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Economic Analysis of Data Engineering On Production Sharing Contract Case Study Field "A"

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Abstract

Field "A" is the exploration field which has two productive layers, starting from the top is a layer K1 and L5. The oil reserves in this field amounted to 35.54 MMSTB. The field development planning system using PSC (Production Sharing Contract) for 30 years beginning in January 2012 to January 2042, carried out with the addition of 8 + 5 vertical wells with hydraulic fracturing of horizontal wells and pumps on each well. The field development scenarios generate cumulative oil production of 10.91 MMSTB and 30.7% recovery factor. Based on the economic analysis conducted, it can be said that the development scenario profitable taking into account the NPV @ 10% amounting to US$ 21,948,937.46, ROR is 33.24% (15% of bank interest), DPIR is 0.7, PIR is 2.03 and POT is 3.69 years from 24 years of time contract.

Keywords: economic analysis, hydraulic fracturing, production sharing contract

1. Introduction

Economic analysis at an upstream oil and gas activities need to be carried out in view of the exploration and exploitation of oil production is a capital intensive industry, technology, and solid risk. So that the necessary calculations to determine the level of profit of a project that will be conducted by analysis of its economic parameters. In principle, the calculation of economic activities in exploration and production of petroleum resources dependent on oil production that will be produced, the cost of which has been or will be issued, the price-per-unit volume of oil (US $ / barrel oil), and a system of economic calculation is used.

That the economic system is still used in Indonesia is the Production Sharing Contract (PSC). In each PSC, the contractor and the government in this case represented by SKK Migas dividing the total production for each period based on a ratio agreed by the contractor and the government. Usually for oil producing field division of the result by 85%: 15%.Of which 85% for the government and 15% to the contractor, for the distribution of the gas field by 70% to 30% for the government and the contractor. Meanwhile, if the field is managed by the national oil company, after deducting the tax division will be 60% to 40% for the government and the contractor.

2. Basic Theory

Analysis Economic In Oil Field Development Plan

Mengalisa economic analysis conducted by the flow of money to be in and out in developing the field. The output of the analysis of the economics of this are economic indicators such as Net Present Value (NPV), Internal Rate of Return (IRR), Pay Out Time (POT), Profit Investment Ratio (PIR), and Discounted Profit Investment Ratio (DPIR) to the scenarios used as the development of an oil field.
The economic components used in the economic analysis of fiscal regimes tailored to the Production Sharing Contract (PSC) oil and natural gas used in Indonesia.

Cash Flow

*Cash flow*is a picture of the final cash flow that can be obtained and government contractors. The amount of Net Cash Flow (NCF) is a Total Contractor Share (TCS) after deducting total expenses (expenditure). Expenditure includes the cost of the investment (capital and non-capital) and operating costs. The elements required in the calculation of Net Cash Flow (NCF), among others:

- Gross Revenue
- Investation
- Depreciation
- Operating Cost

- Escalation Rate
- First Tranche Petroleum (FTP)
- Investment Credit
- Unrecovered
- Cost Recovery
- Recoverable Cost (Recovery)
- Equity to be Split (ETS)
- Division of Revenue (Share)
- Domestic Marketing Obligation (DMO)
- Taxable Income (TI)
- Tax
- Expenditure
- Net Contractor Share (NCS)
- Total Contractor Share (TCS)

Depreciation

Depreciation related to cost of capital, which means a reduction in the value of capital goods as a result of damage or impairment factor for usage over time. One of the depreciation that is often used in the economic analysis of oil field development plan is the method of double-declining balance (DDB).

Double Declining Balance Method

This method has a way similar to the Declining Balance, except that in this method the amount of the depreciation rate multiplied by 2 so that the form of the equation becomes:

$$Di = K.2R\ (1\text{-}2R)\ i\text{-}1 \qquad (1)$$

Economic Indicators

Oil and gas field development planning is not only defined in terms of technical aspects, but also in terms of economics. To determine whether a field development project is profitable or not, can be done by analyzing the economic indicators of oil and gas as follows:

(1) Net Present Value (NPV)

Net Present Value (NPV) is the value of the net benefits of a project are measured at the present time. A project is said to be feasible if the NPV is positive or greater than the minimum target of NPV can be obtained by the company, if the NPV of a project is negative, it can be said the project suffered a loss or not feasible. NPV of a project equal to zero, the amount of expenditure for organizing the project will be equal to the reception. The general form NPV equation is:

$$NPV = \sum_{t=1}^{n} CF_o + \frac{CF_n}{(1+r)^n} \qquad (2)$$

(2) Rate of Return (ROR)

Rate of Return (ROR) or Internal Rate of Return (IRR) indicates the relative value of the earning power of capital invested in the project, which is the discount rate that causes the NPV equal to zero. ROR price must satisfy the following equation:

$$ROR = \sum_{t=1}^{n} CF_o + \frac{CF_n}{(1+ROR)^n} \qquad (3)$$

Normally every company has a limit on the minimum value of the desired ROR expressed in MARR (Minimum Attractive Rate of Return). A project is considered feasible if ROR is greater than bank interest or greater than the MARR.

(3) Profit to Investment Ratio (PEAR)

Profit to Investment Ratio (PIR) is also called the Return on Investment (ROI) is the ratio of net profit that is not cut (undiscounted net cash flow) to the amount of investment made. PIR is a dimensionless number that relates the number resulting from investment projects each dollar invested. Profit to Investment Ratio is defined as follows:

$$PIR = \frac{\text{Total Undiscounted Net Cashflow}}{\text{Investasi}} \qquad (4)$$

(4) Discounted Profit to Investment Ratio (DPIR)

Discounted Profit to Investment Ratio(DPIR) is a measure that reflects the ability of giving a total profit. DPIR defined as the ratio between the NPV or net cash flow that has been multiplied by a discount factor on investment. Here is the formula for calculating DPIR:

$$DPIR = \frac{\text{Total Discounted Net Cashflow}}{\text{Investasi}} \quad (5)$$

A project is said to be worth doing if DPIR is positive or greater than the minimum target DPIR can be obtained by the company.

(5) Pay Out Time (POT)

Pay Out Time (POT) or Pay Back Period (PBP) is a period or the time necessary to be able to close back investment spending by using the "proceeds" or net cash flow (net cash flows).

Spider Diagrams

Sensitivity analysis is a method that is used to see the effect of changes to the economic indicators. A sensitivity analysis can also indicate how they affect the benefits to be gained from an investment. Spider diagram (Figure 1) presents data or information that provides an overview of the comparison of the elements of two or more objects are going to be compared. In the oil and gas industry, these parameters are: the price of oil, investment, and production of oil.

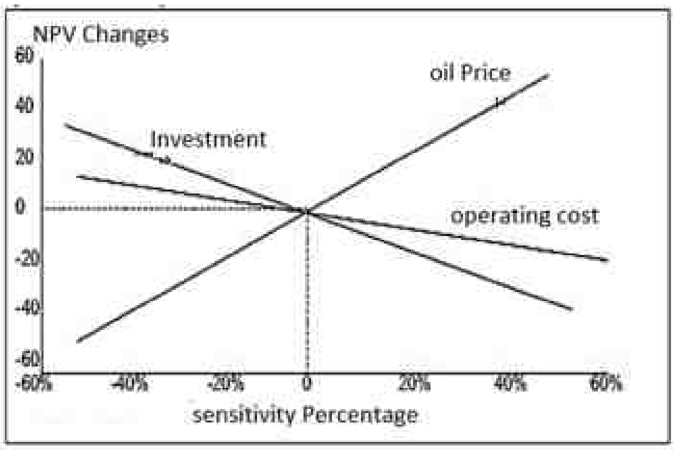

Figure 1. Spider Diagram

3. Case Study

Oil Reserves Data Early

Field "A" is a field that has been completed in oil and gas exploration and production will move into the field. This field has two layers that have analyzed the number of initial oil reserves. Table 1 below is a summary reserves initially on the Field "A":

Table 1. Early Oil Reserves Field "A"

Layer	OOIP (MMSTB)	RF (%)	UR (MMSTB)
K1	24.97	40.05%	10
L5	10.57	36.08%	3.81
Total	**35.54**	**38.85%**	**13.81**

Based on the analysis of Table 1 shows that the Field "A" has oil reserves that can be produced by 38.85% (analysis of engineering) or equivalent to 13.81 MMSTB.

Field Development Planning

Field "A" is planned to be developed with a variety of field development scenarios. Where basecase is the scenario without doing any development or in other words producing wells that have been there before. Then Np (STB) is the amount of oil that can be obtained up to the rest of the contract period of 24 years (6 years of exploration) in units of Stock Tank Barrels (STB). Meanwhile, the recovery factor is the ratio between the oil that can be produced with the oil reserves in the initial condition (Original Oil In Place). Table 4 shows the activity or project, the cumulative amount of oil that can be produced and the recovery factor obtained.

Table 4. Field Development Scenarios

Scenario	Np (STB)	RF%
Basecase + 8 + 5 vertical wells hydraulic fracturing horizontal wells + pump	10.91103 million	30.7%

The position or location of development wells is shown in Figure 2, while the production performance of the field development plan submitted is shown in Figure 3.

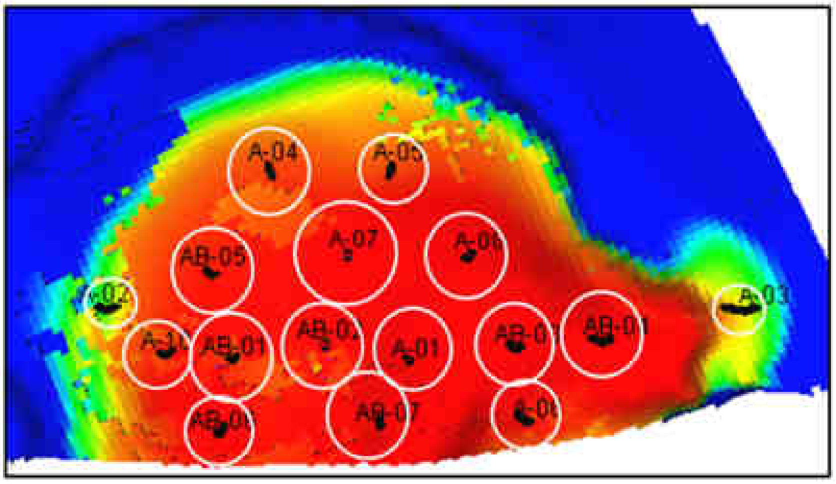

Figure 2. Development Wells of Field Development

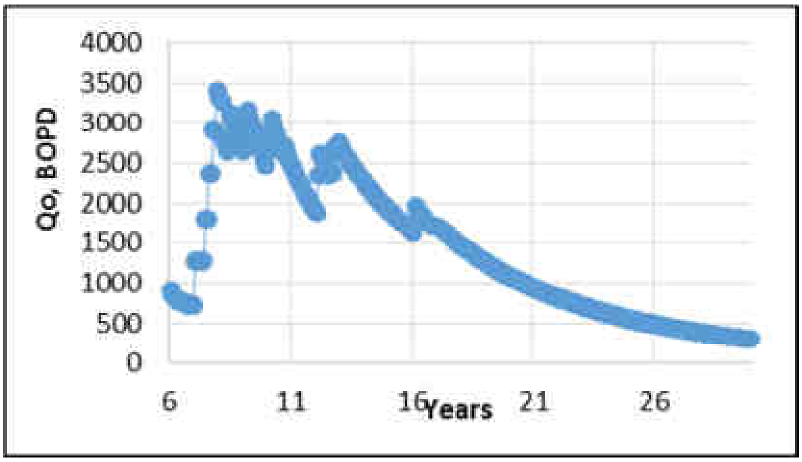

Figure 3. Performance Production Field Development Scenario "A"

Data Fiscal Regime of the Production Sharing Contract (PSC)
In this project the contract system is implemented PSC (Production Sharing Contract) for 30 years starting in January 2012 to January 2042. Some of the parameters used in calculating the economics of each field development scenarios detailed in Table 2 as follows:

Table 2. Fiscal Terms of Production Sharing Contract

Parameters	Value
Time project (30 years)	Year 2012 - 2042
Oil price	US $ 73 / barrel
Government share after tax	60%
Contractor share after tax	40%
Tax	44%
First Tranche Petroleum (FTP)	10%
Cost recovery	100%
Operating cost	US $ 8.25 / barrel
Opex escalation	2 years
DMO (5 years)	25%
Depreciation	*Double Declining Balance* - 5 years

Then, to estimate the cost of oil field development in the form of new well drilling costs and the cost of hydraulic fracturing stimulation is summarized in Table 3. The cost estimates are based on the prices of each activity or project the real field.

Table 3. Estimated Cost of Field Development

Parameters	Cost
Drilling vertical wells	US $ 3.5 million / well
Horizontal well drilling	US $ 4.5 million / well
Hydraulic fracturing vertical wells	US $ 450,000 / well
Hydraulic fracturing horizontal wells	US $ 650,000 / well
Pump	US $ 150,000 / pump
Surface facilities and pipelines	US $ 10,000,000

4. Economic Analysis

Many aspects need to be considered in the selection of development scenarios eligible to apply. In addition to technical aspects, economic aspects also need to be one of the scenarios of development. In the scenarios need to consider the price of economic indicators such as NPV, ROR, PIR, DPIR, and POT. Although such a scenario will give the results of the acquisition of the greatest cumulative production but in terms of the economic scenario is not economical then the scenario can not be applied.

Calculation of Net Cash Flow

In this calculation started in the second because the first year is devoted to capital investment projects construction of production facilities, while oil production is carried out after the production facility was built. Economic calculation step can be described as follows:

1. Calculating the amount of oil production per year by summing the oil production rate per month for one year on the scenario.
2. Counting both investment capital and non-capital costs.
3. Determining the Double Declining Balance depreciation over 5 years. On the Double Declining Balanced depreciation value of the goods at the end of the period will have a residual value (Salvage Value), and the value that is depreciated each year are not the same.
   $Di = K.2R. (1-2R)^{(I-1)}$
   R = 0:25
   For example: Depreciation th-1
   = 2,816,244 US $ x (2 x 0.25) x (1- (2 x 0.25)) (1-1)
   = 1,408,122 US $
4. Counting Escalation Factor (Esc. Factor)
   Escalation Factor = (1 + Escalation Rate) (n-1)
   Namely: Esc. Factor 1 = (1 + 0.02) 2-1 = 1.02
5. Calculating operating cost
   operating cost X = the number of oil production (*operating cost* esc x factor)
   OC1 = 411 340,44 x (8.25 x 0.02)
   OC1 = US $ 67871.17
6. Calculating gross revenue per year.

GR = Production number x oil prices
GR1 = 411 538 bbl x 73 US $ / bbl
= US $ 28,807,678

7. Counting FTP (First Tranche Petroleum)
FTP = FTP (shared) x GR oil (Ro)
FTP_1 = 10% x US $ 28,807,678
= US $ 2880768

8. Calculating the Revenue Recovery (RR)
RR = GR - FTP
RR_1 = 28807678-2880768
= US $ 25.92691 million

9. Counting Unrecovered (UR)
UR_2 = Non Capital 1
If $(CR + IC)_{n-1}$> (Rec.) N-1; then Urn = (CR + IC - Rec.) n-1
If not then the urn = 0
Example: UR_1 = US $ 2.82947 million

10. Counting the Cost Recovery (CR)
If Rec. Rev. > 0; then CR = Non Cap. + Depreciation + Esc. Op. Cost + UR
If *Brake. Rev.*= 0; then CR = 0
CR_1 = 1,301,348 + 6,620,126 + 5,547,036 + 0 = US $ 14,815,985

11. Counting Recoverable Cost or Recovery (Rec.)
If (CR + IC)> Rem. Rev; then Rec. = Rem. Rev.
If (CR + IC) <Rem. Rev, then Rec. = CR + IC
Rec, 1 = MIN (Remaining Gross Revenue; Cost Recovery) = US $ 14,815,985

12. Calculating Equity to Be Split (ETS)
ETS = *Rec.Rev* - Rec.
ETS_1 = 14815985-2829470
= US $ 11,110,925

13. Counting Contractor Share
CS = (CS after tax / (1-tax)) x ETS
CS_1 = (0.4 / (1-0.44)) * US $ 11,110,925
= US $ 2098776

14. Counting Government Share
GS = (1-CS) x ETS
GS1 = (1-0672) x US $ 11,110,925
= US $ 8134753

15. Calculating the First Tranche Petroleum (FTP) Contractor
FTP Contractor 1 = Split before tax (contractor) x FTP
= 26, 7% x US $ 2,880,768
= US $ 771 642

16. Calculating the First Tranche Petroleum (FTP) Government
Government FTP 1 = Split before tax (goverment) x FTP
= 73.21% * US $ 2,880,768
= US $ 2,109,125

17. Calculating Taxable Income
IT = *ETS Oil Contractor* + FTP Oil Contractor - DDMO
TI1 = US $ 2,976,172 + US $ 771642-0
= US $ 3747815

18. Calculating Tax

tax = TI x *tax*
tax1 = US $ 3,747,815 x 0:44
= US $ 1649039

19. Calculating Net Contractor Share (NCS)
NCT = *Taxable Income* - Tax
NCT1 = US $ 3,747,815 - US $ 1,649,039
= US $ 2098776

20. Calculating Net Government Take (NGT)
NGT = *governement share* FTP + Government + DMO + Tax
NGT1 = US $ 8,134,753 + US $ 2,109,125 + US $ 1,929,106 US $ 1,649,039 +
= US $ 11,892,917

21. Calculating Total Contractor Share (TCS)
TCS = *Net share Contractor* + Recovery
TCS1 = US $ 2,098,776 + US $ 14,815,985
= US $ 16,914,761

22. Counting Expenditure (EXP)
EXP = *Capital* + Non-capital + OPEX
exp1 = US $ 11.71213 million + US $ 1,301,348 US $ 1,065,041 +
= US $ 13,013,478

23. Calculating Net Cash Flow
NCF = TCS - EXP
NCF1 = US $ 16,914,761 - US $ 29,226,821
= US $ - 13,013,478

24. Calculating Cumulative Net Cash Flow
*Cum.N*CFN = Cum.NCFn-1 + NCFn
*Cum.N*CF1 = - US $ 3,056,244 + (- US $ 13,013,478)
= US $ - 16,069,722

Indicator Calculation Economic

Step profits indicator calculation is as follows:

a. Calculating the Rate of Return (ROR)
In this field development scenario obtained ROR = 33.24% means an economic value or profitable project for ROR is much larger than bank interest (12%).

b. Calculating Net Present Value (NPV)

$$\text{NPV @ df = 10\%} = \sum_{n=1}^{4} CCF(DF) = \text{US \$ 21,948,937.46}$$

That is, the cumulative value of cash flow to be received in the future (30 years old) when brought in now assuming a discount factor of 10% was US $ 21,948,937.46.

c. Discounted Calculating Profit to Investment Ratio (DPIR)
DPIR = (Cum. DNCF / Investment Capital + Non Capital))
DPIR = (21,948,937.46 US $ / US $ 28,480,504 + 2,802,696 US $) = 0.7

DPIR worth 0.7 or a positive value, indicating the project will be profitable for the contractor because it has exceeded the minimum target DPIR to be gained by the contractor.

d. Calculating Profit o Investment Ratio (PIR)
PIR = (Cum. NCF / (Capital + Non Capital Investment))
PIR = (63,437,589.86 US $ / US $ 28,480,504 + 2,802,696 US $) = 2.03

PIR value of 2.03 indicates the amount to be generated by 2.03 times from each dollar invested as capital.

e. Calculating Pay Out Time (POT)
POT = (Year 1 / (Cum. DCCF2 - DCCF3))
POT = ((6,063,385) / 8,790,259) + 3 = 3.69 years

POT or capital will be returned during the period of 3.69 years. Then, a diagram of the Net Present Value (NPV) of the Company as shown in Figure 4 after January 2018, so that this scenario can be said to be beneficial for capital back quickly.

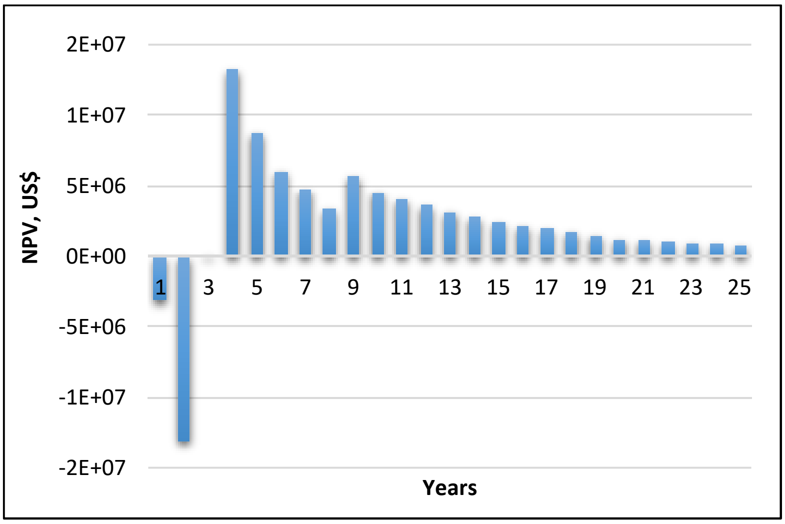

Figure 4.*Company NPV*

For a summary of the results of the calculation of the economic indicators of field development scenario "A" performed, as shown in Table 5.

Table 5. Economic Indicators Field Development Scenario "A"

Economic Indicator	Value
ROR	33.24%
NPV	US $ 21,948,937.46
DPIR	0.7
PIR	2.03
POT	3.69 years

Sensitivity Analysis
Sensitivity analysis is an analysis conducted to see the effect of changes in the quantities that affect the profits seen in the results of its economic indicators. Sensitivity analysis was performed on selected scenarios to be developed is a vertical well Basecase + 8 + 5 + hydraulic fracturing of horizontal wells on each well + pump. Quantities that are typically used for sensitivity analysis is the rate of production, the price of oil (oil price), investment costs and operating costs (operating cost). This analysis is done by giving some price changes to the amount of sensitivity to a decline of 5%, 10%, and 15% and an increase of 5%, 10% and 15%. Then the sensitivity obtained Contarctor NPV (Table 6), Government NPV (Table 7) and IRR (Table 8).Later, the results of the sensitivity analysis can be plotted in the form of a spider diagram and visits sensitivity to the magnitude of the price of NPV and ROR. Sensitivity spider diagram can be seen in Figure 5, Figure 6 and Figure 7.

Table 6. Results Sensitivity of NPV Contractor

Contractor NPV				
Sensitivity	**Oil Prod US $**	**Oil Price US $**	**Opex US $**	**Invest US $**
70%	11,719,592	11,719,592.38	24,073,184.38	29,415,689
80%	15,145,479.32	15,145,479.32	23,365,102.07	26,926,772.02
90%	18,553,657.93	18,553,657.93	22,657,019.77	24,437,854.74
100%	21,948,937.46	21,948,937.46	21,948,937.46	21,948,937.46
110%	25,334,529.67	25,334,529.67	21,240,855.16	19,460,020.18
120%	28,712,661.45	28,712,661.45	20,532,772.85	16,971,102.91
130%	32,084,925.57	32,084,925.57	19,824,690.55	14,482,185.63

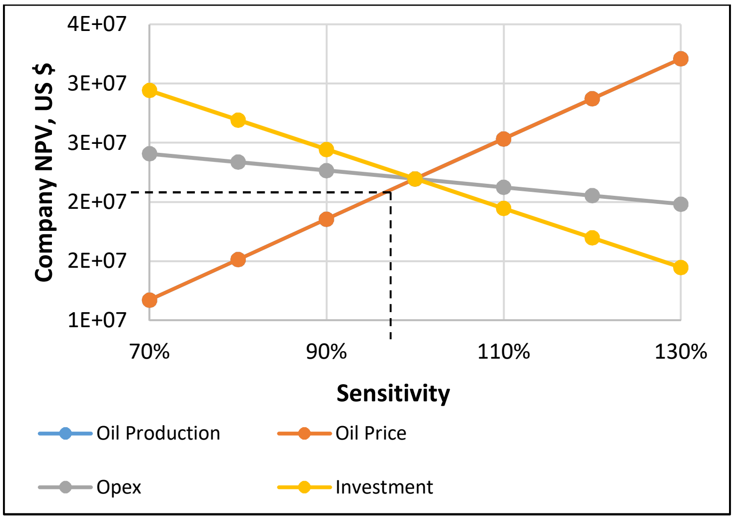

Figure 5. Spider diagram NPV Sensitivity Contractor

Table 7. Results Sensitivity of NPV Goverment

Government NPV				
Sensitivity	**Oil Prod US $**	**Oil Price US $**	**Opex US $**	**Investment US $**
70%	103,326,226.53	103,326,226.53	179,602,198.15	168,703,298.23
80%	124,914,339.16	124,914,339.16	175,781,092.16	168,515,158.88
90%	146,520,160.13	146,520,160.13	171,959,986.16	168,327,019.53
100%	168,138,880.17	168,138,880.17	168,138,880.17	168,138,880.17
110%	189,767,287.54	189,767,287.54	164,317,774.18	167,950,740.82
120%	211,403,155.33	211,403,155.33	160,496,668.19	167,762,601.47
130%	233,044,890.79	233,044,890.79	156,675,562.20	167,574,462.11

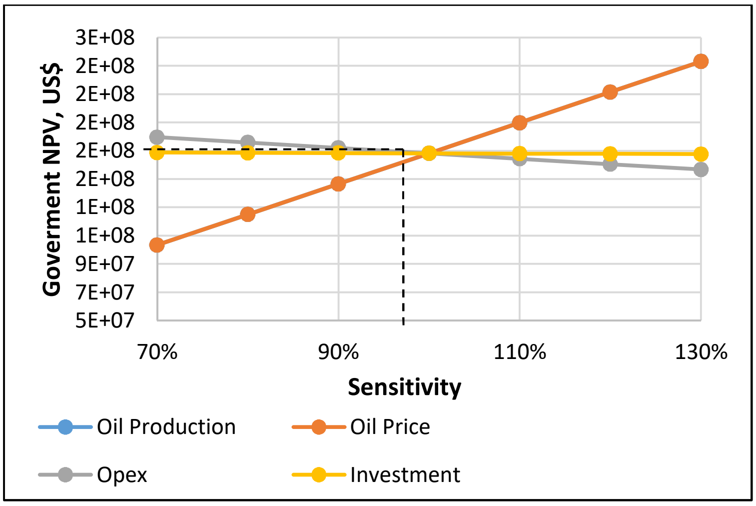

Figure 6. Spider diagram NPV Sensitivity Goverment

Table 8. Results of Sensitivity ROR

ROR				
Sensitivity	**Oil Prod**	**Oil Price**	**Opex**	**Investment**
70%	24.04%	24.04%	34.85%	55.37%
80%	27.29%	27.29%	34.32%	46.15%
90%	30.35%	30.35%	33.79%	38.97%
100%	33.25%	33.25%	33.25%	33.25%
110%	36.03%	36.03%	32.70%	28.60%
120%	38.71%	38.71%	32.15%	24.76%
130%	41.32%	41.32%	31.60%	21:54%

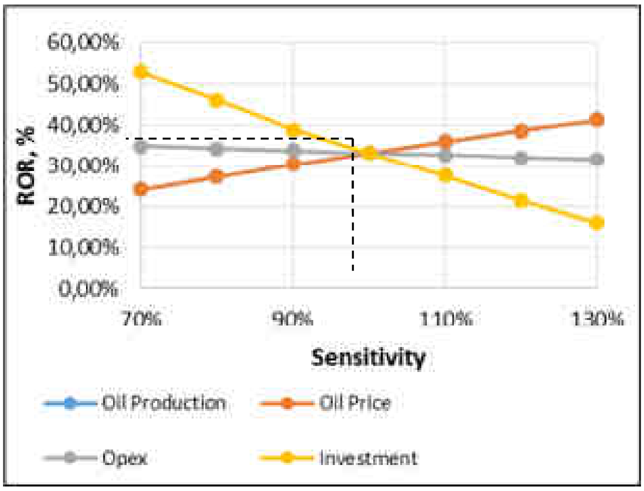

Figure 7. Spider Diagram Sensitivity ROR

Judging from the spider diagram, the results of the sensitivity of the field development scenario in mind that the most influential parameters on NPV sensitivity contractors (Figure 5) is an investment, oil production and oil prices. Then the most influential parameters on NPV sensitivity goverment (Figure 6) is oil production and oil prices. Whereas, for the sensitivity percent ROR (Figure 7) most influential parameters are oil production, oil prices and investment made.

5. Discussion

Field "A" is the exploration field with two layers, namely Layer K1 and L5. This field has a total oil reserves initially (OOIP) of 35.54 MMSTB (million barrels). Field "A" is managed by company "X" that adopts the PSC (Production Sharing Contract) for 30 years from January 2012 to January 2042. division system used was 60% for the government and 40% to the company after deducting taxes. The economic parameters used by the PSC fiscal regime (Table 2) and estimates current operating costs (Table 3).

Field development scenarios conducted in Field "A" is basecase plus 8 + 5 vertical wells horizontal wells. Then, in order to optimize production, conducted hydraulic fracturing stimulation in each well. The layout of the planned wells are shown in Figure 2. Production of a well definite pressure decreased and the amount of production. Therefore, to maintain the performance to remain high well production carried out installation of pumps (artificial lift) in each well. The flow rate of the development scenario shown in Figure 3 are used as a basis in calculating the economics.

Based on the calculation of the basic economic system of oil and gas with the PSC Contract, the proposed field development scenario NPV value on a discount factor of 10% was US $ 21,948,937.46. That is, the cumulative value of cash flow to be received in the future (30 years old) when brought in now assuming a discount factor of 10% was US $ 21,948,937.46. Rate Of Return (ROR) amounted to 33.24%. ROR value of this scenario is higher than bank interest, which the bank rate by 12%, so it can be said to be lucky. Then, the price Discounted Profit to Investment Ratio (DPIR) worth 0.7 or a positive value, indicating the project will be profitable for the contractor because it has exceeded the minimum target DPIR to be gained by the contractor. Meanwhile, the value of Profit to Investment Ratio (PIR) of 2.03 indicates the amount of gain that would result from this development scenario amounting to 2.03 times from each dollar invested as capital. The last economic indicator is the Pay Out Time (POT), which is a scenario behind the capital fell in the remaining term of 3.69 years with a 24-year project showed that the process of return of capital for investment relatively quickly. Based on the analysis of five economic indicators, scenario development proposed to develop the Field "A" can be said to be profitable. Meanwhile, based on engineering analysis, this scenario resulted in a cumulative 10.91 MMSTB sehingg oil, obtained recovery factor of 30.7%, it is feasible to implement this scenario.

Sensitivity analysis carried out on the Net Present Value (NPV) and Rate of Return (ROR) to see how these indicators are sensitive to changes in certain parameters. For sensitivity analysis, there are some parameters that are altered to determine what is a sensitive parameter, namely the oil price, the amount of oil production, the amount of investment and production costs. In each of the given amount of change increases and decreases in price by 70%, 80%, 90%, 100%, 110%, 120% and 130%. Which is used as a benchmark oil price of 73 USD / bbl, production costs are used as a benchmark by 8.25 USD / bbl, and the total investment price. Calculation of cash flow from this scenario are listed on page appendix. Where is the cash flow that is displayed every two years starting from the year 0, ie 2018. Sensitivity analysis has been done and then continued by making a spider diagram is a graph illustrating the sensitivity of indicators of profits to changes in the economic parameters (price of oil, the amount of oil production, costs of production and investment costs). The results of the sensitivity analysis of this scenario can be seen in Table 6, Table 7 and Table 8. Then, the spider diagram for the sensitivity of profit indicators, namely NPV and ROR to the scenario put forward more details can be seen in Figure 5, Figure 6 and Figure 7. costs of production and investment costs). The results of the sensitivity analysis of this scenario can be seen in Table 6, Table 7 and Table 8. Then, the spider diagram for the sensitivity of profit indicators, namely NPV and ROR to the scenario put forward more details can be seen in Figure 5, Figure 6 and Figure 7. costs of production and investment costs). The results of the sensitivity analysis of this scenario can be seen in Table 6, Table 7 and Table 8. Then, the spider diagram for the sensitivity of profit indicators, namely NPV and ROR to the scenario put forward more details can be seen in Figure 5, Figure 6 and Figure 7.

The percentage of the sensitivity aims to look at the financial condition of the company when the price of oil fell and oil prices rose. Range starting percentage of 70% up to 130% due to generally decrease or increase in income does not deviate significantly exceed 30% of the previously planned budgetting. Meanwhile, the intersection of spider diagram stands at 100% indicates if the field development project is implemented, the financial income and expenditure in accordance of budgetting planned. Based on the results of the spider diagram can be analyzed that the most sensitive economic parameters or which have an impact on the size of the profits for the company on the magnitude of the price of NPV and ROR is an investment, oil production and oil prices.

6. Conclusions

1. Field development plan "A" does is basecase vertical wells plus 8 + 5 horizontal wells + hydraulic fracturing of horizontal wells and installation of pumps (artificial lift) in each well.
2. Cumulative oil production (Np) obtained from the proposed development scenario of 10.91 MMSTB, with a recovery factor of 30.7%.

3. Based on the economic analysis carried out, then the scenario proposed development is said to be beneficial to the NPV @ 10% amounting to US $ 21,948,937.46, ROR 33.24% (12% interest), PIR of 2.03, 0.7 and POT DPIR 3.69 years from the remainder of the 24-year project that is quite fast.

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