Paper 45

Economic Asset Optimization To Enhance Profitability Of "XSW" Oil Field Offshore Block

Raden Rosa Setra Wiguna and Widhyawan Prawiraatmadja

ICMEM

The 7th International Conference on Management in Emerging Markets

Abstract - **Indonesian oil and gas production decreased in the last decade. Majority current oilfield producer backbone located onshore was mature field category and going to depletion phase. Meanwhile, exploration activities have not found new significant economic oil and gas reserves, then one of the efforts that can be done is to asset optimization the existing oil reserves that still have economic value. To overcome this condition, there have been shifting paradigms by the upstream company to change focus in oil and gas development field from onshore to offshore oilfield.**

XSW offshore block already produced oil 41.39 MMSTB and had 7.9 MMSTB remaining reserves. The project's purpose is to create XSW development scenario to enhance its profitability with Environmental Social Governance (ESG) principle, and evaluate project economics through Production Sharing Contract (PSC) cost recovery scheme. The scenario applied sensitivity analysis of oil price, oil production cumulative, operational and capital expenditure. The best scenario can generate 7.3 MMSTB incremental oil production, total investment 81.31 million USD, gross revenue 495.52 million USD, company's profit 57.73 million USD, government profit 86.6 million USD. As the capital budgeting perspective, the project can generate NPV 18.58 million USD, IRR 20.77%, payback period 5.42 years.

Keywords - **asset optimization, economic value, offshore oilfield, Environmental Social Governance (ESG), Production Sharing Contract (PSC)**

I. INTRODUCTION

PEP is one of the leading national oil and gas companies in Indonesia. PEP is one of the subsidiary state-owned enterprises that run in the energy sector, established in 2005 will be focused on operator oil and gas activity as mandated in Law Number (No.) 22 of 2001 subject to oil and gas.

In running the upstream oil and gas industry, PEP partners with government representatives through a Production Sharing Contract (PSC) contract agreement with a cost recovery scheme that will terminated in the end of 2035.

The oil and gas industry in general have five stages of activity consist of exploration, production/development, processing, transportation, and marketing. These five main activities can be divided into two categories, classified as upstream and downstream activities. Upstream oil and gas business activities are exploration and production activities, while downstream business activities are processing, transportation, and marketing.

A. Upstream Oil and Gas Industries

Exploration which includes geological studies, geophysical studies, seismic surveys, and exploration drilling is the initial stage of all upstream oil and gas business activities. This activity aims to find new reserves. If economical reserves are found to be developed, then it will continue with production/development activities.

Production activities include drilling for an additional number of wells and spacing with the purpose of optimizing the drainage radius of oil and gas reserves in the reservoir. This production activity also has three stages primary, secondary, and tertiary. The crude oil that is successfully produced will be sold to the refinery unit and finally become revenue for the company.

Exploration and production involved a series of long-term processes not only operational activities but also investments as well.

B. Production Sharing Contract (PSC) Scheme

The Government of Indonesia (GOI) applied specific regulations for managing the oil and gas industry, named Production Sharing Contract (PSC) through a cost recovery scheme. PSC scheme was introduced in Indonesia in 1966 but officially enforced in Indonesia in 1971 through Law Number (No.) 8 of 1971 subject to Oil and Gas Mining Company, which rules that state-owned companies can cooperate with other parties in managing and operating upstream oil and gas activities in the form of production sharing contract.

The cost incurred by the oil and gas contractor will receive recovery costs. The return on investment costs is only given after producing oil and or gas by scenario installments from a portion of oil and gas production. The PSC contractor will receive their share in the form of a volume of oil or gas.

In the PSC system, an oil and gas company appointed by the government as a contractor manages a certain working area. The company ensures all the risks and costs

of exploration, development, and production. Exploration has succeeded in finding commercial oil and gas reserves, contractors are given the opportunity to obtain costs (cost recovery) from production. The contractor gets a production share after deducting cost recovery which is called profit share or known as profit oil. The contractor is also obliged to pay income tax, and all equipment and installations become state property [1].

The proportion share that applied in the PSC scheme between PEP and Government is 67% for PEP take and 33% for the government take.

C. Business Issue Elaboration

The need to supply oil and gas in Indonesia grows rapidly year to year. It makes the Indonesian government should try to overlook how to improve oil and gas production significantly to balance the domestic demand.

Indonesian crude oil lifting performance in 2021 published by the Ministry of Energy Mineral Resources showed that for oil realization 660 Million Barrel Oil Per Day/MBOPD (93.65% of the target) and 981.98 MBOEPD (97.51% of the target) for natural gas [2].

The majority of current oilfield production is almost supported by the onshore field that already has high water cut. Meanwhile, the offshore field that has oil and gas reserves has not yet to be optimized its production due to several factors such as legal permits, deep-sea geographically, and offshore technology that already in Indonesia still not sufficient to cover the needs of the offshore contractor.

PEP currently operated 1 offshore block namely XSW Block. XSW block was first discovered by an exploration well in 1972 by an American company. Then it started to production/development stage in 1975. The company aggressively drilled development well in a total of 34 wells with 4 platforms, the last development drilling well was in 1992, until in 2000 the American company relinquished this block and finally operated by PEP. From 2000 until now, there are no new development activities in the XSW block, which caused the production rate of the XSW block drops significantly from around 3000 BOPD in 1999 before relinquishment, nowadays just around 750 BOPD.

Based on the Reserves and Resources Annual Report of XSW Block, there are some potential reserves of oil around 7.9 MMSTB that can be exploited from several kinds of development activities, for example, new infill drilling and workover.

The objectives of this research are to analyze the factor that can influence upstream oil and gas industries, evaluate the XSW block, and whether it can optimize its development field and economic project.

II. METHODOLOGY

A. Conceptual Framework

To have a better understanding while explaining the business issue identification and the alternative recommendation that can be made from this research, the author tried to make a systematical conceptual framework in order for the analysis to be focused and narrowed to the objectives.

The oil and gas industry are involved a complex multi-discipline background and cross-function coordination between institutions, so, environmental analysis needs to be done in order to have a specific understanding each of sector that can be affected by its business process.

Environmental analysis is divided into two factors:

1. External Analysis: this part of the analysis tried to identify several factors that can be outside caused of the company and or outside of the current business sector. Commonly this will explain PESTEL analysis, and Porter's Five Forces to identify the current potential competitor in the same sector.

2. Internal Analysis: this part of the analysis tried to identify several factors that influenced from the inside of the organization's perspective on running the proper business strategy. This part will evaluate using SWOT analysis, meanwhile technical and economic analysis will be completed to define the output of the research.

B. Research Methodology

The research methodology that will be applied in this research uses a capital budgeting analysis framework. The objectives of this research are to evaluate the economic feasibility of project development in the XSW offshore oilfield. Several economic indicators will be evaluated such as Net Present Value (NPV), Internal Rate of Return (IRR), Net Cash Flow (NCF), and Payback Period.

This economic indicator will be calculated by the Indonesian PSC Cost Recovery scheme formula with some assumption parameters and technical input adjustment.

To ensure the risk factors of the economic project, sensitivity analysis ran for several parameters that can affect the entire project's economy.

C. Capital Budgeting

Capital budgeting is the process a business undertakes to evaluate potential major projects or investments [3]. The advantages of the capital budgeting method such as budget planning for the project's costs, estimating a timeline for its return on investment, and deciding whether the project's potential value is worth its capital investment. Some parameters that will be analyzed in the capital budgeting method are Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period.

Net Present Value (NPV): The NPV of a project is the sum of the present values of each of the cash flow, positive as well as negative, that occurs over the life of the project (Damodaran, 2014) [4]. The formula is as follows:

$$\text{NPV of a project} = \sum_{t=1}^{N} \frac{CFt}{(1-r)^t} - Initial\ investment \quad (1)$$

Where CFt = Cash flow in period t
R = Discount rate
N = Life of the project

The decision rule referred to NPV for the independent project:
If the NPV > 0, then, Accept the project
If the NPV < 0, then, Reject the project

Internal Rate of Return (IRR): The internal rate of return (IRR) is a metric used in financial analysis to estimate the profitability of potential investments. IRR is a discount rate that makes the net present value (NPV) of all cash flows equal to zero in a discounted cash flow analysis (Fernando, 2022) [5]. The formula is as follow:

$$0 = \text{NPV} = \sum_{t=1}^{T} \frac{Ct}{(1+IRR)^t} - C_0 \quad (2)$$

Where C_t = Net cash inflow during the period t
C_0 = Total investment costs
IRR = The internal rate of return
t = The number of time periods

- When the value of the IRR project is greater than the hurdle rate, so the project is profitable and worth to be executed.
- When the value of the IRR project is smaller than the hurdle rate, so the project tends to make a loss than reject the project.

Payback Period (PP): The payback period method is the amount of time required for a company to recover its initial investment in a project, as calculated from cash inflow.

III. RESULTS

A. External Environment Analysis

The sustainability of the oil and gas industry is not only determined by domestic policies but is also influenced by global issues. Therefore, the author tries to do an analysis using PESTEL analysis as follows:

Politic : Uptrend and downtrend of oil prices very dependent on the stability of geopolitics conditions in the world. The last example is a confrontational war between Russia and Ukraine, and it can boost oil prices from an average of US$ 60/barrel into becoming above US$ 100/ barrel. From a domestic perspective is an inconsistency regulation about the PSC scheme between cost recovery and gross split.

Economy : Oil and gas in Indonesia still as the highest supporting revenue to the whole state revenue behind tax around 97.98 trillion Rupiah. It comes to sense because the majority of people's activities and industries still rely on oil and gas product.

Socio-Cultural : The main objective of implementing upstream oil and gas activities is for the prosperity of the people, so the existence of upstream oil and gas activities can provide a socio-cultural multiplier effect directly to the Indonesian people. One of the efforts to empower domestic products is through Domestic Component Level (DCL) rules.

DCL is the minimum amount of the domestic component in goods, services, and a combination of goods and services. The government regulations require oil and gas contractors to limit the use of imported parts by a certain percentage with the aim of:

- Increase the competitiveness and production of domestic goods
- Increase job opportunities for Indonesian workers

Technology : Technology applications in the oil and gas business always show an improvement to maximize the opportunity to produce remaining reserves of oil and gas. For example: horizontal drilling, floating offshore rig and production platform.

Environmental: The initiation of the Net Zero Emission (NZE) 2050 campaign in the Paris Agreement has also changed the paradigm of all companies worldwide to start oriented towards sustainable resource continuation. The Indonesian government has instructed all companies to implement Environmental Social Government (ESG) aspects.

Legal : One of the biggest challenges in the oil and gas business in Indonesia is a legal permit. The government representatives created the One Door Service Policy (ODSP) to facilitate between the company and the related ministerial to issue the permit.

Porter's Five Forces Analysis:

Rivalry Among Existing Firms (Low to Medium), considering that each PSC company already has its respective working area limits according to the contract, the company only needs to make an effort to optimize the way of producing oil and gas from its area because each working area has different reservoir characteristics and volume of reserves.

Threat of New Entrants (Low), since the oil and gas industry are a capital-intensive sector, there are only several companies that can fulfill the requirements of the government. Several technical strict requirements, budget, and definite working program commitments for the first five years must be met by the prospective company.

Threat of Substitutes (Low to Medium), since the start of the transition energy campaign toward Net Zero Emission (NZE) in 2050, the demand for alternative energy has increased, but this still needs a long time to be realized due to infrastructure that has not been integrated from producers and distributors to the end-user of consumers.

Bargaining Power of Buyers (High), demand for crude oil products and their derivatives end product is still very high, so when demand increases, the market (buyer) is already involved in influencing oil price fluctuation.

Bargaining Power of Suppliers (High), as the main commodity, there are several countries that have large production and act as suppliers of net oil and gas exporters. These countries are members of the Organization Petroleum Exporting Country (OPEC). OPEC countries can affect the supply of world oil production by limiting or issuing production quotas and production reserves at any time if needed.

B. Internal Environment Analysis

To identify the current company's business condition and look for improvement to make new strategic planning or optimization in business process, SWOT analysis are run related to this topic research about XSW offshore development as follows:

Strength, PEP as the subsidiary of state-owned company, run the PSC contract through the cost recovery scheme, with share proportion Government Share 37% and Contractor Share 63%.

Weakness, XSW offshore block already produced since 1975, reservoir production decline naturally 20% per annum, located offshore, huge cost of OPEX and CAPEX.

Opportunities, the oil remaining reserves of the XSW block based on the 2021 reserves report still have a huge number of around 7.9 MMSTB proven reserves, the Indonesian demand for the end product of oil and gas tends to increase, especially in the term of post-pandemic Cov-19.

Threat, the old production facilities, legal permit for offshore area development, oil price fluctuation to the downtrend slope.

C. Technical Analysis

Technical analysis of the XSW block included the petroleum system, geological evaluation, reserves estimation, and potential forecast production from several development activities. XSW block currently produced oil rate on fluctuation around 500-700 BOPD.

The development plan of the XSW block is divided into two scenarios. Scenario 1 includes efforts to improve and replace some part of production facilities and reactivates the suspended well in order for the XSW block can produce oil at its optimum production rate around 1200-1500 BOPD. At the end of PSC contract in 2035, scenario 1 will produce oil cumulative at 2.1 MMSTB.

Scenario 2 basically is Scenario 1 added with four new drillings well and five workover activities. Two new drilling targeted 450 BOPD, and the remaining two wells targeted 325 BOPD, while each workover activity targeted 250 BOPD. At the end of PSC contract in 2035, scenario 2 will produce oil cumulative at 7.3 MMSTB.

D. Economic Analysis

The calculation referred to the PSC Cost Recovery scheme, with the assumption that oil price 2022 used 63 USD/barrel and for the future price refers to corporate policy, hurdle rate used 10.43%.

Scenario 1 will generate gross revenue of 141.98 million USD, the company's take 12.92 million USD, government take 19.45 million USD. From the capital budgeting perspective for the company, the company's Net Present Value (NPV) is 1.2 million USD, with an Internal Rate of Return (IRR) of 11.93% compared to company's hurdle rate reference of 10.43%; the project scenario still viable and profitable for the company. The payback period (PP) is 5.55 years which is the project will start to generate profit in the middle of 2027.

Scenario 2 will generate gross revenue of 495.52 million USD, the company's take 57.73 million USD, government take 86.6 million USD. From the capital budgeting perspective, the company's Net Present Value (NPV) is 18.58 million USD, with an Internal Rate of Return (IRR) of 20.77% compared to company's hurdle rate reference of 10.43%, the payback period (PP) is 5.42 years which is the project will start to generate profit in the end of 2026.

Table 1 - SCENARIO ECONOMIC PROJECT COMPARISON

Parameters	Scenario 1	Scenario 2
Gross Revenue (MM US$)	141.98	495.52
Contractor Take (MM US$)	12.92	57.73
Government Take (MM US$)	19.45	86.6
NPV (MM US$)	1.2	18.58
IRR (%)	11.93	20.77
Payback Period (Years)	5.55	5.42

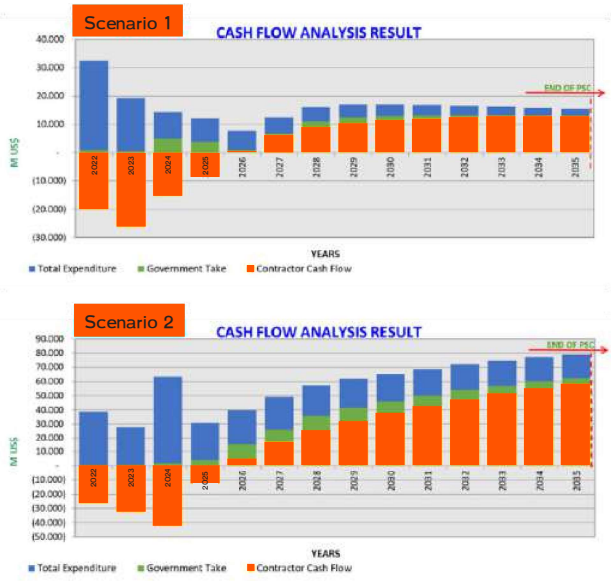

Fig. 1 Cash flow analysis comparison between two scenarios.

E. Sensitivity Analysis

The oil and gas industry business is dominated by several external uncertainty factors that a company or even a country can't even control. The sensitivity analysis runs to identify what factors affect the economy of oil and gas projects, especially in the XSW block project.

In this case, the factor tested is the oil price, OPEX, CAPEX, and oil cumulative production. The sensitivity will range +/- 20% from its initial number. The output of the sensitivity analysis is to review the effect on NPV project.

Table 2 - SENSITIVITY ANALYSIS SCENARIO 1

CAPEX		OPEX		Oil Production		Oil Price	
Δ change	NPV (MM US$)	Δ change	NPV (MM US$)	Δ change	NPV (MM US$)	Δ change	NPV (MM US$)
-20%	5,31	-20%	4,81	-20%	-4.28	-20%	-7.41
-10%	3.32	-10%	3,03	-10%	-1.48	-10%	-2.84
0%	1.22	0%	1,22	0%	1.22	0%	1.22
+10 %	-0.88	+10 %	-0.57	+10 %	3.91	+10 %	5.18
+20 %	-3.01	+20 %	-2.38	+20 %	6.51	+20 %	9.04

Table 3 - SENSITIVITY ANALYSIS SCENARIO 2

CAPEX		OPEX		Oil Production		Oil Price	
Δ change	NPV (MM US$)	Δ change	NPV (MM US$)	Δ change	NPV (MM US$)	Δ change	NPV (MM US$)
-20%	26.14	-20%	30.38	-20%	1.69	-20%	-8.12
-10%	22.36	-10%	24.48	-10%	10.33	-10%	6.01
0%	18.58	0%	18.58	0%	18.58	0%	18.58
+10 %	14.67	+10 %	12.55	+10 %	26.58	+10 %	30.69
+20 %	10.63	+20 %	6.37	+20 %	34.58	+20 %	42.79

According to the sensitivity analysis project each of scenario, the factors that has highly influenced is oil price and oil production cumulative.

IV. DISCUSSION

PEP is operating XSW offshore block applied Economic Social Government (ESG) approach. PEP not only focused on its production target but also focused on the environmental conservation where its oilfield stands.

XSW offshore block is still attractive to be developed in the near future with several additional activities to improve oil production cumulatively. XSW block development Scenario 1 still generate profit for the company, but it has risk factor due to oil price fluctuation that will impact to NPV project to become negative. Scenario 2 development is the best scenario development that will generate profit higher for the company and give a higher share to the government.

Based on the economic project analysis, Scenario 2 is the best development scenario that is still viable to execute in XSW offshore block. Since the offshore material and rent facility costs are relatively higher than at the onshore activities, the author suggested that PEP can initiate the farm-in contract utilizing a method that can be used together with other PEP block oilfields but in different management zone (the same offshore oil and gas field), therefore the cost/price with service company provider can be negotiated lower than the individual project.

V. CONCLUSION

The evaluation of the XSW offshore block included external and internal environment factors of the oil and gas industry. External factors such as the stability of global geopolitics aspect play an essential role because once there is an issue about geopolitics, the impact directly on the oil price, that is one of the most sensitive factors for economic project calculation.

The government policy regarding oil and gas regulation also runs a critical factor, especially for investor attractiveness.

Indonesia's oil and gas production currently dominated by the onshore field, which is now in the depletion stage. Meanwhile, there are many oil and gas fields located offshore that have not yet developed optimally. XSW's offshore block development plan is divided into two scenarios.

According to the economic calculation and analysis using the PSC cost recovery scheme, scenario 1 generated 141.19 million USD gross revenue, 19.45 million USD government take, 12.92 million USD contractor take, with NPV 1.22 million USD, and 11.96% IRR on hurdle rate at 10.43%, payback period 5.55 years.

Scenario 2 generates 495.52 million USD gross revenue, 86.6 million USD government take, 57.73 million USD contractor take, with NPV 18.58 million USD, and 20.77% IRR on hurdle rate at 10.43%, payback period 5.42 years.

ACKNOWLEDGMENT

The author would like to give gratitude and special honor to PEP Company for granted the research and to my research counselor Ir. Widhyawan Prawiraatmadja, M.A., Ph.D.

REFERENCES

1. Lubiantara, Benny., "Dinamika Industri Migas (Catatan Analis OPEC)," Jakarta: PT. Petromindo.Com, 2014.
2. Ministry of Energy and Mineral Resources 2021 Performance Report, Jakarta, 2022.
3. Kenton, Will.,"Capital Budgeting", retrieved from: https://www.investopedia.com/terms/c/capitalbudgeting.asp, accessed on June 29th, 2022.
4. Damodaran, Aswath,. "Applied Corporate Finance", United States of America, Wiley, 2014.
5. Fernando, Jason,."Internal Rate of Return (IRR)", retrieved from:https://www.investopedia.com/terms/i/irr.asp, accessed on June 29th, 2022.
6. Lubiantara, Benny., "Economic Analysis of Oil and Gas Projects", 2021.
7. Ross, Jenna,."Visualizing Historical Oil Prices (1968-2022)", Retrieved from: https://advisor.visualcapitalist.com/historical-oil-prices/ , accessed on June 28th, 2022.
8. Oil and Gas in Indonesia (Investment and Taxation Guide), PricewaterhouseCoopers Indonesia, 2020.
9. Ministry of Finance, "Informasi APBN 2021", Jakarta, 2022.
10. Lubiantara, Benny.,"Ekonomi Migas", Jakarta: PT. Gramedia Widiasarana Indonesia, 2012.
11. Pedoman Tata Kerja,"Plan Of Development (POD)", SKK MIGAS, Jakarta, 2018.