REPLACEMENT ANALYSIS

INTRODUCTION

- Mass production has found to be the most economical method of satisfying human wants.
- Failure to continuously upgrading these assets can result in serious loss of operating efficiency.
- A sound replacement analysis can ultimately effect the financial success of an enterprise.

GENERAL NATURE

Two important terms here in this analysis are,

Defender

- The existing old asset being considered as the asset to be replaced

Challenger

- The asset proposed to be the replacement

KEY POINTS

- Additional expenses incurred for the installation of a new machine before operation should be considered as part of initial cost.

- When a old machine is replaced its removal may entail expenses which must be deducted from the amount received to arrive at net salvage value.

TERMINOLOGIES

- **Sunk cost**

For example, suppose a machine acquired for $50,000 three years ago has a book value of $20,000. The $20,000 book value is a sunk cost that does not affect a future decision involving its replacement.

Present book value – Present market value

- **Economic life – Estimating economic life in any organization is very useful.**
- **Unused value**

IN THIS CHAPTER…

1. **Outsider's point of view**
2. **Cash flow approach- for equal life**
3. **Economic life of an asset**

OUTSIDER'S POINT OF VIEW

Problem 1:

A company purchased machine X a year ago for Rs.8500 with the following characteristics,

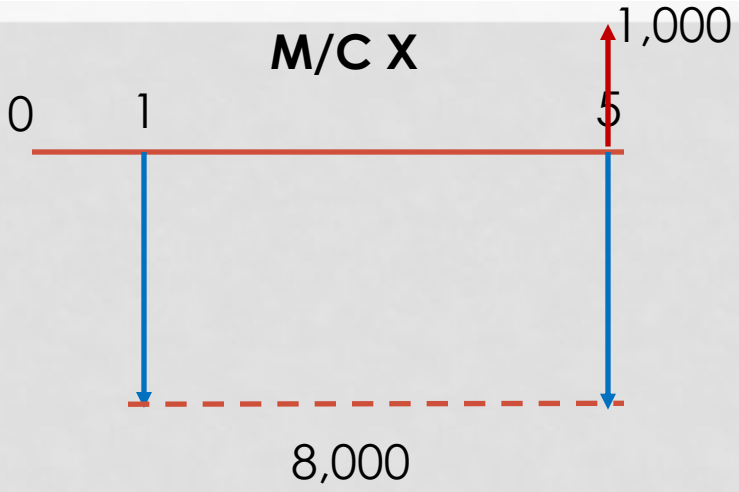
Estimated life- 6 years
Salvage value- Rs.1000
Operating expenses- Rs.8000/year

At the end of 1st year a salesman offers machine Y for Rs.11500 which has estimated life of 5 years, salvage value of Rs.1500 and an operation cost of only Rs.5500/year due to improvement. The salesman offers Rs.3500 for machine X, if machine Y is purchased.

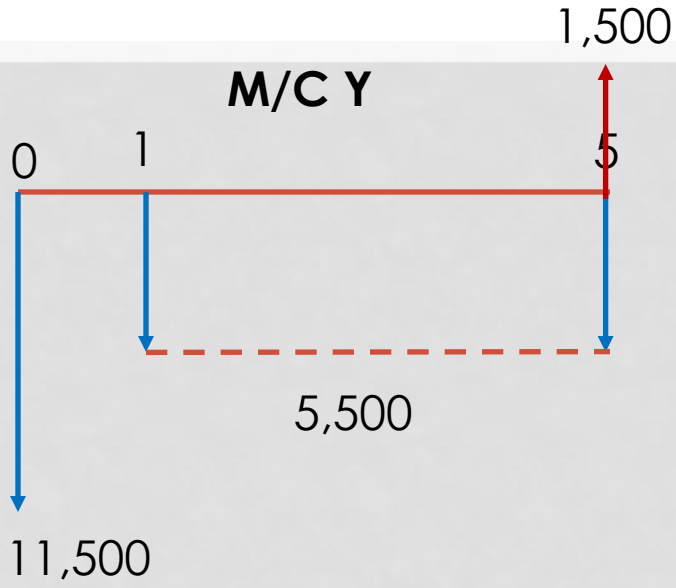
This appears low to the company but the best offer received elsewhere is only Rs.3000

Assume an interest rate of 8% and determine the best course of action by taking outsider's point of view?

OUTSIDERS POINT OF VIEW



YOU



CASH FLOW APPROACH- FOR EQUAL LIFE

- This approach is based on the fact that-
- If the challenger is selected, the defender's present market value is a cash inflow to the challenger.
- Alternatively, if the defender is selected there is no actual expenditure of cash for the organization.
- Hence defender's first cost is taken as zero and the market value of the defender is subtracted from the challenger's first cost.

SOLVING THE SAME PREVIOUS PROBLEM

WHAT HAPPENS FOR UNEQUAL LIFE?

IN THE ABOVE PROBLEM IF THE CHALLENGER HAS A LIFE OF 10 YEARS.

CONCLUSION

- **The annual saving of replacing m/c X by m/c Y considering the outsider's point of view is Rs.1595.85/year.**
- **By cash flow approach there is a reduction of Rs.659.5/year (sometimes decision may be reverted)**
- **The error is due to the market value of m/c X is Rs.3500, which is annualized over a period of 10 years. Actually it is to be annualized for 5 years since its life is 5 years.**

HENCE CASH FLOW APPROACH CANNOT BE USED WHEN THE DEFENDER AND CHALLENGER HAS UNEQUAL LIVES. ONLY OUTSIDER'S POINT OF VIEW IS TO BE USED.

POLICY OF USING SUNK COST

In spite of the fact that sunk cost cannot be reversed, charging the sunk cost of the defender to the cost of its contemplated replacement, can lead to erroneous conclusion. This is illustrated in example given below,

Consider Problem 2 extension of Problem 1

In problem 1, if the present book value of m/c X is Rs.7250 and if the company decides to recover the sunk cost it has incurred in m/c X by m/c Y, what error in equivalent annual costs will result in making the comparison of financial desirability of the 2 machines?

CAPITAL RECOVERY COST

Let, **P=** first cost of the asset, **F=** estimated salvage value, **n=** estimated service life in years, **CR(i)=** capital recovery with return.

$$CR(i)= P(A/P, i, n) – F(A/F, i, n)$$

But since, $(A/F, i, n)=(A/P, i, n) – i$

$$CR(i)= P(A/P, i, n) – F[(A/P, i, n) – i]$$

$$CR(i)= (P-F)\ (A/P, i, n) + F.i$$

ECONOMIC LIFE OF AN ASSET

- Minimum cost life- optimum time for replacement
- Here the annual cost can be,

  - ✓Constant
  - ✓Constant Increasing
  - ✓Sporadic

EXAMPLE

An asset purchased 3 years ago is now challenged by a new piece of equipment. The present market value of the defender is Rs.130000. anticipated salvage values and Annual Operating Costs (AOC) for the next 5 years are given in the table. What is the minimum cost life to be used while comparing this defender with a challenger if a 10% year return is required.

Life in years	Salvage value	AOC
1	Rs 90,000	Rs 25,000
2	Rs 80,000	Rs 27,000
3	Rs 60,000	Rs 30,000
4	Rs 20,000	Rs 35,000
5	Rs 0.00	Rs 45,000

SOLUTION

CR(i) = (P-F) (A/P, i, n) + Fi

Finding for n=1, 2, 3, 4, 5

n=1,

1.10

CR(i) = (1,30,000-90,000) (A/P, 10,1) + 90000 x 0.1= **53000**

n=2,

0.5762

CR= (1,30,000-80,000) (A/P, 10,2) + 80000 x 0.1 = **36810**

n=3,

0.4021

CR= (1,30,000-60,000) (A/P, 10,3) + 60000 x 0.1 = **34147**

n=4,

0.3155

CR= (1,30,000-20,000) (A/P, 10,4) + 20000 x 0.1 = **36705**

n=5,

0.2638

CR= (1,30,000-0) (A/P, 10,5) + 0 = **34294**

Equivalent Annual Operating Costs for n= 1,2,3,4,5

n= 1, A= 25,000

n=2,

A= [25000 **(P/F,10,1)** + 27000 **(P/F,10,2)**] x **(A/P, 10,2)**

= 25952

n=3,

A= [25000 **(P/F,10,1)** + 27000 **(P/F,10,2)** + 30000 **(P/F, 10,3)**] x **(A/P, 10,3)**

= 27174

n=4,

[25000 **(P/F,10,1)** +27000 **(P/F,10,2)** +30000 **(P/F,10,3)** +35000 **(P/F, 10,4)**] x **(A/P, 10,4)**

= 28861

n=5

A= [25000 **(P/F,10,1)** + 27000**(P/F,10,2)** + 30000 **(P/F,10,3)** + 35000 **(P/F, 10,4)** +

45000 **(P/F,10,5)**] x **(A/P, 10,5)**

= 31504

TABULATIONS

Year	CR (i)	AOC	EUAC
1	53000	25000	78000
2	36810	25952	62762
3	34148	27174	61322
4	36702	28861	65563
5	34294	31504	65798

Minimum total EUAC occur at year 3.

Hence economic life of the asset is 3 years