CH.14 : Economic analysis of public projects

- Method used : **1) (B/C) = (Benefit / cost)**

2) (B–C) = (Benefit – Cost)

- Benefit = (Benefit – Disbenifit)
- Cost = (Cost – saving)

Multi alternatives :

By (B/C) use Incremental

By (B-C) use Ranking

Example :

	A	B	C
Aw Beneifit	300000	450000	600000
Aw Cost	225000	375000	487500
Aw Disbenifit	63000	112500	177000
Aw saving	22500	60000	82500

a) find (B/C) for each project .

$(B/C)_A = \frac{Beneifit-Disbenefit}{Cost-saving} = \frac{300000-63000}{225000-22500} = 1.1704 > 1$

$(B/C)_B = \frac{Beneifit-Disbenefit}{Cost-saving} = \frac{450000-112500}{375000-60000} = 1.0714 > 1$

$(B/C)_C = \frac{Beneifit-Disbenefit}{Cost-saving} = \frac{600000-177000}{487500-82500} = 1.0444 > 1$

All these are Economical !

b) Use (B/C) ratio (Use Incremental)

$$\left(\frac{B}{C}\right)_{B-A} = \frac{(Beneifit-Disbenefit)_B-(Beneifit-Disbenefit)_A}{(Cost-saving)_B-(cost-saving)_A} =$$

$$\frac{(450\,000-112\,500)-(300\,000-63\,000)}{(375\,000-60\,000)-(225\,000-22500)} = \frac{186\,000}{112\,500} = 0.8933 < 1$$

$$(B/C)_{C-A} = \frac{(600\,000-177\,000)-(300\,000-63000)}{(487500-825000)-(225\,000-22\,500)} = \frac{186\,000}{202\,500} = 0.92 < 1$$

So , A is selected

C) Use (B- C) (Use Ranking)

$$(B-C)_A = (300\,000-63\,000)-(225\,000-22\,500) = 34\,500$$

$$(B-C)_B = (450\,000-112\,500)-(375\,000-60\,000) = 22\,500$$

$$(B-C)_C = (600\,000-177\,000)-(487\,500-82\,500) = 18\,000$$

So , A is Selected (biggest)

See Example 14.2 & 14.3 & 14.4

CH.16 Cost Terminology

Total Cost = T_C = F_c +V_C X

F_C : Fixied , V_C = variable

$$\boldsymbol{T_{R\,(x)} = Rx}$$

T_R : $Total\ Revenue$

R : Cost of each unit (SP)

X : Cost of Units

$$\boldsymbol{T_P = T_R - T_C}$$

T_p : $Total\ profit$

$$\boldsymbol{A_{c(x)} = \frac{T_{c(x)}}{X}}$$

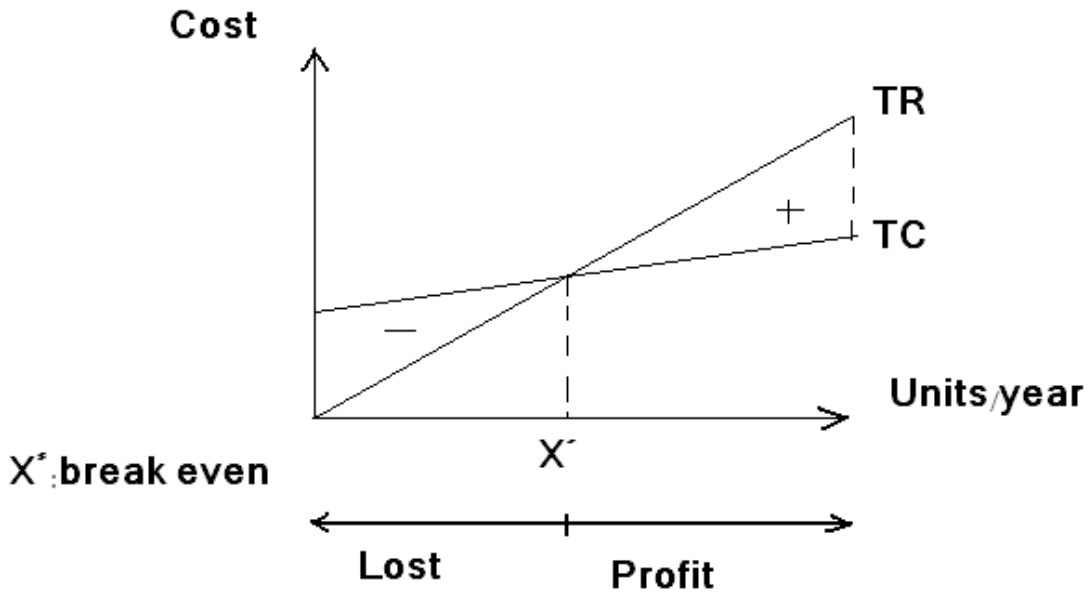
$A_{c(x)}$: $Average\ Cost$

$$\boldsymbol{M_{c(x)} = \frac{d\,T_C}{d\,x}}$$

$M_{c(x)}$: Marginal Cost

$$\boldsymbol{M_{R(x)} = \frac{d\,T_R}{d\,x}}$$

$M_{R(x)}$ =Marginal revenue



Ex.1

Cost (TC) and selling price (SP) functions , with respect to the annual production volume (t) as follows :

TC = 1000 + 2t SR

TR (t) = 6t – 0.001 t^2 SR / Unit

a) Over what range of production is profit possible ?

*** Break even point**

TR – TC = 0

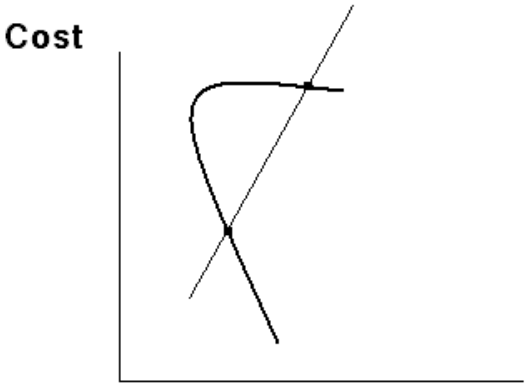
6 t – 0.001 t^2 - 1000 -2t = 0

4t – 0.001 t^2 - 1000 = 0

T1 = 267.949 Unit/year

T2 =3732.05 Unit/year

So , 267.949 ≤ t ≤ 3732.05



b) Determine the level of production for maximum profit :

$\frac{\delta\, TP\,(t)}{\delta\, t}$ = 0

Tp (t) = 4 t – 0.001 t^2- 1000

$\frac{\delta TP(t)}{\delta t}$ = 4 -0.002t = 0

4 = 0.002 t $\rightarrow t = \frac{4}{0.002}$ = 2000 Unit/year

C) Determine the level of production for maximum average profit per unit .

$\frac{\delta A\, TP\,(t)}{\delta\, t}$ = 0

ATP(t) = $\frac{4t-0.001\, t^2-\, 1000}{t}$ = 4 -0.001 t - $\frac{1000}{t}$

$\frac{\delta A\, TP\,(t)}{\delta\, t}$ = - 0.001 + $\frac{1000}{t^2}$ = 0

t = $\sqrt{\frac{1000}{0.001}}$ = 1000 Unit/year

Ex.2

Tow machines (A&B) are being considered for a project investment . The variable cost and annual fixed shown in the following table :

Machine	Fixed Cost SR	Variable cost SR/unit
A	**3600**	**10.50**
B	**4275**	**8.25**

a.What is the number of units/year for break-even between tow machines ?

b.If the estimated number of units/year is 1000 ,what the annual savings are estimated if machine (B) is purcgased instead of machine (A) ?

c.If machine (B) is producing 1000 units/year , what revenues/units must be generated in order to break-even ?

a. (Tc)A= 3600 +10.5 X

(Tc)B =4275 + 8.25 X TcA=TcB » 4275 – 3600 = (10.5 – 8.25)

$$X = \frac{675}{2.25} \quad » \quad X=300$$

b. (Tc)A= 3600 +10.5 (1000) = 14,100

(Tc)B =4275 + 8.25 (1000)= 12,525 » 14100 – 12 525 = 1575 SR

c. (Tc)B = (Tc)A

4275 + 8.25 x = R (x)

X= 1000 » 4275 + 8.25 (1000) = R (1000) » R = 12.525/ unit