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THE LIFE CYCLE AS AN OFFSHORE PIPELINE

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Abstract: *The life of offshore oil and gas pipeline, included different phases like: predesign (prefeasibility study), design, construction, commissioning, operation, maintenance, decommissioning and disposal (or abandonment). Each one of these actions may originate project and or specific activity. The jobs of offshore oil and gas pipeline is to transport oil, gas, water and biphasic products, for offshore oil fields to refinery and products exploitation, located to shore. This paper, provide information by the life and operation of offshore oil and gas pipeline, based to the optimization of engineering and economic activity.*

Keywords: *offshore oil and gas pipelines, life cycle, environmental protection*

1. INTRODUCTION

In the feasibility studies of oil and gas pipelines, transport offshore products to shore industry is a very important activity of the offshore industry. Because the oil and gas price are variable depending of the market manufacturers want minimal investment in the offshore equipment. This tendency is justified by the reduction of time life of constructions as well as the reduction of the equivalent maximum investments period of production. In the period corresponding to the first phases (engineering, construction and start-up of transport in first years of oil and gas exploration) the total value of capital investments is higher the total income. The analysis assumes different perspectives in the mind term but specialty in the long term, when the control of the operating, production and maintenance costs of the plants is of fundamental importance to increase income and profit of offshore oil and gas pipelines. During the activity of oil and gas pipelines life

the profitability of pipelines is function by the technical solutions during the engineering and purchasing stage. The selection of a better equipment and solution result a small investment in first stage but is necessary to investment in maintenance activity of platform. It's very important in this first stage to investment in environmental and security of oil and gas pipelines because every accident in environmental area is necessary to investment in activity of company (see to Oil platform accident in Houston, 2010 and Exxon Valdez accident) [1].

The Life Cost of oil and gas pipelines is a total sum of all cost sustained for the equipment beginning with purchase, throughout their life operation and up until the end of their service life. The problems in the defined life cost is to defined whit is time to operation the oil and gas pipelines for the structure of oil and gas exploration and production (the life of oil and gas pipelines is function by the oil and gas quantities, price of the oil and gas, the government legislation and

the price of maintenance). The choice of one or the other is a very significant impact of economic investments as it makes the determination of the operating costs difficult. In this paper is presenting the minimum investment policy of the life of oil and gas pipelines.

2. OIL AND GAS PIPELINES

The physical life of offshore oil and gas pipelines is averaging 20 to 40 years. The cost of offshore oil and gas pipelines is function by complexity (diameter, type of products transport, length, and type of the pipelines). The cost depends by the environment in which it operates the complexity of seabed or structures by oil and gas, the market condition and/or specific requirements of operator [2].

The environmental condition is:

- The seabed depth,
- The latter's lithological condition,
- The seismic characteristic of area,
- The marine meteorological condition.

The oil and gas exploitation condition conditioned the pipelines by the following elements:

- The life of oil and gas exploitations,
- The type of hydrocarbons (oil or gas or rich gas) and their composition (to possibility to transport in biphasic conditions),
- The weight and complexity of the topsides for processing oil and gas reserves,
- The need to continuously controlling oil and gas pipelines,
- The performances of oil and gas pipelines equipment's and corrosion preventions.

The market conditions and the specific inputs of the operating company is:

- Daily rate oil and gas transportation,
- The need to maintain a constant work load for national industries,
- A system to export production (eventually requirement for integrated storage),
- A price of oil and gas,
- Priority on time and cost of getting production started,

- A tendency by the companies to repeat and extrapolate known structural schemes and to use standard conditions.

Oil and gas offshore pipelines are used for:

- transport products from Jackets to Central Platform,
- transport water from Central Platform to fields for injection,
- transport biphasic products to shore facilities,
- transport oil and gas from platforms to shore facilities,
- transport oil from platforms to vessel from transportation and storage,

3. THE LIFE CYCLE OF OFFSHORE STRUCTURES

The life cycle of oil and gas pipelines can be broken down into following six main phases:

- Conceptual design,
- Outline design and feed,
- Detailed design,
- Construction, Installation and Commissioning,
- Operation, Production and Maintenance,
- Decommissioning and Disposal.

The Conceptual design (Feasibility Study), includes:

- Comparison of the major techniques of offshore oil and gas activity,
- Processing, delivery procurement, operation and support options,
- Cost benefits analysis for the conceptual design and alternative/optional,
- Safety and environmental activity and impact,
- Legal frameworks (International, Regional and Local Rules).

The Outline design and feet is function by Requirements Analysis, based to identification and examination of the technical solution and option for the facilities, processes and delivery to the preferred technical solution.

In the stage, detailed design is presented specifications for the equipment, process control and optimization of the offshore structures.



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The Construction, Installation and Commissioning phase concerns the carrying out of the project's plan in order to perform the construction task, to install the plant and to build the operating structure to run.

The Operation, Production and Maintenance phase is the most extensive the life cycle.

The Decommissioning and Disposal phase in the last few years assumed an ever increasing importance. The OSPAR CONVENTION (Oslo-Paris, 1992) defined guidelines for the execution of all activities in this stage.

4. THE CONCEPT OF LIFE CYCLE COSTING

Evaluating the cost over the lifetime of an asset will provide the opportunities of improving the decision to performing the investments to create value. This is a very important to decide the investment function by price to the oil barrel.

Because the oil barrel price decreased since the last few year, and environmental and law is creating the barrier to the major risk of oil and gas exploration, the maximum revenues to the investments is very difficult to defined and obtain.

In this case of improving the Concept of life costing, the companies are required to understand:

- The type of oil and gas pipelines that best suits for the exploitation of oil and gas field,
- The type equipment configuration of the terms related to Life Cycle Costs.

In the ISO/TC 67/WG 9 LIFE CYCLE COSTING, the differences between Life Cycle Cost and Life Cycle Costing:

- The Life Cycle Costing means a systematic analytic process where different alternatives are evaluated with the goal to find the best way to use scarce resources,
- The Life Cycle Cost means the consideration of all cost that are connected to procurement and ownership of a product over a defined period of the products lifetime.

The ISO Standard defined the Life Cycle Costing: "systematic consideration of all relevant cost and revenues associates with the acquisition and ownership of alternative options required to full an asset need. It is a iterative process of estimating, planning and monitoring cost and revenues differences throughout an asset's life. It is used to support the decision making process by evaluating alternative options and performing trade off studies. While the largest benefits can be achieved in the early project stages evaluating major configuration options, it is equally applicable to all stage of the life cycle and many levels of details".

Based to the ISO standards has been planned into the parts [1,2]:

- Methodology,
- Calculation methods,
- Project Implementation Guidelines.

In Part 1 of the Life Cycle Coasting process are this steeps [3]:

- Diagnostics and scoping,
- Data collection and structured breakdown of costs,
- Analysis and modeling,
- Reporting and decision.

5. THE CONCEPT OF LIFE CYCLE COSTING

The continuous decrease of oil price new technology and financial crises have forced the

Oil and Gas Industry to review the financial investments procedure, the production policies and the operations. The need for maximizing revenues across the asset's Life Cycle has shown that it is no longer possible to pursue the optimization of each phase of a life cycle.

6. CONCLUSIONS & ACKNOWLEDGMENT

The oil and gas offshore pipelines are the parts of investments to transport energy products from offshore fields to shore facilities. Because the oil price decreases in

this moment, new investments are difficult to implement.

In this case many companies decided to modify the existent pipelines to new products.

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