



AACE
INTERNATIONAL



AACE® International Recommended Practice No. 15R-81

PROFITABILITY METHODS

TCM Framework: 3.3 – Investment Decision Making

6.1 – Asset Performance Assessment

Rev. July 16, 2009

Note: As AACE International Recommended Practices evolve over time, please refer to www.aacei.org for the latest revisions.

SAMPLE

Contributors:

Disclaimer: The opinions expressed by the authors and contributors to this recommended practice are their own and do not necessarily reflect those of their employers, unless otherwise stated.

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INTRODUCTION

Scope

This Recommended Practice (RP) of AACE International defines specific practices for determining the profitability of investments. The methods offered are general, since not all profitability techniques can or should be included in an RP. In its broadest sense, profitability is a measure of value added. Increased profitability thus reflects greater economic good for society. There is no economic progress without profitability.

Purpose

This RP is intended to provide broad guidelines, not standards, for profitability methods that most seasoned practitioners in most industries would consider to be reliable and would generally endorse. Profitability methods with less general applicability, e.g., the revenue requirement technique used by electrical utilities or the benefit-cost ratio used in the public sector, are not included in this RP.

Background

Profitability methods are critical tools for assessing asset performance and making effective investment decisions. These processes are central to portfolio and program management in that selecting the right capital or maintenance projects can be as important to enterprise success as effectively executing any particular project.

This RP is a revision in the spirit of the original RP developed in 1981 by Henry Thorne and Julian Piekarski, past presidents of AACE.

RECOMMENDED PRACTICE

AACE recommends the following practices for determining profitability for investment decision-making:

1. Net present value (NPV). Sometimes denoted as net present worth (NPW). The equivalent annual value practice (EAV), is included.
2. Internal rate-of-return (IRR). This technique is also denoted as discounted cash flow rate-of-return (DCFRR). References including AACE's *Skills and Knowledge of Cost Engineering*, 5th edition, and the tables of contents of popular engineering economics textbooks refer to rate-of-return (ROR). In its most generic sense, however, ROR includes more than IRR or DCFRR and is a less useful term for this RP. Industry and academe show no distinct preference among the terms. The modified IRR method (MIRR), is included.
3. Return-on-investment (ROI).
4. Payback period (PB). Sometimes denoted as payoff period or payout period (PO).

The following practices are recommended for calculating enterprise-level or strategic business unit-level profitability:

5. Economic value added (EVA).
6. Return-on-assets (ROA).

The choice of a particular method will depend on executive preferences, the individual company, and the characteristics of its portfolios, programs, or projects. The 1981 publication of this RP explained that IRR was preferred to NPV by a ratio of three to one, per the results of an earlier survey of some Fortune 500 firms. A 1997

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reference confirmed that the techniques maintained that relative popularity decades later. PB followed in popularity after the two leading methods.

PRACTICES DEFINED

The cost engineer should be aware that definitions and resulting calculations of some profitability measures can vary in different organizations and, sometimes, within different offices of the same firm. Whenever applying or discussing the profitability values stated by others, the wise cost engineer makes certain to know how the values have been calculated. Any method chosen must allow reliable comparison among alternatives, so that an investment can be confidently selected. Therefore, although reasonable accuracy is necessary, the cost engineer should not become too engrossed by arcane details of a supposedly "perfect" calculation method.

The returns eventually achieved will almost certainly be somewhat different from those forecasted. It is essential, however, that the method enables choice of an investment that will probably deliver a greater return than any alternative that is discarded as a result of the analysis. Choosing a specific version of calculation of any of these six measures is not as important as uniformly applying the variant to all alternatives, so that their comparison is meaningful. The six recommended measures are defined as follows:

1. **Net present value (NPV)**, equates to the sum of net period cash flows over the periods or life of the analysis, each discounted to an initial point, designated time zero. A net period cash flow is the difference between cash inflows and cash outflows for the time period. An annual period is commonly adopted. Cash inflows comprise revenues and realized salvage values. Cash outflows include capital outlays, all expenses, and taxes. The applied discount rate is commonly the weighted average cost of capital (WACC), for the firm. The NPV may underestimate the real value of an alternative since it does not include the "option value," whereby managers can subsequently leverage the results created by choosing the alternative for later opportunities that would otherwise not be possible.
2. **Internal rate-of-return (IRR)**, equates to the discount rate that yields $NPV = 0$, given an array of net period cash flows. The IRR offers a straightforward means of comparing the alternative returns so that a venture can be selected.
3. **Return-on-investment (ROI)**, is the ratio of net investment gain to investment cost. In its simplest form, which is most common, no correction is made for the time-value of money. A more accurate ROI calculation incorporates the time-value of money of cash inflows, the return, and cash outflows, the investment. Complex ROI, the engineer's or the plant method, is the ratio of the average annual gain to the initial investment, expressed as a percentage.
4. **Payback period (PB)**, is the period of time that an investment requires to recoup the amount invested or to break even. As with ROI, it is most commonly calculated without considering the time-value of money, but a more accurate version adjusts for time-value.
5. **Economic value added (EVA)**, is economic profit. EVA can be applied to project and program profitability determinations, but it is typically applied to business unit or enterprise-level analysis. The measure considers the total capital employed by the enterprise. The enterprise is expected to generate income that covers both capital and operational costs.
6. **Return-on-assets (ROA)**, is normally calculated as the percentage ratio of net income, after interest and taxes, to total asset book value. Other formulas instead use operating income, earnings before interest and taxes (EBIT), or earnings before interest and after taxes (EBIAT). Whether strictly formulated or modified, ROA generally measures the efficiency of enterprise asset application for financial gain—a useful metric for asset managers.