

Production Function

In simple words, production function refers to the functional relationship between the quantity of a good produced (output) and factors of production (inputs).

In this way, production function reflects how much output we can expect if we have so much of labour and so much of capital as well as of labour etc. In other words, we can say that production function is an indicator of the physical relationship between the inputs and output of a firm.

Mathematically, such a basic relationship between inputs and outputs may be expressed as:

$$Q = f(L, C, N)$$

Where Q = Quantity of output

L = Labour, C = Capital, N = Land.

Hence, the level of output (Q), depends on the quantities of different inputs (L, C, N) available to the firm. In the simplest case, where there are only two inputs, labour (L) and capital (C) and one output (Q), the production function becomes.

$$Q = f(L, C)$$

Production function may be classified into two:

1. Short-run production function which is studied through Law of Variable Proportions
2. Long-run production function which is explained by Returns to Scale

Short-run production function - The law of variable proportions

The law examines the relationship between one variable factor and output, keeping the quantities of other factors fixed.

Definition

As the proportion of one factor in a combination of factors is increased, after a point, first the marginal and then the average product of that factor will diminish.

Assumptions of the law

The law is based on the following assumptions:

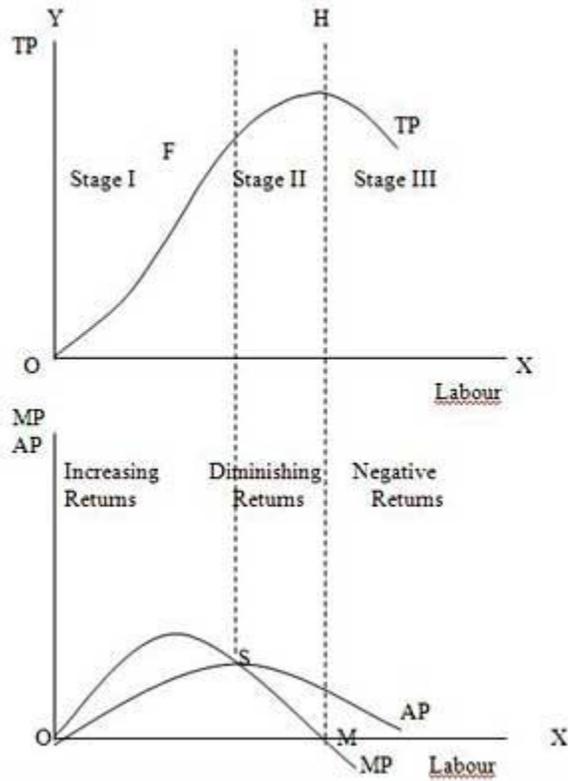
1. Only one factor is made variable and other factors are kept constant.
2. This law does not apply in case all factors are proportionately varied. i.e. where the factors must be used in rigidly fixed proportions to yield a product.
3. The variable factor units are homogenous i.e. all the units of variable factors are of equal efficiency.
4. Input prices remain unchanged
5. The state of technology does not change or remains the same at a given point of time.
6. The entire operation is only for short-run, as in the long-run all inputs are variable.

Three stages of law

1. The behaviour of the output when the varying quantity of one factor is combined with a fixed quantity of the other can be divided into three stages. They are Increasing returns stage
2. Decreasing returns stage
3. Negative returns stage

Stage I: Stage of increasing returns

Stage I ends where the average product reaches its highest (maximum) point. During this stage, the total product, the average product and the marginal product are increasing. It is notable that the marginal product in this stage increases but in a later part it starts declining. Though marginal product starts declining, it is greater than the average product so that the average product continues to rise.



Stage II: Stage of decreasing returns

Stage II ends at the point where the marginal product is zero. In the second stage, the total product continues to increase but at a diminishing rate. The marginal product and the average product are declining but are positive. At the end of the second stage, the total product is maximum and the marginal product is zero.

Stage III: Stage of negative returns

In this stage the marginal product becomes negative. The total product and the average product are declining.