



**WIRC of ICAI**  
presents

## Capital Budgeting: FM for PCC

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## Capital Budgeting



### Capital Budgeting: Nature



- Normally irreversible decisions
- Pertaining to investments, generally fixed assets
- Having a longish useful life and impact
- Involving an outlay at initial stage
- Yielding a return over time
- In terms of increased revenues/  
reduced costs.

### Process Steps



- Planning
- Evaluating
- Selecting
- Implementing
- Controlling
- Reviewing



## Basic Principles

- Incremental/ relevant cashflows considered
- Long-term funding
- Interest exclusion
- Post-tax



## Importance

- Impact on long-term profitability
- Impact on strategic positioning
- Optimum utilisation of scarce resources
- Objective of maximisation of firm's wealth



## Types of Decisions

- Replacement/ modernisation
- Expansion
- Diversification
- Closure



## Data required

- Cash flow v/s accounting profit
- Incremental cash impact
- Tax effects



## Capital Budgeting

- Accounting Profits: Lacunae
  - ☞ Ignores timing of the profit
  - ☞ Ignores opportunity cost of the funds
  - ☞ Ignores ticket size
- Cashflow approach: Benefits
  - ☑ Mitigates accounting assumptions/ambiguities
  - ☑ Universal application
  - ☑ Considers time value of money!!

# Techniques



## Evaluation Techniques

- Traditional methods
  - Accounting rate of return (ARR)
  - Payback
- Discounted cash flow (DCF) methods
  - Net Present Value (NPV)
  - Internal rate of return (IRR)
  - Profitability index (PI)
  - Modified Internal rate of return (MIRR)
  - Discounted payback



## Accounting Rate of Return

- Ratio of total returns generated as a ratio to total investment
  - ☑ Simple to understand and calculate
    - Average post-tax profits/ average investments
  - ☞ Considers accounting profits
  - ☞ Ignores time value of money
  - ☞ Is size-indifferent



## Payback Period

- Time taken for investment to be recovered
- 👍 Simple to understand and calculate
- 👍 Considers cashflow
- 👎 Ignores time value of money
- 👎 Ignores benefits flowing after payback period
- 👎 Is size-indifferent



## Profit vs Cashflow approach

- Adjustments made to accounting profit
  - Depreciation & amortisation
  - Initial investment/layout
  - Regular capex
  - Working capital changes
  - Salvage value



## Net Present Value

- Cumulative value of project's net CFs, discounted at its cost of capital
- 👍 Most scientific of all methods
- 👍 Reasonably simple to understand/ calculate
- 👍 Most universally accepted and used
- 👍 Considers cash-flows
- 👍 Considers time value of money



## Internal Rate of Return

- Inherent rate of return of a project CFs, independent of its cost of capital
- 👍 Reasonably simple to understand and calculate
- 👍 Considers cash-flows
- 👍 Considers time value of money
- 👎 Is size-indifferent



## Profitability Index

- Ranking mechanism to evaluate each projects returns as a ratio to its investments
- 👍 Simple to understand and calculate
  - PV of inflows/ PV of outflows
- 👍 Considers time value of money
- 👎 Is size-indifferent



## Modified Internal Rate of Return

- Inherent rate of return of project CFs, assuming they are *re*-invested into project at its cost of capital, until end of project life
- 👍 Reasonably simple to understand and calculate
- 👍 Considers cash-flows
- 👍 Considers time value of money
- 👎 Is size-indifferent



## Discounted Payback

- Time taken for investment to be recovered, after due consideration to time value of money
- 👍 Simple to understand and calculate
- 👍 Considers cash-flows
- 👍 Considers time value of money
- 👎 Is size-indifferent
- 👎 Ignores benefits accruing after payback period

**Teasers**



## Teaser

- Initial investment – Rs50,000
- Asset depreciated on SLM over 5 years for taxation purposes
- Salvage value – nil
- Tax rate – 35%
- Year-wise CFBT in Rs.
  - 10,000
  - 10,692
  - 12,769
  - 13,462
  - 20,385
- PVF@14% are .877, .769, .675, .592, .519



## Teaser

- Three projects – L, M and N - involving discounted cash outflow of Rs550, Rs75 and Rs10020
- Sum of discounted cash inflows for these projects are L – Rs650, M – Rs95 and N – Rs10300
- Calculate the PI for these projects



## Teaser

- Zee Ltd. proposes to install a machine involving a capital cost of Rs360,000
- Salvage value at end of machine's useful life of 5 years is nil
- The machine will produce annual net operating income after depreciation of Rs68,000
- Zee Ltd.'s tax rate is 45%
- Calculate IRR if PVA factors for 5 years are below:

Discounting Rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.20	3.13

# Exam Questions



## Exam sum:

- Nine Gems Ltd., a zero-tax co. for seven years, has just installed Machine-MQR at a cost of Rs 200,000. MQR has five year life with no residual value. Annual production volume is 150,000 units, which can be sold at Rs6 p.u. Annual cash operating costs are Rs200,000 at this output level. Fixed costs are at Rs3 p.u. for the same prodn level
- Nine Gems Ltd. has just come across another model called Machine-MZS capable of giving the same output at an annual cash operating cost of Rs180,000. There will be no change in fixed costs. MZS costs Rs250,000 and it's estimated life is five years with nil residual value.
- The company has an offer for sale of MQR at Rs100,000. But the cost of dismantling and removal will be Rs30,000. As it has not yet commenced operations, it wants to sell MQR and purchase MZS.
- Should Nine Gems opt for the replacement, if its cost of capital is 14%.
- Will your view change if MQR has not yet been installed and the company is in the process of selecting one or the other machine?



## Exam sum:

- Following is the data on a capital project being evaluated by the management of X Ltd.:

Annual cost saving	Rs40,000	NPV	??
Useful life	4 years	Cost of capital	??
I.R.R	15%	Cost of project	??
Profitability index (PI)	1.064	Payback	??
Salvage value	nil		

- Find the missing values considering only full table of discount factor

	15%	14%	13%	12%
1 Year	0.869	0.877	0.885	0.893
2 Years	0.756	0.769	0.783	0.797
3 Years	0.658	0.675	0.693	0.712
4 Years	0.572	0.592	0.613	0.636
Total	2.855	2.913	2.974	3.038



## Exam sum:

- S Ltd. has Rs1000 allocated for capital budgeting purposes. The various project outlays and the associated profitability indexes have been determined as below:

Project	P1	P2	P3	P4	P5	P6
Amount Rs.	300	150	350	450	200	400
Profitability Index	1.22	0.95	1.20	1.18	1.20	1.05

- All projects are indivisible and there is no alternative use of the money allocated for capital budgeting
- Which of the project/s should be undertaken?



## Exam sum:

- ABC Ltd. has been producing a chemical product by using machine Z for the past two years. Now it's management is thinking to replace Z either by X or by Y machines. The following details are available:

	Z	X	Y
Book value (Rs000)	100	-	-
Resale value now (Rs000)	110	-	-
Purchase price (Rs000)	-	180	200
Annual fixed costs (including depreciation)(Rs000)	92	108	132
Variable running cost (including labour) p.u. (Rs.)	3	1.5	2.5
Production per hour (unit)	8	8	12
Salvage value (Rs000)	10	15	18

- Each unit will use materials of Rs10, and will be sold for Rs20. Each machine will operate for 2000 operating hours p.a. for the next 5 years
- Depreciation is charged per SLM. Additional annual cost of Rs8,000 would be incurred on special advertising to sell the extra output of machine Y. Tax rate is 50% and cost of capital 10%
- Using NPV method, analyse the feasibility of the proposal



## Exam sum:

- Cash flows of projects C and D are reproduced below:

Project	C0	C1	C2	C3	NPV, 10%	IRR
C	-10,000	+2,000	+4,000	+12,000	+4,139	26.5%
D	-10,000	+10,000	+3,000	+3,000	+3,823	37.6%

- Why there is a conflict of rankings?
- When would you recommend project C in spite of lower IRR?

Years%	10%	14%	15%	30%	40%
1	0.909	0.877	0.870	0.769	0.714
2	0.826	0.770	0.756	0.592	0.510
3	0.751	0.675	0.658	0.455	0.364



## Exam sum:

- LM Ltd. has to make a choice between two projects namely A and B, the details whereof are as under:

Particulars	Project A	Project B
Initial Outlay	135,000	240,000
Scrap value	nil	nil
Annual Income, year 1	-	60,000
Annual Income, year 2	30,000	84,000
Annual Income, year 3	132,000	96,000
Annual Income, year 4	84,000	102,000
Annual Income, year 5	84,000	90,000

- If LM's opportunity Cost of Capital is 16%, calculate:
  - Discounted payback period
  - Profitability Index
  - NPV
- 0.862      0.743    0.641    0.552    0.476



## Exam sum:

- XYZ Ltd. is forced to choose between two machines A and B. The two machines are designed differently, but have identical capacity and do exactly the same job
- Machine A costs Rs150,000 and will last for 3 years. It costs Rs40,000 per year to run
- Machine B is an 'economy' model costing only Rs100,000, but will last only for 2 years, and costs Rs60,000 per year to run
- These are real cash flows
- The costs are forecasted in rupees of constant purchasing power
- Ignore tax
- Opportunity cost of capital is 10%
- Which machine should XYZ Ltd. buy?



## Exam sum:

- Z Ltd. is operating an elderly machine that is expected to produce a net cash inflow of Rs40,000 in the coming year and Rs40,000 next year
- Current salvage value is Rs80,000 and next year's value is Rs70,000
- The machine can be replaced now with a new machine, which costs Rs1,50,000, but is much more efficient and will provide a cash inflow of Rs80,000 a year for 3 years
- Ignore tax. Take opportunity cost of capital as 10 percent
- Z Ltd. wants to know whether it should replace the equipment now or wait a year with the clear understanding that the new machine is the best of the available alternatives and that it in turn be replaced at the optimal point. Advise with reasons



## Exam sum:

- X Ltd., an existing profit-making company, is planning to introduce a new product with a projected life of 8 years. Initial equipment cost will be Rs120 lakh and additional equipment costing Rs10 lakh will be needed at the beginning of third year.
- Working capital requirement is Rs15 lakh
- At end of 8 years, original equipment will have resale value equivalent to cost of removal, additional equipment would be sold for Rs1 lakh
- 100% capacity of the plant is of 400,000 units per annum
- Per unit sale price of Rs100 with a p/v ratio of 60%
- Fixed annual Operating Cash Cost are likely to be Rs16 lakh
- Production/sales volume, additional advertisement exps are expected as under:

Year/s		1	2	03-05	06-08
Capacity utilisation	In %age	20	30	75	50
Advt Expenditure	In Rs Lakh	30	15	10	4

- At 50% tax, straight-line method of depreciation, (permissible for tax purposes too) and 12% after-tax cost of capital, should the project be accepted?



## Exam sum:

- Beta Limited is considering replacement of its existing machine EM by a new machine NM, which is expected to cost Rs264,000.
- NM will yield annual cash revenues of Rs568,750 and incur annual cash expenses of Rs295,750. NM's salvage value at end of year 5 is Rs18,200
- EM's cash revenues will be Rs455,000 and associated cash expenses will be Rs318,500. EM will have a salvage value of Rs.4,550, at the end of five years. EM has a book value of Rs91,000 and can be sold for Rs45,500 today
- Beta Ltd is in 35% tax- bracket, and w/o depreciation at 25% WDV. It has a target debt to value ratio of 15%. In the past, it has raised debt at 11% and it can raise fresh debt at 10.5%
- Beta Ltd plans to follow dividend discount model to estimate cost of equity capital. It plans to pay a dividend of Rs2 per share in the next year, which is expected to grow at 8% p.a. Its current market price is Rs20 per equity share.
- Advise whether Beta Ltd should replace the existing machine, after computing:
  - the incremental cash flows of the replacement decision
  - the weighted average cost of capital of the company
  - the net present value of the replacement decision
  - the discounted payback period of the replacement decision.



## Exam sum:

- PQR Limited has decided to go in for a new model of a Mercedes car. The cost of the vehicle is Rs40 lakh. PQR has two alternatives:
  - taking the car on finance lease; or
  - borrowing and purchasing the car.
- LMN Limited is willing to provide the car on finance lease of PQR Limited for five years at an annual rental of Rs8.75 lakh, payable at the end of the year.
- The car will have a useful life of 5 years, and will fetch a net salvage value of Rs10 lakh at the end of year five. The depreciation rate for tax purpose is 40% on WDV basis. The applicable tax rate for the company is 35%. The applicable before-tax borrowing rate for the company is 13.8462%.
- What is the net advantage of leasing for the PQR Limited?

	1	2	3	4	5
13.8462%	0.8784	0.7715	0.6777	0.5953	0.5229
9.0000%	0.9174	0.8417	0.7722	0.7084	0.6499



## Exam sum: Replacement decision

- DEF Limited is thinking of replacing its existing machine EM by a new machine NM costing Rs60 lakh. DEF's current production is 80,000 units, which will increase to 100,000 units, if NM is bought. The product's selling price would remain unchanged at Rs200 per unit.
- Following is the cost of producing one unit of product using the machines

	Materials	Wages & Salaries	Suprvn	Repairs & Maint.	Power & Fuel	Depn	Allocated Corp Ohs	Total
EM	75.00	51.25	20.00	11.25	15.50	0.25	10.00	183.25
NM	63.75	37.50	25.00	7.50	14.25	5.00	12.50	165.50
Difference	(11.25)	(13.75)	5.00	(3.75)	(1.25)	4.75	2.50	(17.75)

- EM has an accounting book value of Rs100,000, and it has been fully depreciated for tax purpose. EM will be useful for 5 years.
- NM's supplier has offered to accept EM for Rs250,000. However, the market price of EM today is Rs150,000 and it is expected to be Rs35,000 after 5 years. NM has a life of 5 years and a then salvage value of Rs250,000
- Assume corporate Income tax rate at 40%, and depreciation is charged on SLM basis for tax purposes. DEF's cost of capital is 15%
- Based on NPV and IRR of the replacement decision, should DEF go ahead?



## Exam sum: Replacement decision

- JKL Ltd is considering a proposal of installing a drying equipment, DE, which would involve a cash outlay of Rs600,000 and net Working Capital of Rs. 80,000. DE's expected life is 5 years without any salvage value. JKL is allowed depreciation on SLM basis for tax purpose
- Estimated before-tax cash inflows during years 1 thru 5 were 240, 275, 210, 180, and 160 respectively
- The applicable Income-tax rate to the Company is 35%. If JKL's opportunity cost of capital is 12%, calculate DE's
  - discounted payback period
  - payback period
  - NPV and
  - IRR

	1	2	3	4	5
PV factor at 12%	0.8929	0.7972	0.7118	0.6355	0.5674
PV factor at 14%	0.8772	0.7695	0.6750	0.5921	0.5194
PV factor at 15%	0.8696	0.7561	0.6575	0.5718	0.4972

# Thank you

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