PROJECT APPRAISAL & FINANCE

SESSION --11

Environmental Appraisal of Projects: Meaning of Environment and Pollution:

An ecosystem is a functional unit of nature where organisms interactwith each other and their surrounding. There are many external forces, substances or conditions which can effect the living organism in one way or the other. These factors which can effect living organisms are in toto referred to as the **environment.**

Pollution is the introduction of harmful material into the environment.

- **Pollution created by Different Industries**.

Industrial Activities release / emit harmful chemicals into the stratosphere
, into water bodies and which leach into the soil too over time.

Air Pollution-

- Sulphur dioxide released by the burning of fossil fuels particularly coal and at times petrol and diesel by Power Plants
- Carbon monoxide , hydrocarbons , nitrous oxides – Automobile and Transport industry

Water Pollution –

Major source of pollutants are:

- Domestic – homes and commercial establishments due to badly maintained drainage and sewerage systems
- Industrial wastes and effluents- petro-chemical, fertilizer, tanneries, steel , distilleries, coal washeries, synthetic material , drugs, fibres, rubber , plastic Radioactive Pollution –

- **Methods of preventing Pollution.**

Preventing Air Pollution:

- Desirable and harmless air quality standards have to be establishedAdequate legislation to compel control of pollutants at source
- PUC Certification
- Use unleaded petrol , CNG (Compressed Natural Gas), mixed fuel containing methanol

Preventing Water Pollution:

- Stabilization of ecosystem-reducing waste input , harvesting and removal of biomass , trapping of nutrients , fish management and aeration
- CSIR's techniques – removal of ammonia, mercury , phenolics and sodium salts for re use of water after decolourization.
    - **Environmental Regulations in India**

- The Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities. EIA was made statutory in 1994.
- The Water (Prevention and Control of Pollution) Act was enacted in 1974 to

provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. The Act was amended in 1988..

- The Air (Prevention and Control of Pollution) Act was enacted in 1981 to provide for the prevention, control and abatement of air pollution in India.

- The Noise Pollution (Regulation and Control) Rules, 2000 under The Environment (Protection) Act - The increasing ambient noise levels in public places from various sources,

- Functions of the Central Pollution Control Board of India at the National Level

  - Advise the Central Government on any matter concerning prevention and control of water and air pollution and improvement of the quality of air.

  - Plan and cause to be executed a nation-wide program for the prevention, control or abatement of water and air pollution;

  - Co-ordinate the activities of the State Board and resolve disputes among them;

  - As per the policy decision of the Government of India, the CPCB has delegated its powers and functions under the Water (Prevention and Control of Pollution) Act, 1974, the Water (Prevention and Control of Pollution) Cess Act, 1977 and the Air (Prevention and Control of Pollution) Act, 1981 with respect to Union Territories to respective local administrations.

  - CPCB along with its counterparts State Pollution Control Boards (SPCBs) are responsible for implementation of legislations relating to prevention and control of environmental pollution.

Functions of the Central Board and State Boards for the Union Territories

- Advise the Governments of Union Territories with respect to the suitability of any premises or location for carrying on any industry which is likely to pollute a stream or well or cause air pollution;

- Evolve efficient methods for disposal of sewage and trade effluents on land;develop reliable and economically viable methods of treatment of sewage, trade effluent and air pollution control equipment;;Environmental Impact Assessment for Projects Introduction:

Formally Environmental Impact Assessment (EIA) and Strategic Environmental Analysis (SEA) are structured approaches for obtaining and evaluating environmental information prior to its use in decision making in the development process.

.Due Diligence reports contain inter alia comments / opinions on the Project's vulnerability if harmful events were to occur and arrive at the maximum possible loss(MPL) as regards the plant in that eventuality.

- . Environment Impact Assessment (EIA) may need to be carried out if the probability of such occurrence is high.

- The impact depends on the nature ,scale, and location of the Project and it

includes the effect on the natural resource base (quality of air, water, noise , biological) and socio- economic components of the environment management.

- Inter – alia EIA involves mainly:
  Identification of environmental components impacted Likely to be and the sources of impact, Extent of Impact & Mitigation.

General procedure for EIA:

- Project screening, Scoping on of Project / Development Action,Defining th,Consideration of Alternatives,Descripti e Environmental baseline,
- Main: Identification, Prediction, Evaluation, Mitigation

Decision making,Monitoring,Auditing. EIA related legislation

The Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991. EIA was made statutory in 1994.

EIA Notification 2006:

Projects seeking environment clearance have been divided into 2 categories- Category A-All major projects such as river valley, nuclear , thermal power, mining etc. require EIA study and clearance from Central Govt.

Category B- Clearance is accorded by State Environmental I Assessment Authority(SEIAA) on appraisal and recommendation by Level Expert Appraisal Committee(SEAC). Category B1 are those th require EIA study and B2 which do not require EIA study.

x----------x----------x

Social Cost Benefit Analysis (SCBA). SOURCE: "Projects: Planning , Implementation , and Review"-Prasanna Chandra 8th Edition (10th reprint-2018) Chapter 14.**SCBA** also called economic analysis is a methodology developed for evaluating investment projects from the point of view of the society or economy as a whole.

- **The rationale for SCBA-**
  Focus is on social costs and benefits of the project as differentiated from monetary costs and benefits:
  Market imperfections-rationing, minimum wages, foreign exchange regulation

Externalities-like infrastructure benefiting, environment pollution harming neighbouring areas,

- Taxes and subsidies-cost/gain from private point of view, transfer payments from social point of view
- Concern for savings-higher valuation is placed on savings (a it leads to investment) and lower value on consumption
- Concern for redistribution-a rupee going to an economically backward section is socially more valuable than going to an affluent section
- Merit wants- adult education, balanced nutrition programmes are more vauable in SCBA even though they are not sought by conumers in the market place.

- **Different approaches to SCBA-**

- **UNIDO (UN Industrial Development Organization) Approach**Stages:
  - Calculation of Financial Profitability at market prices
  - Obtain net benefit in terms of economic prices (efficiency or shadow prices)

Shadow pricing - Basic issues:

- Choice of Numeraire: "*net present consumption in the hands of the people at the base level of consumption in the pvt sector in terms of constant prices in domestic accounting currency"*- Concept of tradability-for a tradable good international price (border price) represents the "real" value of the good in terms of economic effeciency

-3 Sources of shadow prices-1.if impact on consumption: consumer willingness to pay 2. if impact on production: cost of production 3. if impact is on international trade : foreign exchange value

- Taxes-when a project augments domestic production by other producers taxes should be excluded; for fully traded goods taxes should be ignored; when a project results in diversion of non traded inputs which are in fixed supply from other producers or addition to non-traded consumer goods, taxes should be included.

Shadow pricing - Specific resources:

- traded Inputs and outputs – border price translated in domestic currency at the market exchange rate

-non tradable inputs and outputs-a good is non-tradable if “cif” price > domestic cost of production or “fob” price < its domestic cost of production

- externalities- product which is an incidental outcome, not traded in market, beyond the control of the persons affected

- labour inputs-labour from other employments, induce new workers, import of workers]
- Capital inputs Foreign exchange
  - ❑ Adjust for impact on savings and investment
  - ❑ Adjust for impact on income distribution
  - ❑ Identify Income gain/loss of Groups; Project, Other Pvt Business, Govt, Workers, Consumers, External sector
  - ❑ Adjust for impact on merit and demerit goods
- more and less than economic value respectively
  - ➢ **Little–Mirrlees (LM) Approach**
  - ❑ Similarities with UNIDO approach

-Calculating shadow prices
-Considering the factor of equity
-Using DCF analysis
  - ❑ Differences with UNIDO approach

- ➢ L-M approach measures cost and benefits on international prices (border prices).measures in terms of uncommitted social income instead of consumptionefficiency, savings and redistribution are dealt with together instead of individually

- ➢ Methodology followed by Financial Institutions:

3 Aspects are Considered:

- ❑ Economic rate of Return – Border prices for all non labour inputs and outputs

- “cif” prices for inputs and “fob” prices for outputs

- Social conversion factor is used for non tradable goods like electricity, transportation , taking into account 3 components – tradable , labour and residual.
- Step 1: Ascertain Social cost of Initial Outlay
- Step 2: Acertain Social cost of operations
- Step 3: Ascertain the stream of Costs and Benefits
- Step 4: Use the IRR formula to arrive at the value of “r” which will be the ERR of the project.

- ❑ Effective rate of Protection:

(Value added at domestic prices – Value added at world prices)÷(Value added at world prices).

- ❑ Domestic resource cost (DRC)

Reflects the domestic cost incurred per unit of foreign exchange saved or earned.

If the domestic resource cost per USD saved is less than the present exchange rate it is

desirable to manufacture the product in the country rather than import it.

DRC= A+B+C ÷ P- (Q+R+S+T) X Exchange rate where
A=10%charge on domestic capital
B=8%Depreciation on domestic capital assets other than land C=annual cost of Non traded inputsP= Sales realizations at border prices Q=10%charge on imported capitalR= 8%Depreciation on imported capital assets S=annual cost of imported inputsT= is the annual cost of domestically procured but tradable inputs

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Session 15- Structuring Projects: How project structures create value

Project management typically revolves around three parameters – Quality, Resources, and Time. A project structure can usually be successfully created by considering:

1. **Project Goal**
2. **Project Timeline and Order**
3. **Project Milestones**

Definition Phase

Clear Goals

The project manager is responsible for the achievement of all project goals. These goals should always be defined using the SMART paradigm (specific, measurable, ambitious, realistic, time-bound)..

Transparency About the Project Status

Your flowcharts, structure plan, and milestone plan are useful tools to help you stay on track.

Risk Recognition

It's the duty of the project manager to evaluate risks regularly.. The sooner you identify these risks, the sooner you can address negative developments.

Managing Project Disturbances

It's not very likely that you have enough personal capacity to identify every single risk that may occur. Instead, work to identify the big risks and develop specific strategies to avoid them. Even if you're no visionary, you should rely on your skill set, knowledge, and instincts in order to react quickly and productively when something goes wrong.

Responsibility of the Project Manager

Project managers of all projects must possess the following attributes along with the other project-related responsibilities:

- Knowledge of technology in relation to project products
- Understanding Management concepts
- Interpersonal skills for clear communications that help get things done
- Ability to see the project as an open system and understand the external-internal interactions

Project Success

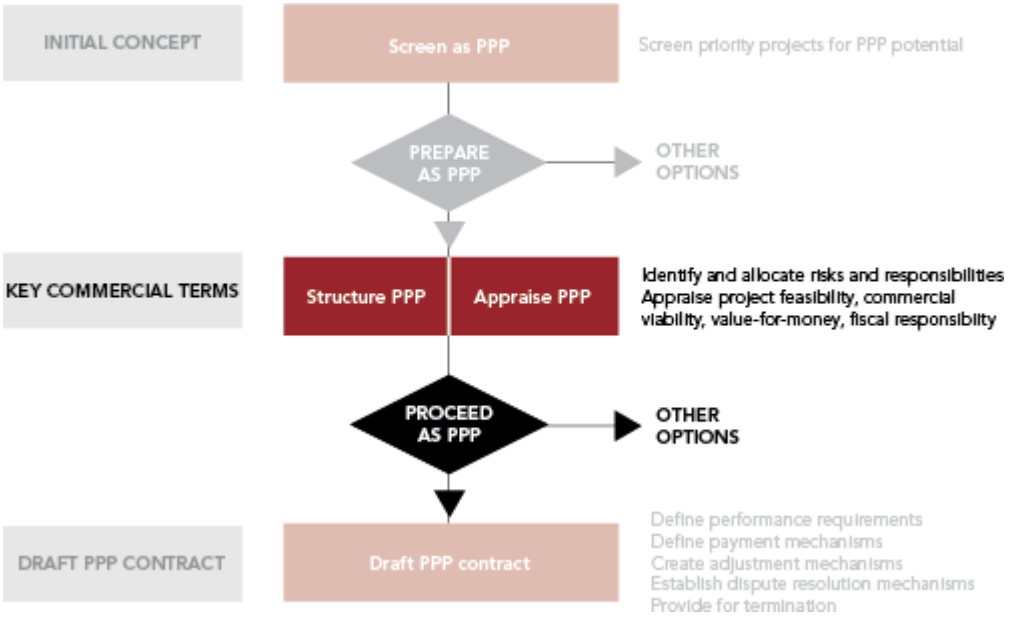
Project success is a multi-dimensional construct that can mean different things to different people. It is best expressed at the beginning of a project in terms of key and measurable criteria upon which the relative success or failure of the project may be judged. For example, some generally used success criteria include:

- Meeting key project objectives such as the business objectives of the sponsoring organization, owner or user
- Eliciting satisfaction with the project management process, i.e., the deliverable is

complete, up to standard, is on time and within budget

Structuring a PPP project" means allocating responsibilities, rights, and risks to each party to the PPP contract.. The key commercial terms are typically detailed enough to enable practitioners to appraise the proposed PPP, as described in Identifying PPP Projects, before committing the resources needed to develop the draft PPP contract in detail.

Structuring PPP Projects



Structuring PPP Projects shows how PPP structuring—to the level of key commercial terms—fits into the overall development process. Information from the feasibility study and economic viability analysis is a key input to PPP structuring.Technically feasible, economically and commercially viable, fiscally responsible, and provide value for money.
The starting point for PPP structuring is the project concept: that is, the project's physical outline, the technology it is expected to use, the outputs it will provide, and the people it will serve. These are often developed before deciding whether to implement the project as a PPP, as described in Identifying PPP Projects.

The specification of output requirements in the PPP contracts is described in Designing PPP Contracts.
This section follows the literature, starting with identifying and prioritizing project risks (Identifying Risks) then describing how risks are allocated (Allocating Risks) then explaining how the risk allocation relates to the other aspects of project structure (Translating Risk Allocation into Contract Structure)..

There are four types of organizational structures, each of which has their own unique set of influences on the management of the organization's projects:

1. Functional, 2.Project 3.Matrix 4.Composite

Functional

Most organizations are divided along functional lines, that is, each “division” is organized by work type, such as engineering, production, or sales.

In the functional organizational structure, projects are initiated and executed by the divisional managers, who assume the project manager duties in addition to their regular, functional, roles. They are often given secondary titles such as “Coordinator of Project X.”In this structure, project managers usually don’t have alot of authority to obtain resources or to manage schedules and budgets.

Project-Oriented

On the other end of the scale is the project-oriented organization. These companies do most of their work on a project basis and are therefore structured around projects. This includes construction contractors, architectural firms, and consultants.

Project managers are usually full time in the role, and for small projects they might manage several projects at once.

In this structure project managers usually have a great deal of independence and authority. They are able to draw on resources with little required approval.

theories of corporate governance and organizational purpose. An integrated vision of projects would directly link projects and programs to governance and strategy, whereas the continued promotion of single project management practices reinforces the top-down mechanistic shareholder approach and deny any value creation mission for project management, as shown in Exhibit 2.

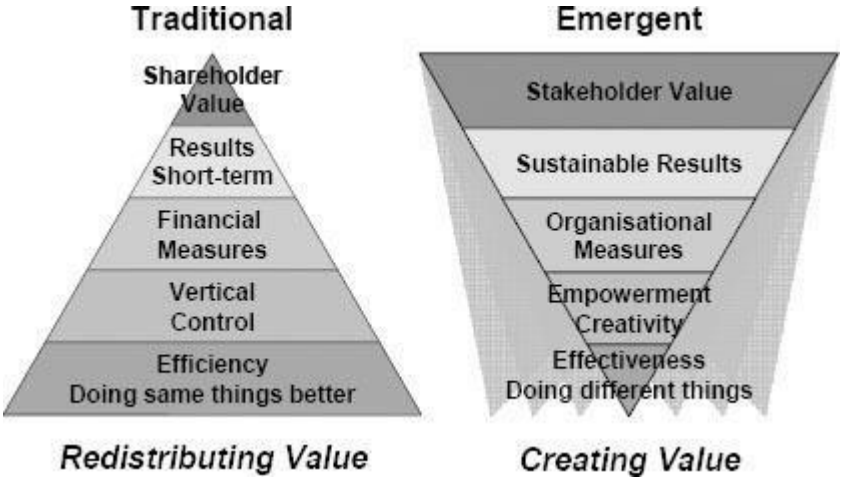


Exhibit 2: Shareholder and stakeholder value approaches

Vertical and Horizontal Integration

Corporate strategies can be considered as medium or long-term forecasts of the organization's future position. Their implementation is usually a top-down process and regards the high level direction of the corporation. In PBOs, portfolio management should not just be used to allocate resources in the most efficient way, but foster vertical

integration between programs and projects to align with corporate strategy and effectively create value for the business.

Business units, because they are close to the action, will best be able to deal with turbulent environments by developing *business strategies.* In PBOs, the word ‘business unit’ may often be synonymous with ‘programs’ and the advantage of a horizontally integrated project management approach *versus* a product delivery project management approach should be obvious.

X.....X.....X.....X

SESSION 16: PORTFOLIO THEORY TO CAPITAL BUDGETING

The major contribution of modern **portfolio theory** to the **capital budgeting** problem is to assist management in analysing and evaluating the risk associated with individual investments within the context of a set of other investments Capital budgeting is the process that companies use for decision making on capital projects—those projects with a life of a year or more. This is a fundamental area of knowledge for financial analysts for many reasons.

Capital budgeting undergirds the most critical investments for many corporations—their investments in long-term assets. The principles of capital budgeting have been applied to other corporate investing and financing decisions and to security analysis and portfolio management.

The typical steps in the capital budgeting process are: 1) generating ideas, 2) analyzing individual proposals, 3) planning the capital budget, and 4) monitoring and post-auditing.

Projects susceptible to capital budgeting process can be categorized as: 1) replacement, 2) expansion, 3) new products and services, and 4) regulatory, safety and environmental.

Capital budgeting decisions are based on incremental after-tax cash flows discounted at the opportunity cost of funds. Financing costs are ignored because both the cost of debt and the cost of other capital are captured in the discount rate

The net present value (NPV) is the present value of all after-tax cash flows, or

NPV=n∑t=0CFt(1+r)t

where the investment outlays are negative cash flows included in the CF_ts and where *r* is the required rate of return for the investment.

The IRR is the discount rate that makes the present value of all future cash flows sum to zero. This equation can be solved for the IRR:

n∑t=0CFt(1+IRR)t=0

The payback period is the number of years required to recover the original investment in a project. The payback is based on cash flows.

The discounted payback period is the number of years it takes for the cumulative discounted cash flows from a project to equal the original investment.

The average accounting rate of return (AAR) can be defined as follows: AAR=Average net

incomeAverage book valueThe profitability index (PI) is the present value of a project’s

future cash flows divided by the initial investment:

- PI=PV of future cash flowsInitial investment=1+NPVInitial investment

The capital budgeting decision rules are to invest if the NPV > 0, if the IRR > *r,* or if the PI > 1.0. There are no decision rules for the payback period, discounted payback period, and AAR because they are not always sound measures.

Depreciation schedules affect taxable income, taxes paid, and after-tax cash flows, and therefore capital budgeting valuations.

Spreadsheets are heavily used for capital budgeting valuation.

When inflation exists, the analyst should perform capital budgeting analysis in “nominal” terms

if cash flows are nominal and in "real" terms if cash flows are real.

Sensitivity analysis calculates the effect on the NPV of changes in one input variable at a time.

Scenario analysis creates scenarios that consist of changes in several of the input variables and calculates the NPV for each scenario.

Simulation (Monte Carlo) analysis is used to estimate probability distributions for the NPV or IRR of a capital project. Simulations randomly select values for stochastic input variables and then repeatedly calculate the project NPV and IRR to find their distributions.

Risk-adjusted discount rates based on market risk measures should be used as the required rate of return for projects when the investors are diversified. The capital asset pricing model (**CAPM)** and arbitrage pricing theory (APT) are common approaches for finding market-based risk-adjusted rates.

In the CAPM, a project's or asset's beta, or β, is used as a measure of systematic risk. The security market line (SML) estimates the asset's required rate of return as $r_i = R_F + \beta_i [E(R_M) - R_F]$.

Real options can be classified as 1) timing options; 2) sizing options, which can be abandonment options or growth (expansion) options; 3) flexibility options, which can be price-setting options or production-flexibility options; and 4) fundamental options. Simple options can be evaluated with decision trees; for more complex options, the analyst should use option pricing models.

Economic income is the investment's after-tax cash flow plus the change in the market value. Accounting income is revenues minus expenses.

Economic profit is EP =

NOPAT – WACC

where NOPAT = Net operating profit after tax = EBIT(1 – Tax rate) and WACC = cost of capital = WACC × Capital. When applied to the valuation of an asset or security, the NPV of an investment (and its market value added) is the present value of future EP discounted at the weighted average cost of capital.

NPV=MVA=∞∑t=1EPt(1+WACC)t

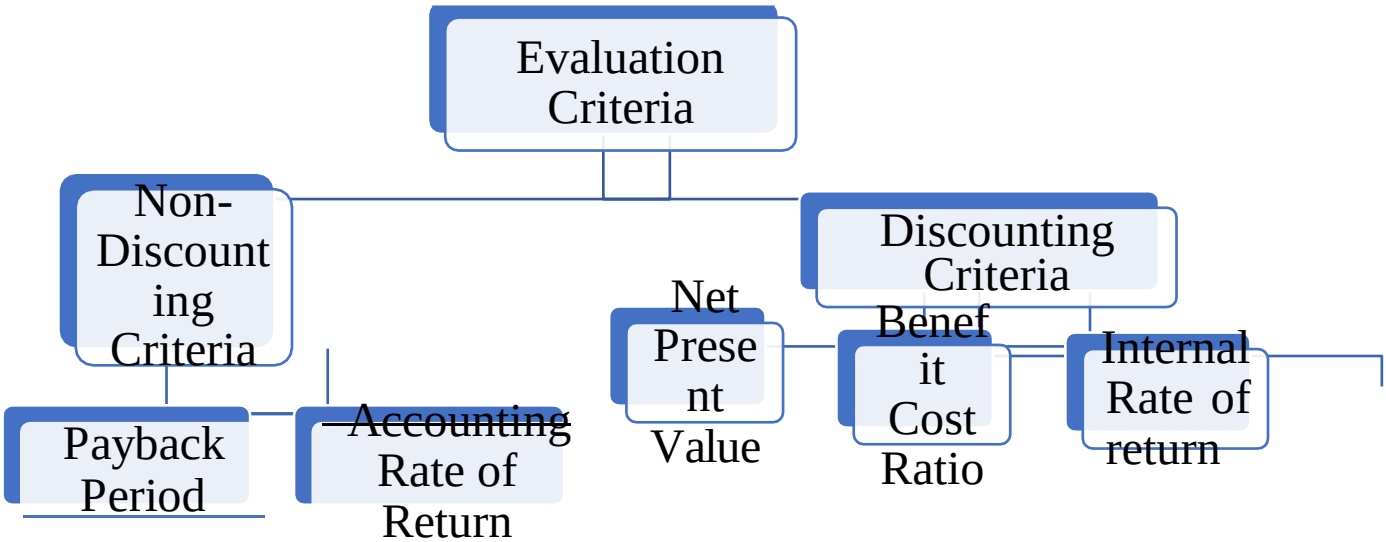
X.....X.....X.....X

(SESSION—SEVENTEEN) VALUING PROJECTS

AppraisingaProjectbyDiscountingandNon-Discounting Criteria

Capital budgeting decisions relate to acquisition of assets that generally have long-term strategic implications for the firm.Capital budgeting decisions become fairly intricate as it impacts other areas of corporate finance like capital structure, dividends and cost of capital. Why Important because it isNon-reversible,Large initial outflow followed by small periodic inflows, Information gap and inexperience,

Strategic and risky in nature,



NPV

NPV is the net benefit that a project will yield, in terms of today's money value.
Rs. 100 in hand today, is worth Rs. 110 a year down the line, if it is possible to earn a 10% return during the period, on the initial amount. In the example, Rs. 100 is the present value (PV); Rs.
110 is the future value (FV); 10% is the discount rate (r); and the time period (t) is 1 year. Their relation is defined by the following equation:

$PV = FV \div (1 + r)^t$

In the given example, the expression in the right can be substituted as $110 \div (1 + 10\%)^1$ i.e. $110 \div (1 + 0.10)^1$ i.e. $110 \div (1.10)^1$ i.e. 100

Thus, NPV calculations involve the following stages:

- Evaluate the cash flows that a project is likely to yield at various points of time in future.
- Decide on a discount factor. There are various ways of arriving at this number. This is discussed later in this Chapter.
- Discount each cash flow by the discount factor to arrive at its present value.
- The total of the present values of each cash flow during the life of the project is the gross present value of the project.
- Gross present value less Project Cost is the NPV.

Suppose a company's financials are as shown in Table 5.1.

Financials of Company ABC

Earnings before Interest, Depreciation, Tax &Amortisation (EBIDTA)		Rs. 9,000
Less Interest		Rs.1,5000
Less Depreciation & Amortisation		R. 5,000
Profit before Tax		Rs. 2,500
Tax at 30%		Rs750
Profit after Tax	Rs 1750	

The net present value calculations are based on discounting cash flows – not profits.

The return that investors expect from a company's equity shares again is a function of the inherent risk in the company, the level of transparency with which it operates, its overall corporate governance standards etc. Investors are comfortable with a lower return from equity shares of companies that do not take much risk, are very transparent in their operations and maintain high corporate governance standards.

Cost of equity can also be measured as follows:
$R_f+\beta(R_m-R_f)$ where, R_f is the Risk-free return β denotes the beta of the company's shares[2]; R_m is the market return from a diversified equity index;
Suppose the risk-free return is 6%, beta of a company's shares is 1.1 and the return on a diversified equity index is 20%. Cost of equity can be calculated as 6% + {1.1 X (20% – 6%)} i.e. 6% + (1.1 X 14%) i.e. 21.4%

IRR

IRR is the discount rate at which NPV becomes zero i.e. PV of gross cash flows is equal to the Project Cost.

However, MS Excel allows the use of IRR function for the calculation. Suppose the cost of a project is Rs. 500. It is likely to yield cash flows during the project life of Rs. 100, Rs. 300 and Rs. 600 during the three years.

IRR

C8 | =IRR(C6:F6)

	A	B	C	D	E	F
4						
5			*Year 0*	*Year 1*	*Year 2*	*Year 3*
6	Cash Flows		-500	100	300	600
7						
8	**Internal Rate of Return**		**33%**			

Since the above calculation is based on annual cash flows, the calculated value is annual IRR. If monthly cash flows are available, then the calculated value would be monthly IRR. This can be annualised by multiplying by 12, to determine annual IRR.

Similarly, quarterly IRR has to be multiplied by 4 to arrive at annual IRR..

Unfortunately, IRR does not inform how much value will be added to the company in rupees. NPV is the value that a project will add to the company.

5.2 XIRR

The calculated IRR value is the IRR for a period, which in the above example was 1 year. This period needs to be constant. For instance, IRR function should not be used, if the third inflow related to Year 3 and Year 4 combined.

Where the time periods are irregular, then the calculations should be done based on entering the actual year-end dates against each cash flow, and using the XIRR function. Unlike IRR function which only uses the cash flows as inputs, XIRR function also requires

the respective dates. This is illustrated in Table 5.4, assuming the third inflow related to two years.

Table 5.4

Calculation of xiRR

C9 | =XIRR(C7:F7,C6:F6)

	A	B	C	D	E	F
4						
5			*Year 0*	*Year 1*	*Year 2*	*Years 3 & 4*
6	Yar-end Date		*31-Mar-12*	*31-Mar-13*	*31-Mar-14*	*31-Mar-16*
7	Cash Flows		-500	100	300	600
8						
9	**Internal Rate of Return**		**27%**			

5.3 MIRR

An inherent assumption in IRR calculations is that the

intermediate cash flows can be re- invested at the IRR. In the example in Table 5.3, the assumption is that Rs. 100 received at the end of Year 1 can be re-invested at 33% for 2 years; similarly, Rs. 300 received at the end of Year 2 can be re- invested at 33% for a year. Such re-investment is not always possible. Therefore high IRRs give a more optimistic picture than reality; low IRRs give a more pessimistic picture.

Similarly, the project may be financed through a loan that may be at a different rate. These differences in rates are addressed by calculated a modified IRR, using the MIRR function. This function accepts financing rate and re-investment rate as additional inputs. The calculation for the numbers in Table 5.3 is shown in Table 5.5, taking financing rate as 15% and re- investment rate as 12%.

Table 5.5

Calculation of MIRR

C12 | =MIRR(C6:F6,C8,C10)

	A	B	C	D	E	F
4						
5			*Year 0*	*Year 1*	*Year 2*	*Year 3*
6	Cash Flows		-500	100	300	600
7						
8	Finance Rate		15%			
9						
10	Re-investment Rate		12%			
11						
12	**Internal Rate of Return**		**29%**			

5.4 Payback Period

NPV and IRR give an idea about the viability of the project over its lifetime. However, they do not reveal when the investment in the project will be paid back. Payback period provides that information.

Calculation of Payback Period

Rs. Crore

	Year 0	Year 1	Year 2	Year 3	Year 4
Investment	-300				
Cashflow		75	100	150	200
Salvage Value					25
Total	**-300**	**75**	**100**	**150**	**225**

In the first two years of the project, the cash flows amount to Rs. 75 crore + Rs. 100 crore i.e. Rs. 175 crore – still not adequate to payback the investment of Rs. 300 crore.

However, the addition of the Year 3 cash flow of Rs. 150 crore takes the total cash flow of Rs. 325 crore, which is more than the original investment. Thus, the investment of Rs. 300 crore is paid back sometime in Year 3.

The moment cash flow in Year 3 reaches Rs. 125 crore, the

project investment is paid back (Rs. 75 crore + Rs. 100 crore + Rs. 125 crore). Since the total cash flow in Year 3 is Rs. 150 crore, the figure of Rs. 125 crore amounts to Rs. 125 crore ÷ Rs. 150 crore i.e. 83% of the Year 3 cash flow. 83% of 12 months is 10 months. Thus, the project is paid back in 2 years and 10 months.

5.5 Discounted Payback Period

The earlier payback period calculations do not account for time value of money. The Rs. 300 crore of investment will get paid back through cash flows in 2 years and 10 months. However, future cash flows are less valuable than today's money that is invested in the project.

Discounted payback period calculations entail discounting each cash flow to its present value. The calculations are shown in Table 5.10.

Rs. Crore

	Year 0	Year 1	Year 2	Year 3	Year 4
Investment	-300				
Cashflow		75	100	150	200
Discount Factor	12%	0.892857	0.797194	0.71178	0.635518
Present Value		66.96	79.72	106.77	127.10
Cumulative Present Value		66.96	146.68	253.45	380.55

Table 5.10Calculation of Discounted Payback Period

In the above table, discount factors are worked out as $1 \div (1+12\%)^n$Cash flow for each year multiplied by the discount factor for that year gives the present value of each cash flow.

The present value of cash flow for each year is totalled sequentially, to arrive at the cumulative present value.

Sometime in Year 4 is when the cumulative present value touches Rs. 300 crore. Cumulative present value upto Year 2 is Rs. 253.45 crore. So discounted payback occurs when Rs. 300 crore – Rs. 253.45 crore i.e. Rs. 46.55 crore is eared in Year 4. This represents 12.23% of the present value of cash flow in Year 4. 12.23% of 12 months is 1.47 months. Therefore, the project is paid back in 3 years and
1.47 months.

x_____x-_____-x_____x

VALUING PROJECTS====SESSION18

AppraisingProjectswithSpecialFeatures
Mutually Exclusive Projects with unequal lives
Optimal Timing of Project
Determination of Economic Life
Investment and Financing Aspects in a Project
Inflation & Capital Budgeting
International Investments

Mutually Exclusive Project

For a proper comparison of the two alternatives, that have different lives, we have to convert the present value of costs into a uniform annual equivalent (*UAE*) figure – this is also called an equivalent annual cost (EAC) figure. The *UAE* is a function of the present value of cost, the life of the asset, and the discount rate. The *UAE* is simply:

PV Cost PVIFA
r,n

1. Optimal Timing of Project

Projects are usually performed in relatively unstable environments. As such, changes to the baseline schedules of projects are inevitable. Therefore, project progress needs to be monitored and controlled. The control process can be assumed as a continuum in which one side is continuous control and the other side is no-control. Continuous control and no-control strategies

are cost-wise prohibited. Hence, project progress should be controlled at some discrete points in time during the project s duration. The optimal number and timing of control points are the main issuesIn real life, an investment is rarely a “now or never” proposition. Typically, it can be undertaken now or at some point of time in future. Given this option, the issue of optimal timing assumes significance.

Under conditions of certainty, the optimal timing may be determined by using the following procedure.

Examine alternative dates (*t*) when the investment can be made.
Estimate the net future value as of each alternative date and convert the same to its current value.Choose the timing that has the highest current value
Book ROI It is a common practice to use book ROI defined as Net income
Book value of assets

for evaluating existing businesses and projects on a continuing basis. Though widely used, the book ROI has two serious flaws: Even though a project may earn a constant economic rate of return, its book ROI displays wide variation across time. There is an upward bias in the book ROI of a business which has substantial investment in intangible assets.

2. Economic Rate of return

Interest rate at which the cost and benefits of a project, discounted over its life, are equal. ERR differs from the financial rate of return in that it takes into account the effects of factors such as price controls, subsidies, and tax breaks to computethe actual cost the project to the economy. The rate of return can be used to judge the success of a project. Obviously, a higher rate of return is desirable, whereas a negative rate of return represents a net loss on the investment within that specific time period.
As rate of return is usually calculated at the end of an investment's useful life, rates of different investments can be compared with each other. This information can be used to drive future investments by revealing **which types of investment provide net gain and which are unsuccessful**. A higher ROI represents a better return on the investment, but it should be taken into consideration that ROI looks at a time period without making many adjustments for the change in the value of money over time.

To understand this ERR economics concept, consider *investing* in the general sense (rather than specifics like capital projects, stocks or bonds). Having $100 today is worth more than having
$100 in five years, namely because that $100 could be invested somewhere and collect interest, meaning that in five years it will in fact be worth more than $100. This assumes a generic interest rate is available for that $100 to be invested, which is often an industry standard.

Economic Rate of Return Example

Consider a company that invests $100 into three different projects. Each project ends up being worth $300 at the end of its life, meaning each project would have the same ROI. However, if project X returned $300 in two years, project Y returned $300 in five years and project Z returned $300 in 10 years, then that's a significant difference in project performance that isn't necessarily

captured in the ROI. This is why businesses use the internal rate of return as well.

$$\text{Economic rate of return for a given year} = \frac{\text{Cash Flow + Change in Present Value}}{\text{Present value at the beginning of the year}}$$

$$\frac{\text{Cash flow} \quad \text{+ Change in book value}}{}$$

SESSION 19

FCF Approach, ERR Approach, Real Options – Issues in valuing long term projects

FCFF, or Free Cash Flow to Firm, is the cash flow available to all funding providers (debt holders, preferred stockholders, common stockholders, convertible bond investors, etc.). This can also be referred to as unlevered free cash flow, and it represents the surplus cash flow available to a business if it was debt-free. A common starting point for calculating it is Net Operating Profit After Tax (NOPAT), which can be obtained by ultiplying Earnings Before Interest and Taxes (EBIT) by (1-Tax Rate). From that, we remove all non-cash expenses and remove the effect of Capex and changes in Net Working Capital, as the core operations are the focus.

To arrive at the FCFF figure, a Financial Analyst will have to undo the work that the accountants have done. The objective is to get the true cash inflows and outflows of the business

Free cash flow approach values the cash flows available to investors after providing for capital expenditure and increase in working capital, deemed essential for growth. Assuming a constant debt ratio funds earmarked for growth from the equity holders

(Capital Expenditure – Depreciation) x (1 – debt ratio) + Increase in Working Capital x (1 – debt ratio)
Constant debt ratio implies that the repayment of debt is made out of new issues of debt.

FCFF in Business Valuation

FCFF is an important part of the Two-Step DCF Model, which is an intrinsic valuation method. The second step, where we calculate the terminal value of the business, may use the FCFF with a terminal growth rate, or more commonly, we may use an exit multiple and assume the business is sold.DCF Analysis is a valuable Business Valuation technique, as it evaluates the intrinsic value of the business by looking at the cash-generating ability of the business. Conversely, Comps and Precedent Transactions both use a Relative Valuation approach, which is common in Private Equity, due to restricted access to information.

Example of How to Calculate FCFF

Below we have a quick snippet from our Business Valuation Modeling Course, which has a step-by-step guide on building a DCF Model. Part of the two-step DCF Model is to calculate the FCFF for projected years.

FCFF Formula

FCFF = NOPAT + D&A – CAPEX – Δ Net WC

NOPAT = Net Operating Profit
D&A = Depreciation and Amortization expense CAPEX = Capital

Expenditure

Δ Net WC = Changes in Net Working Capital

Alternative FCFF Formulas

When a Financial Analyst is modeling a business, they might only have access to partial information from certain sources. This is particularly true in Private Equity, as private companies do not have the rigorous reporting requirements that public companies

do. Here are some other equivalent formulas that can be used to calculate the FCFF.

FCFF = NI + D&A +INT(1 – TAX RATE) – CAPEX – Δ Net WC

*Where:*NI = Net Income

D&A = Depreciation and Amortization Int = Interest Expense
CAPEX = Capital Expenditures
Δ Net WC = Net Change in Working capital

FCFF = CFO + INT(1-Tax Rate) – CAPEX
*Where:*CFO = Cash Flow from Operations INT = Interest Expense
CAPEX = Capital Expenditures

EBIT*(1 – Tax Rate) + D&A – Δ Net WC – CAPEX
*Where:*EBIT = Earnings before Interest and Tax D&A = Depreciation and Amortization CAPEX = Capital Expenditures
Δ Net WC = Net Change in Working capital
FREE CASH FLOW TO EQUITY

Free cash flow to equity is a measure of how much cash is available to the equity shareholders of a company after all expenses, reinvestment, and debt are paid. FCFE is a measure of equity capital usage.

The Formula for FCFE Is

FCFE=Cash from operations−Capex+Net debt issued\text{FCFE} = \text{Cash from operations} - \text{Capex} + \text{Net debt issued}FCFE=Cash from operations−Capex+Net debt issued

How to Calculate FCFE

Free cash flow to equity is composed of net income, capital expenditures, working capital, and debt. Net income is located on the company income statement. Capital expenditures can be found within the cash flows from investing section on the cash flow statement.These are short-term capital requirements related to immediate operations. Net borrowings can also be found on the cash flow statement in the cash flows from financing section. It is important to remember that interest expense is already included in net income so you do not need to add back interest expense.

What Does FCFE Tell You?

The FCFE metric is often used by analysts in an attempt to determine the value of a company. This method of valuation gained popularity as an alternative to the dividend discount model (DDM), especially if a company does not pay a dividend. Although FCFE may calculate the amount available to shareholders, it does not necessarily equate to the amount paid out to shareholders.

Analysts also use FCFE to determine if dividend payments and stock repurchases

are paid for with free cash flow to equity or some other form of financing. Investors want to see adividend payment and share repurchase that is fully paid by FCFE.

If FCFE is less than the dividend payment and the cost to buy back shares, the company is funding with either debt or existing capital or issuing new securities. Existing capital includes retained earnings made in previous periods.

If the company's dividend payment funds are significantly less than the FCFE, then the firm is using the excess to increase its cash level or to invest in marketable securities. Finally, if the funds spent to buy back shares or pay dividends is approximately equal to the FCFE, then the firm is paying it all to its investors.

Example of How to Use FCFE

Using the Gordon Growth Model, the FCFE is used to calculate the value of equity using this formula:

V equity=FCFE(r−g)V_\text{equity} = \frac{\text{FCFE}}{\left(r-g\right)}Vequity=(r−g) FCFE

Where:

- *Vequity = value of the stocktoday*
- *FCFE = expected FCFE for next year*
- *r = cost of equity of the firm*
- *g = growth rate in FCFE for the firm*

This model is used to find the value of the equity claim of a company and is only appropriate to use if capital expenditure is not significantly greater than depreciation and if the beta of the company's stock is close to 1 or below 1.

REAL OPTION VALUATION METHOD

A real option is a choice made available to the managers of a company concerning business investment opportunities. It is referred to as “real” because it typically references projects involving a tangible asset instead of a financial instrument. Tangible assets are physical assets such as machinery, land, and buildings, as well as inventory.

Understanding Real Options

Real options are choices a company’s management makes to expand, change, or curtail projects based on changing economic, technological, or market conditions. Factoring in real options affects the valuation of potential investments, although commonly used valuations fail to account for potential benefits provided by real options. Using real options value analysis (ROV), managers can estimate the opportunity cost of continuing or abandoning a project and make decisions accordingly.

It's an important distinction that real options do not refer to a derivative financial instrument, such as options contracts, which give the holder the right to buy or sell an underlying asset.

Instead, real options refer to choices or opportunities that a business may or may

not take advantage of or realize. For example, investing in a new manufacturing facility may provide a company with real options for introducing new products, consolidating operations, or making other adjustments to changing market conditions.

Net present value (NPV) and real options

The real options method estimates a value for this flexibility and choice, which is present when managers are making a decision on whether or not to undertake a project. Real options build on net present value in situations where uncertainty exists and, for example: (i) when the decision does not have to be made on a now or never basis, but can be delayed, (ii) when a decision can be changed once it has been made, or (iii) when there are opportunities to exploit in the future contingent on an initial project being undertaken. Therefore, where an organisation has some flexibility in the decision that has been, or is going to be made, an option exists for the organisation to alter its decision at a future date and this choice has a value.

It's important to understand exactly how the NPV **formula** works in Excel and the math behind it.

NPV = F / [(1 + r)^n] where, PV = Present **Value**,

F = Future payment (cash flow), r =Discount rate,

n = the number of periods in the future is the most straightforward approach to

real options pricing.

x_____-x____-x____-x

(SESSION-TWENTY)

PROJECT NEGOTIATION.

- **Why and What do we need to negotiate:**
  Project Agreements: Generally the Project Company outsources every corporate and entrepreneurial function and through contracts for supply of goods and services generically referred to as project agreements, it procures everything it needs to develop and operate the project. The system of project agreements is particularly extensive and complex. They have to address certain peculiarities that make it possible to apply project finance – this requirement is defined as the **bankability** of the project agreements
- **Basic Rules to verify their bankability to emphasize in Negotiation**

➢ Reliable counterparty from industrial and financial stand point and compliance transparency
➢ Price indexing clauses – pass through right
➢ Quality index
➢ Take or pay clause - Buyer has to take minimum quantity or pay amount corresponding to minimum quantity - minimum set price.
➢ Pre-established indemnity clause for non performance and based on overall damage to the project. Replace a non-performing supplier
➢ Termination and withdrawal clause – by counterparty should be restricted and in favour of project company in case of default by third parties

- Length of contract should cover the entire repayment period of the credit agreement as lenders are exposed to without recourse credit risk.
- Warranty period

- **Common Project Agreements**

- Construction contracts (EPC – Engineering, Procurement and Construction or Turn–key)
- Operations and Maintenance (O&M) Contract
- Raw Material Supply Agreement
- Refinancing Project Finance deals – restructuring, drawdown, payment clawback

- **Overview**

- Basic types of negotiations
  1. Distributive negotiation- zero sum game one's gain is at another's expense – claiming value
  2. Integrative negotiation- create greater value for eventual distribution- creating and claiming value
- Four concepts-
  1. BTNA-best alternative to a negotiated agreement–a plan B
  2. The reserve price at which you plan to walk away
  3. ZOPA- zone of possible agreement in which deal is feasible
  4. Value creation through trades- One party assumes greater value for something the other has and they trade both benefitting in value terms

- **General aspects to note in the negotiation process**

- Study the Project in detail
- Understand the bankability of the Project
- Determining authority /hierarchy levels in both the organization
- Understanding their background
- Defining Ground Rules
- Be confident, attentive, fair and flexible
- Create trust, avoid any conflict of interest
- Be prepared for multiparty /multiphase negotiations

- **General aspects to note in the negotiation process**

- Use concessions to continue negotiations
- Continual evaluation of stage of negotiation and revisit reparation
- For closing the deal

- **Who is an effective negotiator**

- Aligns with organizational goals
- Prepares thoroughly
- Learns about the other party
- Mental dexterity to make quick assessments
- Indifferent to personal issues
- Ability to quickly spot potential barriers
- Knows how to form coalitions
- Has a reputation for reliability and creditworthiness

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