

A Certain Machinery Costs P5200559 With A Life Of 12 Years And A Zero Salvage Value. Money Is Worth 23%.

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Understanding the economics of machinery investment is crucial for businesses aiming to optimize their capital expenditure and operational efficiency. When evaluating a particular piece of machinery that costs P5200559, with an expected lifespan of 12 years and no salvage value at the end of its useful life, it's essential to analyze its cost implications considering the time value of money. The high discount rate of 23% further complicates this analysis, emphasizing the importance of thorough financial evaluation to determine the true cost and profitability associated with this machinery.

In this article, we will explore the various financial concepts involved, including depreciation, present value, annuity calculations, and the implications of a high discount rate. We will also discuss practical methods for calculating annual equivalent costs, understanding the impact of zero salvage value, and making informed decisions based on these calculations.

Understanding the Cost of Machinery

Before diving into detailed calculations, it's important to understand the basic parameters:

- Initial Cost: P5200559
- Useful Life: 12 years

- Salvage Value: P0 (Zero)
- Interest Rate / Discount Rate: 23%

The high discount rate of 23% indicates that money invested elsewhere could earn this rate, making it imperative to account for the opportunity cost in evaluating the machinery's cost.

Key Concepts in Cost Evaluation

1. Time Value of Money

Money today is worth more than the same amount in the future due to its earning potential. This principle underpins all present value calculations and influences decisions on capital investments.

2. Depreciation

Although the machinery has no salvage value, depreciation reduces the book value over its useful life, impacting tax calculations and financial statements.

3. Present Value (PV)

PV is the current worth of a future sum of money or stream of cash flows given a specified rate of return.

4. Annuity and Capital Recovery

When spreading the cost of machinery over its useful life, annuity calculations help determine annual

equivalent costs, considering the discount rate.

Calculating the Present Worth of the Machinery

Since the machinery costs P5200559 and has no salvage value, the total cost can be viewed as the present value of its costs over 12 years. To evaluate the annual equivalent cost, we need to find the capital recovery factor and annualize the cost.

1. Capital Recovery Factor (CRF)

The CRF converts a present sum into an equivalent annual amount over the machinery's life:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where:

- i = discount rate per period (23% or 0.23)
- n = number of periods (12 years)

Calculating:

$$(1 + 0.23)^{12} = 1.23^{12}$$

Using a calculator:

$$1.23^{12} \approx 10.33$$

\]

Then,

\[

$$CRF = \frac{0.23 \times 10.33}{10.33 - 1} = \frac{2.376}{9.33} \approx 0.2547$$

\]

This means that each year, approximately 25.47% of the initial cost is equivalent in present value terms.

2. Annual Cost (Capital Recovery)

Multiplying the initial cost by the CRF gives the annual equivalent cost:

\[

$$\text{Annual Cost} = P5200559 \times 0.2547 \approx P1,323,731.88$$

\]

This annual cost reflects the amount that, if paid each year, is equivalent in present value to the initial investment at a 23% discount rate.

Implications of Zero Salvage Value

Since the salvage value is zero, the entire initial investment must be recovered through annual operational benefits or cost savings. This affects the decision-making process:

- Higher annual costs imply a need for higher annual returns or efficiency.
- Comparisons with alternative investments require considering the opportunity cost of capital at 23%.

Assessing the Cost Effectiveness of the Machinery

To determine whether this machinery is a worthwhile investment, consider:

- Expected benefits or revenue generated by the machinery annually.
- Operational and maintenance costs over its lifespan.
- Alternative investments with similar risk profiles offering a 23% return.

If the machinery's annual benefits exceed the calculated annual cost (~P1,323,732), it could be considered a financially sound investment.

Additional Considerations in Machinery Cost Analysis

1. Maintenance and Operating Costs

These costs impact total expenditure and should be included in annual cash flow analyses.

2. Tax Implications

Depreciation methods and tax laws influence after-tax cash flows, affecting profitability.

3. Residual or Salvage Value at the End of Useful Life

In this case, zero salvage value simplifies calculations, but in real-world scenarios, salvage value can significantly alter the cost analysis.

Practical Example: Comparing Investment Options

Suppose a company considers purchasing this machinery or investing the same amount elsewhere. To compare:

1. Calculate the annualized cost of the machinery (₱1,323,732).
2. Estimate the annual benefits or savings from using the machinery.
3. Determine if the net benefit exceeds this annualized cost.

If the benefits are less than the annualized cost, the machinery may not be a sound investment under the 23% discount rate.

Conclusion

Evaluating the cost of machinery like this P5,200,559 machine requires understanding the interplay between initial cost, lifespan, salvage value, and the discount rate. Using the capital recovery factor, businesses can determine the annual equivalent cost, facilitating comparisons with operational benefits or alternative investments.

The high discount rate of 23% underscores the importance of ensuring that the machinery generates sufficient benefits to justify its cost. Zero salvage value simplifies the analysis but emphasizes the need to recover the entire investment through operational gains.

By applying these financial principles, decision-makers can make informed choices that align with their

strategic goals and financial constraints. Properly analyzing machinery costs ensures optimal capital allocation, enhanced profitability, and sustainable business growth.

Key Takeaways:

- The capital recovery factor is essential for annualizing machinery costs considering the discount rate.
- Zero salvage value simplifies the calculation but places greater emphasis on operational benefits.
- A high discount rate like 23% significantly impacts the present value and annual cost calculations.
- Regularly reviewing operational costs and benefits ensures the machinery investment remains financially viable.

References:

- Brealey, R., Myers, S., & Allen, F. (2017). Principles of Corporate Finance.
- Van Horne, J. C., & Wachowicz, J. M. (2005). Fundamentals of Financial Management.
- Local financial and tax regulations relevant to depreciation and capital investments.

If you need further assistance with machinery cost analysis, ROI calculations, or investment decision-making, consult with a financial advisor or an industrial engineer specialized in capital budgeting.

Frequently Asked Questions

What is the annual depreciation expense for the machinery costing P5,200,559 with a 12-year life and zero salvage value?

The annual depreciation expense is P433,379.92, calculated by dividing the cost (P5,200,559) by the useful life (12 years).

How do you determine the present worth of the machinery given a 23% interest rate and a 12-year lifespan?

Since the salvage value is zero, the present worth is equal to the initial cost of P5,200,559, but to evaluate the investment's value over time, you can discount future cash flows at 23% to find the net present value.

What is the significance of the 23% interest rate in evaluating this machinery investment?

The 23% interest rate reflects the time value of money, used to discount future costs or benefits, helping determine the machinery's present value and profitability.

If the machinery generates an annual net cash inflow of P600,000, what is its net present value (NPV)?

Assuming a 23% discount rate, the NPV can be calculated by discounting each year's cash flow and subtracting the initial cost. For example, the present value of an annuity of P600,000 over 12 years at 23% is approximately P3,776,000, resulting in an NPV of roughly P3,776,000 minus P5,200,559, which may be negative, indicating the investment needs further analysis.

How does the zero salvage value impact the decision to invest in this machinery?

A zero salvage value means no residual value at the end of its lifespan, emphasizing that the

investment's value depends solely on the machinery's ability to generate benefits during its useful life, potentially making the decision less attractive if operational cash flows are insufficient.

Additional Resources

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Introduction

The evaluation of a machinery's worth is a fundamental aspect of financial planning and investment decision-making within manufacturing, construction, and other capital-intensive industries. A recent case involves a machinery asset priced at P520,055.90, with a lifespan of 12 years and a zero salvage value at the end of its useful life. Compounding this analysis is the fact that the cost of money—represented by the discount or interest rate—is notably high at 23%. This article aims to dissect the financial implications of this machinery, exploring the concepts of depreciation, present value, and the impact of a high discount rate on investment appraisal.

Understanding the Basic Parameters

Before delving into the detailed financial analysis, it is essential to clarify the primary parameters involved:

- **Initial Cost:** P520,055.90
- **Useful Life:** 12 years
- **Salvage Value:** P0.00
- **Discount Rate (Money's Worth):** 23% per annum

These parameters form the foundation for evaluating the machinery's financial viability, through methods like depreciation schedules, net present value calculations, and cost recovery analysis.

Implications of a Zero Salvage Value

The zero salvage value indicates that at the end of 12 years, the machinery is expected to have no residual worth for salvage or resale. This assumption simplifies depreciation calculations but also underscores the importance of recovering the initial investment within the machinery's lifespan through operational returns or cost savings.

Why Zero Salvage?

- The machinery may be of a type that becomes obsolete quickly.
- It may be subject to technological advancements rendering it outdated.
- The industry standard for similar equipment might be that salvage is negligible or non-existent.

Impact on Financial Calculations

- The entire initial investment must be recovered through operational benefits.
- Depreciation expense becomes a straightforward straight-line calculation.
- The absence of salvage reduces complexity in net present value (NPV) calculations, but emphasizes the importance of cash flows generated during the useful life.

Depreciation and Cost Recovery

Given the machinery's estimated 12-year lifespan and zero salvage value, the straight-line depreciation method is typically employed for simplicity:

Annual Depreciation Expense:

$$\begin{aligned} \text{Annual Depreciation} &= \frac{\text{Initial Cost} - \text{Salvage Value}}{\text{Useful Life}} = \\ &= \frac{P520,055.90 - 0}{12} \approx P43,338.00 \end{aligned}$$

This uniform depreciation expense reflects the annual reduction in book value, but does not account for the time value of money or cash flows.

Implications:

- Cost recovery is evenly spread over 12 years.
- The company must generate sufficient cash flows annually to justify the investment.
- Depreciation reduces taxable income, but the real focus should be on discounted cash inflows.

Time Value of Money and Discount Rate

The high discount rate of 23% significantly influences the valuation of the machinery. The concept of the time value of money asserts that a peso today is worth more than a peso in the future, owing to potential earning capacity.

Why Is the Discount Rate 23%?

- It could reflect the company's weighted average cost of capital (WACC).
- It might incorporate risk premiums associated with the machinery's industry or technological obsolescence.
- It indicates a high opportunity cost of capital, signaling that funds could otherwise be invested at higher returns elsewhere.

Effect of a 23% Discount Rate

- Future cash flows are heavily discounted, reducing their present value.
- An investment with high discount rates requires higher future cash inflows to be considered viable.
- The calculation of net present value (NPV) becomes critical in determining whether the machinery's benefits justify its cost.

Calculating Present Value of the Machinery's Cost

While the initial cost is an upfront expenditure, understanding its present value relative to expected returns helps determine its profitability.

Present Value of Cost (PV):

- Since the cost is paid at the beginning, its present value is simply P520,055.90.
- For ongoing cash flows, the present value of benefits or savings over 12 years must be discounted at 23% annually.

Calculating the Cost Recovery via Annuity:

- Since depreciation is evenly spread, the key is to evaluate whether the machinery generates sufficient annual cash inflows to recover the initial investment discounted over 12 years.
- The present value of an annuity formula is:

$$PV = P \times \frac{1 - (1 + r)^{-n}}{r}$$

where:

- P = annual cash inflow
- r = discount rate (23% or 0.23)
- n = number of periods (12)

Application:

Suppose the machinery generates a consistent annual cash inflow X . To recover the initial investment:

$$520,055.90 = X \times \frac{1 - (1 + 0.23)^{-12}}{0.23}$$

Calculating the denominator:

$$\frac{1 - (1 + 0.23)^{-12}}{0.23}$$

$$(1 + 0.23)^{12} \approx 1.23^{12} \approx 11.629$$

\]

\[

$$(1 + 0.23)^{-12} = \frac{1}{11.629} \approx 0.086$$

\]

So,

\[

$$\frac{1 - 0.086}{0.23} \approx \frac{0.914}{0.23} \approx 3.978$$

\]

Therefore,

\[

$$X \approx \frac{520,055.90}{3.978} \approx \text{P}130,713.76$$

\]

Interpretation:

The machinery must generate an annual cash inflow of approximately P130,714 to recover its initial cost over 12 years at a 23% discount rate.

Investment Viability and Decision-Making

The critical question for stakeholders is whether the machinery's operational benefits and cash inflows justify the initial expenditure, given the high discount rate.

Key Considerations:

- Break-even cash flow: P130,714 annually.
- Revenue and cost analysis: Will the machinery produce enough operational income to meet or exceed this figure?
- Risk factors: Technological obsolescence, market fluctuations, maintenance costs.
- Alternative investments: Could the same capital produce higher returns elsewhere with similar risk profiles?

Net Present Value (NPV) Calculation:

If the machinery's expected annual cash inflows are (X) , the NPV is:

$$\text{NPV} = \text{Total Present Value of inflows} - \text{Initial Investment}$$

$$\text{NPV} = X \times \frac{1 - (1 + r)^{-n}}{r} - P520,055.90$$

Substituting the earlier calculation:

- If (X) exceeds P130,714, the NPV is positive, indicating a favorable investment.
- If less, the investment might not be justified.

Scenario Analysis:

Suppose the machinery generates P150,000 annually:

$\backslash$

$$PV_{\text{inflows}} = 150,000 \times 3.978 \approx P596,700$$

\\

\\

$$NPV = P596,700 - P520,055.90 = P76,644.10$$

\\

A positive NPV suggests profitability under these assumptions.

Conversely, if annual cash inflows are P120,000:

\\

$$PV_{\text{inflows}} = 120,000 \times 3.978 \approx P477,360$$

\\

\\

$$NPV = P477,360 - P520,055.90 \approx -P42,695.90$$

\\

Negative NPV indicates the investment may not be financially sound.

Implications of a High Discount Rate (23%)

The 23% discount rate is notably high, reflecting either:

- Elevated risk levels
- Industry-specific factors
- High cost of capital

Effects on Investment Analysis:

- Stringent Return Requirements: Projects must generate substantial cash flows to be viable.
- Discounted Payback Period: The time it takes for discounted cash flows to recover the initial investment extends, making quick recoveries less likely.
- Sensitivity to Cash Flow Variations: Slight changes in estimated inflows significantly impact NPV due to the high discount rate.

Strategic Considerations:

- Companies must carefully project cash flows to ensure they surpass the threshold of P130,714 annually.
- Risk mitigation strategies, such as warranties or operational efficiencies, become vital.
- Alternative financing options or subsidies could lower the effective discount rate and improve project viability.

Conclusion

The analysis of a machinery costing P520,055.90 with a 12-year life and zero salvage value, evaluated at a 23% discount rate, reveals the complexities inherent in capital investment decisions. The high discount rate demands robust annual cash inflows—approximately P130,714—to justify the investment. If the machinery can generate cash flows exceeding this threshold, it promises a positive net present

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