No Time Like the Present, No Value Like the Present

There is never a shortage of projects, just a shortage of resources to accomplish them.

by David Elam

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The challenge is selecting projects that best allow an organization to achieve its strategic objectives, a process that requires an assessment of the benefits the project will produce, the resources it will consume, and the prospects for successful project delivery. Even when a project is needed to satisfy regulatory requirements, there are often multiple performance options, each of which must be evaluated in terms of benefits produced, resources consumed, and prospects for success. Project decisions that were once derived from simple financial analyses and advocated on the basis of experience now require more detailed and objective financial analyses.

Example NPV Analysis

Consider a project to reduce the use of treatment chemicals for a pollution control operation. Our initial assessment suggests that a $50,000 investment in an engineering study and equipment upgrades will yield $12,000 per year in savings and that the service life of equipment upgrades will be five years. In the past, we might have presented a simple payback calculation to secure the $50,000 to fund the project. We would have shown that our $50,000 investment returned $60,000 in cost savings over the service life of the upgrade, yielding a net benefit of $10,000 or a return on investment of 20%. We would have likely supplemented the financial data with soft data, citing an improved image that comes with reduced chemical consumption and the reduced risk of an environmental release with fewer chemicals onsite. It's not likely that this simple back-of-the-envelope approach would work in today's cash constrained world.

A more rigorous approach is to evaluate the project in terms of discounted cash flow as summarized in Table 1. Using this method, the expected financial returns are discounted to reflect the time value of money. The discount rate is determined by management and reflects prevailing interest rates, the rate of return that investments in the company's business sector are expected to produce, and other factors that affect the competitiveness or viability of the company. By discounting future cash flow, we are able to calculate the value of those future returns at their present value, allowing us to better evaluate our investments.

The formula for calculating net present value of future cash flows is:

$$NPV = CF_0 + CF_1/(1+r)^1 + CF_2/(1+r)^2 + CF_3/(1+r)^3 + ... + CF_n/(1+r)^n$$

where *NPV* is net present value; CF_o is initial cash outlay; CF_n is cash flow at term *n*; *r* is discount rate for the term; and *n* is number of terms.

Going back to our example and assuming the modest discount rate of 7% (annually and constant over the life of the project):

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NPV, $ = (-50000) + (12000/1.07) +
(12000/1.14) + (12000/1.23) +
(12000/1.31) + (12000/1.40)

NPV, $ = (-50000) + (11215) +
(10526) + (9756) + (9160) + (8571)

NPV, $ = -772
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The negative NPV of -$772 provides a much different picture of our proposed project. Instead of the $10,000 benefit the simple payback model suggested, we find that we have lost almost $800 over the useful life of our proposed upgrade! Although

Table 1. Cash flow models for treatment chemical reduction project.

	Cash Flow Model, Incremental Returns			Cash Flow Model, Lump Sum Return		
Year	Cash Outflow ($)	Cash Inflow ($)[1]	NPV ($)	Cash Outflow ($)	Cash Inflow ($)[2]	NPV ($)
0	(50,000)	-	(50,000)	(50,000)	-	(50,000)
1	-	11,215	(38,785)	-	-	-
2	-	10,526	(28,259)	-	-	-
3	-	9756	(18,503)	-	-	-
4	-	9160	(9343)	-	-	-
5	-	8571	(772)		42,780	(7220)
6	-	8000	7228	-	-	-
7	-	7453	14,681	-	-	-
8	-	6977	21,658	-	-	-

Notes: [1]Incremental cash inflow of $12,000 per year discounted at 7% annually.
[2]Lump sum cash inflow of $60,000 in year 5 discounted at 7% annually. Highlighted values are referenced in text.

a real-world project would involve other considerations such as tax consequences that might improve financial performance, this simple example illustrates how the proper financial analytical tools can improve the quality of our project decisions.

The NPV analysis, while useful, doesn't provide a complete picture. Using NPV analysis as the sole criteria for project selection would always mean selection of the project with the highest NPV; however, as illustrated above, the NPV is calculated over the term of the project. In the case of our project, the NPV would approach $22,000 if the service life of the upgrade was eight years, assuming the same $12,000 per year savings for each of the additional three years of service. Available cash resources may make a project with a lower NPV and a shorter performance period more favorable than a project with a higher NPV and a longer performance period. If two projects both require a $50,000 investment and Project A yields an NPV of $10,000 in four years and Project B yields an NPV of $20,000 in eight years, Project A, all other factors being equal, is the probably the better choice.

Timing Is Critical

Note also that cash flow timing is an important consideration. Assume that our pollution control operation upgrade did not yield incremental returns $12,000 per year for each of the five years, but instead, produced a lump sum return of $60,000 at the end of five years. Under this scenario, the financial picture would be quite different. Instead of the calculated NPV of approximately -$800, the NPV would be approximately -$7200. This simple example underscores the importance of cash flow management: project success is determined by both cash flow timing and amounts.

NPV considerations also provide insight into the importance of cash flow management while we are working on our projects. In short, we must perform the project to conform to the cash flow model that was used to qualify it. This means we must manage the schedule to established milestones, assign resources as scheduled, purchase goods and services on a just-in-time basis, and pay vendors as required. Minor shifts in the project schedule can alter planned cash flow timing, changing the financial performance of the project.

NPV calculations drive home the time value of money reminding us that when it comes to managing time and money, we're well served working in the present. **em**