

Return on Investment

Show Me the Money

Years ago I was teaching *Business Basics* to a sixth grade class for Junior Achievement. The school is in a small town and I was working for what was by far the largest employer in the area — virtually every kid in the class had a relative or at least knew someone working for the company. The company, American Greetings, is the largest public company producing greeting cards, gift wrap and related products. I started this particular day with a question: “Why is American Greetings in business? For what purpose does the company exist?” **Every** child raised a hand. When I called on the first young lady her answer was the predictable “to make greeting cards”. I, of course, said no. A few hands went down. The next child said to make gift wrap. Another “no” and quite a few more hands went down. After hearing answers of ribbons and bows and a few more, each being shot down one at a time; we eventually got all hands down. I then told the class that “American Greetings was in business for the same reason every other for profit company was, that is to make a profit so as to provide a good return for their shareholders’ investment. And, if the management of American Greetings thought they could make a better profit by producing widgets then they would manufacture widgets!” If a company is to invest in its future, then there will always be multiple projects competing for limited dollars. Deciding how best to invest among competing alternatives is a principle function of management.



A Case Against “Payback”

Many companies use the simple payback period method in determining an investments’ merit. The payback period is as simple and straightforward of a calculation there is (which is probably why it is so often used). In its most simplified form:

$$\text{Payback} = \text{Investment} \div \text{Annual Savings}$$

For example, a distribution center invests \$10,000 on a conveyor that will save \$2,000 per year in direct labor. This investment has a payback period of 5 years.

Why is the simple payback a poor choice to evaluate alternatives? There are two significant reasons:

1. The calculation ignores all money flows outside of the payback period.
2. It accounts for no time-value of money.

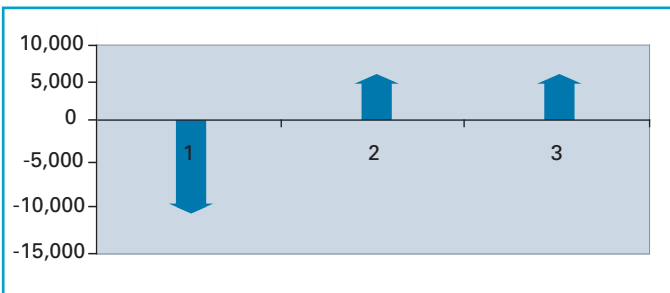
“If you need a piece of equipment and don’t buy it, you will end up paying for it but not having it.”

Henry Ford

To illustrate, let's look at a simple example. Say you are evaluating three alternative projects requiring a \$10,000 investment each. The cash flows and payback calculations could look like this:

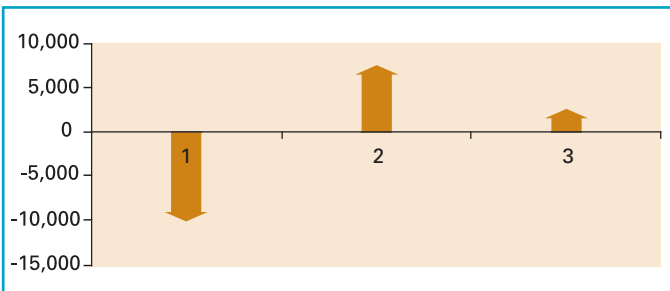
Year	Alternative A	Alternative B	Alternative C
0	-10,000	-10,000	-10,000
1	5,000	7,500	9,000
2	5,000	2,500	500
3	—	—	500
Payback	2 years	2 years	3 years

Alternative A Cash Flows



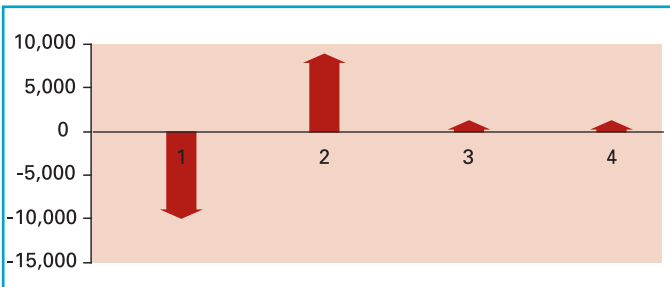
Project A's graph illustrates a 2-year payback period

Alternative B Cash Flows



Project B's graph also illustrates a 2-year payback period, although arguably with a more desirable cash flow scenario

Alternative C Cash Flows



Project C's graph illustrates a 3-year payback period. Is the longer payback of Project C truly less desirable than that of Project A's?

Which investment is preferable? Looking only at the payback period, one would say that alternatives 'A' and 'B' are identical and both are superior to alternative 'C'. But, is that truly the case? Would you rather recoup 50% of your investment in year 1 or 75%? Would you rather extend the payback period by one year, as 'C' does, if you could capture 90 % of your return in the first year?

Years Beyond Payback Period

Also, what would be different if you looked at years beyond the payback period?

Year	Alternative A	Alternative B	Alternative C
0	-10,000	-10,000	-10,000
1	5,000	7,500	9,000
2	5,000	2,500	500
3	5,000	2,500	500
4	5,000	2,500	500
5	5,000	1,750	300
6	5,000	1,500	0
7	5,000	500	0
8	4,000	0	0
9	3,500	0	0
10	3,500	0	0

Chart showing the same three alternative projects as above but with cash flows extended out to 10 years.

Now which investment would you choose?

(This example shows three alternatives, each with an initial investment of \$10,000. Not illustrated, but virtually always needing consideration is the "Do Nothing" option. For further thoughts on the "Do Nothing" option, see AHS's white paper by the same name.)

A Better Way

There are many different, yet valid, ways of financially evaluating competing alternatives. Each of the methods has their own strengths and weaknesses. Hopefully the above example has convinced you that the simple payback period is clearly not the best method. That said, *what is?*

The important things to consider are the opposite of the short comings of the payback period: (a) look at all cash flows over the life of the investment and (b) recognize and give weight to the value of money over time.

Two of the more common evaluation tools are (1) the Internal Rate of Return (IRR) and (2) the Net Present Value (NPV). These two methods are similar in that they both use discounted cash flows. A discounted cash flow is simply the value of a future cash flow (revenue or expense) expressed in today's dollars. If I were to offer you \$100 that you could have either today or six months from now, which would you take? Today, of course! What if I offered you either \$100 today or **\$500** six months from now? Understand that decision process and you understand the time value of money and discounted cash flows!

Internal Rate of Return

The IRR is a percentage (expressed as 'i' in calculation formulas) that will result in a zero present value when applied to the cash flows of a project. If the IRR is greater than the hurdle rate (the hurdle rate is the percent value your company places on money over time, think of it as opportunity cost) then the project should be pursued. If the IRR is less than the hurdle rate, the investment should not be made.

Net Present Value

The NPV is a dollar value that subtracts from all future discounted cash flows the project's initial capital cost. If the NPV is positive, the project is considered a good investment. As an example, a project requires a \$1.2 million investment. Calculating the present worth of all future cash flows over the life of the project results in a total of \$2.7 million. $2.7M - 1.2M = 1.5M$, and therefore, a recommended project. In order to calculate the present worth of future cash flows, you must apply your company's required percentage return rate.

Cash Flows

Cash flows are simply the amount of cash (at least estimated) that a project will either cost (typically expressed as a negative number; i.e. capital investment) or generate as a revenue (typically expressed as a positive number; i.e. the cost avoidance of future direct labor can be expressed as a positive cash flow). Cash flows are, for the purposes of calculations, normally expressed as occurring at the end of a time period. However, this is not always the case; sometimes cash flows can be expressed as occurring at the beginning of a time period so understanding the formulas and tools being used is important.

Cash flows are also expressed as a net number. For example, let's say you invest \$500,000 that will automatically sort outbound cartons to the correct shipping door. The new automation allows you to re-task the 12 associates who manually perform this task today and who each earn \$30,000 per year (the \$30,000 is fully burdened with benefits). This is a \$360,000 per year savings in direct labor. However, let us also assume that this level of automation will force you to add two maintenance technicians at a burdened cost of \$38,000 per year each and will require an additional estimated \$15,000 per year in parts and outside service. Now the net annual savings is:

$$\text{\$360,000} - (2 \times \text{\$38,000}) - \text{\$15,000} = \text{\$269,000.}$$

The examples stated thus far are pretty straightforward and easily accounted for in the calculations. Additional cash flows that can be difficult to quantify but also can have a significant impact include:

- **Cost Avoidance.** The delay of spending capital to build a new facility to accommodate planned growth. Let's say you currently operate a distribution center in a 500,000 sq. ft. facility with 32' of clear building height. Further, under your current operating methods the facility is 80+ percent utilized and you have forecasted growth of 10% per year over the next five years. Investing in technology that will add years to the life of the existing building is a common example of cost avoidance.
- **Cost Avoidance.** The cost savings of implementing a safety or ergonomic project and thus avoiding future liability associated with an injury.
- **Additional Revenue.** The profit from introducing a new product line (and having the resources within the supply chain that allow you to introduce the new items).
- **Additional Revenue.** The added revenue gained by having product available for purchase. As an example, a 3PL (3rd Party Logistics provider) runs the .com business for a traditional retailer. If the 3PL cannot sell an item that is not received and put into inventory, then investing in procedures, personnel and technology that moves inventory from the receiving dock to the pick location faster would provide added revenue.
- **Additional Revenue.** The profit from increased revenues by extending the sales window. If supply chain efficiencies allow you to elongate the peak holiday sales period by either speeding replenishment product to stores or allowing a .com to ship later and still ensure delivery before the holiday, what impact does this have to the company's bottom line?
- **Inventory Accuracy.** How much money does the company spend for safety stock? How much labor is spent to go to pick locations that do not have sufficient inventory? What is the cost to perform an annual full physical inventory and its corresponding right-off?

“Our favorite holding period is forever.”

Warren Buffett

Timelines

Not every company has the luxury of basing their investment decision on Warren Buffett's favorite holding period, “forever”. Establishing the timeline under which you can achieve an acceptable return is a common challenge in the Supply Chain industry. For example, many 3PLs are awarded business on a limited contract basis. If a 3PL wins a 3 year contract, any investment must be evaluated in that light. The potential return on investment for any period beyond the initial contract is, at best, debatable. Depending on the scope of work, potential for savings and the duration of a planned project, alternative investments in systems and automation may or may not be justified.

Intangible Benefits

One topic only alluded to is the ambiguous “intangibles”. In virtually every analysis there are benefits that are difficult to measure. Upon greater scrutiny, many of the so called intangible benefits can be quantified with effort. For example, inventory accuracy was mentioned earlier. This could easily be listed as an intangible benefit to a project that leverages technology to increase location accuracy. Writing off this accuracy as an intangible benefit is easy, but does that truly reflect the value the increased accuracy brings to the company? Each intangible benefit should be questioned, after all if it is important enough to list is it important enough to quantify?

Taxes

No commentary on ROI could be complete without a nod to the “T” word. Taxes can have a significant impact on a project's viability. Looking at cash flow before taxes (CFBT) and cash flow after taxes (CFAT) includes looking at tax implications over the life of a project.

Involved in this consideration is an understanding of the relationships between gross income, operating expenses (typically tax deductible), depreciation on assets and tax rates. In simplified terms, a company's taxable income (TI) is equal to its gross income less expenses and depreciation.

$$\text{Net Profit After Taxes (NPAT)} = \text{Taxable Income} - \text{Taxes}$$



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Summary

This paper likely raises as many questions as it answers. There are, after all, many CPAs and academics whose life's work are devoted to the understanding and use of the tools and techniques that aide management in allocating scarce capital dollars to competing projects.

On a micro level, these projects may be alternative methods of accomplishing the same end result. For example, a company may need additional capacity within it logistics network. Being evaluated are the expansion of an existing distribution center against the construction of a replacement facility or the construction of an additional facility. The analysis then is really a comparison of four competing alternatives:

1. Do Nothing, which is to say live with your current situation as is.
2. Add capacity to the existing facility through a physical expansion.
3. Close the existing D.C. after building a new facility at a different site.
4. Keep the original D.C. and build a new D.C. for added capacity.

On a macro scale, companies often set annual capital investment budgets where completely unrelated projects vie for those same limited dollars. At this corporate level, that same D.C. capacity expansion project could compete against projects such as IT infrastructure upgrades and the aging fleet of company vehicles (and likely many more).

As stated in the beginning, “*Deciding how best to invest among competing alternatives is a principle function of management.*” By taking into account the tools and methods available you can make better informed, logical choices when evaluating between various investment opportunities.

About AHS

AHS is a full-service provider of supply chain solutions that helps streamline processes, improve employee productivity, and increase return on investment. AHS is uniquely equipped with multiple divisions to provide the complete spectrum of products and services to develop the best solutions for our clients. Whether re-designing an existing distribution center, building a new facility, or simply updating equipment, AHS can assist you with any project.