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Comparison of Cost of Purchase and Lease of Mine Equipment as a Strategy for Production of Run-Off Mine – a case study of Zibo Fm Quarry and Roadstone Quarry, Ondo state, Nigeria.

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Abstract
This research compares the cost of purchasing mining equipment with the cost of leasing mining equipment for the production of run-off mines. To achieve this objective, questionnaires were given to the quarry managers and also personal visitations were made. The data/information acquired from the questionnaires and personal visitations were subjected to statistical analysis. The results show that the total revenue for lease and purchase of mine equipment in Zibo FM for ten years are ₦ 11,263,200,000 and ₦11,289,142,610, the total investment for lease and purchase are ₦ 2,280,031,600 and ₦ 1,149,871,600, while the payback periods for lease and purchase option is 3 months 2 days and 2 months 28 days. The net present value for lease and purchase are ₦4.493×10^9 and ₦ 4.478×10^9. The total revenue for lease and purchase of mine equipment in Roadstone Quarry for ten years are ₦ 2,026,200,000 and ₦ 2,042,917,220, the total investment for lease and purchase are ₦ 1,943,499,520 and ₦ 707,619,520, while the payback period considering lease and purchase option is 17 months 10 days and 14 months 22 days. The net present value for lease and purchase are ₦ 7.292×10^8 and ₦ 6.882×10^8.

Keywords: Lease, Net Present Value (NPV), Payback Period, Total Revenue, Total Investment, Salvage Value and Depreciation

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1. Introduction

According to Gregory, senior vice president of the construction group of wells Fargo equipment finance in Atlanta, there is no right or wrong mode of acquiring mine equipment, just different situation for different companies and determining what is best requires some foresight and predictions about what the future will bring, which remains a challenge. There are three main ways of acquiring equipment; they are buying or purchasing the equipment, renting the equipment and equipment lease.

Contractors will often rent when they need specific equipment for a particular job, especially in times of uncertainty to avoid taking on more expense and in this mode of acquiring equipment, the dealer maintains the unit (Gregory, 2013). However, leasing offers a usage arrangement rather than ownership which puts the risk of obsolescence onto the lessor and requires no cash upfront. Buying of equipment offers immediate ownership and deductions for depreciation and interest can bring down a firm's taxable income and save the company on its taxes (Gregory, 2013).

This study compares the cost of purchasing mining equipment with the cost of leasing mining equipment for the production of run-off mines. To achieve this objective, questionnaires were given to the quarry managers and also personal visitations were made. The data/information acquired from the questionnaires and personal visitations were subjected to statistical analysis. The remainder of this study is organized as follows. Section two sketches out the methodology and then describes the study area. Section three presents and discusses the results. Section four concludes.

2 Methodology

2.1 Depreciation methods

The estimated value recovered at the end of the asset's serviceable life is the residual or salvage value (Nabeela, 2013). The different depreciation methods aim to allocate the cost of an asset to different accounting periods in a systematic and rational manner. Each method produces a different pattern of expenses over time (Shankaranarayana and Ramanath, 2011). All of the depreciation methods end up recognizing an amount of depreciation which is the cost of the fixed asset, less any expected residual value. The depreciation method used in this research is:

2.2 Double Declining method

This method charges larger amounts of depreciation to the early years of an asset's life. Under this method, a constant rate is applied to the asset balance, that is, acquisition cost less accumulated depreciation. Thus, the depreciation in the final year should be calculated as the difference between the book value at the beginning of the year and the residual value. (Shankaranarayana and Ramanath, 2011). Double declining balance percentage is given as: DDB% = (100%/ Lifetime of asset) $\times$ 2 and the depreciation expense is given as: DDB% $\times$ Book value (Nabeela, 2013). For instance, considering a four-year double declining balance depreciation schedule for a truck that was purchased for $30,000 with a lifetime of four years.

$$DDB\% = 100/4 \times 2 = 50\%$$

Table 1: Depreciation charged over years using double declining method

Year	DDB%*Book Value	Depreciation Expenses($)	Net Book Value($)
0			30,000
1	0.5 * 30,000	15,000	15,000
2	0.5 * 15,000	7,500	7,500
3	0.5 * 7,5000	3,750	3,750
4	0.5* 3750	1,875	1,875

The residual value of the truck after four years is $1,875 and the accumulated depreciation expense is $28,125.

2.2 Description of the Study Area

Ondo state is located in the south western part of the Nigeria between latitudes 5^0 $45^{'}$ and 8^0 $15^{'}$ North of the Equator and longitudes 4^0 $3^{'}$ and 6^0 East of the Greenwich. The state is a member of the region called Niger Delta where Nigeria oil wells can be found. There are two distinct geological regions in Ondo state, first is the region of sedimentary rocks in the south and Okitipupa and secondly, the region of Precambrian basement complex rocks in the north. The major rocks in Ondo state are granite and charnockite (Onifade, 2008)

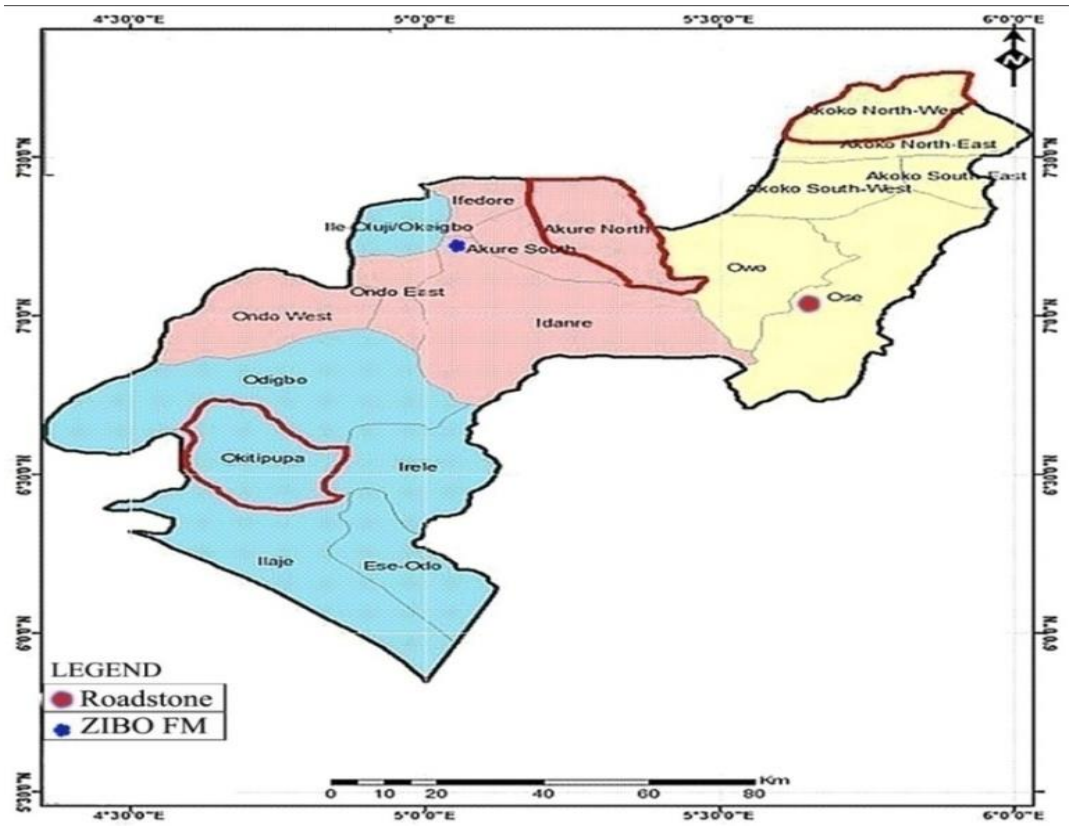

Fig.1: Map showing location of the study areas (Source: www.google.com, 2013)

3.0 Data Analysis

Data collected at Zibo FM Quarry and Roadstone Quarry via questionnaires is analysed to compute variables needed in comparing the cost of purchase of mine equipment and cost of lease of mine equipment; capital budgeting tools such as net present value method and payback period method were used to assess the profitability of either purchase or lease option in both quarries. The following variables are computed:

Total estimated reserve of the deposit

Total estimated reserve of the deposit

$$= \text{production rate per day} \times \text{number of working days per week} \times \text{number of weeks in a year} \times \text{life span of quarry} \quad (1)$$

Cost of lease of mine equipment

Cost of lease of mine equipment over a period of ten years =

$$\text{Cost of lease of mine equipment in a year} \times 10 \quad (2a)$$

Cost of lease of mine equipment in a year

$$= \text{cost of lease of mine equipment per month} \times 12 \times n \quad (2b)$$

where n = number of an equipment available in the quarry

Cost of purchase of mine equipment

Cost of purchase of mine equipment

$$= \text{unit cost of purchase of a mine equipment} \times \text{quantity} \quad (3)$$

Total accumulated depreciation expense of a mine equipment over a period of ten years

Total accumulated depreciation expense = accumulated depreciation expense over a period of ten years × quantity (4)

Salvage value of a mine equipment over a period of ten years

Salvage value = cost of purchase of mine equipment − total accumulated depreciation expense of a mine equipment for ten years (5)

Cost of consumables

Cost of consumables for a year

$$= \text{cost of setting up administrative offices} + 12(\text{cost of fuel used per month} + \text{cost of explosives used per month} + \text{cost of detonating cord used per month} + \text{cost of delay cap used per month} + \text{cost of water and lubricant used up}$$

per month + salary of workers per month) (6a)

Cost of consumables for ten years

$$= \text{cost of setting up administrative offices} + (10 \times 12)\ (\text{cost of consumables for a year} - \text{cost of setting up administrative offices}) \quad (6b)$$

Total investment

Total investment for ten years (purchase)

$$= \text{total cost of purchase of mine equipment} + \text{total cost of maintenance for ten years} + \text{total cost of consumables for ten years} \quad (7a)$$

Total investment for ten years (lease)

$$= \text{total cost of lease of mine equipment} + \text{total cost of maintenance for ten years} + \text{total cost of consumables for ten years} \quad (7b)$$

Total Revenue

Total revenue for ten years

$$= \text{revenue from sale of products in ten years} + \text{total salvage value of mine equipment} \quad (8)$$

In the case of lease, total salvage value from sale of mine equipment is zero since the lessor owns the equipment.

Total Profit

$$\text{Total profit} = \text{total revenue} - \text{total investment} \quad (9)$$

Payback period

The payback period for any project is obtained using the following formula:

$$\text{Payback period} = \frac{\text{initial capital outlay}}{\text{annual cash inflow}} \quad (10a)$$

$$\text{Initial capital outlay} = \text{cost of acquiring equipment} + (\text{cost of maintenance} + \text{cost of consumables}) \text{in a year} \quad (10b)$$

$$\text{Annual cash flow} = \frac{\text{total profit}}{10 \text{ years}} \quad (10c)$$

Net present value

$$NPV = \sum_{t=1}^{n} \frac{A_t}{(1+k)^t} + \frac{S}{(1+k)^n} - c_0$$

Where: A_t is cash flow at time t, and t = 1, … … …. , n

k is interest rate or discount rate = 20%

c_0 is initial capital outlay.

S is Salvage value realized after ten years

Table 2: Purchase and lease of basic mine equipment in Zibo Fm quarry for ten years

S/N	Results	Lease (₦)	Purchase(₦)
1	Total Revenue	11,263,200,000	11,289,142,610
2	Total Investment	2,280,031,600	1,149,871,600
3	Total Profit	8,983,168,400	10,139,271,010
4	Initial Investment	228,903,160	248,727,160
5	Annual Cashflow	898,316,840	1,013,297,101
6	Salvage Value	-	25,942,610
7	Payback Period	3 months 2days	2 months 28days
8	NPV	4.493×10^9	4.478×10^9

Table 3: Purchase and lease of basic mine equipment in Roadstone quarry for ten years

S/N	Result	Lease (₦)	Purchase (₦)
1	Total Revenue	2,026,200,000	2,042,917,220
2	Total Investment	1,193,499,520	707,619,520
3	Total Profit	832,700,480	1,335,297,700
4	Initial Investment	120,249,952	164,001,952
5	Annual Cashflow	83,270,048	133,529,770
6	Salvage Value	-	16,717,220
7	Payback Period	17 months 10 days	14 months 22 days
8	NPV	7.292×10^8	6.882×10^8

3.1 Discussion

From Table 2, considering the option of equipment lease for 10 years, the initial investment needed to commence operation in Zibo FM Quarry is 10.04% of total investment needed, total profit is 79.76% of the total revenue, the payback period is 3 months 2days and the net present value at a discount rate of 20% is $₦4.493 \times 10^9$. However, considering the option of equipment purchase, the initial investment needed to commence operation in Zibo FM Quarry is 21.63% of total investment, total profit is 89.81% of the total revenue, salvage value is 17.58% of expense incurred in equipment purchase, the payback period is 2 months 28days and the net present value at a discount rate of 20% is $₦4.478 \times 10^9$.

The payback period method considers equipment purchase as the best strategy for producing run off-mine because the payback period method recognizes the strategy with lower payback period as the better one. With respect to the net present value method, equipment lease is the best strategy for producing run off-mine because the net present value recognizes the strategy with higher net present value as the better one. Therefore, it can be inferred that equipment lease for a period of ten years would add an extra value of $₦0.015 \times 10^9$ to Zibo FM Quarry. From Table 3, considering the option of equipment lease for 10 years, the initial investment needed to commence operation in Roadstone Quarry is 10.08% of total investment needed, total profit is 41.10% of the total revenue, the payback period is 17 months 10 days and the net present value at a discount rate of 20% is $₦7.292 \times 10^8$.

However, considering the option of equipment purchase, the initial investment needed to commence operation in Roadstone Quarry is 23.18% of total investment, total profit is 65.36% of the total revenue, salvage value is 16.29% of expense incurred in equipment purchase, the payback period is 14 months 22 days and the net present value at a discount rate of 20% is $₦6.882 \times 10^8$. The payback period method considers equipment purchase as the best strategy for producing run off-mine because the payback period method recognizes the strategy with lower payback period as the better one. With respect to the net present value method, equipment lease is the best strategy for producing run off-mine because the net present value recognizes the strategy with higher net present value as the better one. Therefore, it can be inferred that equipment lease for a period of ten years would add an extra value of $₦0.41 \times 10^8$ to Roadstone Quarry.

4 Conclusion

This research compares the lease and purchase of mine equipment for two granite quarries in Ondo State. It can be inferred that the payback period method favours the purchase of mine equipment in both Zibo Fm Quarry and Roadstone Quarry because it gives a lower value of 2 months 28days and 14 months 22 days. This method does not consider the investment and cash inflows after the early period of mining and it only shows how long initial investment will be recovered; the shorter the payback period, the less the risk a firm is exposed to. However, the net present value method approves the lease of mine equipment in both Zibo Fm Quarry and Roadstone Quarry because it gives a higher value of $₦4.493 \times 10^9$ and $₦7.292 \times 10^8$. This method ensures future cash flows are discounted to their present value at a given discount rate and cash inflows and cash outflows throughout the life of project are considered in capital budgeting.

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APPENDIX

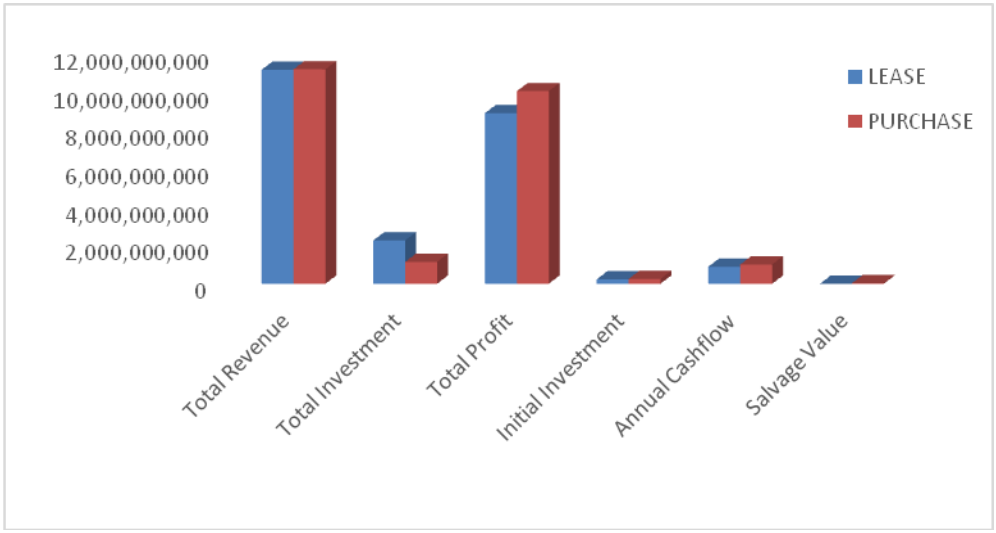

Fig.2: Bar chart showing comparison of cash inflows and outflows in Zibo Fm quarry

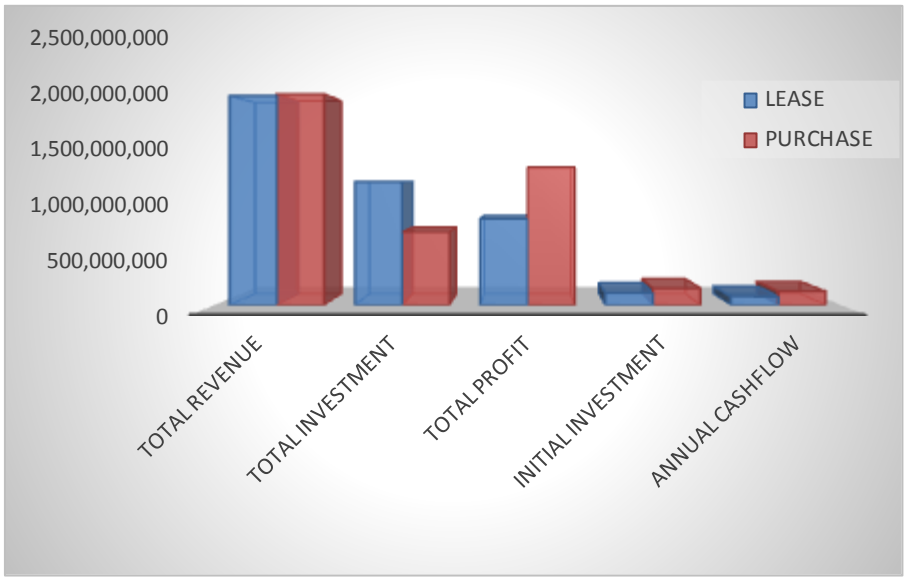

Fig. 3: Bar chart showing comparison of cash inflows and outflows in Roadstone quarry

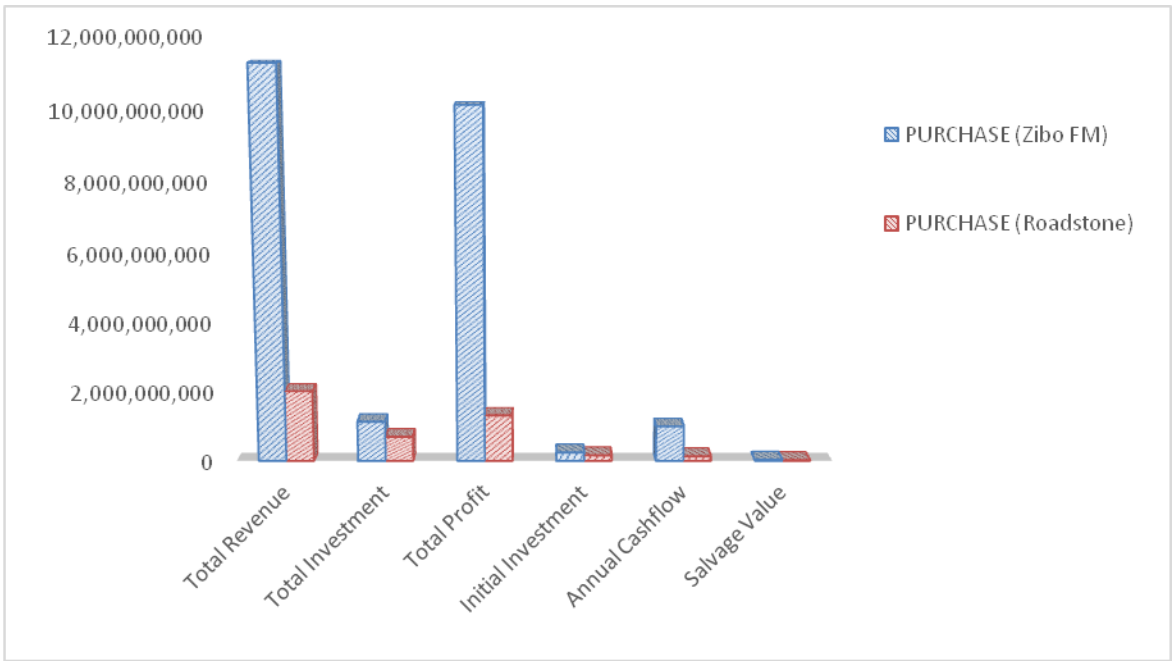

Fig.4: Bar chart showing comparison of cash inflows and outflows with respect to purchase of mine equipment in both quarries

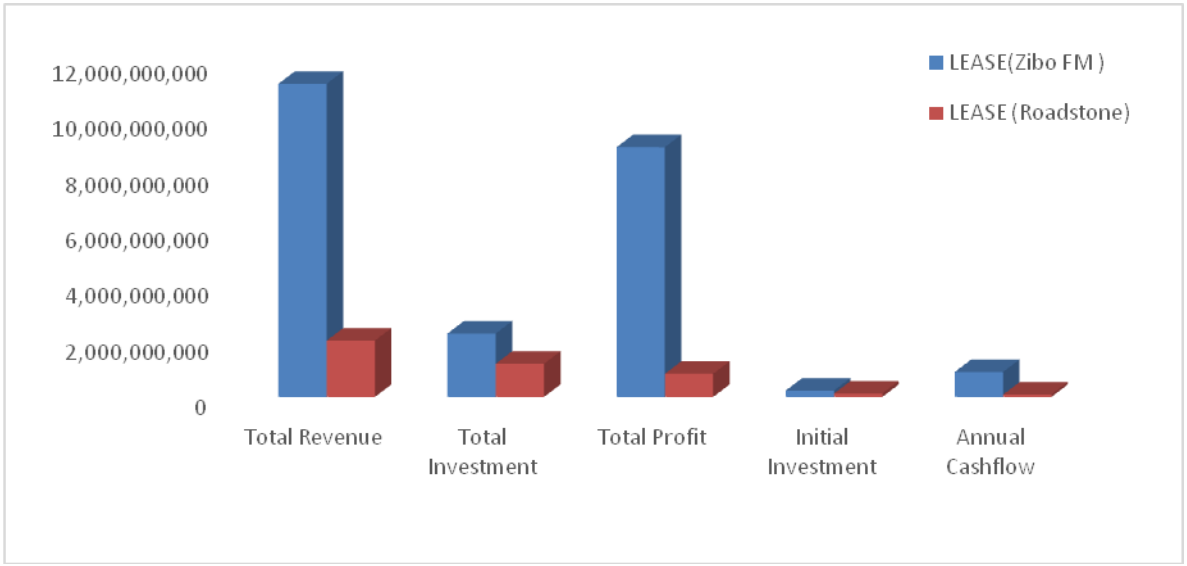

Fig.5: Bar chart showing comparison of cash inflows and outflows with respect to lease of mine equipment in both quarries