## Introduction to the Evaluation of Business Investments

Businesses often face the need to spend large amounts of money on assets that will be functional for many years. Here are a few examples:

* Equipment to improve an unsafe work situation or to protect the environment
* Equipment to test the consistency of products as required by the customer
* Equipment to package, label, and ship products according to the customer’s specifications
* Equipment to reduce labor costs and improve the quality of products
* Purchase of a building instead of leasing space

Expenditures made for long-term assets are referred to as [**capital expenditures**](http://www.accountingcoach.com/terms/C/capital-expenditures.html) and are recorded as assets on the balance sheet. During the years that these assets (other than land) are used, their costs are systematically moved from the balance sheet to the income statement through [**Depreciation Expense**](http://www.accountingcoach.com/terms/D/depreciation-expense.html).

**Capital Budgeting**

Limitations such as time, money, and logistics frequently prevent a company from moving forward with too many major expenditure projects at the same time. Instead, a company will often rank its projects by priority and profitability. By using a process called capital budgeting, the company decides which capital expenditure projects will be undertaken and when.

At the top of the list of capital expenditure projects are those for which no real choice exists (e.g., installing an updated sewer line within the plant to replace one that is leaking, correcting a safety hazard, correcting a code violation, etc). The remaining capital expenditures are usually ranked according to their profitability using a capital budgeting model.

## Capital Budgeting Models

There are a number of capital budgeting models available that assess and rank capital expenditure proposals. Four of the most common models for evaluating business investments:

1. Accounting rate of return
2. Payback
3. Net present value
4. Internal rate of return

While each of these models has its benefits and drawbacks, financial managers prefer the net present value and the internal rate of return methods. There are two reasons why these models are favored: (a) all of the cash flows over the entire length of the project are considered, and (b) the future cash flows are discounted to reflect the time value of money.

The following table highlights the differences among the four models:

|  |  |  |
| --- | --- | --- |
| Method | Information Used | Time Period Covered |
| **Accounting Rate of Return** | Accrual Accounting Amounts | Average of All Years or a Specific Year |
| **Payback** | Cash Flows – Not Discounted | Until Cash is Recovered |
| **Net Present Value** | Discounted Cash Flows | Entire Life of Project |
| **Internal Rate of Return** | Discounted Cash Flows | Entire Life of Project |

**Cash flows vs. accounting profits**

The company's **cash flows** are not the same as the accounting net income amounts that are based on accrual accounting. The following table shows the cash received or saved as positive amounts, and the cash that was paid out or lost as negative amounts (in parentheses).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Kiboko Manufacturing, Inc. Relevant Cash Flows**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | Amount Paid  for Machine | Labor  Savings | 30% Income Tax on Labor Savings\* | Income Tax of 30% Saved From Tax Depr\* | Net Cash Flows  Before Discounting | | Today | (100,000) |  |  |  | (100,000) | | Year 1 |  | 24,000 | (7,200) | 3750 |  | | Year 2 |  | 25,000 | (7,500) | 3750 |  | | Year 3 |  | 26,000 | (7,800) | 3750 |  | | Year 4 |  | 27,100 | (8,130) | 3750 |  | | Year 5 |  | 28,200 | (8,460) | 3750 |  | | Year 6 |  | 29,300 | (8,790) | 3750 |  | | Year 7 |  | 30,500 | (9,150) | 3750 |  | | Year 8 |  | 31,733 | (9,520) | 3750 |  |  |  | | --- | | \*NOTE: These tax savings are based on a hypothetical income tax situation. Assume the machine will be depreciated for 8 years using straight line method with no salvage value. | |

**Non-cash, non- discounted model**

**1.** [**Accounting Rate of Return**](http://www.accountingcoach.com/terms/A/accounting-rate-of-return.html). This method of evaluating business investments considers the profitability of a project based on accrual accounting amounts found in the financial statements. The drawback of the accounting rate of return is that the net income amounts are not adjusted for the time value of money. In other words, Ksh.10,000 of net income in Year 4 is considered to be as valuable as Ksh.10,000 of net income in Year 1.

If the new machine is purchased, Kiboko’s income statements will show a reduction of labor expense of about Ksh.24,000 in Year 1 and Ksh.31,733 in Year 8—an average of Ksh.27,729 during the 8 years. The income statements will also show additional depreciation expense of about Ksh.12,500 per year (the Ksh.100,000 cost of the machine and a useful life of 8 years with no salvage value). The net result of the average annual labor savings of Ksh.27,729 minus the additional annual depreciation expense of Ksh.12,500 is an average of Ksh.15,229 of additional net income before income tax expense. Assuming an income tax rate of 30%, the net income after income tax expense will average approximately Ksh.10,660 per year.

Kiboko’s balance sheet will start with the new asset’s [**carrying amount**](http://www.accountingcoach.com/terms/C/carrying-amount.html) (or the [**book value**](http://www.accountingcoach.com/terms/B/book-value.html)) of Ksh.100,000. The book value will decrease to Ksh.0 at the end of 8 years. In other words, the balance sheet amount will average about Ksh.50,000 per year during the 8-year period.

At this point, Kiboko must choose one of the following calculations to estimate the accounting rate of return. (As with most "return" calculations, the numerator comes from the income statement and the denominator comes from the balance sheet.)

* Average additional accounting net income before income tax expense ÷ the additional original investment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ksh.15,229** | **÷** | Ksh.100,000 | = | **15.2%** |

* Average additional accounting net income after income tax expense ÷ the additional original investment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ksh.10,660** | **÷** | Ksh.100,000 | = | **10.7%** |

* Average additional accounting net income before income tax expense ÷ the additional average investment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ksh.15,229** | **÷** | Ksh.50,000 | = | **30.5%** |

Average additional accounting net income after income tax expense ÷ the additional average investment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ksh.10,660** | **÷** | Ksh.50,000 | = | **21.3%** |

As you can see, the calculation Kiboko chooses depends on (a) whether the company prefers to use *before* tax or *after* tax average accounting net income, and (b) whether it prefers to use the *initial* investment amount or the *average* investment amount.

**Non- discounted Cash Flow Model**

**2.** [**Payback**](http://www.accountingcoach.com/terms/P/payback.html). This method of evaluating business investments uses **cash flows** (not the accounting net income flows) to measure the amount of time it takes for a company to recoup its investment.

There are two drawbacks to the payback model: (a) cash flows are not discounted for the time value of money, meaning that a shilling received three years from now has the same value as a shilling received in the current year, and (b) it fails to consider the profitability of the project in its entirety. For example, a project with a fast initial payback might not generate much profit over its life. Another project with a slow initial payback might be phenomenally profitable over its life because its profitability increases dramatically after the payback period.

**Discounted Cash Flow Models**

**3.** [**Net Present Value**](http://www.accountingcoach.com/terms/N/net-present-value.html). This method of evaluating business investments estimates all of the cash flowing in and out of a project. The estimated cash flows are then discounted to the present to reflect the time value of money.

This technique is referred to as a **discounted cash flow model** or a **present value model** because it brings all of the estimated future cash amounts back to the present time. Using our Kiboko Manufacturing example, the estimated cash flows in Year 5 will be discounted more than the estimated cash flows in Year 1 because cash received in the future is less valuable than cash received today.

In the net present value model the company must *specify the rate* it will use for discounting the future cash flows. (The rate selected will likely be the minimum that the company needs to earn on the project after uncertainties, risks, and the company's cost of capital is considered.) The combination of the present value of the cash inflows and the present value of the cash outflows is known as the **net present value**.

Assuming that Kiboko chose to use a rate of 12%, let's calculate the net present value of the relevant cash amounts for Kiboko's proposed purchase:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | End of | Amount Paid for Machines & Labor Savings | Income Tax on Labor Savings\* | Tax Saved From Tax Depr\* | Net Cash Flows Before Discounting | Present Value Factors For Ksh.1 at **12%** | **Present Value Ksh.** | | Today | (100,000) |  |  | (100,000) |  |  | | Year 1 | 24,000 | (7,200) |  |  |  |  | | Year 2 | 25,000 | (7,500) |  |  |  |  | | Year 3 | 26,000 | (7,800) |  |  |  |  | | Year 4 | 27,100 | (8,130) |  |  |  |  | | Year 5 | 28,200 | (8,460) |  |  |  |  | | Year 6 | 29,300 | (8,790) |  |  |  |  | | Year 7 | 30,500 | (9,150) |  |  |  |  | | Year 8 | 31,733 | (9,520) |  |  |  |  | | **Net Present Value** |  |  |  |  |  |  |  |  | | --- | | The table shows the cash amounts discounted by the specified rate of 12%. Cash amounts received or saved are shown as positive amounts. Cash amounts paid are shown in parentheses. All of the cash amounts are assumed to occur at the end of the year. | |

When the net present value is a *positive* amount, the project is earning more than the rate used to discount the cash flows. As you can see from the above table, Kiboko's proposed project is showing a positive net present value of Ksh.14,668. This means that the new machine will provide Kiboko with **Ksh.12,818 more in present value shillings than the minimum specified return of 12%**.

A net present value of Ksh.0 would indicate that a project is expected to earn *exactly* the rate used to discount the future cash flows. If the net present value is a *negative* amount, the project will earn less than the rate used to discount the cash flows. (This doesn't always mean, however, that the project is showing a negative return—it could be the project is earning a return of 11% instead of the specified rate of 12%.)

http://www.accountingcoach.com/openads/www/delivery/lg.php?bannerid=8&campaignid=5&zoneid=6&channel_ids=,&loc=http%3A%2F%2Fwww.accountingcoach.com%2Fonline-accounting-course%2F10Xpg02.html&cb=3dee496d74**4.** [**Internal Rate of Return**](http://www.accountingcoach.com/terms/I/internal-rate-of-return.html). This discounted cash flow model calculates the rate that will cause the net present value to equal zero. In other words, it answers the question, "What rate of return will the project earn over its life?" It is similar to the net present value method in that (a) all of the estimated cash flows over the entire life of the project are considered, and (b) the estimated cash flows are discounted to the present.

Since the internal rate of return model produces the rate that will discount all of the cash back to a net present value of exactly zero, you may need to try various rates (as shown in present value tables) until you find the exact rate that gives you zero. (You will save time by using a computer, financial calculator, or programmable calculator.)

As you can see below, Kiboko finds that a rate of ............. will yield a net present value of Ksh.0:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | End of | Amount Paid for Machines & Labor Savings | Income Tax on Labor Savings\* | Tax Saved  From Tax Depr\* | Net Cash Flows Before Discounting | Present Value Factors For Ksh.1 at **16%** | **Present Value Ksh.** | | Today | (100,000) |  |  | (100,000) | 1.00 | (100,000) | | Year 1 | 24,000 | (7,200) |  |  | 0.86 |  | | Year 2 | 25,000 | (7,500) |  |  | 0.74 |  | | Year 3 | 26,000 | (7,800) |  |  | 0.64 |  | | Year 4 | 27,100 | (8,130) |  |  | 0.55 |  | | Year 5 | 28,200 | (8,460) |  |  | 0.48 |  | | Year 6 | 29,300 | (8,790) |  |  | 0.41 |  | | Year 7 | 30,500 | (9,150) |  |  | 0.35 |  | | Year 8 | 31,733 | (9,520) |  |  | 0.31 |  | | **Net Present Value** |  |  |  |  |  | **KKsh.    – 0 –** |  |  | | --- | | The table shows the cash amounts discounted by the rate that result in net present value of Ksh.0. The cash amounts received or saved are shown as positive amounts. Cash amounts paid are shown in parentheses. All of the cash amounts are assumed to occur at the end of each year.   \*NOTE: These tax savings are based on a hypothetical income tax situation. | |

Knowing that the project has an internal rate of return of 16% may be more useful to Kiboko than knowing its net present value is Ksh.14,668. In fact, if this method is applied to all of its capital expenditure proposals, Kiboko can easily rank the proposals according to profitability. For example, if Kiboko decides to commit no more than Ksh.500, 000 for nonemergency projects, it can start by funding those proposals which show the highest internal rate of return and work its way down the list until the entire Ksh.500,000 is committed.

**Qualitative Factors and Judgment in Investment Appraisal**

In theory, the use of sophisticated techniques is emphasized since they maximize value to shareholders. In practice, however, companies, although tending to shift to the formal methods of evaluation, give considerable importance to qualitative factors. Most companies in Asia are guided, one time or other, by three qualitative factors:

1. Urgency
2. Strategy
3. Environment

All investors think that regency is the most important consideration while a large number thinks that strategy plays a significant role. Some investors also consider intuition, security and social considerations as important qualitative factors. Companies and investors in Kenya consider qualitative factors like employees’ morals and safety, investor and customer image, or legal matters important in investment analysis.

Due to the significance of qualitative factors, judgment seems to play an important role. Some typical response of companies and investors are:

* Vision of judgment of the future plays an important role. Factors like market potential, possibility of technology change, trend of government policies etc., which are judgmental, play important role.
* The opportunities and constraints of selecting a project, its evaluation of qualitative and quantitative factors, and the weight age on every bit of pros and cons, cost-benefit analysis, etc., are essential elements of judgment. Thus, it is inevitable for any management decision.
* Judgment and intuition should definitely be used when a decision of choice has to be made between two or more, closely beneficial projects, or when it involves changing the long-term strategy of the company. For routine matters, liquidity and profits should be preferred over judgment.
* It (judgment) plays a very important role in determining the reliability of figures with the help of qualitative methods as well as other known financial matters affecting the projects.  
  We feel that what businessmen call intuition or (simply) judgment is in fact informed judgment based on experience. A firm growing in a favorable economic environment will be able to identify profitable opportunities without making net present value or internal rate of return computation. Businessmen often act more intelligently than they talk.

**Another Application of a Present Value Calculation**

A savvy company (or individual) will use the net present value method to help determine the amount it should spend to acquire another business. For example, assume that you wish to purchase Kenya orchads You expect that the Kenya orchads will generate a positive net cash flows after tax of Ksh.15,000 per year for ten years, at which time you plan to liquidate or sell the company for Ksh.40,000 after taxes. To cover the risk associated with your investment in Kenya orchads you need to earn 14%. With that in mind, what is the maximum amount you should pay today for Kenya orchads?

The [**net present value**](http://www.accountingcoach.com/terms/N/net-present-value.html) method will give us the amount to be paid in order to earn 14%. The following table shows the required calculations:

|  |  |
| --- | --- |
|  | Net Cash Flows Before Discounting |
| Year 1 | 15,000 |
| Year 2 | 15,000 |
| Year 3 | 15,000 |
| Year 4 | 15,000 |
| Year 5 | 15,000 |
| Year 6 | 15,000 |
| Year 7 | 15,000 |
| Year 8 | 15,000 |
| Year 9 | 15,000 |
| Year 10 | 15,000 |
| Year 10 sale | 40,000 |
| **Net Present Value** |  |

If you purchase the Kenya orchards for Ksh.88,380.00 you will earn exactly a 14% return if the cash flows occur as estimated. If you pay more than Ksh.88,380 you will earn less than a 14% return; a price of less than Ksh.88,380 means you will earn more than a 14% return.

To learn the rate that you will earn on a specific price, you can compute the internal rate of return. This is done by finding the rate that will discount the future cash amounts back to the price.