

PEEM (PART B)

Page No.:

Date:

youva

Replacement Studies

Topics: Replacement (meaning)
Reasons for Replacement
Factors to be considered in Replacement Studies
Payback Method
Average Rate of Return
Internal Rate of Return
Present Value Method
Challenger and Defender

Replacement (Meaning)

Equipments and machines used in industries deteriorate with time, as a result of which their efficiency decreases and in turn increases their maintenance cost.

Hence, there arises a need to formulate a replacement policy which would enable in deciding the age at which the replacement of the old equipment by new one is more economical than continuation of old equipment.

Reasons for Replacement

Machines/Equipment are generally considered for replacement for the following reasons.

(I) Deterioration:

It is the decline in performance due to wear and tear or misalignment indicated by:

- (a) Increase in maintenance cost
- (b) Reduction in product quality and rate of production
- (c) Increase in labour cost
- (d) Loss of operating time due to breakdowns.

(II) Obsolescence:

Technology is progressing fast, newer and better equipment are being developed and produced every year.

The equipment gets obsolete due to advancement in technology and the unwarranted manufacturing costs arising from such obsolete equipment will:

- (a) Reduce profits
- (b) Impair competition.

(III) Inadequacy

When the existing asset/equipment become inadequate to meet the demand or it is not able to increase the production rate to desired level, the question of replacement arises.

(IV) Working Conditions

It may be thought of replacing the old equipment and machinery which creates unpleasantness i.e. give rise to unsafe conditions to workers and leads to accidents, making the environment noisy and smoky etc.

(V) Economy

The existing units/equipment have outlived their effective life and it is not economical to continue with them.

FACTORS TO BE CONSIDERED FOR REPLACEMENT

The factors which are important for replacement of machinery and equipment can be classified as :

(I) Technical Factors

(II) Financial / Cost Factors

(III) Tangible Factors

In detail :

(I) Technical Factors

1. Whether the present equipment has become obsolete due to technological developments.
2. If the present equipment is inadequate in meeting increased product demand.
3. Reduced safety as compared to new machine available / developed.

4. Whether the present equipment has deteriorated due to wear and tear. It may be indicated by increase in maintenance costs, reduction in product quality, rate of output, and increase in labour cost etc.
5. If the present equipment is polluting or spoiling working condition of the industry.
6. Possibility of performing additional operations by new machine.
7. How often the present equipment requires maintenance and repairs.

(II) Financial / Cost factors

1. High repair and maintenance cost of the existing equipment / machinery.
2. Reduction in scrap and waste by use of new machine.
3. Effect on consumption of power by replacing the existing machine by new one.

(III) Tangible Factors

These factors involve sociological and humanitarian considerations with far reaching effects.

1. Like replacing the existing machine which causes unpleasantness (may be noise or smoke pollution) and unsafe working conditions leading to accidents.

PAYBACK PERIOD METHOD

The Payback period method is used to quickly evaluate the time it should take for an investor to get back the amount of money put into a project.

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Estimated Annual Net Cash Inflow}}$$

Payback period represents that period in which the total investment in permanent assets pays back itself, or the amount of time required to recover the cost of investment. This is an important determinant of whether to take the project or not, as longer payback periods are typically non-desirable for investment positions.

Steps to calculate

1. Calculate annual net earnings (Profit) before depreciation and after tax. These are annual cash inflows.
2. Divide the initial outlay/Investment i.e. cost of the project by annual cash inflows (only where project generates constant returns or constant inflows)
3. Where the annual cash inflows are unequal, the payback period can be found.

by adding all the cash inflows until the total is equal to the initial cash outlay of the project (original cost of asset)

Example of Constant Returns (Payback Period)

Question A project cost Rs 1,00,000 and in return gives the annual cash inflow of Rs 20,000 for 8 years. Calculate the payback period.

Solution

Payback Period =
$$\frac{\text{Initial Investment or cash outlay of the project}}{\text{Annual cash inflow}}$$

$$= \frac{100000}{20000} \Rightarrow 5 \text{ years}$$

So, the investment of Rs 100000 will be recovered in 5 years.

Here the life of the machine is 8 years, which states the investment according to payback period will be recovered in 5 years and for next 3 years ($5 + 3 = 8$ years life) it will be generating profits.

Example of Unequal Returns (Payback Period)

Question Determine the payback period which requires cash outlay of Rs 10000 and generate the inflow of Rs 2000, Rs 4000, Rs 3000, Rs 2000 for 4 years.

Solution

Inflows	years	Cumulative Inflows
2000	1	2000
4000	2	6000
3000	3	9000
2000	4	11000

So, to recover the cash outlay of Rs 10000, it will be somewhere between 3-4 years.

So,
for 3rd year 9000 are recovered
4th year 11000 are recovered

We need 10000 ($10000 - 9000$ (3rd year)) = 1000
and difference between 4th and 3rd year
 $11000 - 9000 = 2000$

$$\text{So, } \frac{1000}{2000} = 0.5 \text{ year}$$

Payback period will be 3.5 years ($3 + 0.5$)

AVERAGE RATE OF RETURN

Rate of Return takes into consideration the earning expected from the investment over the whole life of investment.

(In this method Net Investment is taken into consideration)

$$\text{Net Investment} = \text{Investment} - \text{Scrap Value} \\ \text{(Initial)} \quad \text{(If given)}$$

$$\text{Average Rate of Return} = \frac{\text{Average Annual Profits}}{\text{Net Investment in the Project}} \times 100$$

Question. The project requires the investment of Rs 500000. It has scrap value of Rs 20,000 after 5 years. It is expected to give returns as Rs 40000; Rs 60000; Rs 70000; Rs 50000 and Rs 20000 respectively for 5 years.

Solution

$$\text{Average Annual Profits} = \frac{40000 + 60000 + 70000 + 50000 + 20000}{5}$$

$$= 48000 \text{ Rs}$$

$$\text{Net Investment} = 500000 - 20000 (\text{scrap}) \\ = 480000 \text{ Rs}$$

$$\text{Average Rate of Return} = \frac{48000}{480000} \times 100 = 10\% \quad \underline{\text{Ans}}$$

CHALLENGER AND DEFENDER

If the existing equipment/machine is considered for replacement with a new equipment, then the existing equipment/machine is known as defender, which tries to defend itself from replacement whereas new equipment/machine is known as challenger, which challenges the old asset for replacement.