

# ANALYSIS OF ADVANTAGES AND DISADVANTAGES OF VARIOUS PROFITABILITY MEASURES FOR COMPARING ALTERNATIVES

Payout period does not adequately consider the later years of the project life, does not consider working capital, and is generally useful only for rough and preliminary analyses.

Rates of return on original investment and average investment do not include the time value of money, require approximations for estimating average income, and can give distorted results of methods used for depreciation allowances.

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If there is any question as to which method should be used for a final determination, *net present worth* should be chosen, as this will be the most likely to maximize the future worth of the company.

Investment costs due to land can be accounted for in all the methods except payout period. Costs incurred during the construction period prior to startup can be considered correctly in both the net-present-worth and the discounted-cash-flow methods, while they are ignored in the return-on-investment methods and are seldom taken into account in determining payout period.

## Comparison of alternative investments by different profitability methods.

**Example 5** Comparison of alternative investments by different profitability methods. A company has three alternative investments which are being considered. Because all three investments are for the same type of unit and yield the same service, only one of the investments can be accepted. The risk factors are the same for all three cases. Company policies, based on the current economic situation, dictate that a minimum annual return on the original investment of 15 percent after taxes must be predicted for any unnecessary investment with interest on investment not included as a cost. (This may be assumed to mean that other equally sound investments yielding a 15 percent return after taxes are available.) Company policies also dictate that, where applicable, straight-line depreciation is used and, for time-value of money interpretations, end-of-year cost and profit analysis is used. Land value and pre startup costs can be ignored.

Given the following data, determine which investment, if any, should be made by alternative-analysis profitability-evaluation methods of

(a) *Rate of return on initial investment*

(b) *Minimum payout period with no interest charge*

(c) *Discounted cash flow*

(d) *Net present worth*

(e) *Capitalized costs*

In- vest- ment num- ber	Total initial fixed-capital invest- ment, \$	Working- capital invest- ment, \$	Salvage value at end of service life, \$	Service life, years	Annual cash flow to pro- ject after taxes, † \$	Annual cash expenses ‡ (constant for each year), \$
3	210,000	15,000	20,000	8	59,000 (constant)	21,000

† This is total annual income or revenue minus all costs except depreciation and interest cost for investment.

‡ For investment number 1, variable annual cash flow to project is: year 1 = \$30,000, year 2 = \$31,000, year 3 = \$36,000, year 4 = \$40,000, year 5 = \$43,000.

## *Note*

Methods (a) and (b) in this problem give incorrect results because the time value of money has not been included.

Although investment No. 3 is recommended by methods (c), (d), and (e), it is a relatively narrow choice over investment No. 2.

consequently, for a more accurate evaluation, it would appear that the company management should be informed that certain of their policies relative to profitability evaluation are somewhat old fashioned and do not permit the presentation of a totally realistic situation.

## CEN 262 ENGINEERING ECONOMICS PROBLEMS SETS

If \$1000 is invested at 6% compounded interest on January 1, 1990, how much will be accumulated by January 1, 2000?

How much would you have to invest at 6% interest on January 1, 1994, in order to accumulate \$1791 on January 1, 2000?

What is the present worth on January 1, 1987, of \$1263 on January 1, 1994, if interest is at 6%?

How much must be deposited at 6% each year for 7 years beginning on January 1, 1991 in order to accumulate \$1504 on the date of the last deposit, January 1, 1997?

How much would you need to deposit at 6% on January 1, 1990, in order to draw out \$179.2 at the end of each year for 7 years, leaving nothing in the fund at the end?

If \$2000 is invested now, \$1500 2 years hence, and \$1000 4 years hence, all at 8%, what will the total amount be 10 years hence?

If you deposit \$4500 at 5% annual interest compounded quarterly, how much money will be in the account after 10 years?

If you deposit \$4000 into an account paying 9% annual interest compounded monthly, how long until there is \$10000 in the account?

If you deposit \$2500 into an account paying 11% annual interest compounded quarterly, how long until there is \$4500 in the account?

If you deposit \$5000 into an account paying 8.25% annual interest compounded semiannually, how long until there is \$9350 in the account?