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Selecting Appropriate Oil-Share Contract Scheme for Rejuvenating Marginal Field in Central Sumatra Basin

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Abstract. The global economy's unfavorable condition and the excessive portion of cost recovery yield an uneconomic situation for the contractors. To bring back the situation and the Contractor's spirits to continue investing in Indonesia, the Indonesian Government provides incentives and other alternatives for contractors to amend the conventional Production Sharing Contract (PSC) scheme with PSC Gross Split scheme based on regulations of the Minister of Energy and Mineral Resources Number 8 and Number 52 years 2017. However, the new scheme should prove its positive feasibility through economic simulation under both schemes in the worst field condition such as marginal conditions, a condition the oil production continuously declines from time to time. We select the YZ field in the Central Sumatra Basin or Rokan Block, Riau Province. This study aims to compare the feasibility of the project under both schemes and select the more appropriate option for rejuvenating YZ marginal field. Based on the results of calculations using the conventional PSC, the Net Present Value (NPV), Internal Rate of Return (IRR), and Pay Out Time (POT) values are 78.35 M US$, 10.92%, 3.0 years, respectively. Moreover, Applying PSC gross split results NPV, IRR, and POT 621.38 M US$, IRR 15.73%, and 3.29 years consecutively. PSC gross-split scheme seems attractive for bringing more revenue, which can rejuvenate the activity in the marginal oil field. Sensitivity analysis results oil price and investment are the most sensitive parameters for conventional and gross-split PSC. Therefore, feasibility of marginal oil field under conventional PSC is highly depends on oil price while gross-split PSC affects in investment parameter.

INTRODUCTION

The marginal field defines an oilfield area that is not meet the economic situation under the production sharing contract's terms and conditions in a certain period [1]. the term "marginal" means the actual condition cannot satisfy economist criteria due to some obstacles that decrease the possibility of exploiting oil to the surface, e.g., small reserves or deep reservoir [2]. Unreachable criterion makes this field miss from the investor's eyes, resulting in many oil contractors (KKKS) still put this field's type on "undeveloped field" lists. Therefore, to increase the interest of KKKS to invest in marginal fields, the Ministry of Energy and Mineral Resources (ESDM) is preparing new regulations regarding the management of oil and gas blocks for marginal fields. One of the provisions in the Ministerial Regulation is the cooperation scheme for oil and gas block concessions. In January 2017, the Government of Indonesian Minister of Energy and Mineral Resources (ESDM) Ignasius Jonan issued the Energy and Mineral Resources Regulation Number 08 of 2017 concerning Gross Split Production Sharing Contracts [3]. A gross split contract is a production sharing contract in the upstream oil and gas business activities based on the principle of sharing gross production without a cost recovery mechanism. In the gross split production sharing contract, the base split is determined for oil at 57% for the state share and 43% for the contractor, and natural gas at 52% for the state share and 48% for the contractor share [4]. The initial profit sharing is the basic reference in determining the profit-sharing at the time of the field development plan's approval. Furthermore, at the time of approval for field development, the initial results (base split) can be adjusted according to the variable and progressive components. The variable components in question include the status area, field location, the depth of the reservoir, the availability of

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supporting infrastructure, and carbon dioxide (CO2) content, while the progressive component is the price of petroleum and the cumulative amount of oil and gas production[5].

The gross split profit-sharing scheme is a new oil and gas contract model and hasn't implemented in other country. The existence of this gross split profit-sharing system raises the pros and cons of the oil and gas industry. Many parties support this contract system because it can break the long bureaucratic chain and the government does not need to think about cost recovery. However, the cons voice rise due to the contractor's burden and responsibilities will increase, means the contractor's risks to operate oilfield become higher.

We make an economic model under both conventional and gross-split contracts based on marginal field conditions to minimize contradictions between the gross-split PSC scheme's pros and cons. We select the "YZ" field because this oilfield is one of the marginal fields discovered in 2008 in central Sumatra basin, with an area of 24.73 hectares. The field is in the management area of PT. Chevron Pacific Indonesia. The plan to initiate YZ Field's development is in 2017. Before developing the YZ field, it is necessary to conduct a study on the economic feasibility of developing the YZ Field.

Based on this case, this research takes the title Comparative Economic Study of Marginal Oil Field Development Using PSC Production Sharing Contracts, and Gross Split Production Sharing Contracts. This study discusses and compares the two types of contracts, which are more feasible and profitable for both the government and contractors. This study's results can contribute to ideas for the Government and oil and gas cooperation contract contractors in developing a sharper, more balanced, and realistic oil and gas marginal field management strategy.

METHODOLOGY

This study's object, the YZ field, has approximately 61 acres with original oil in place (OOIP) around 1.1 MMSTB. Figure 1. Tabulates the annual production (unit: Barrel Oil per Day, BOPD) performance of the YZ field, forecasted based on a daily production basis (unit: Barrel Oil per Year, BOPY). Moreover, cumulative production (in barrels) also include in figure 1. Figure 1 indicates a continuous decline of oil production, which means the YZ field has the potency to be a marginal oilfield. Figure 2. emphasizes this study's flowchart, which focuses on the literature study from various sources such as books, regulations, and oil and management references. The study starts with determining the background and formulating the problem, i.e., this study's objective. The formulated objective collects various data and information correlated to the reservoir, production, and investment data. Analyze the collected data under calculation to obtain the feasibility indicator, i.e., NPV, IRR, and POT, for both conventional and gross-split schemes. Moreover, perform sensitivity analysis to observe the impact of oil price, production rate, and operating cost to feasibility indicators. The process for selecting the most appropriate scheme consists of a comparative study based on government and contractor shares under both conventional and gross-Split. This study utilizes average oil price from 2015 to 2017 (50 US$/barrel) and 8 US$/ barrel operating cost with 2% annual escalation, Table 1,2, and 3 consecutively lists the useful information for data calculation in this study.

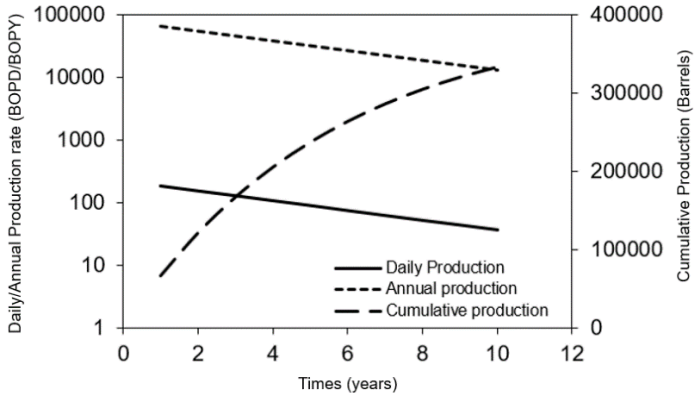

FIGURE 1. YZ Field performance, comprises of daily oil production, annual oil production, and cumulative oil production.

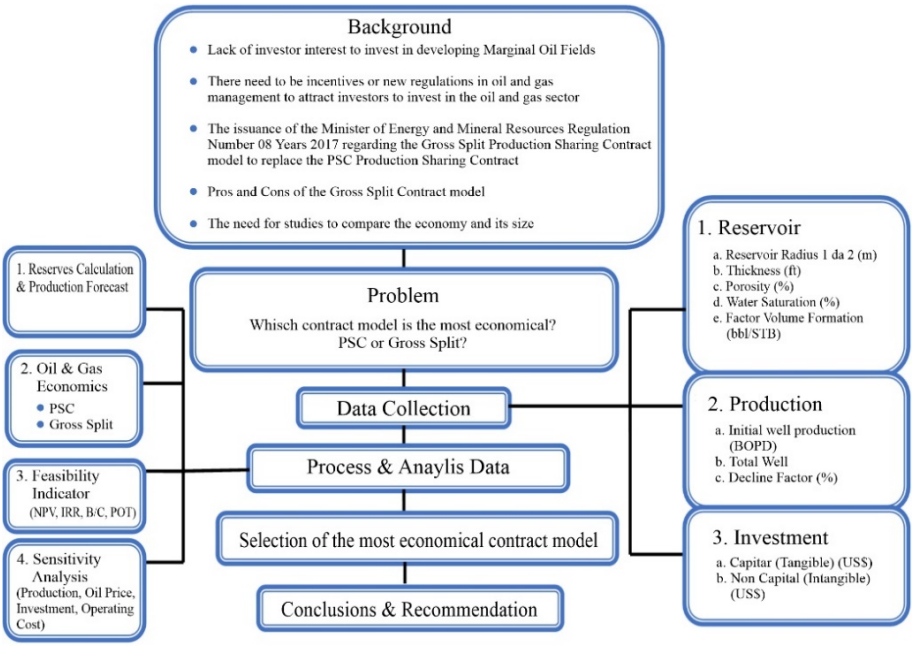

FIGURE 2. Research's flow chart.

TABLE 1. YZ field's investment budget (in thousand US$)

I. Capital Cost	Price ($M)	II. Non-Capital Cost	Price ($M)
1. Capital Drilling		1. Non-Capital Drilling	
a. Casing	450.83	a. Rig Contract	615.56
b. Tubing	88.18	b. Mud and Cementing	380.54
c. Well Equipment	97.23	c. Bits, Reamers, Accessories	310.70
2. Production Facility		d. Directional Drilling	329.57
a. Piping	161.61	e. Perforation and Completion	123.76
b. Equipment and Accessories	202.17	f. Logging and Coring	124.72
		g. Generals (Overhead, etc.)	326.33
		3. Road and Location	
		a. Well Site	550.52
		b. Access Road Preparation	238.31
Sub Total Non-Capital Cost	1.000.00		3.000.00
Total Investment		4.000.00	

TABLE 2. Fiscal data for conventional PSC and gross-split PSC

Fiscal Term	Conventional PSC	Gross Split PSC
Government Split	85%	
Contractor Split	15%	
Depreciation Factor	25%	25%
Operating Expenditure	8 US$/Barrel	8 US$/Barrel
Escalation Rate	2%	2%
Discount Rate	10%	10%
Split Before Tax	26,79%	
First Tranche Petroleum	20%	-
Minimum Attractive Rate of Return	15%	15%
Investment Credit		

Fiscal Term	Conventional PSC	Gross Split PSC
Domestic Market Obligation (DMO)	25%	
DMO Fee	25%	
Corporate & Dividend Tax	44%	44%

TABLE 3. List of contractor's split correction factor for gross-split PSC

component	Parameter	Gross Split PSC
Variable Split		**Split Correction**
Field Status	No POD	0%
Field Location	Onshore	0%
Reservoir Depth	<2500m	0%
Availability of Supporting Infrastructure	Well Development	0%
Reservoir Type	Conventional	0%
Content of CO_2 (%)	-	0%
Content of H_2S (%)	-	0%
Oil Specific Gravity	>25	0%
TKDN	70-100	4%
Production Stage	Primary	10%
Progressive Split		
Oil Price	50	2,50%
Total Cumulative Production	< 30	10%
Contractor Split	Base split + Variable + Progressive	75,75%

RESULT AND DISCUSSION

Calculation through 85-15 Government-contractor share oil on conventional PSC yields 78.35 Million US$ NPV at 15% interest rate, 10.92% IRR, and three years POT. These results mean that the project is far from economist condition by applying a conventional PSC scheme to the YZ field, although the NPV is still positive. IRR lower than the Minimum Attractive Rate of Return (MARR), a minimum interest rate that is still allowable for investors to gain a profit, i.e., IRR lower than MARR (in this case, MARR is 15%). In the gross split PSC scheme, the application of 57-43 government-contractor base and progress share on table 3 yields 621.38 million US$ NPV, 15.73% IRR, and 3.3 years POT under the same interest rate. Compare to conventional PSC, applying a gross-split scheme has a more positive NPV and IRR higher than MARR. However, the POT is slightly longer. Comparing economic indicators on both schemes indicates the gross-split PSC scheme's application more profitable and makes the YZ field more feasible than conventional PSC.

Figures 3 and 4 plots the effect of altering oil price, investment, oil production, and operating cost (OPEX) parameters to NPV, IRR, and POT under conventional PSC (figure 3) and gross-split PSC (figure 4). Both figures reveal that the most sensitive parameter for conventional PSC is oil price and oil production for conventional PSC, while investment makes the gross-Split PSC more feasible. Therefore, Oil price influences the feasibility of the marginal oil field under the conventional PSC scheme. Another PSC scheme, gross-split PSC highly dependent on investment. Based on the YZ field result, the Government of Indonesia must encourage investors to boost their investments in the marginal oil field because enormous investment in the marginal oil field makes the gross-split scheme more feasible.

(a) (b) (c)

FIGURE 3. Effect of Production (Np), Operating cost (Opex), Investment, and oil price NPV (a), IRR or ROR (b), and POT (c), based on conventional PSC contract

(a) (b) (c)

FIGURE 4. Effect of Production (Np), Operating cost (Opex), Investment, and oil price NPV (a), IRR or ROR (b), and POT (c), based on gross-split PSC contract

CONCLUSIONS

We compare the feasibility between conventional PSC and gross-split PSC for the YZ field in the Sumatera basin through the economic model study. The study consists of various literature studies, data collection, and data analysis to select the more appropriate scheme between two-type PSC. Calculation of economic indicators based on both schemes yields the gross-split PSC yields more-positive NPV and IRR higher than MARR, compare to conventional PSC. Through sensitivity studies on NPV, IRR, and POT by altering oil production, operating cost, investment, and oil price results, oil price fluctuation significantly affects NPV, IRR, and POT. On the other hand, investment brings a significant impact on three economic indicators.

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