THE EFFECT OF DEPRECIATION METHODS ON THE PROFITABILITY AND NET PRESENT VALUE (NPV): A CASE STUDY OF NAM CON SON 2 PHASE 2 PIPELINE PROJECT, VIETNAM FOR THE PERIOD OF 2019-2037

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ABSTRACT

Different depreciation methods produce different profitability calculations of a project. The Return on Investment (ROI) and the Net Present Value (NPV) are some of the capital budgeting criterias used to evaluate the feasibility of a project investment. The purpose of the study is to measure the effect of the implementation of two depreciation methods, which are straight-line and double declining depreciation methods to the Return on Investment and the Net Present Value. The data were collected from the Vietnam investment opportunity published by Vietnam Oil and Gas Group (Petrovietnam) in 2012 for the investment period of 2019-2037. Straight-line and double declining depreciation methods, time value of money, Net Present Value and Return on Investment were used to analyse the data. The finding shows that the double declining depreciation method improves the Return on Investment and the Net Present Value of the project compared to straight-line depreciation.

Keywords: Depreciation, NPV, pipeline project, Vietnam, ROI

1. INTRODUCTION

The oil and gas industry has experienced dramatic volatility, and in order to maintain its growth, PT Perusahaan Gas Negara Tbk. (PGN), a well known Indonesia state-owned company that specializes in gas distribution industries and natural gas, need to look for investments opportunities, not limited in Indonesia but also abroad. Many opportunities come from foreign investment in gas pipeline projects abroad, which one of them is Nam Con Son 2 phase 2 pipeline project, Vietnam. Investment invitation, announcement from Vietnam to invest in gas pipelines is based on publication in 2012 by Petrovietnam, the Vietnam Oil and Gas Group. The invitation offered for investment opportunities in 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 of 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) (Partnership with Petrovietnam 2012. Overview of PVN's Investment Project., 2012).

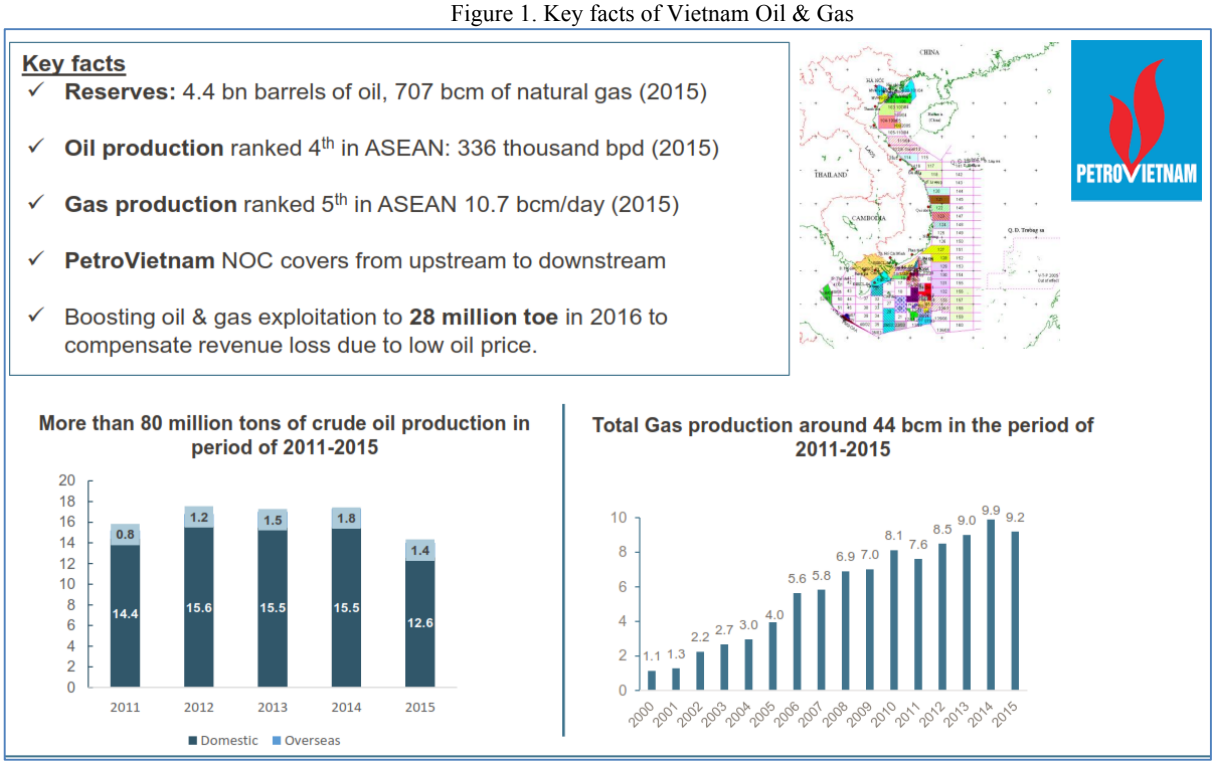
It is important to study the feasibility of this project before deciding to invest. According to Glinz & Flores (Glinz & Flores, 2006), the capital budgeting model is a tool to analyze the behavior of the investment and its potential. Based on the previous study by Daryanto & Primadona (Daryanto & Primadona, 2018) there are five elements involved in capital investment calculations:1) Required rate of return; 2) Economic life (number of years for which cash inflows are anticipated); 3) Amount of cash inflow in each year; 4) Amount of investment, and 5) Terminal value. Additionally, accounting principles used, such as depreciation methods, also become an important aspect that influenced the result of the calculation.
The aim of the study is to calculate how the depreciation method—straight-line and double declining depreciation—influence the NPV calculation which probably implicates to the investment decision.

2. LITERATURE REVIEW

2.1 VIETNAM OIL & GAS

Located in the center of South East Asia and is bordered by China to the north, Laos, and Cambodia to the west, Vietnam ranked as the 13th most populous country in the world with the population of 90 million, 60% of whom are under 35; it has a working age population of 56 million (Energy Key Facts, 2015).The total area of Vietnam is over 331,600 square kilometers and consists of mountains and tropical forests as well as more densely populated plains in both the north and south of the country. Hanoi in the north is the capital of the country and Ho Chi Minh City in the south is the largest commercial city. Da Nang, in central Vietnam, is the third largest city and an important seaport. (PWC, 2016).
Vietnam's GDP growth was 6.7% in 2015 up from 6% in 2014 and 5.4% in 2016. Over the last 20 years, GDP growth has averaged over 7%. (PWC, 2016). Vietnam's import demand is expected to grow by around 250% between 2010 and 2020 – faster than any other emerging powers, including China (Energy Key Facts, 2015). And this economic growth, industrialization and export market expansion are driving domestic energy use and make Vietnam a huge pool of both potential customers and employees for many investors as seen in Figure 1.

Figure 1. Key facts of Vietnam Oil & Gas



Source: (Australian Trade and Investment Commission, 2015)

2.2 DEPRECIATION

To accountant depreciation is not a matter of valuation, but rather a method of reallocating the cost of tangible assets as long as the useful life of the asset. Depreciation is the accounting process of allocating the cost of tangible asset to expense in a systematic and rational manner to those periods expected to benefit from the use of the asset (Kieso, Weygandt, & Warfield, 2013). The depreciation method laid relationship with asset and liability balance sheet and effecting on aspects such as formation costs, taxation issues, and reproductive process which finally gives impact to the evaluation of a project. The total amount to be depreciated over the accounting life of the asset is known as depreciation basis. It's equal to the coast of the asset plus any setup or delivery cost that may incur. Company depreciates its' long-term assets for tax and purposes . Generally, costs are allocated, as depreciation costs or expense, between the periods in which the assets are expected to be used. The method of computing depreciation and the period in which assets are depreciated can vary between types of assets in the same business. And depreciation method also can be determined by law or accounting standards, which may vary by country. There are several standards of computing depreciation expense such as straight-line method, double declining balance methods, Sum-of-years-digits method; and Units-of-production depreciation method (Gallagher & Andrew, 2003).

Managers change depreciation policies in response to tax law changes, poor performance and changes in investment opportunities. Managers adopt changes in methods to increase income for both new and existing assets experiencing decrease performance than those who adopt income-increasing method changes only for new assets. And also non-income-increasing policy changes appear to be in response to changes in firms' investment opportunities (Keating, Zimmerman, & Simon, 1999).

2.3 NET PRESENT VALUE (NPV)

Net present value (NPV) is one of the capital budgeting techniques used to evaluate the projects or investments. The NPV analysis takes into consideration both before & after cash flow over the lifespan of a project, including the depreciation method used on the project. NPV and Internal Rate of Return (IRR) parameters are effective and widely used of an investment analysis (Daryanto & Primadona, 2018). NPV is calculated by multiplying the cash inflow for each year by the present value of $1 for that year at the appropriate rate of return. This process is called discounting the cash inflows. The rate at which the inflows are discounted is called the required rate of return, or the discount rate, or the hurdle rate. The difference between the present value of the cash inflows and the amount of investment is called the NPV. If the NPV is a non-negative amount, the proposal is accepted . The formula of NPV is as follows:

$$NPV = \sum_{t=1} Discount\ Factor * Net\ Cash\ Flow$$

Where: t = time when cash inflow or cash outflow is disbursed. It is assumed that all cash is disbursed at the end of the year.

2.4 RETURN ON INVESTMENT (ROI)

The profitability is the most common measure for projects' financial performance and can be measured using the capital budgeting criteria, ROI. ROI is a profitability ratio that calculates the profits of an investment as a percentage of the original cost (Daryanto & Primadona, 2018). According to Investopedia (Return on investment – ROI , 2018) Return on Investment (ROI) is a performance measure, used to evaluate the efficiency of an investment or compare the efficiency of a number of different investments. ROI measures the amount of return on an investment, relative to the investment's cost. 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.
The return on investment formula:

ROI = (Gain from Investment - Cost of Investment) / Cost of Investment

2.5 PREVIOUS RESEARCH ON EFFECT OF DEPRECIATION METHOD

According to Keating, Zimmerman & Simon accounting depreciation affects company's financial report which is frequently used in contracts and disclosures to capital markets, internal decision making and control, and tax computations. Depreciation has also become important aspects that influence the advantageousness of investment alternatives as they alter the NPV of investment opportunities (Ackermann, Fochmann, & Wolf, 2016). The previous studies find that depreciation policy affecting the tax base and, therefore, the tax amount in each period over the time horizon, and the changes are associated with changes in the tax treatment of depreciable assets, the firm's financial performance, and the firm's investment opportunities.

3. METHODOLOGY

To accomplish this study, the steps are: (1) Study the terms and conditions from Nam Con Son 2 phase 2 investment invitation; (2) Calculate the ROI and NPV for the project using different method of depreciation (3) Make a comparison of both result (4) In this study data were collected from the Vietnam investment opportunity published by Vietnam Oil and Gas Group (Petrovietnam) in 2012 for an investment period of 2019-2037.

4. RESULT AND DISCUSSION

The assumptions used for terms and condition of NPV and ROI calculation are: 1) Depreciation Period = 16 years 2) Terminal value = $ 0; 3) The estimated transportation tariff : USD 5/MMBTU; 4) The volume of gas calculated by ramp-up pipe utilization scenario from 100 - 500 MMSCFD; 5) The discount rate is based on the PGN's capital cost (WACC) obtained based on assumptions from Bloomberg at the time of the evaluation: 9.70% ; 6) Tax Rate = 32 %;

Table 1 shows NPV and ROI calculation based on straight-line depreciation resulting in NPV = 896,459,073.16, NPV Index 144.59%, and ROI 22.90%.

Table 1. NPV and ROI based on straight-line depreciation

In thousand USD

Years	Revenue (USD)	Depreciaton 16 years, SL	Opex	NET INCOME	DIFF TAX	TAX	EAT	EAT PV	EBITDA	FCF	PV FCF
1	0	38,750	60,479	(99,229)	31,753	0	(99,229)	(90,455)	(60,479)	(60,479)	(55,131)
2	0	38,750	66,345	(105,095)	33,630	0	(105,095)	(87,331)	(66,345)	(66,345)	(55,131)
3	182,500	38,750	104,243	39,507	(12,642)	0	39,507	29,926	78,257	78,257	59,279
4	365,000	38,750	148,869	177,381	(52,741)	(4,020)	173,361	119,708	216,131	212,111	146,466
5	547,500	38,750	201,171	307,579	0	(98,425)	209,153	131,653	346,329	247,903	156,045
6	730,000	38,750	262,220	429,030	0	(137,290)	291,740	167,401	467,780	330,490	189,635
7	912,500	38,750	333,219	540,531	0	(172,970)	367,561	192,257	579,281	406,311	212,526
8	912,500	38,750	365,541	508,209	0	(162,627)	345,582	164,778	546,959	384,332	183,254
9	912,500	38,750	400,999	472,751	0	(151,280)	321,471	139,728	511,501	360,221	156,570
10	912,500	38,750	439,896	433,854	0	(138,833)	295,021	116,893	472,604	333,771	132,246
11	912,500	38,750	482,565	391,185	0	(125,179)	266,006	96,077	429,935	304,756	110,072
12	912,500	38,750	529,374	344,376	0	(110,200)	234,176	77,101	383,126	272,926	89,860
13	912,500	38,750	580,724	293,026	0	(93,768)	199,258	59,804	331,776	238,008	71,434
14	912,500	38,750	637,054	236,696	0	(75,743)	160,953	44,036	275,446	199,703	54,638
15	912,500	38,750	698,848	174,902	0	(55,969)	118,933	29,662	213,652	157,683	39,327
16	912,500	38,750	766,636	107,114	0	(34,276)	72,837	16,560	145,864	111,587	25,369
	NPV	896,459,073									
	NPV Index	144.59%									
	ROI =	22.90%									

Table 2. Shows calculation of NPV and ROI based on the double declining method of depreciation with the result of NPV = 910,708,150.58, NPV index 146.89% and ROI 23.00%. The net income calculation of project takes into account income/expenses from the tax payment differences compare to straight-line depreciation. This is important considering the cash flow on the difference in tax payments can be invested for additional income. All of the project's book values / assets are charged at the end of the depreciation period (year 16th).

Table 2. NPV and ROI based on double declining depreciation

In thousand US

Years	Revenue USD	Depreciaton 16 years, DD	Opex	Interest Inc/Exp on tax differences	NET INCOME	DEFF TAX	TAX	EAT	EAT PV	EBITDA	Cash Flow	PV CF
1	-	77,500	60,479	-	(137,979)	44,153	-	(137,979)	(125,778)	(60,479)	(60,479)	(55,131)
2	-	67,813	66,345	-	(134,158)	42,930	-	(134,158)	(111,481)	(66,345)	(66,345)	(55,131)
3	182,500	59,336	104,243	-	18,921	(6,055)	-	18,921	14,333	78,257	78,257	59,279
4	365,000	51,919	148,869	-	164,212	(52,548)	-	164,212	113,391	216,131	216,131	149,242
5	547,500	45,429	201,171	390	301,289	(28,481)	(67,931)	233,358	146,889	346,719	278,787	175,485
6	730,000	39,750	262,220	3,348	431,378	-	(138,041)	293,337	168,316	471,128	333,087	191,125
7	912,500	34,782	333,219	3,275	547,774	-	(175,288)	372,487	194,834	582,556	407,268	213,027
8	912,500	30,434	365,541	3,050	519,575	-	(166,264)	353,311	168,463	550,009	383,745	182,974
9	912,500	26,630	400,999	2,697	487,569	-	(156,022)	331,547	144,107	514,199	358,177	155,682
10	912,500	23,301	439,896	2,237	451,541	-	(144,493)	307,048	121,658	474,842	330,349	130,890
11	912,500	20,388	482,565	1,688	411,235	-	(131,595)	279,640	101,001	431,623	300,028	108,365
12	912,500	17,840	529,374	1,066	366,352	-	(117,233)	249,119	82,022	384,192	266,959	87,895
13	912,500	15,610	580,724	384	316,551	-	(101,296)	215,254	64,605	332,160	230,864	69,290
14	912,500	13,659	637,054	(346)	261,441	-	(83,661)	177,780	48,640	275,100	191,439	52,377
15	912,500	11,951	698,848	(1,114)	200,586	-	(64,188)	136,399	34,018	212,538	148,350	36,999
16	912,500	83,659	766,636	(1,912)	60,293	-	(19,294)	40,999	9,321	143,952	124,658	28,341
	NPV	910,708,150.58										
	NPV Index	147%										
	ROI =	23%										

NPV, NPV index and ROI calculation result in table 1 and table 2 show that using double declining a depreciation method to improve ROI and NPV of the project.

A double declining method considered as accelerated methods of depreciation. With this method there is greater depreciation in the earlier years, as compared to the straight-line depreciation method. The amount of depreciation of an asset affects the reported profits of the project. Therefore, the accelerated methods of depreciation skew the profits and reveal lower profit in the early years. As the asset comes closer to the end of its useful life, it faces less annual depreciation, with the net effect of the project realizing a higher reported profit in later years. This method helps to reduce taxes in the early years of an asset's life. If the decision making take the Time Value of Money into consideration, as in the NPV's project calculation then this will improve the result. Another reason for using the double declining method is because fixed assets are considered to be the biggest contribution to at the beginning of the period of their useful life, and will experience a greater level of decline in function in the coming period along with the reduced economic life of these assets.

5. LIMITATION

This study expands the literature about depreciation method and capital budgeting model in the real project. In the near future, it is suggested to carry out research with many projects in the gas pipeline industry to get a more comprehensive result. Since the focus is about one project, it is worth to explore it on a wider scale and find out if different project yields the same result. In addition, the study only focuses on financial aspects. Therefore, the research would be better if also includes the non-monetary considerations, such as political, economic, social, and technological and environmental. It is also suggested to carry out a similar research for other projects in the different industries, such as oil, mining, construction, or estate industry.

6. CONCLUSION AND RECOMMENDATION

The purpose of the study is to measure the impact of implementation of two depreciation methods, which are straight-line and double declining depreciation methods to the Return on Investment and Net Present Value. The data were collected from the Vietnam investment opportunity published by Vietnam Oil and Gas Group (Petrovietnam) in 2012 for the investment period of 2019-2037. The research found that the double declining depreciation method improves ROI and NPV of the project compare to straight-line depreciation. The study found that both of method resulted in positive NPV and accepted ROI which means that the projects are feasible. The benefit of an accelerated method is the timing of the deductions. Rapid methods have more tax savings in the early years and fewer savings in later years, and since NPV takes Time Value of Money into consideration, this will improve the NPV of the project. However, the project has zero terminal value, and by the end of the period, the investor should recognize all the book value of the asset as depreciation expense. It's also important to note that total tax deductions over the life of an asset will be the same regardless of what depreciation method is used. The study is also beneficial for the academicians and students understand depreciation methods and capital budgeting model.

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