Laxmi Narain Dubey College, Motihari

(a constituent unit of B.R.A. Bihar University, Muz.)

Department of Economics

Topic: <u>Law of Variable Proportions</u>

Paper-I: MICROECONOMICS

Part-I

B.A. (Hons.)

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THE LAW OF VARIABLE PROPORTIONS

- ✓ The law of variable proportions occurs in the short run, when, to increase production, only one of the factors of production is increased while the others are kept fixed.
- ✓ The law states that, as more and more units of the variable factor are applied to a given amount of the fixed factors, the output will initially increase at an increasing rate, then at a constant rate, and finally at a decreasing rate.
- ✓ As the marginal increase that occurs in the total output of the good diminishes eventually, this law is also called the law of diminishing marginal returns.
- ✓ Alfred Marshall applied the law of diminishing returns only to agriculture. Later, it was called the law of variable proportions by economists such as Stigler and Robinson, who applied it to the other sectors in the economy also.
- ✓ The following figure shows the law of variable proportions in operation when the number of workers used to produce a good is increased, keeping all other factors of production constant.
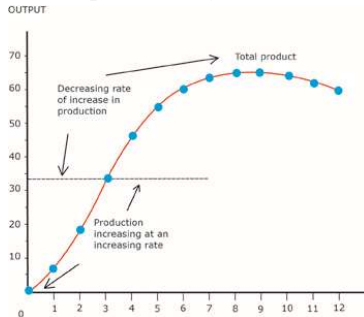

ASSUMPTIONS

- ✓ The law of variable proportions is based on the following assumptions
    - i.   The period under consideration is the short run.
    - ii. There is only one variable input. All other inputs are fixed.
    - iii. As far as the variable input is concerned, its units are all homogenous or are equally efficient in production.
    - iv. There is a given time involved.
    - v.   The technology is assumed to be given.
    - vi. The prices of the factors of production do not change in the time under consideration.

STAGES OF PRODUCTION

- ✓ The stages of production under the law of variable proportions are shown in the below figure.
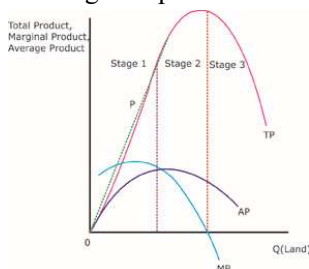
- ✓ We assume that there are two factors of production: land, which is fixed, and labour, which is variable.
- ✓ Thus, the short-run production function can be written as: $X = f(L, \bar{N})$
- ✓ A bar has been inserted over N, which indicates that land is fixed in the short run.
- ✓ In the figure, we analyse the total product, marginal product, and average product of the variable factor labour in the **three stages of production**.

Stage 1

- ✓ This is also called the stage of increasing returns to the factor.
- ✓ It starts from the origin and goes on till the point where average product is at its maximum.
- ✓ In this stage,
    - i.   Total product initially increases at an increasing rate and once the point of inflexion P is reached, it increases at a decreasing rate.
    - ii. Marginal product increases initially, reaches its maximum, and then starts decreasing.
    - iii. Average product increases all along till it reaches a maximum.

Note:
1. The reasons why marginal product and average product increase are because the fixed factor land is abundant and thus underutilised, and also when the employment of labour increases, each unit of labour becomes more specialised.

Stage 2
- ✓ This is also called the stage of decreasing (diminishing) returns to the factor.
- ✓ It starts from where average product is at a maximum and goes on till the point at which marginal product becomes zero and total product is at a maximum.
- ✓ In this stage:
    - i. Total product increases at a decreasing rate and then reaches its maximum.
    - ii. Marginal product is decreasing and becomes zero.
    - iii. Average product is also decreasing, but is positive.
- ✓ All along this stage, average product is greater than the marginal product.

    Note:
    1. This is the stage where a rational producer will operate because in this stage, the efficiency of labour is maximum.
    2. The reason why marginal product and average product decrease at this stage is that the labour-to-land ratio has reached beyond the optimal stage and thus the efficiency of labour begins to fall.

Stage 3
- ✓ This stage is also called the stage of negative returns to the factor.
- ✓ It starts from where total product, after having reached its maximum, starts decreasing.
- ✓ In this stage:
    - i. Total product decreases.
    - ii. Marginal product is negative.
    - iii. Average product also decreases but remains positive.

    Note:
    1. This is the stage where a rational producer will never operate because the efficiency of labour and land are decreasing. Also, the specialisation of labour has reached its limit and thus if more labour is employed, it will lead to inefficiencies.

APPLICABILITY OF THE LAW
- ✓ As far as the applicability of the law of variable proportions is concerned, it has been found to be more relevant to agriculture, where nature plays a more important role, compared to industry, where a major role is played by man-made factors. However, it plays an important role in all sectors in that it helps firms in making rational decisions relating to the stage of production in which it should operate.