

Week 12 & 13– Capital Investment Appraisal

*Time Value Of Money - Present Value, Future Value,
Discounted Cash Flow*

1] Compound Interest And Future Value

When you put your money into savings account or purchased government savings bond, you receive **compound interest**.

The interest occurs when interest paid on the investment during the first period is added to the principal; then, during the second period, interest is earned on this new sum.

In order to calculate the compound interest of future value, the formula is as below: -

Week 12 & 13– Capital Investment Appraisal

1] Compound Interest And Future Value (cont'd)

$$FV = PV (1+k)^n$$

where,



FV= the future value of the investment at the end of n year

k = the annual interest / discount rate

PV= the present value, or original amount invested at the beginning of the first year.

n = the number of years during which the compounding occurs.

Week 12 & 13– Capital Investment Appraisal

2] Present Value

In the future value, we have been moving money forward in time and know how much it will grow in the future.

Now, we will look into how much should we invest today for the future sum. In other words, it is the current value of a future sum, that is present value.

In order to calculate the present value, the formula is as below: -

Week 12 & 13– Capital Investment Appraisal

2] Present Value (cont'd)

$$PV = FV [1 / (1+k)^n]$$

where,



FV = the future value of the investment at the end of n year.

k = the annual interest / discount rate.

PV = the present value, or original amount invested at the beginning of the first year.

n = the number of years until the payment will be received.

Week 12 & 13– Capital Investment Appraisal

Investment Decision Technique – NPV, IRR and Payback

When you invest you are normally spending money now, hoping for a return in the future. You need ways of deciding whether the returns are adequate and to help you decide which investments are best.

The projects include:

Invest in a new product line

Replace obsolete assets

Rebuild existing machine

Acquire new plant

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Concept 1 - Emphasis on Cash Flow

“Cash flow is King” seems to be the message for businesses today. The recession experienced by most companies in recent years focused attention on generating cash. Spectacular business collapses in recent years in US demonstrate that reliance on profit or earnings per share as measures of performance can be dangerous. That’s why when financial manager making decision will emphasize cash flow more than accounting profit.

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Concept 2 - Time Value of Money

An important principle in financial management is that the value of money depends on when the cash flow occurs - £100 now is worth more than £100 at some future time. In other words, **money received now is more valuable than the same amount in the future.**

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Discounting Technique 1 - Net Present Value

Net Present Value (NPV) is concerned with cash flow (based on relevant costs and benefits) rather than profits. It is the PV of cash inflow in n years if invested today at a discount rate of $r\%$ less PV of cash outflow.

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Discounting Technique 1 - Net Present Value (cont'd)

Decision rule:-

If **NPV > 0** **Accept** the project as it gives a greater return than a similar investment at the given discount rate.

If **NPV < 0** **Reject** the project as it gives a lower return than a similar investment at the given discount rate.



Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Discounting Technique 2 - Internal Rate of Return

Managers frequently ask: **“What rate of return am I getting on my investment?”** To calculate the correct return, it requires us to find the rate that equates the PV of future benefits to the initial investment (PV of initial investment – PV of cash inflow = 0).

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Discounting Technique 2 - Internal Rate of Return (cont'd)

When calculating **IRR**, we must provide the project's NPV at 2 different discount rates (1 positive and 1 negative) and estimate the IRR using the following equation.

$$\mathbf{IRR} = r_{+} + \frac{NPV_{+}}{NPV_{+} - NPV_{-}} [r_{-} - r_{+}]$$

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Discounting Technique 2 - Internal Rate of Return (cont'd)

where,



r_+ and r_- are two discount rates

NPV_+ and NPV_- are their corresponding NPV.

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Discounting Technique 2 - Internal Rate of Return (cont'd)

Decision rule:-

If **IRR > Cost of capital** = **Accept** the project as having additional NPV after deducting all cost of financing.

If **IRR < Cost of capital** = **Reject** the project as *not* having additional NPV after deducting all cost of financing.



Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Non-Discounting Technique 1 - Payback Period

This method focuses on how many years it recovers the cash flows from a project to pay back the initial investment. It does not explicitly consider the time value of money by discounting cash flow to find present value.

The payback period can be based on either:

- Cash flow without discounting
- Discounted cash flow

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Non-Discounting Technique 1 - Payback Period (cont'd)

Cash proceeds must be calculated year by year until they total the original outlay.

Of course, the cash flows above are not discounted. If calculating discounted cash flows, take interest rate into account.

Week 12 & 13– Capital Investment Appraisal

Technique – NPV, IRR and Payback (cont'd)

Non-Discounting Technique 1 - Payback Period (cont'd)

Decision Rule:-

If **Payback period** < **Target** = **Accept** the project

If **Payback period** > **Target** = **Reject** the project

