CAPITAL BUDGETING MODEL AND SENSITIVITY ANALYSIS OF THE PROJECT FEASIBILITY IN VIETNAM FOR THE PERIOD OF 2019-2037

Dini Mentari
Wiwiek Mardawiyah Daryanto

ABSTRACT

Oil and gas sector has long been a major pillar of the economics of Indonesia before the fall in oil prices in 2013. In 2016, this sector contributed USD 23.7 Billion to the country's GDP, or about 3.3 % of the country's economy. However, the total of oil and gas production declined around 4.41% per year since 2007, and the sharpest decline was in 2013. This situation gave impact to the performance of the industry, especially to the government revenues. The purpose of this study is to measure the feasibility of oil and gas industry investment project as an option to generate other revenue stream in a foreign country, Vietnam, for the period of 2019 – 2037. Capital Budgeting Model indicators: Payback Period, Return on Investment (ROI), Net Present Value (NPV), NPV Index, Discounted Payback Period, and Internal Rate of Return (IRR) were used to analyze the data, and sensitivity analysis. The calculation shows that the capital budgeting indicators fulfilled the standard required. This study will be beneficial for the investor to explore other revenue stream opportunity to generate higher return.

Keywords: Capital budgeting model, net present value, internal rate of returns, project feasibility, other revenue

1. INTRODUCTION

The oil and gas industry, both in Indonesia and globally, has experienced dramatic volatility. Global political-economic situations are believed to drive the sensitivity of oil prices. Records show that from its peak in mid-2008 (US$ 145 per barrel), the oil price collapsed by more than 70% and ended in 2008 at US$ 40 per barrel following the global financial crisis. As market confidence returned, buoyed by confidence in growth in China and other emerging markets, crude prices rose again to an average (on an annual basis) of approximately US$ 94-98 a barrel from 2011 to 2014. Recently, the market has been back in turmoil. With the development of shale oil and gas technology, United States, previously the biggest net-oil importer, has reduced their dependency on oil and gas import. This consequently led oil to be oversupplied in oil-producer countries. Hence, become a key factor for the dropped oil price, even to below US$ 30 per barrel at the beginning of 2016. At the end of 2016, Organisation of Petroleum Exporting Countries (OPEC) reacted to this by restricting the oil production to stabilize the supply and restore the global oil price to a normal level. (PWC, 2017). Historically, Indonesia has been active in the oil and gas sector for nearly 130 years with oil and gas production has a long and relatively successful history, characterized by its relatively stable and well-understood regulatory framework. In many areas, including the development of the Production Sharing Contract (PSC) model and the commercialization of Liquefied Natural Gas (LNG), Indonesia has been an international pioneer and continues to be a significant player in the international oil and gas industry. However, the industry is arguably now in a transitional phase, with declining oil production and growing domestic need for gas (both for consumers and industrial use). Indonesia's production and opportunity profile has also moved steadily away from oil and towards gas - a trend which may ultimately represent a permanent shift. The age of relative stability in this sector has probably passed. PT Perusahaan Gas Negara Tbk ("PGN"), as state-owned company now under Oil and Gas Holding PT Pertamina (Persero) become a sub holding in Natural Gas industries and plays a significant role in the fulfillment of domestic natural gas. However, with the recent condition of the oil and gas industry, has also give impact to PGN performance which showed that PGN net income and profitability trends continued to decline in the last five years. The company need to boost its sales or find another revenue stream.

Recently there is an investment invitation announcement from Vietnam Country to invest in gas pipelines in the country. Based on a publication in 2012 by Vietnam Oil and Gas Group (Petrovietnam) offered for investment opportunities. The Project called Nam Con Son II Gas Pipeline project in Ba Ria - Vung Tau-Vietnam, involves the construction of a 355km gas pipeline (325 Km offshore and 30 Km onshore) is being executed in two packages. First Package with Length: 151 Km, Ø 26" (offshore), with joint investment by Petrovietnam Gas ("PV") (51%), Rosneft (32,7%), Perenco (16,3%) amounted total by USD 680 million already completed on December 2015. And now Vietnam is calling foreign investor to join for the second pipeline project for Length: 174 Km offshore with a minimum amount to USD 155 million (25% of market share) (Petrovietnam, 2012)

The purpose of this study is to measure the feasibility of the project in Vietnam for the period of 2019-2037 based on quantitative method, Capital Budgeting Model for the criteria of Payback Period, Return on Investment, Net Present Value, Profitability Index, Discounted Payback Period, Internal Rate of Return and Sensitivity Analysis. The limitation of this study are the government regulations and industry analysis were based on the condition in Vietnam in the year 2017, cost, price assumptions and standard requirement criteria for capital budgeting model determined by PGN and regulation in Indonesia, and it is only focused on the specific gas pipeline project. The findings of this study will be beneficial for PGN or other investor to explore another revenue stream opportunity to generate higher return. And also the outcome of this study will facilitate the students and academicians adding skills and implementing the theory of Capital Budgeting Method and Sensitivity Analysis for a feasibility study. This study consists of five sections. Section one captures the introduction, section two highlight the theory review of natural gas and transportation of natural gas, capital budgeting model and sensitivity analysis, section three discuss the

methodology used to analyzed the problem, section four presents the result and discussion of capital budgeting calculation and sensitivity analysis, and the final section will define the project conclusion based on former calculation and recommendation to be used by the investor.

2. LITERATURE REVIEW

2.1. NATURAL GAS AND TRANSPORTATION OF NATURAL GAS

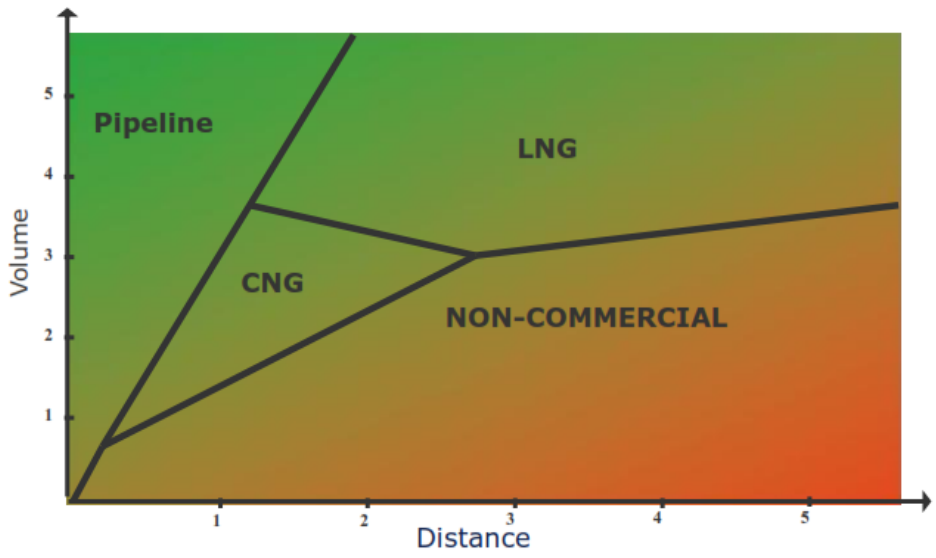
Natural gas is a naturally occurring hydrocarbon gas mixture consisting primarily of methane, but commonly including varying amounts of other higher alkanes, and sometimes a small percentage of carbon dioxide, nitrogen, hydrogen sulfide, or helium. Natural gas is a fossil fuel used as a source of energy for heating, cooking, and electricity generation. It is also used as a fuel for vehicles and as a chemical feedstock in the manufacture of plastics and other commercially important organic chemicals. Fossil fuel-based natural gas is a non-renewable resource (Wikipedia, 2018). Natural gas also occurs in coal deposits, which is called *coalbed methane* (EIA, 2018) and natural gas is considered as one of the cleanest, safest, and most useful forms of energy in our day-to-day lives. (Alberta Energy, 2018).

The location of the natural gas sources and the location of the market or the demand most of has to be transported over a very long distance. And due to the gaseous state that each of volume content lower energy make the cost of transportation are approximately higher than for petroleum and coal. Thus, natural gas has a considerable competitive disadvantage, in particular, deposits located far away from the consumers as far as costs are concerned. The use thus depends on the special requirements of the consumer country, its economic policy, basic requirements and increasingly also on environmental aspects. The most common method of gas delivery to consumers (Hetland, 2004) are:

a. Pipeline Network System
   The transportation method using gas pipe is carried out for transport distance <2,500 km. Pipeline transportation methods only apply to adjacent locations, large limitations, but the supply of resources is more stable.
b. CNG
   The distance traveled by gas for CNG is between 800-3,000 km with the amount of gas transported <300 MMSCF.
c. LNG
   LNG transportation system is carried out if the distance is more than 3,000 km with the amount of gas transported at least 500 MMSCF.

Figure 1 and Table 1 show the matrix on distance and volume for each method and variable of gas transportation.

Figure 1: Pipelines, CNG and LNG; distance and volume matrix



Source: (*Annual Report Natural Gas Forum , 23 Sept 2014 – DNV GL)*

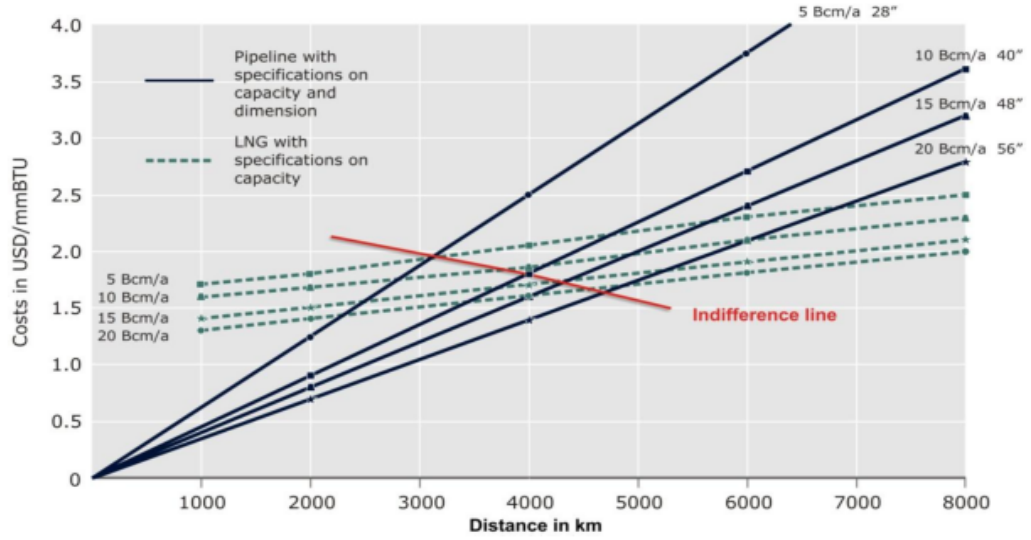
Table 1: Relevant variables of gas transportation option

Variables	Gas Transportation Moda			Comment
	Pipeline	CNG	LNG	
CAPEX (relative)	**HIGH**	**LOW**	**HIGH**	Large volumes and long amortization periods needed for PL & LNG
OPEX (relative)	**LOW**	**MEDIUM**	**MEDIUM**	Contributing: Energy Loss
The increased cost of financing, more risk aversion	+	+	-	Pipelines may more easily secure mutual commitments
Less demand for gas/energy	-	+	+	LNG/CNG-ships can more easily find alternative markets
Well tested technology	++	0	+	(CNG is, however, ready to go)
Scale economies	++	-	+	Pipeline's capacity increase on the margin: cheap to add
Break-even on small volumes, medium distance	-	+	-	CNG best solution for marginal fields, far from existing infrastructure

Source: (*Annual Report Natural Gas Forum, 23 Sept 2014 – DNV GL)*

When transporting natural gas via pipeline, the transportation costs depend to a large degree on the capacity of the pipeline (See Figure 2).

Figure 2: Transportation cost for natural gas via pipeline and as LNG as a function of the capacity (Schwimmbeck, 2008)



For instance, transportation costs decrease by approximately half for an increase of the capacity from 5 to 20 BCM per year. Offshore transport through pipelines is approximately 50 % more expensive than onshore. Leaks in the pipelines, in the distribution networks or at the end consumer decrease the economically usable volume of natural gas. The losses in the industrialized western nations have been estimated to range up to 1 % of the volume of natural gas produced (Jurgen Messner & Georg Babies, 2012)

2.2. CAPITAL BUDGETING

According to Anthony, Hawkins & Merchant (2011), Capital Budgeting Investment Problems also commonly called Capital Budgeting Problems is defined as an alternative decision to those that involve relatively long-term differential investments of capital. These expenditures and investments include projects such as building new infrastructure or investing in long-term businesses. Often, cash inflows and outflows from prospective projects are evaluated to determine whether the potential returns generated to meet the objectives or sufficient company standards, also known as "investment appraisal." Once the opportunity has been identified or chosen, the administration has the task of evaluating whether the project is desired or not.

The international capital budgeting process in multinational enterprises deals with the construction of future scenarios under uncertainty and the assessment of the potential success and failure of future projects. The defined (or any other) recommendations can naturally not guarantee successful investment projects. However, the practical recommendations to implement the policies of reflective prudence, critical communication and independence might diminish the effect of cognitive, emotional and political biases and thus enhance the economic, social and environmental impact of international investment decisions. In any case, it could contribute to a more reflective, if not enlightened, management and government praxis (Schönbohm & Zahn, 2015).

Ideally, companies must look for all projects and opportunities that increase shareholder value. However, because the amount of capital available at certain times for new projects is limited, management needs to use capital budgeting techniques to determine which projects will generate the most profit over the applicable time period. Once the project has been identified, the administration begins the financial process to determine whether or not the project must be implemented. General capital budgeting decision tools are as follows:

a. Payback Period

The payback period is the most basic and simple decision tool. With this method, that is basically determining how long it will take to pay back the initial investment that is required to undergo a project. The PBP method calculates and estimates the period of time required for the profit or benefits to equal the cost or to reach the break-even point (Newnan, Lavelle, & Eschenbach, 2013). Although PBP is the easiest method to perform a cost-benefit analysis, it is often criticized as inferior relative to other methods. This is because it is met with several limitations. PBP ignores the time value of money and does not consider cash flows after the payback period. This can lead to a team making a wrong economical decision. As a result of such limitations, the PBP method can really only be used in relatively small and short-term projects. Furthermore, due to these limitations, PBP is widely used as a "decision aid" rather than a "decision tool" (Avery, Flaherty, & Rhee, 2011). Altough these limitations, it was found that many companies will integrate the PBP method into evaluating economic decisions.

b. Return on Investment

Return on Investment (ROI) is the most common profitability ratio because of its versatility and simplicity. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment. The result is expressed as a percentage or a ratio. If an investment's ROI is not positive, or if other opportunities with higher ROIs are available, these signals can help investors eliminate or select the best options.

Because of the return on investment nature of the proposed metric and because of its augmented inclusion of economic and other sustainability factors, it can be readily incorporated in typical process engineering activities and can be used by decision makers to make informed decisions regarding the viability of the projects and their impact on sustainability. (El-Halwagi, 2017)

c. Net Present Value (NPV)

The net present value decision tool is a more common and more effective process of evaluating a project. Based on Daryanto & Primadona (2018), NPV has calculated by multiply the cash inflow for each year by the present value of $1 for that year at the appropriate rate of return. Perform a net present value calculation essentially requires calculating the difference between the project cost (cash outflows) and cash flows generated by that project (cash inflows). According to Newman et al. (2013), the basic notion of this method is to calculate the present value of the investment by subtracting the present value of cost from the present value of benefits. The NPV tool is effective because it uses discounted cash flow analysis, where future cash flows are discounted at a discount rate to compensate for the uncertainty of those future cash flows. Although NPV solves the limitations of the payback period method by taking time value of money into consideration, the NPV method does experience one relative flaw. NPV is only accurate if the predicted cash flow is accurate. Unfortunately, in real life, cash flow is hard to predict. However, despite this flaw, the net present value is still the most frequently utilized method for economic decision-making (Sun & Queyranne, 2000).

The acceptance of NPV as the best method is supported by more research. Groppelli & Eshan (2006) demonstrate that NPV is a reliable tool because the discount rate is chosen. If the discount rate is not realistic, then the project may not continue and would be unreliable. Projects should only be accepted if the rate of return is high. Arshad (2012) conducted a study that compares different author's view. Arshad found that NPV is superior to the other methods because it is consistent with shareholders' wealth maximization. NPV seems to be a preferable method in the event that projects are mutually exclusive. Sometimes, investors prefer to use this method because it is an easy way to calculate and reinvest cash flows at the cost of the capital. A minor issue regarding NPV that has been addressed is that it accounts for the same discount rate for both the inflow and outflow of money. We know that there exist differences between borrowing and lending rates. Therefore, a modified internal rate of return is suggested as an alternative method that accounts for the existing difference between borrowing and lending rates. It also discounts cash inflows at lending rates and cash outflow at borrowing rates. (Galli, 2018).

d. Net Present Value (NPV) Index

NPV Index or a Profitability Index (PI) attempts to identify the relationship between the costs and benefits of a proposed project. The profitability index is calculated by dividing the present value (NPV) of the project's future cash flows by the initial investment. A PI greater than 1.0 indicates that profitability is positive, while a PI of less than 1.0 indicates that the

project will lose money. As values on the profitability index increase, so does the financial attractiveness of the proposed project.

e. Discounted Payback Period

The discounted payback period is the period of time over which the cash flows from an investment pay back the initial investment, factoring in the time value of money. This approach adds discounting to the basic payback period calculation, thereby greatly increasing the accuracy of its results. The calculation starts with the cash flow of a project must be estimated and broken down into periods. These cash flows are then reduced by their present value factor to reflect the discounting process. With the assumption of a large cash outflow to begin the project, future discounted cash flows are net against the initial outflow. The discounted payback period is calculated when the inflows equal the outflows.

f. Internal Rate of Return (IRR)

The internal rate of return is a discount rate that is commonly used to determine how much of a return an investor can expect to realize from a particular project. IRR is considered one of the easier methods by which to develop an immediate idea of the percentage of return that will be returned in each alternative (Galli, 2017). Strictly defined, the internal rate of return is the discount rate that occurs when a project is break even, or when the NPV equals 0. Here, the decision rule is simple: choose the project where the IRR is higher than the cost of financing or Weighted Average Cost of Capital (WACC). The greater the difference between the financing cost and the IRR, the more attractive the project becomes.

2.3. SENSITIVITY ANALYSIS

According to Harrington (2004), a valuable means of analyzing the assumptions is called sensitivity analysis. This process examines how the change in an assumption will change the forecast. If changing a particular assumption has little impact on the forecast, then the assumption is not considered critical. If changing one assumption causes a major change in the projected statements, then it considered a critical variable that warrants further analysis and careful monitoring. The risk of looking only at the impact of one variable at a time is that simplifying some critical assumptions maybe ignored. To concentrate on the key factors, analyst frequently design different scenarios, different sets of assumptions about the future. A widely used technique of scenario analysis combines three different sets of values for the crucial assumptions into three scenarios: most likely, optimistic, and pessimistic. The original forecast, or scenario, is usually the most likely scenario. The economic performance of a project can be determined once certain factors are identified, such as plant capacity, process technology, raw material cost, and another cost. However, the effects of these factors on the economic viability of the project are also of concern. In this study, the pipeline tariff will be an important factor to measure the sensitivity analysis, since it will depend on supply demand market condition and adjusted to the project offers from Vietnamese Government. The goal was to set up several scenarios that can be identified to make the decision for the project.

3. METHODOLOGY

The quantitative approach was used to analyze the investment opportunity in Vietnam. Capital budgeting model and sensitivity analysis was used in order to calculate the time frame and profitability of the project to compare with the expected result with several scenarios. The steps used are: (1) Study the project opportunity; (2) Set the research objectives; (3) Calculate the capital budgeting of the project; the result are: Payback Period, Dicounted Payback Period, NPV, NPV Index, IRR, ROI; (4) Make decision wheater the project is feasible or not; (4) If the project is feasible, the sensitivity analysis is used to analyze how sensitive the transportation tariff towards the capital budgeting criteria. Based on the result of quantitative method then it is decided whether this project is feasible or not fulfilling the requirement of company or investors project standard.

4. RESULT AND DISCUSSION

4.1 PROJECT NAM CON SON 2 PHASE 2 PIPELINE

Nam Con Son Pipeline 2 transporting gas from gas fields in the Nam Con Son and Cuu Long Basins and imported gas from neighboring to Ho Chi Minh City to meet market demand and potential:

1. New gas discoveries: The project will provide infrastructure to support for new gas discoveries in Nam Con Son Basin and for gas imported from TAGP or from Natuna D-Alpha in the South-East Asia region;
2. Market demand/growth: The demand for gas is expected to continue to rise by 12.1% per year during the period 2011 – 2020, reaching 24.8 bcm in 2020. Southern provinces are expected to show above-average growth due to new gas power plants, fertilizer factories as well as industrial and commercial households;
3. Supply deficits: Southern Vietnam currently is facing a gas supply deficit. The launch of the Nam Con Son 2 Pipeline is forecast to address this deficit.

Petrovietnam Gas Corporation (PVGAS) is undertaking the construction of Nam Con Son II Gas Pipeline project in Ba Ria-Vung Tau, Vietnam. The pipeline system will be capable of carrying up to six billion m3 of gas a year from gas fields in the Nam Con Son basin. The project involves the construction of a 355km gas pipeline is being executed in two packages. The first phase of the first package involves the construction of a 151km pipeline, has been completed in December 2015. The second phase involves the construction of 174km, includes the construction of a 30 km onshore pipeline. A final investment decision for Nam Con Son 2 Pipeline phase 2 project will be made in 2018. PVGAS is expected to invite tender for the FEED contractor in March 2018. Subject to the appointment; FEED works are expected to take six months to complete.

PVGAS is expected to invited tenders for Engineering, Procurement, Construction and Installation (EPCI) contractor at the end of fourth quarter of 2018. Subject to the appointment of the contractor in the first quarter of 2019; construction works will commence and scheduled for completion in October 2020 (JSB Market Research, 2018)

4.2 CAPITAL BUDGETING ANALYSIS

Capital budgeting analysis is used to calculate investment feasibility of the Nam Con Son II Gas Pipeline Project in Ba Ria–Vung Tau, Vietnam, for the second project with length 174 km offshore amount to USD 620 million with total capacity ± 700 MMSCFD. For this project, the Vietnam government offer equity ownership 49% of the total investment and gives competitive advantages for the investor through:

1. Permit, tax incentives and land cost reduction
   The government state Corporate Income Tax (CIT) 10% for first 15 years from the commencement of operation, exemption for 4 years from the first year of making profits and 50% reduction for the following 9 years. And also the tax incentives for import, duty exemption for construction materials, machinery, equipment, tools and spare parts which cannot be produced locally to form fixed assets
2. Stable gas supply and located in the highest demand region in Vietnam
3. Economic Performance
   For the investment capital approximately US$1,300 million, the government guarantees the NPV US$ 733 million, IRR 18% and Payback Period 6.7 years.
4. Investment method by creating JV with Petro Vietnam Gas to have transmission and/or distribution pipeline.

4.3 FINANCIAL ASSUMPTION

For the depreciation expense, this study is using straight-line depreciation method for 16 years, based on *The Guiding Regulation on Management, Use and Depreciation of Fixed Assets, Socialist Republic of Vietnam, No: 45/2013/TT-BTC*. The straight line depreciation method is the method of depreciation by the rate of stability calculation of each year into the enterprises' cost of business and production of the fixed assets involved in the business operation. For the tax rate, based on *PwC – Vietnam Pocket Tax Book 2017*; Enterprises (generally companies) are subject to the tax rates imposed under the CIT law. The standard CIT rate from 2016 is 20% (it was 22% from 2014 to 2015, and 25% prior to 2014). Companies operating in the oil and gas industry are subject to CIT rates ranging from 32% to 50% depending on the location and specific project conditions. The tax incentives are granted to new investment projects based on regulated encouraged sectors, encouraged locations and the size of the project.

Based on the SSI research (Institutional Research and Investment Advisory) on PetroVietnam Gas in the 3rd quarter of 2016, the transportation tariff of the Phu My-Ho Ci Minh pipeline increased from USD 0.15/MMBTU to USD 0.52/MMBTU. Meanwhile, the Nam Con Son 2 phase 1 pipeline tariff is very high, which is estimated at USD 5-6/mmbtu due to high investment cost and small volumes. The trend of rising transportation segment's contribution to total gross profit aligns with the company's long-term strategy to become a pure gas transmitter. Amongst big oil and gas companies, PetroVietnam Gas is the only one that is likely to attain positive profit growth in 2017 because of the floor pricing policy and increased tariffs (revised-up distribution tariff to Nhon Trach 1, 2 power plants from USD 0.15/MMBTU to USD 0.52/MMBTU plus inflation of 2% annually and 2% annual inflation for other offshore pipelines) (SSI Research, 2016).

Analysis from Viet Capital Securities on the second half of 2016 said that higher expected input gas prices going forward lead the company to trim recurring earnings by~6% across the forecast period. With the specific gas input price for Hai Thach – Moc Tinh being higher than expected, average gas input prices are likely to stay elevated. However, the company also raise the average transportation tariff forecast by 2% given the new Thien Ung – Dai Hung pipeline's tariff was fixed at USD 5/MMBTU vs the previous estimate of USD 1/MMBTU. (Viet Capital Securities, 2016)

4.4 CAPITAL BUDGETING CALCULATION

Capital Budgeting calculation based on criteria for the aspect of Payback Period, Return On Investment, Net Present Value, Profitability Index, Discounted Payback Period and Internal Rate of Return. Accepted criteria for PGN Project Feasibility are based on estimated returns (IRR) and present value (NPV) of the cash flow that will be issued and received. The discount rate used to calculate the present value of the customer's cash flow is based on the company's capital cost (WACC) obtained based on assumptions from Bloomberg at the time of the evaluation. The expected IRR is 12 % based on PGN Budgeting Guideline Year 2018 and the discount rate used is 9.70% (Bloomberg, 2018). The volume of gas calculated by ramp-up pipe utilization scenario from 100 - 500 MMSCFD with transportation tariff is 5 USD /MMBTU as the low range of tariff based on SSI research (Institutional Research and Investment Advisory) on PetroVietnam Gas in the 3rd quarter of 2016.

Table 2: Capital Budgeting Model Calculation Result

Capital Budgeting Criteria	Requirement	Result	Remark
NPV (USD)	> 0	896,459,073	Acceptable
NPV Index/Profitability Index	> 0	144.59%	Acceptable
Internal Rate of Return -IRR (%)	> 12	22.10%	Acceptable
Return On Investment -ROI (%)	> 10	22.90%	Acceptable
Pacback Period (years)	< 6.7	5.63	Acceptable
Discounted Pacback Period (years)	< 8.0	6.84	Acceptable

Table 2 shows that the payback period and discounted payback period are 5.63 years and 6.84 years which are a shorter period than the expected 6.7 years and 8 years. ROI of the project is 22.90%, which is higher than PGN's expected ROI. The NPV is positive with NPV Index resulted to 144.59 %. IRR calculation result is 22.10%, higher than discount rate and IRR PGN standard of 12%. Based on all capital budgeting criteria of Payback Period, Discounted Payback Period, Return on Investment, NPV, NPV Index and IRR, the Project Nam Con Son 2 Phase 2 Pipeline can be concluded feasibly.

4.5 Sensitivity Analysis

The pipeline tariff will be an important factor to measure the sensitivity analysis, since it will depend on the operating conditions and adjusted to the project offers from Vietnamese Government. The scenario of the tariff are;

Optimistic : USD 6/MMBtu are high range of tariff based on SSI research (Institutional Research and Investment Advisory) on PetroVietnam Gas in 3rd quarter of 2016

Most Likely: USD 5/MMBtu are low range of tariff based on SSI research (Institutional Research and Investment Advisory) on PetroVietnam Gas in 3rd quarter of 2016

Pesimistic : USD 4/MMBtu, this number based on the lowest tariff assumption 10% below the most likely tariff scenario

Table 3: Tariff Sensitivity Analysis Result

Capital Budgeting Criteria	Requirement	Pipeline Tariff		
		4 USD/MMBTU	5 USD/MMBTU	6 USD/MMBTU
NPV (USD)	> 0	490,129,706	896,459,073	1,302,788,441
NPV Index/Profitability Index	> 0	79.05%	144.59%	210.13%
Internal Rate of Return -IRR (%)	> 12	17.44%	22.10%	25.96%
Return On Investment -ROI (%)	> 10	13.31%	22.90%	32.48%
Pacback Period (years)	< 6.7	6.24	5.63	5.22
Discounted Pacback Period (years)	< 8.0	8.00	6.84	6.21
Result		Acceptable	Acceptable	Acceptable

From the sensitivity analysis, it shows that in the range of +/- 10% of the pipeline tariff in most likely scenario, the result for all the requirement Capital Budgeting criteria are still acceptable. So the project is still feasible even in the pessimistic scenario.

5. CONCLUSION AND RECOMMENDATION

The Study shows the feasibility result of PGN Project Diversification of Project Nam Con Son 2 Phase 2 Pipeline in Vietnam. The study concern of the measurement analysis includes capital budgeting model and sensitivity analysis. The outcome shows that the project in Vietnam is feasible to be implemented for the investor.

In term of capital budgeting, the study found that the project will give good return exceeding the requirement from PGN. With normal price of tariff USD 5/MMBTU, capital budgeting criteria of the project feasibility are shown by the Payback Period and Discounted Payback Period calculation result which is 5.63 years and 6.84 years, a shorter period compared to 6.7 years and 8 years standard; ROI 23%, higher than expected ROI; positive NPV with NPV Index resulted to 144.59%; IRR rate is 22.10%, which is higher than 9.7% discount rate. With the tariff USD 4/MMBtu for pessimistic scenario, the result show that the Capital Budgeting criteria still acceptable fulfilled the requirement.

This study can give insight for investors company in the oil and gas industry especially about the project feasibility in Vietnam. Therefore, the company can make a better decision with the purpose to increase the market share and the profitability.

It is recommended to use the qualitative method and explore another country or industry in the future research, therefore, the data can be more solid in term of getting a broader picture about the benefit using Capital Budgeting Model with Sensitivity Analysis for the feasibility study.

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Dini Mentari
Sekolah Tinggi Manajemen IPMI, Jakarta 12750, Indonesia
Email: dini.mentari@ipmi.ac.id,

Wiwiek Mardawiyah Daryanto
Sekolah Tinggi Manajemen IPMI, Jakarta 12750, Indonesia
Email: wiwiek.daryanto@ipmi.ac.id