feet
Molded Depth:	13.50 m	44 feet
Operating draft :	7.00 - 9.00 m	23 - 30 feet
Scantling draft :	9.00 m	30 feet
Gross Tonnage :		41,000
Year Built:		2010
Classification Society:	ABS (American Bureau of Shipping)	

Accommodations

Living area:	single cabin with apartment、 single cabin、 double cabin、 4-men's cabin
Public area:	Infirmary 、 pilot rest room、 office、 Data storage、 meeting room 、 Crew's mess room、 Officer's mess room、 Decker rest room、 Lounge、 gymnasium
Control area:	Central control room 、 battery room 、 fire control station 、 emergency generator room 、 CO2 room
Passage area:	Interior walkway、 ladder、 lift、 emergency escape
Sanitation area:	Sanitary unit、 public toilet、 bath room、 cleaning room、 dressing room
Service area:	Galley 、 high temperature galley、 laundry and dry room、 worker laundry、 dressing room 、 boiled water room

Food storage area:	Lobby 、 dry provision store、 fish store 、 meat store 、 vegetable store 、 dairy store.
Mechanical area:	Air condition room、 air condition unit room、 fan room 、 vice engine fan room、 main engine fan room、 fan room for engine case、 lift、 pipe laying switchboard room、 engine case、 assistant engine room、 winch room、 purifier room、 cable vent-pipe.
Working area:	Electric control room、 watching room、 ADT control room、 dark room、 jointing equipment repair room、 machine repair room、 middle collating room、 tube shelf control room、 NDT checking room etc.
Storage area:	Store 、 electric store、 linen store 、 galley store、 equipment checking storage、 AUT specimen storage 、 jointing material storage 、 depot

Navigation Anchor Arrangement

Anchors: (2)

Type :

12,900 kg
Spek

Anchor Chain And Accessories:

Anchor chain cables: Diameter 87 mm (3.43 in.), AM3 grade with electro-welded anchor chains, total length 715 m (2,345 ft.) (26 pieces).

The Combined Windlass

Part of windlass:

Anchor chains :

AM3
grade, 87mm
(3.43 inches)

Working load :

359.5 kN

Part of mooring winch :

Rope diameter :

80 mm 3.15
inches

Drum load :

200 kN

Capacity of ropes :

200 m 656
feet

Part of warping end :		
Load of warping end :	150 kN	
Chain Stopper		
Hawse Pipe		
Chain Locker		
Cable Releaser		
Mooring Equipment		
Hydraulic Multifunction Winch:		
Part of drum :		3.15
Diameter of rope :	80 mm	inches
Capacity of wire rope :	200 kN	
Part of warping end :		
Load of warping end :	150 kN	
Hydraulic Mooring Capstan:		
Diameter of rope :	80 mm	3.14 inches
Capacity of mooring rope :	150 kN	
Hydraulic Public Pumping Station		
Bollard, Fair Leader, Roller		
Fenderbeam		
Working Boat		
Towing Equipment		
Towing Condition:		
Towing Eye Pad, Towing Hole, Towing Bollard:		
Wire Rope Collect Winch:		
Capacity of wire rope :	200 kN	
Load of warping end :	600 kN	
Diameter of tight wire :	32 mm	1.26 inches
Winch capacity :	200 m	656 feet
Working Anchor Equipment:		
The working anchor equipments set as 12. 12 STEVPRIS high holding power anchor, each set is 12,000 kg.		
Anchor Rigging:		

Anchor lines are steel galvanized wire ropes with length of 2,500 m (8,202 ft.), diameter of 76 mm (3.0 in.) , breaking strength of 3,800 kN and number of 12. Each anchor cable is equipped with the corresponding connections.

Working Anchor Winch:

Diameter of galvanized wire rope :	76 mm	3.0 inches
Duty pull :	pull : 1,100 kN (at mid layer)	
Mooring speed :	abt. 25m/min (at 1,100 kN)	
Holding load :	3,800 kN (at 3RD layer)	
Drum capacity :	2,500 m	8,202 feet
Life Saving Equipment		

The vessel is equipped with life saving equipment according to the non-short international voyages less than 36 persons passenger ship requirements.

Life Boat:

Two totally enclosed lifeboats which can hold about 70 persons will be arranged on each side of B deck. The vessel has four lifeboats total and two of them are also used as rescue boats. Lifeboat is a whole unit include, it should have licence admit by ship class society.

Total length :	8.5 m	28 feet
Carrying capacity of lifeboat:		70
Speed :	6 knots	

Boat Davit

Life Boat Winch

Rescue Boat Winch

Life raft: (8) Can seat 25 persons

Life raft Crane: Each side equipped one set life raft crane on B deck

Life buoys, Life Jacket and Accessories:

Life buoys, life jacket, immersion suits, rocket parachute flare signals to meet the SOLAS rules require.

Embarkation Ladder
Signal Equipment
Water Tight Glide Door
Fire Fighting Equipment
Helicopter Platform

Elevator:

Load weight :	1,000 kg
Entrance door number :	one A60 door auto slide
Lifting door number :	door
Speed :	0.63 m/s

Engine Part

Main Generator Sets (4):

Main generator parameter:

Diesel engines: (4)

Power @ 900 RPM medium speed diesel engine	2,400 kW x 4	575 hp x 4
Burning:	MDO	
Generators: (4)		
Capacity :	2,256 kW x 4	3,218 hp x 4
Rating power @ 900 RPM	2,256 kW x 4	3,218 hp x 4
Power factor :		0.8
Voltage :	450 V	
Frequency :	60 HZ	

Emergency Generator Set:

Emergency generator sets according to parameter:

Diesel engine: (1)

Power @ 1,800 RPM	345 kW	463 hp
Generator: (1)		
(no brush,air-cooling, with silicon steel flange gyrator)		
Rating power @ 1,500 RPM	345 kW	463 hp
Power factor :		0.8
Voltage :	450 V	
Frequency :	60 HZ	

Exhaust System

Incinerator**Hull System:**

Pipe and valve

Pump

Bilge Water System:

2 bilge pump

2 service bilge pump

1 bilge water oil-water separator, including alarm equipment

1 bilge water oil-water separator sewage pump

4 chain-locker injecting pump

Ballast Water System:

4 ballast water pump and ballast water pipes

A electrical control hydraulic actuator butterfly valve operation system and ballast water monitoring system

Seawater Cooling System**Fresh Water Cooling System:**

Cooling Fresh Water system (generator sets)

Cooling Fresh Water System (air conditioning)

Cooling fresh water system

Fire Fighting System**Helicopter Deck Foam Fire Fighting System****Other fire extinguishing equipment:**

Local Engine Room Spray Firefighting Equipment

CO2 System of Engine Room

Kitchen CO2 Fire Extinguishing Equipment

Portable Fire Extinguisher

Pneumatic Quick Closing Valve System

Working Air System

Starting Air System

Fire Line Station Compressed Air System

Working Compressors: (4)

Air Dryers: (2)

Working Air Reservoir

Main Starting Compressor

Main Starting Air Reservoir

Starting Air Reservoir (emergency)

Siren Air Reservoir

Air Reservoir for Control

Steam Boiler System

Fuel Oil System

L.O. System and Slop System

Fresh Water Generating System:

Fresh water Supply System

Closet Flushing System

Sanitation Water Drain System

Air System And Sounding System

E/R Mechanical Ventilation

Work Shop Device

Engine Room Monitoring Device

Tanks (OIL & Water)

Pipeline And Others:

Sea Chest And Shipboard Drain Outlet

Filter

Vent-pipe

Chimney accessory

Workshop and material room

Nameplate

Floor, Grating And Ladder

Paint

Spare Parts and Facility

Pipe Laying Line Supplying System Of Welding Protective Gas

Electric Part

Electric power Source:

Name	Voltage (V)	Frequency(Hz)	Phase	Wire
Main generator	AC450	60	3	3
Emergency generator	AC450	60	3	3
Crane motor	AC440	60	3	3
Anchor winch motor	AC440	60	3	3

Ballast pump motor	AC440	60	3	3
Normal and emergency lighting	AC220	60	1	2
Temporary emergency lighting	DC24V	60		2
Galley equipment	AC440/220	60	1-Mar	2-Mar
General electrical equipment	AC440	60	3	3
Automation system of Communication and navigation equipment	AC220/DC24V	60	1	3
Cable				
Location	Type		Name of cable	

Electric and lighting equipment cable	CJPF86/SC	XLPE insulation, PO inner sheath, tinned copper wire braid, PO outer sheath, bunched flame retardant low-smoke halogen-free
Communication and control cable	CHJPF86/SC	XLPE insulation, PO inner sheath, tinned copper wire braid, PO outer sheath, bunched flame retardant low-smoke halogen-free
	CJPF86/NC	XLPE insulation, PO inner sheath, tinned copper wire braid, PO outer sheath, bunched fire-resisting low-smoke
Fireproof cable	CHJPF86/SC	halogen-free
Interior connecting line of equipment	CBVR/SA	PVC insulated flexible cable
Color and nameplate		
Check and test		
Power:		
Main generator	4 sets	AC450 60Hz 3PH Insulated system
Emergency generator	1 set	AC450 60Hz 3PH Insulated system
Main transformer	2 sets	AC450/AC230

Emergency transformer 2 sets AC450/AC230

Generator:

	Main generator	Emergency generator
Quantity	4	1
Phase	3	3
Rating power	2256KW	315Ekw
Rating voltage	AC450V	AC460V
Rating speed	900 RPM	1,800 RPM
Frequency	60 Hz	60 Hz

Degree of protection	IP23	IP23
----------------------	------	------

Transformer:

	Main transformer	Emergency transformer	Separated transformer
Quantity	2	2	9
Phase	3	3	3
Capacity	500 KVA	100 KVA	
Primary voltage	AC450	AC450	AC440
Secondary voltage	AC230	AC230	AC440
Frequency	60 Hz	60 Hz	60 Hz

Battery**Shore power****Switchboard:**

Main switchboard

Emergency switchboard

Main switch

Distribution Device:

Power distribution box

External power switch box

Lighting distribution box

Navigation and communication box

Charging and discharging box

Shore connection box (concurrent with 600kW external power box)

Electric test device

District group starting panel

Anchor winch control device

Ballast pump

Control of other equipment

ECC

Central control console

Anchor winch console

Ballast system console

Piping console

Piping indication table

Lighting:

Lighting fixture and fitting

Non-waterproof type

Non-waterproof type

Explosion proof type

Low voltage socket box

Navigation and signal light

Navigation light

Signal light

Interior communication:

Command telephone

Auto telephone

Broadcast

Broadcast TV antenna and marine satellite broadcast TV

Engineer calling device
 Hospital calling system
 CCTV
 LAN system
 Audible and visual group alarm panel
 Fire alarm
 General alarm
 Watertight door alarm
 CO2 release alarm system
 Engine room monitor alarm system
 Master clock system
 Miscellaneous

Navigation equipment:

Echo sounder
 DGPS navigation system
 Gyro compass
 Marine meteorograph
 Weather fax receiver
 Clean view screen and window wiper
 Whistle
 VDR
 AIS

Radio communication equipment:

GMDSS
 NAVTEX receiver
 Satellite comm. F
 Super short wave radio station
 Navigation radiophone (NDB)
 Other radio equipment

Miscellaneous:

Shipping security alarm system (SSAS)

Ventilation, Air Condition and Refrigerating System

Ventilation System For Accommodation:

Air exchange ratio
 Ventilating fan
 Design of air duct
 Drain plug for air duct
 Fireproofing air braked

Weather tight cover
Air-condition System:
 Design Condition
 Air-condition areas
 Air-condition mode
 The cooling and heating medium of central air-conditioner
 Ventilation system for air-conditioner
 Water pipe system of air-conditioner
 Control of the air-conditioner system
 Main equipment in air-condition
 Mess Deepfreeze System
 Design parameter
 Structure of refrigerator
 Refrigerator plant
 Pipe Laying System
 Loading And Unloading Of Pipe
 Storage Of Pipe
 Carrying Roller System
 Pipe Cleaning, Handling And Welding System
 Centering Apparatus
 Inspection System
 Tensioner And A&R Winch
 Coating System
 Fire Line
 Stinger
 Station、 Access And Platform
Other Auxiliary Systems:
 Compressed air
 Power socket
 Alarm and monitor system
 Other system
 Heavy Marine Crane

Stern installs a (fixed type) 3000t/2000t (completely rotary type)marine engineering

hoister. Hoist is driven by electric power.the power is supplied by generator station of vessel.

Main claw completely rotary type,situation I

Main parameter:

Main claw completely rotary

Main claw (no back line) fixed aft hoister

Auxiliary claw

1 hooklet (function of person lifting)

Rotary

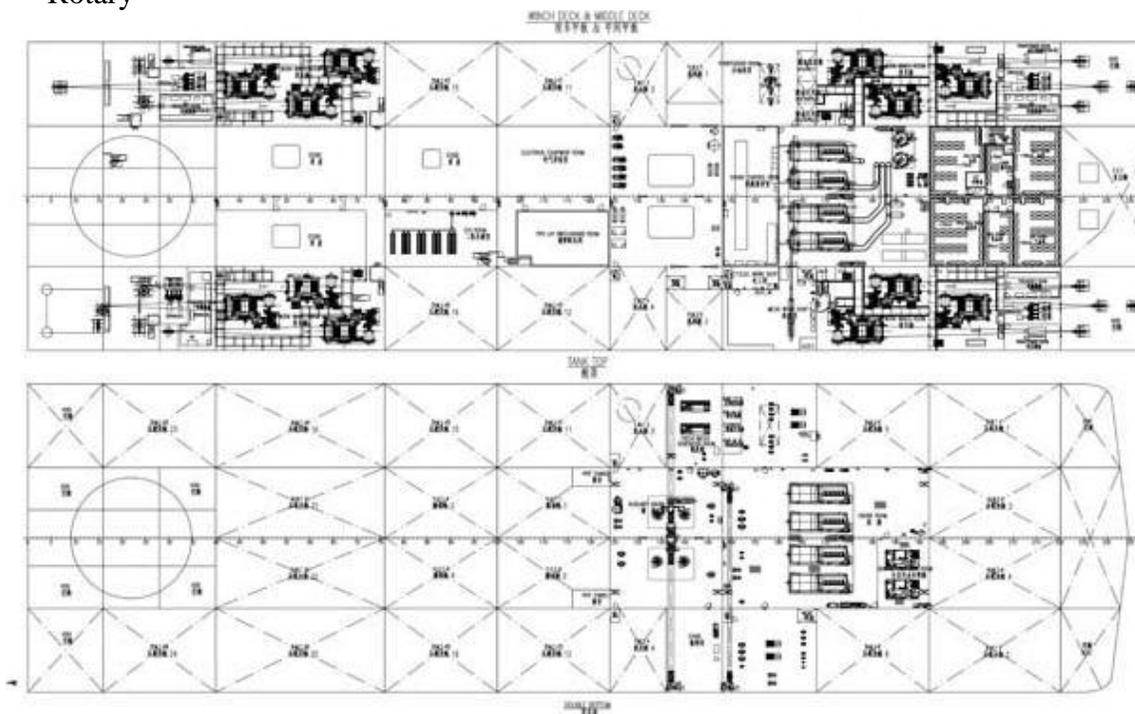


Figure H-1: Prospective Pipe laying barge with 3000T/2000T crane bottom views.

(Brokers, 2011).

APPENDIX I

PETROLEUM TRAINING FACILITY ITEMS

This subsection of the appendix shows images of modules that could not be included in the petroleum training facility development section of this record of study.

This subsection gives some images of the items procured to furnish the training facilities in Bonny and Kaduna.

This subsection includes the following images:

Figure I-1: Calibration Workstation Portable 1. (Rasputen, 2011).

Figure I-2: Centrifugal Compressor Model. (Rasputen, 2011).



Figure I-1: Calibration Workstation Portable 1. (Rasputen, 2011).

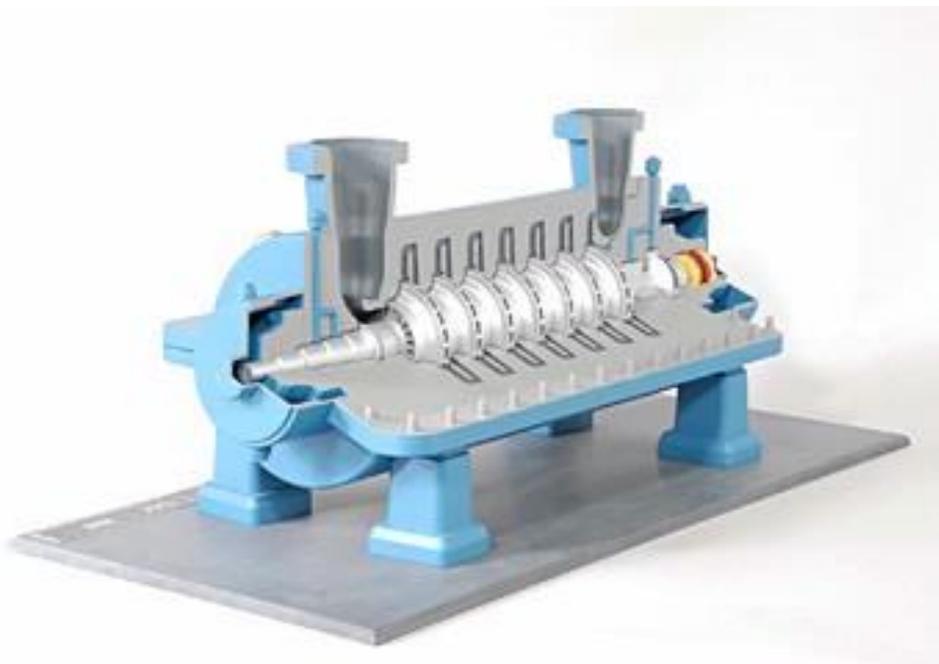


Figure I-2: Centrifugal Compressor Model. (Rasputen, 2011).

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