

CH0401 Process Engineering Economics

Lecture 3

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Process Engineering Economics

- 1 **Economics of Selecting Alternatives**
- 2 Annual cost method
- 3 Present worth method
- 4 Replacement – Rate-of-return method
- 5 Payout time method

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Two most important problem met in process engineering are:

1. the **selection of equipment or a process** to perform a particular service and
2. the **determination of when a given piece of equipment, already in service should be replaced** because of obsolescence or high costs of operation.



Process Engineering Economics – *Introduction*

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The exception to this general rule occurs when factors other than economic ones must be considered, such as

1. an operation where **permanency is not required** (or)
2. where **allowance for expansion** must be considered (or)
3. where a **better-quality product** results etc., which at present time cannot be evaluated in terms of money (dollars, rupees, euros etc.,) such secondary factors are called as ***irreducible factors*** and in some cases greater weightage may be given to them than to the cost in selecting the equipment or service for a given operation (or)
4. in determining whether certain **equipment or services should be replaced**.

Process Engineering Economics – *Introduction*

The **basic relation** for economic selection of alternatives is given by the equation

$$P = R \left(\frac{(1+i)^n - 1}{i(1+i)^n} \right)$$

Annuity Equation

where, P – a present sum of money

R – a periodic-end-of-payment

i – the interest rate earned on P (a present sum of money)

n – the number of equal time period at which R is paid

for comparing **the true cost of service rendered or the earnings obtained by equipment** in processing operations, any one of the four variables (P , R , i , n) as mentioned above annuity equation may be used as the basis.

Therefore, there are four different methods used in the calculation of profitability or in the economic selection of alternatives they are

1. Annual cost method
2. Present worth method
3. Rate-of-return method and
4. Payout time

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