# Chapter 13: Breakeven Analysis

Breakeven analysis is performed to determine the value of a variable of a project that makes two elements equal, e.g. sales volume that will equate revenues and costs.

# Single Project

The analysis is based on the relationship: Profit = revenue – total cost

= R – TC

At breakeven, there is no profit or loss, hence, revenue = total cost

or, R = TC

*Note: It is to be noted that +ve sign is used for both the revenue and the costs. If we are to use*

*–ve sign for costs and +ve sign for revenue, then the above relationships become: Profit = R + TC and R + TC = 0 at breakeven.*

With revenue and costs given in terms of a decision variable, the solution yields the breakeven quantity for the decision variable.

**Costs**, which may be linear or non-linear, usually include two components:

**Fixed costs (FC)** – Includes costs such as buildings, insurance, fixed overhead, equipment capital recovery, etc. These costs are essentially constant for all values of the decision variable.

**Variable costs (VC)** – Includes costs such as direct labour, materials, contractors, marketing, advertisement, etc. These costs change linearly or non-linearly with the decision variable, e.g. production level, workforce size, etc. For the analysis to be followed here, the variation will generally be assumed to be linear.

Then, total cost, TC = FC + VC

Revenue also changes with the decision variable. Again, for the analysis, the variation will generally be assumed to be linear.

The following diagram illustrates the basics of the breakeven analysis.

Revenue or

**Revenue, R**

**Total Cost, TC**

VC FC

QBE, Breakeven quantity

Cost

Production, Q units/year

It can be seen that we have profit if the production level is above the breakeven quantity and loss if it is below.