Return-On-Investment Calculation – Which option do I choose?

Each of us runs into various situations where we need to make a decision involving various capital investment opportunities. Many companies have relied upon the simple payback calculation to help make the financial decision clear. Historically, a two-year payback or sooner has been the only criteria used by companies considering a capital investment. Payback can help in many low capital investment decisions, but should not be the sole factor on large capital investment decisions. The problem is that payback ignores the time value of money component that is key to determining where a company should invest its money. Almost every company has a hurdle rate or rate-of-return that must be exceeded before an investment will be considered. Simple payback, for all intents and purposes, ignores this requirement.

Two additional approaches are recommended to add financial clarity to the decision process. These are net present value (NPV) and internal rate-of-return (IRR).

NPV and IRR are very similar calculations that give the same answer in different terms. IRR shows the actual rate-of-return on the investment at present value (in today’s money). NPV is always calculated using an internally predetermined rate-of-return. When the NPV calculation yields 0, the rate-of-return has been achieved. For example, NPV 15% = 0 means that the investment has a 15 percent rate-of-return. A negative value means the investment has not cleared the hurdle rate. A positive value means it has more than cleared the hurdle. IRR provides a clean rate-of-return unless there are irregular cash flows. For this reason, it is good to use more than one measure to add confidence to your decision. For example, IRR=17.3% means that the investment will yield a rate-of-return of 17.3%.

The NPV and IRR can be daunting to calculate for some when supported only by an ordinary calculator. For example, if n is the number of cash flows in the list of values, the NPV formula is as follows:

\[
NPV = \sum_{i=1}^{n} \frac{values_i}{(1 + rate)^i}
\]

Even my financial calculator draws out the process with too many keystrokes. Not to worry, these calculations are a snap when using many popular spreadsheet programs. Definitions and examples are available in the Help Menu and step by step instructions are many Help Wizards. In addition, there are many excellent books and textbooks available for ongoing study. By setting up a cash flow chart and using the NPV and IRR formula commands available in most popular spreadsheet programs, everyone can start making more informed capital investment presentations.

Consider the following situation: a picking operation with 30 pickers who use old double pallet jacks that need replacement. The product is all full case and is considered conveyable. The current pick rate is 180 cases per hour yielding 40,500 cases a day based upon a 7.5 hour working period. Selected pallets are staged on the dock.

Three options have been developed. The first is to construct pick modules and a conveyor system. This will cost $1,500,000 and is projected to save $375,000 in labor costs annually. The second option involves less mechanization, costing $800,000 and saving $250,000 annually in labor costs. The third option involves replacing the current pallet jacks with newer, faster models.
Assume the hurdle rate is 20 percent. In other words, the company has investment opportunities that yield at least this amount and will not consider any below this level but will give preference to investments with the greatest return.

For cell reference purposes, the upper left cell in the charts below is A1. The MS Excel formulas for NPV and IRR are as follows where B7:G7 is the range of the Total Project Cash flows and 20 percent is the minimum rate-of-return.

=NPV(20%,B7:G7)
=IRR(B7:G7)

The payback formula is as follows:
=IF(C8>=0,-B8/C7,IF(D8>=0,1+(-C8/D7),IF(E8>=0,2+(-D8/E7),IF(F8>=0,3+(-E8/F7),IF(G8>=0,4+(-F8/G7),"5+")))))

The three charts below illustrate the cash flows setup for each option.

<table>
<thead>
<tr>
<th>Year</th>
<th>Option 1</th>
<th>Year</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor Savings</td>
<td>$ 375,000</td>
<td>$ 375,000</td>
<td>$ 375,000</td>
</tr>
<tr>
<td>Investment</td>
<td>$(1,500,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Project Cashflow</td>
<td>$(1,500,000)</td>
<td>$ 375,000</td>
<td>$ 375,000</td>
</tr>
<tr>
<td>Cumulative Cashflow</td>
<td>$(1,500,000)</td>
<td>$(1,125,000)</td>
<td>$(750,000)</td>
</tr>
<tr>
<td>NPV@20%</td>
<td>($315,434)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRR</td>
<td>7.9%</td>
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<td></td>
</tr>
<tr>
<td>Payback</td>
<td>4.00</td>
<td></td>
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</tbody>
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In all of the examples above, the typical two year payback is not achieved. Had this been the only evaluation criterion, most likely the project would not get funded. However, using the time value of money and the company’s 20 percent hurdle rate, we find that Option 2 has financial merit.

**Option 1** has a negative NPV with an IRR of only 7.9 percent and a payback of four years. This obviously has not cleared the minimum rate-of-return and should not be presented.

**Option 2** meets the hurdle rate showing a positive NPV and 20.1 percent IRR with a three-year payback. This option is worthy of consideration and should be presented to management.

**Option 3** has a negative NPV with an IRR of 12.6 percent and a payback of 3.5 years. Unless there is some compelling non-financial reason, this option should not be considered. It is the least expensive option, but not the best in terms of return-on-investment.

All things being equal, Option 2 is the better financial investment.

We all know that other factors need to be brought into the decision-making process like risk, available capital, other investment opportunities, business disruption, senior management’s thoughts, etc. Hopefully this will get you started on the path to taking your opportunity presentations to the next level. More and more, the Chief Financial Officer is getting involved earlier in the capital expenditure approval process. The more we can speak and convey our thoughts and ideas in that language, the more successful we’ll be in both presenting solid ideas and getting those ideas approved.

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