

Economics for Engineers

**DEPARTMENT OF HUMANITIES
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Law of Variable Proportions

- ✓ Short Run Analysis
- ✓ Change in factor proportion on output
- ✓ The three Stages in short run

Assumptions

- State of Technology remain unchanged
- One factor must remain constant
- Varying Proportion of factors

Contd...

The Law states that keeping a factor fixed and by adding additional units of variable factors with the fixed factor will result in the increase in total output at an increasing rate followed by an increase in decreasing rate and finally falls

$$Q=f(L,K).....$$

Increasing stage.. Decreasing stage... Negative stage PRODN

Increasing return to scale

Decreasing return to scale

Constant retrurn to scale

$$Q=F(Z)$$

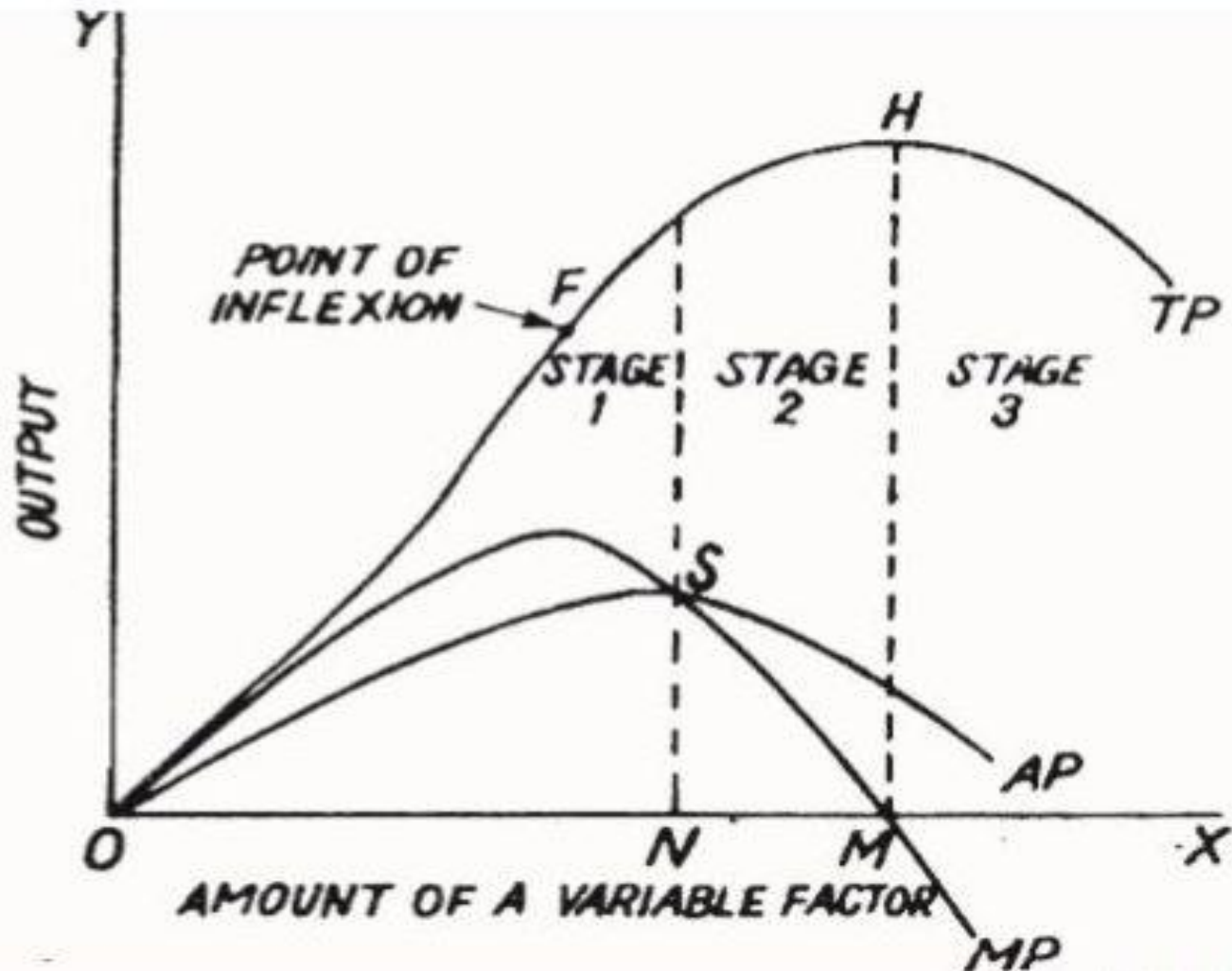
$$Hq=F(sZ)$$

$$H=S...$$

$$H>S...$$

$$H<S..$$

Contd... $Q=F(L,K)$



Contd...

- **1st stages: Stage of Increasing Return**
 - ✓ Total Product(TP) is Concave upwards to the point F (point of Inflection). It means Marginal Product (MP) rises
 - ✓ In stage-1, from point F the TP rising but slope of it decreasing. It means TP is concave downward
 - ✓ Stage -1 ends where Average Product (AP) reaches its maximum point (AP=MP)
 - ✓ Marginal product of fixed factor is negative in this stage

Contd...

- **2nd stage : Stage of Diminishing Return**
 - ✓ TP continues to Increase at a diminishing rate
 - ✓ TP reaches its maximum
 - ✓ The stage ends where TP is maximum
 - ✓ At the point where TP is maximum, MP is Zero. Here MP is marginal product of variable factor
 - ✓ A rational producer will operate in this stage
- **3rd stage : Stage of Negative Return**
 - ✓ TP falls and MP negative
 - ✓ Variable factors are too much relative to fixed factor

Stage of Operation

- A producer will never be found producing in stage 1 and stage 3
- The stage 2 represents the range of rational production decision
- The producer will produce in stage 2 depends upon price of variable factors

Causes of Increasing Marginal Return

- ✓ Abundant fixed factor
- ✓ Indivisibility of fixed factor
- ✓ Efficiency of variable factors

Causes of Decreasing Marginal Return

- ✓ Scarcity of fixed factor
- ✓ Indivisibility of fixed factor
- ✓ Imperfect substitutability of factors



Thank
you!!