

CAPITAL BUDGETING

Capital Budgeting involves :-

- ① Identification - of the projects where investment can be made.
- ② Estimating & Evaluating - post tax incremental cash flows from each project.
- ③ Selection of the best investment proposal (which gives maximum return to shareholders).

② WHY CAPITAL BUDGETING IS IMPORTANT

(i) Substantial investment :- Huge amount of funds are involved in every single project. so it becomes important to analyse each & every aspect before invest.

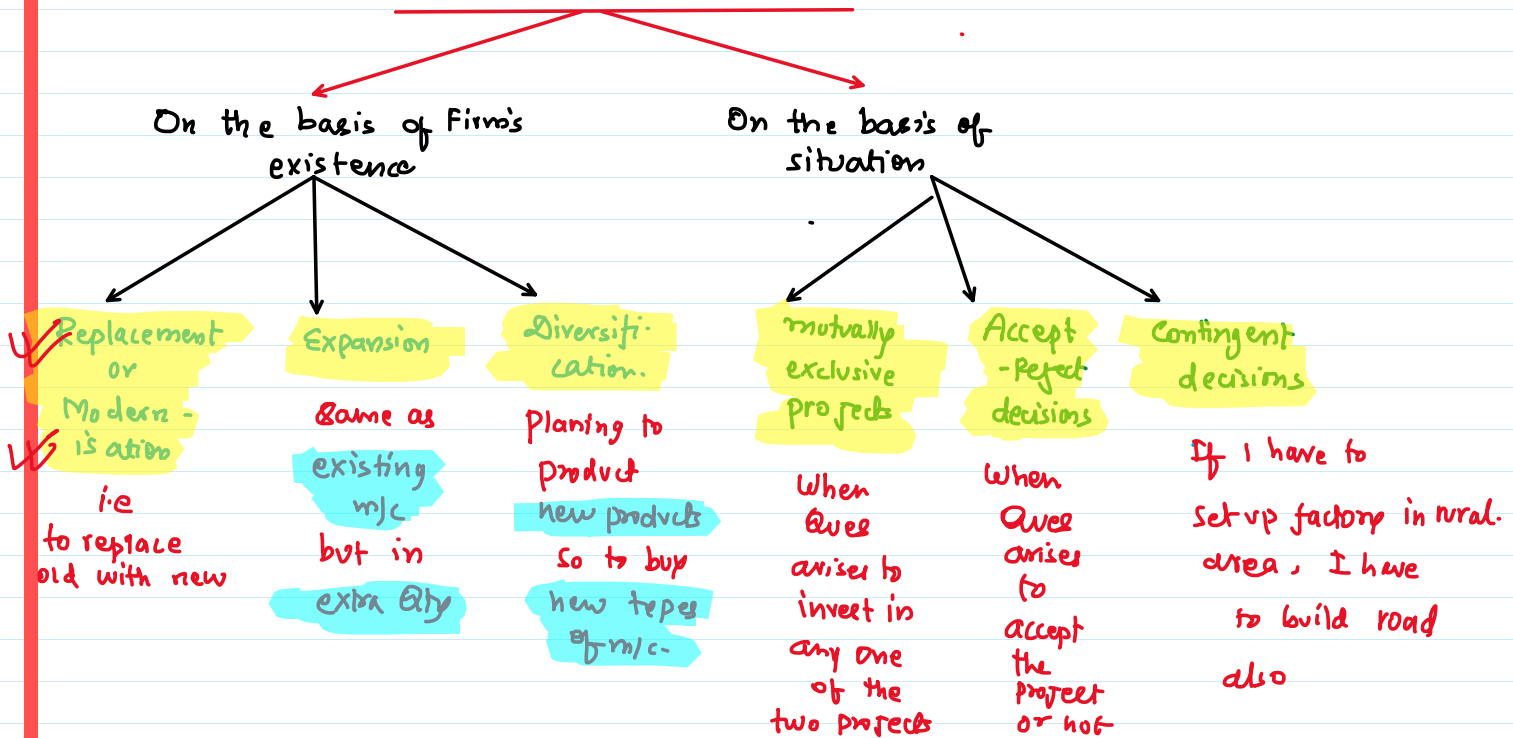
(ii) Long-term period :- The investment in projects are done for a longer period of time let's say 5 years or 10 years.

(iii) Irreversibility :- Since the investments are done for a longer period of time, so the option is opting out of the decision or project is not easily available once the invest is done.

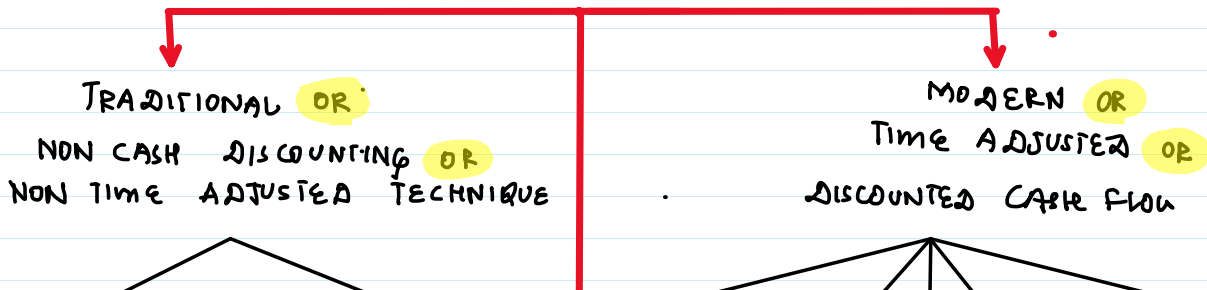
(iv) Complexity :- Before & during continuation of projects

there are no. of parameteres to be evaluated wrt to project & its investment and it even includes the assessment of future which is difficult to do. so it is also difficult to assess income or expenses in future.

③ TYPES OF DECISION IN CAPITAL BUDGETING



④ TECHNIQUES AVAILABLE FOR CAPITAL BUDGETING DECISIONS



ARR method
(Accounting rate of return)

Book profit
or Accounting profit
✓ (5)

Payback period

Cash Flow (CF) (5)

Discounted payback period

Discounted Cash Flow (DCF)

NPV method
DCF

IRR method
DCF

PI method (Profitability Index)

modified IRR
C.C.P

DCF

Disc rate = 10%

PV = $\frac{Yr1}{CF_1}$ $\frac{Yr2}{CF_2}$ $\frac{Yr3}{CF_3}$

8l

8.5

9l.

8l

8.5l

9l.

present
When value of cash flows to be received in future is taken without discounting them, then the technique is known as Non-cash - discounting technique or Non-time adjusted technique as we have ignore the concept of time.

PV = $\frac{Yr1}{CF_1}$ $\frac{Yr2}{CF_2}$ $\frac{Yr3}{CF_3}$

8l

8.5

9l.

7.27

$$\frac{8}{(1+0.1)^1}$$

7.02

$$\frac{8.5}{(1+0.1)^2}$$

6.76

$$\frac{9l}{(1+0.1)^3}$$

When present value of cash flows to be received in future is calculated by discounting with discount rate, then the technique is known as cash discounting or Time adjusted techniques.

(5)

HOW TO CALCULATE A/C PROFIT AND CASH FLOWS

SALES

Xx

(-) Variable cost (always cash) (xx)

Contribution

xxx

(-) Fixed cost in cash (xx)

(-) Non cash Fixed Cost [Depreciation] (xx)



"No Interest"

Profit before Tax

xxx

(-) Tax

(xx)

Profit after Tax [BOOK PROFIT] xxx

+ Depreciation

xx

Cash Flows.

xxx

WACC (k_0) for discounting.

xx

DISCOUNTED CASH FLOWS

xxx

⑥ IMPORTANT TERMS TO UNDERSTAND

- ① Depreciation :- Depreciation is a non-cash expenses so it is deducted to calculate A/c profit but added back to calculate Cash flows
- (first deducted, then added back)
- And due to this process it also helps in saving tax.

Ex-1 Sales = 100

Ex-2 Sales = 100

= .

- VC = 30	- VC = 30
<hr/>	<hr/>
Contri = 70	Contri = 70
- FC cash = 20	- FC cash = 20
- dep = 20	- dep = 0
<hr/>	<hr/>
PBT = 30	PBT = 50
- tax @ 50% = (15)	- tax = (25)
<hr/>	<hr/>
DAT = 15	PAT = 25
+ dep = 20 $\times 50\%$ = 10	+ dep = 0
<hr/>	<hr/>
Cash flow = 35	Cash flow = 25

Cash flow with dep > Cash flow w/out dep

$$\text{Cash flow with dep} = \text{Cash flow w/out dep} + \text{dep} \times \text{tax}$$

② Opportunity cost
(included on expenses side)

It refers to amount of profit lost or forgone due to accepting other project. It is considered in capital budgeting process as an expense.

③ Sunk cost
(ignore)

- means cost which has already been occurred and thus is NOT RELEVANT or not considered in capital budgeting process.

④ Allocated OP

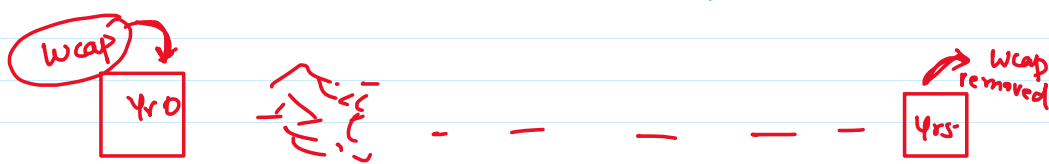
(ignore)

- It refers to the combined fixed cost incurred earlier & now being distributed.

So since it is also been incurred earlier, it is also sunk cost so not considered in capital budgeting process.

⑤ working capital

- whenever a project gets started not only fixed cost or capital but some working capital is also req.

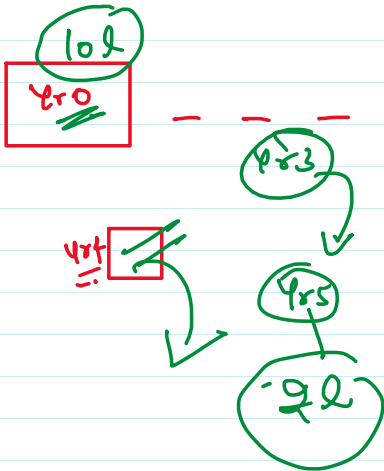


« If nothing is given in the end about w.cap assume it is withdrawn »

So in the year 0, wcap is referred as outflow of funds.

And at the end of the project, when wcap is withdrawn it is considered as inflow of funds.

⑥ Capital Investment :-



It refers to the investment of funds for purchasing something for the project.

It can be done at start of the project or at anytime during the project.

Since it is the outflow of funds so the outflow can be at Y_0 or any year during the project.

⑦ Salvage value :- Let's say we purchased some assets so the assets will be sold at end of the project.

✓✓

So it will be considered as Inflow whenever it is sold

⑧ Capital loss :- Whenever we have Salvage Value, or gain we add it to last year CF.

But if salvage value as per Tax & as per real world is diff. There comes capital gain / capital loss

Capital loss :- value as per Tax $>$ value in real world eg 2 lakh v/s 0

We will add to the last year :- Capital loss \times tax %
 $= (2 \text{ lakh} - 0) \times 30\%$
 $= 60,000$

Capital gain :- value as per Tax $<$ value in real world eg 2 lakh v/s 5 lakh

We will minus to the last year Cash flow :- Capital gain \times tax %
 $= (3 \text{ lakh} - 0) \times 30\%$
 $= 90,000$

⑦ AVERAGE RATE OF RETURN

(i) WHETHER DISCOUNTING APPLY :- **No**

(ii) WHICH CASH FLOW TO USE :- **ACCOUNTING PROFIT OR BOOK PROFIT**

concept 5

(iii) FORMULA TO CALCULATE ARR :-

(The most basic Ques which can ever be asked)

Wht any Invest in common world will be

"What is your average rate return"

[SOLVE BY ANY ONE METHOD]

VERSION I

$$= \frac{\text{Average Book profit}}{\text{Amount invested at the start (Initial Invest)}}$$

VERSION II

$$= \frac{\text{Average Book Profit}}{\text{Average amount Invested}}$$

VERSION III

$$= \text{Simple average of return \% of each year.}$$

$$\text{Average Book Profit} = \frac{\text{profit}_1 + \text{profit}_2 + \dots + \text{profit}_n}{n}$$

$$\text{Average Invest} = \frac{\text{Opng Invest} + \text{closing year Invest}}{2}$$

$$\text{Closing Invest} = [\text{Opng Invest} - \text{Dep}]$$

Example bp AB:

- Initial Invest in a project was 12 lakh & Salvage value was 2 lakh and tax rate = 40%.
- Life of project = 4 years
- k_0 or cost of cap = 12%.

	Yr1	Yr2	Yr3	Yr4
Sales	10L	15L	18L	20L
Cash Cost (both FC & VC)	8L	12L	16L	15L
Dep	2L	2L	2L	2L

Solution

	<u>Yr1</u>	<u>Yr2</u>	<u>Yr3</u>	<u>Yr4</u>
Sales	10L	15L	18L	20L
Cash Cost (both FC & VC)	(8L)	(12L)	16L	(15L)
Dep	(1L)	(1L)	(1L)	(1L)
PBT	1L	2L	1L	4L
(-) tax @ 40%	(0.4L)	(0.8L)	(0.4L)	(1.6L)

PAT or
A/c profit

60,000

1,20,000

60,000

240,000

Version I :-

Average profit
Initial Invest

$$= \frac{120000}{120000} \times 100$$

$$= 10\%$$

$$\text{Average profit} = \frac{\text{profit}_1 + \text{profit}_2 + \text{profit}_3 + \text{profit}_4}{4}$$

$$= \frac{480000}{4}$$

$$= 120000$$

4

Version II

Average Book Profit

$$= \frac{120000}{10,00,000}$$

Average Investment

$$= \frac{120000}{10,00,000}$$

$$= 12\%$$

Calc. of average Invest

= $\frac{\text{Opening} + \text{closing}}{2}$

$$= \frac{12 + 8}{2}$$

	opng	closing
Yr1	1200,000	[1200,000 - 100,000] = 11,00,000

Yr2	11,00,000	[1100,000 - 100,000] = 10,00,000
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Yr3	10,00,000	(10,00,000 - 100,000) = 900,000
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Yr4	900,000	(900,000 - 100,000) = 800,000
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Version III

∴ Average of Return of each year

(12 + 10 + 9 + 8) / 4 = 9.75%

$$\text{Yr 1} = \frac{\text{Profit}}{\text{Op. Invest}} = \frac{60000}{120000} = 5\%$$

$\frac{5 + 10.91 + 6 + 26.67}{4} = 12.15\%$

$$\text{Yr 2} = \frac{\text{Profit}}{\text{Op. Invest}} = \frac{120000}{(122 - 12)} = 10.91\%$$

$$\text{Yr 3} = \frac{\text{Profit}}{\text{Op. Invest}} = \frac{60000}{112 - 12} = 6\%$$

$$\text{Yr 4} = \frac{\text{Profit}}{\text{Op. Invest}} = \frac{240000}{102 - 12} = 26.67\%$$

8 PAYBACK PERIOD

It refers to the "TIME PERIOD" within which the organisation gets its investment amount back.

When the cashflows are same

When the cashflows are not same

Ex-1 Investment 100000
 Cashflows Yr1 Yr2 Yr3
 50000 50000 50000

Ex-1 Invest = 100000

Cash = Yr1 Yr2 Yr3 Yr4
 flows 30k 40k 35k 25k

$$\text{Payback} = \frac{\text{Investment}}{\text{"similar."}}$$

	CF	CUMCF
Yr1	30k	30k
Yr2	40k	30+40 = 70k

I have recov

Remaining =

Cash flows

$$= 100000 / 50000$$

$$= 2 \text{ yrs}$$

Yr 3	35k	70+25 = 105k
Yr 4	25k	105+25 = 130k

105000

Ex-2

$$\text{Invest} = 100,000$$

Cashflows	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
	24000	24000	24000	24000	24000

$$2 \text{ years} + \frac{1 \times (\text{Amount short})}{\text{Amount earned in the year}}$$

$$\approx 35000 = 1$$

$$\approx 1 = \frac{1}{35000}$$

$$- \text{Yr 2} + 0.86 = 2.86 \text{ yrs.}$$

$$\approx 30000 = \frac{1}{30000}$$

$$\text{Payback} = \text{Invest} / \text{Common cash flow}$$

$$= 100000 / 24000$$

$$= 4.16 \text{ yrs}$$

$$= \text{lower year} + \frac{\text{Shortcoming}}{\text{Earning in the year}}$$

$$\text{ie } \text{lower year} + \frac{\text{Invest} - \text{Cumulative C.F}}{\text{Earning of the year}}$$

9) NPV METHOD

DISCOUNTING :- YES

INFLOWS :- DISCOUNTED CASH FLOWS

This method calculates the Net Present value of all the cashflows.

$$\text{Net present value} = \text{Present value of all INFLOWS}$$

(-)

Present value of all outflows.

How to solve NPV Ques

- Find out cash flow after tax (for each year)
(there can be situation that all CFs may be

same or may not be same)

② prepare format given below

All the outflows are shown in (-)ve.

All Inflows in (+)ve.

They are discounted with discounting factor.

<u>Years</u>	<u>Cash Flow</u>	<u>PVF @</u>	$a \times b = c$ [PV]
0	(outflow)	1	
1	Inflow	$\frac{1}{(1+\text{disc rate})^1}$	✓
2	Inflow	$\frac{1}{(1+\text{disc rate})^2}$	✓

If NPV is +ve = ACCEPT THE OFFER

If NPV is -ve = REJECT THE OFFER.

If Ques provides Sales - use Profit

If Ques says about savings - use savings in Cost

but let's say I saved 10,000 in wages then no need to consider wages as exp again.

⑨ PROFITABILITY INDEX (PI)

$$= \frac{\text{Present value of Inflows}}{\text{Present value of Outflow}}$$

If PI is > 1 = accept offer ↙

If PI is < 1 = reject offer ↘

10 DISCOUNTED PAYBACK PERIOD

DISCOUNTED : **YES**
AMOUNT : **DISCOUNTED CASH FLOW**

(rest the process is same as payback)
period with unequal cashflow

$$\begin{array}{lcl} \text{Yr1} & \text{Cash flow}_1 & \times \frac{1}{(1+0.1)^1} = \text{PV} \cdot \cdot \text{Cum. PV} \\ \text{Yr2} & \text{Cash flow}_2 & \times \frac{1}{(1+0.1)^2} = \text{PV} \\ \text{Yr3} & \text{Cash flow}_3 & \times \frac{1}{(1+0.1)^3} = \text{PV} \end{array}$$

$$= \text{lower year} + \frac{\text{Shortcoming}}{\text{Earning in the year}}$$

$$\text{ie } \text{lower year} + \frac{\text{Invest} - \text{Cumulative C.F}}{\text{Earning of the year}}$$

Everything will be same just here

We will use discounted CF.

11 IRR

"It is the rate at which the total of PV of cash inflows = total of PV of cash outflows"

$$\text{IRR} = \text{lower int rate} + \frac{\text{NPV at lower rate}}{\text{NPV at lower rate} - \text{NPV at High rate}} \times \left(\text{H}_{\text{rate}} - \text{L}_{\text{rate}} \right)$$

12 ADJUSTED CASH FLOW

There can be situation where company is not sure about their cash flow. & thus use probabilities

So instead of cash flow we use

CASH FLOW \times probability

$$CF_1 \times P_1 =$$

$$CF_2 \times P_2 =$$

(13) MODIFIED IRR

We just do the opposite i.e. Instead of discounting we compound it to get value on the last date. then found return %.

$$\text{Yr 1} \quad 100 \quad 100 (1.12)^3$$

$$\text{Yr 2} \quad 150 \quad 150 (1.12)^2$$

$$\text{Yr 3} \quad 100 \quad 100 (1.12)^1$$

$$\text{Yr 4} \quad 200 \quad 200 (1.12)^1$$

(-) Cash outflow.

(14) NPV PER £ OF INVEST

Shiva Limited is planning its capital investment programme for next year. It has five projects all of which give a positive NPV at the company cut-off rate of 15 percent, the investment outflows and present values being as follows:

Project	Investment (₹)	NPV @ 15% (₹)
A	(50,000)	15,400
B	(40,000)	18,700
C	(25,000)	10,100
D	(30,000)	11,200
E	(35,000)	19,300

The company is limited to a capital spending of ₹ 1,20,000.

You are required to ILLUSTRATE the returns from a package of projects within the capital spending limit. The projects are independent of each other and are divisible (i.e., part-project is possible).

⑮ UNEQUAL LIFE PROBLEM

EQUIVALEN
ANNUALISED
CRITERIA

We divide the
NPV with
PVAF

REPLACEMENT
CHAIN
METHOD

We repeat
the project
with small
life again.