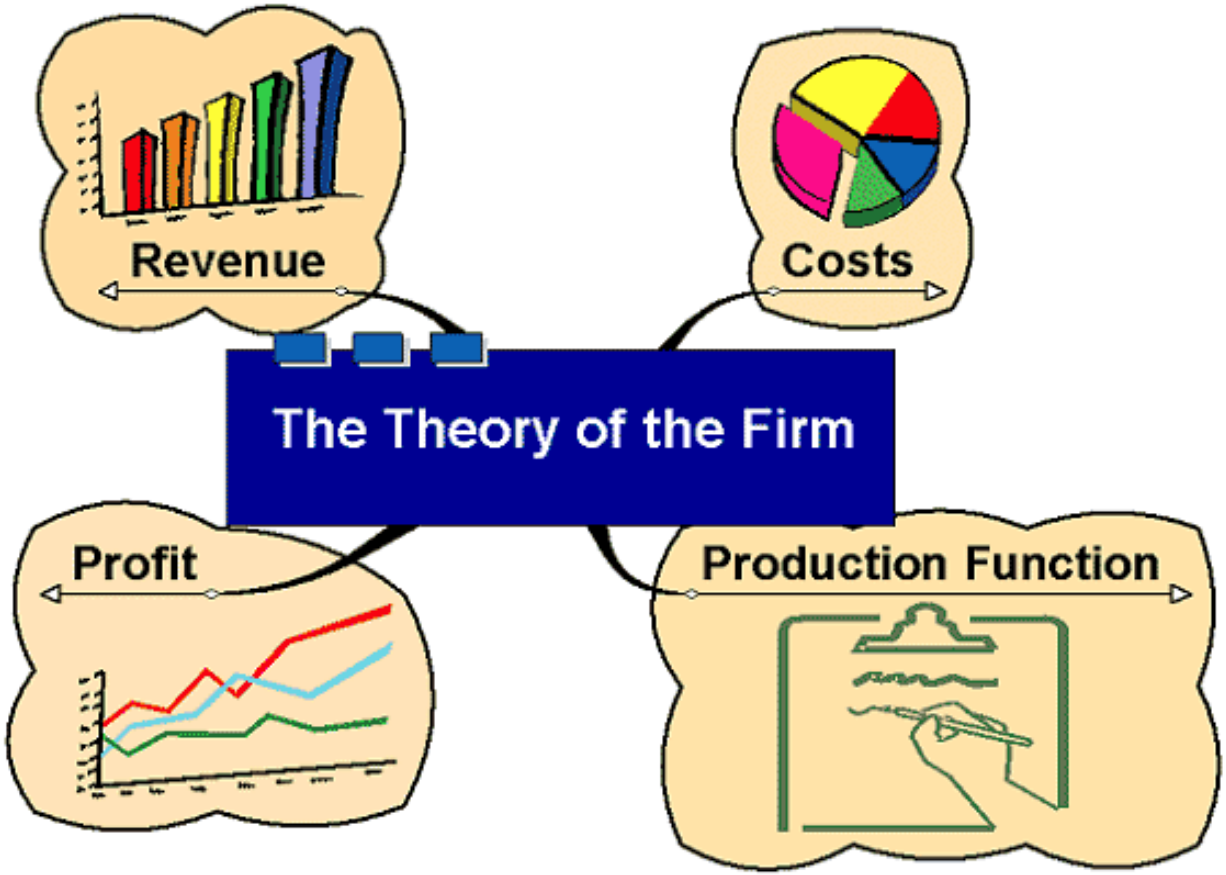
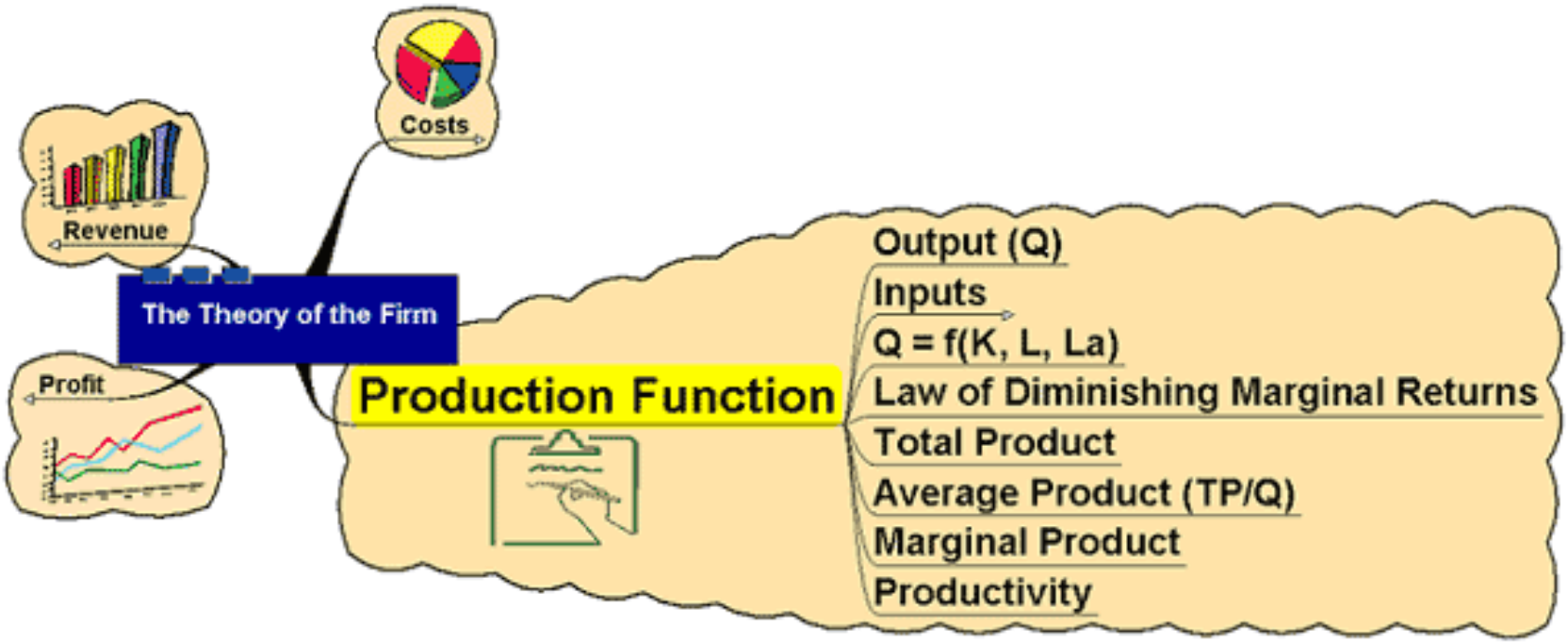
The Theory of the Firm

The Theory of the Firm



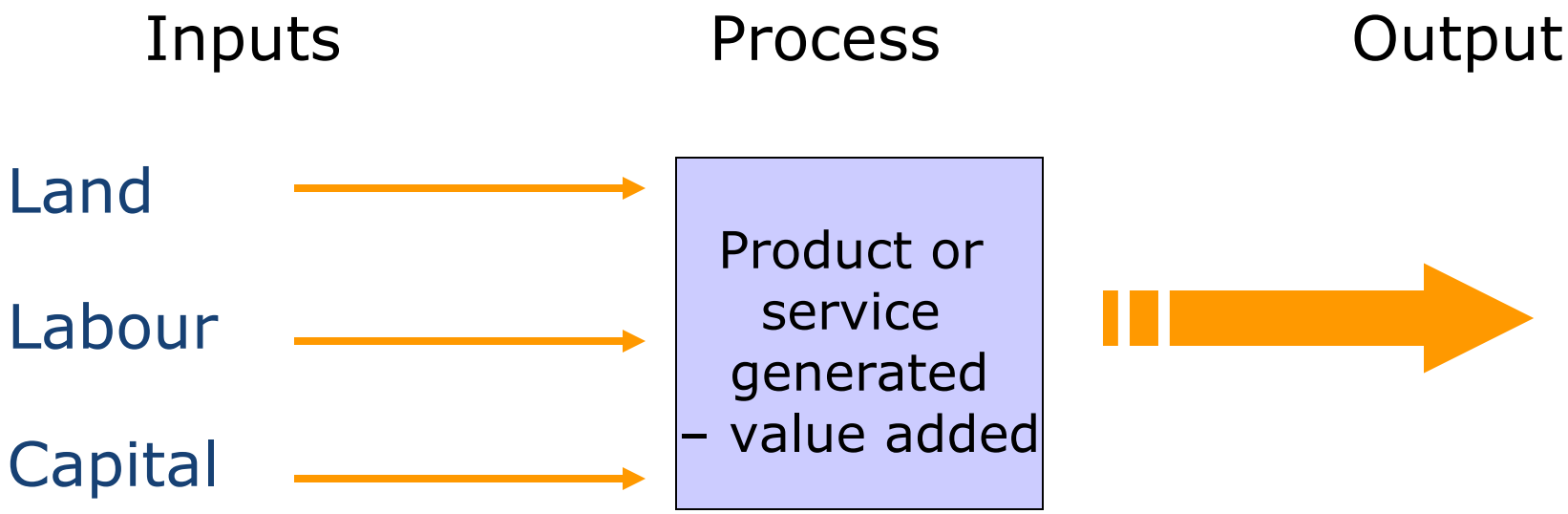
Production Function



Production Function

- States the relationship between inputs and outputs
- **Inputs** – the factors of production classified as:
  - **Land** – all natural resources of the earth – not just 'terra firma'!
    - Price paid to acquire land = **Rent**
  - **Labour** – all physical and mental human effort involved in production
    - Price paid to labour = **Wages**
  - **Capital** – buildings, machinery and equipment not used for its own sake but for the contribution it makes to production
    - Price paid for capital = **Interest**

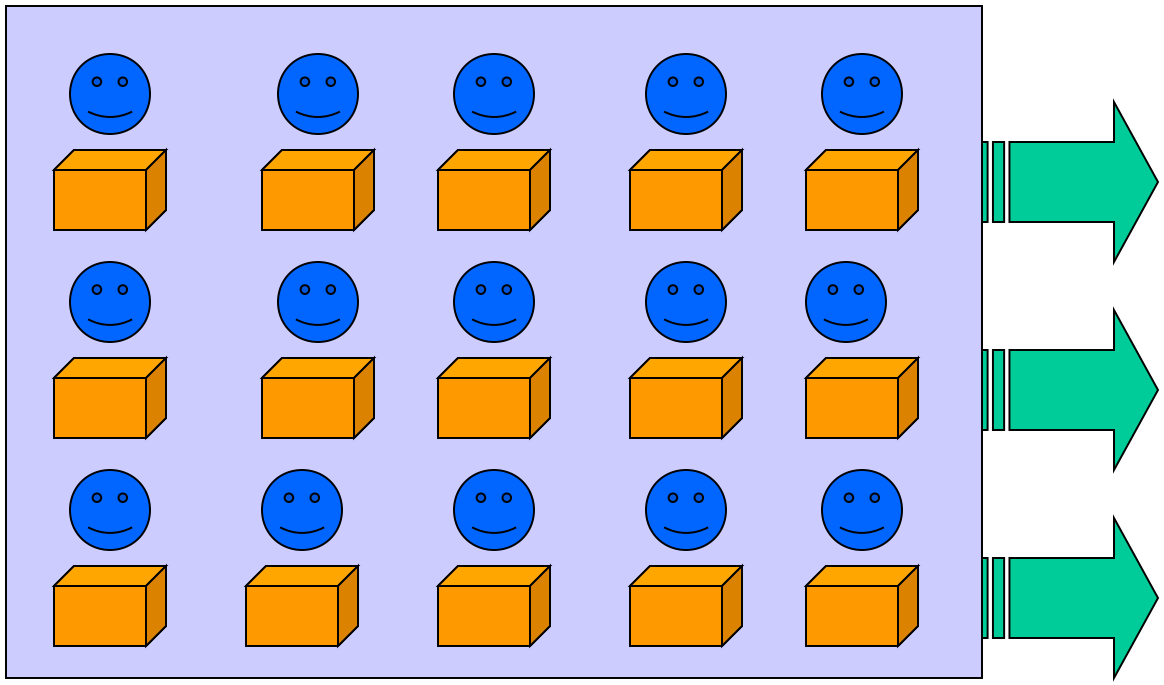
Production Function



Analysis of Production Function: Short Run

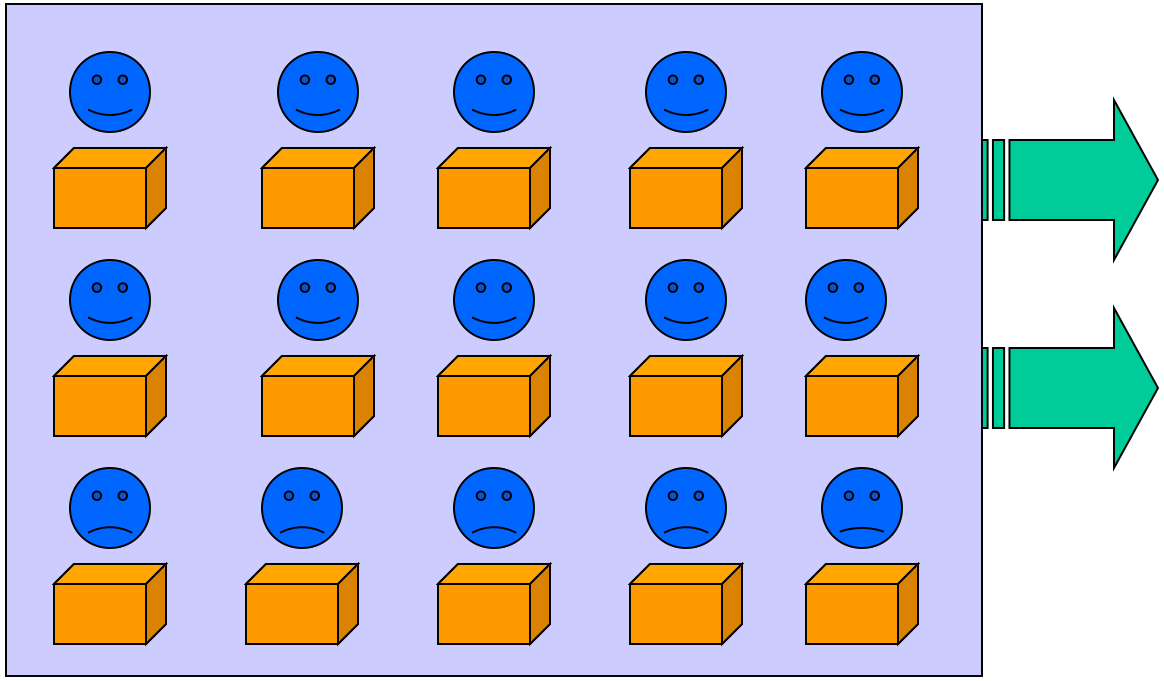
- In the short run at least one factor fixed in supply but all other factors capable of being changed
- Reflects ways in which firms respond to changes in output (demand)
- Can increase or decrease output using more or less of some factors but some likely to be easier to change than others
- Increase in total capacity only possible in the long run

Analysis of Production Function: Short Run



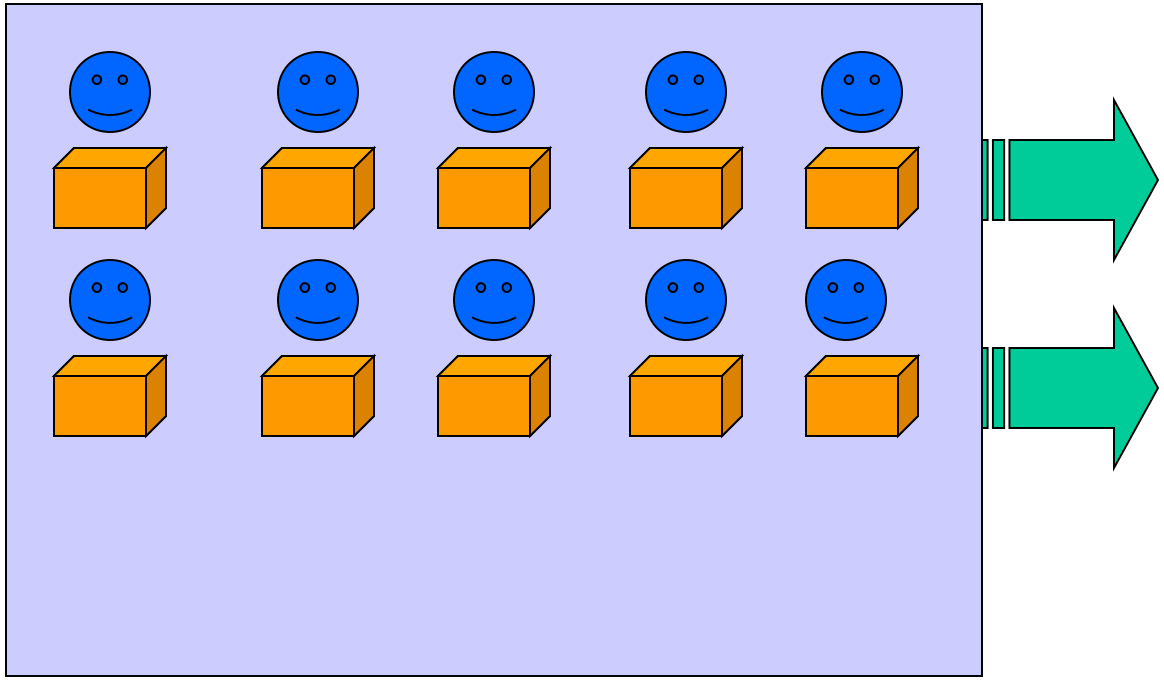
In times of rising sales (demand) firms can increase labour and capital but only up to a certain level – they will be limited by the amount of space. In this example, land is the **fixed factor** which cannot be altered in the short run.

Analysis of Production Function: Short Run



If demand slows down, the firm can reduce its variable factors – in this example it reduces its labour and capital but again, land is the factor which stays fixed.

Analysis of Production Function: Short Run

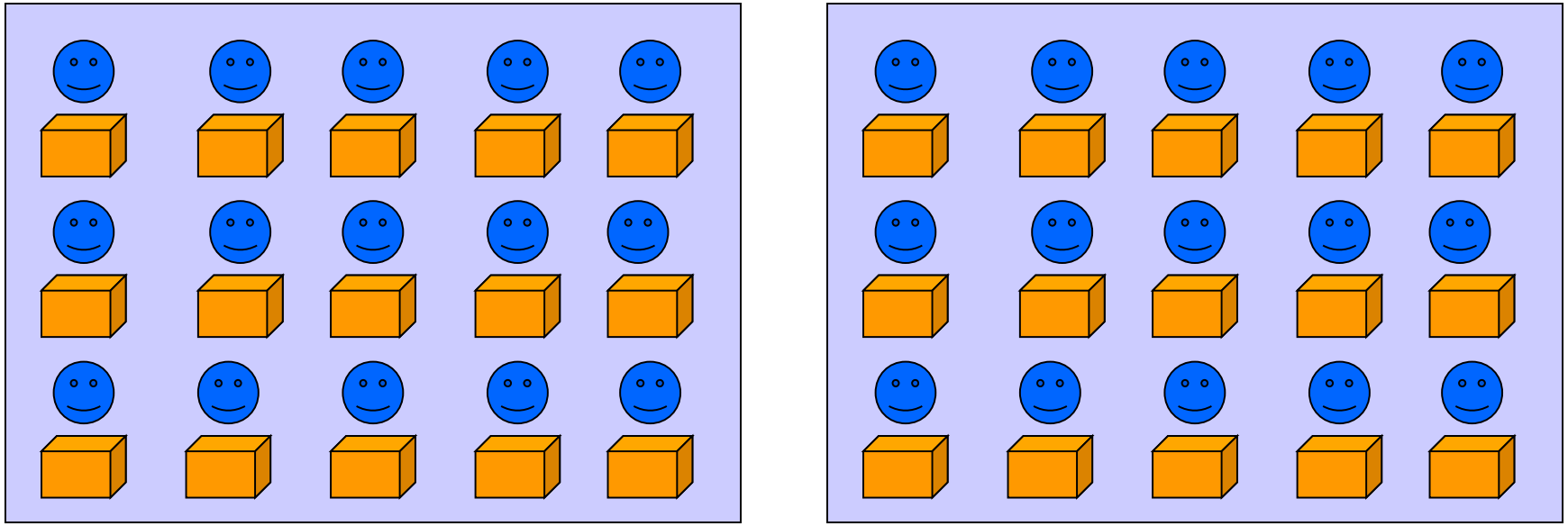


If demand slows down, the firm can reduce its variable factors – in this example, it reduces its labour and capital but again, land is the factor which stays fixed.

Analysing the Production Function: Long Run

- The long run is defined as the period of time taken to vary all factors of production
  - By doing this, the firm is able to increase its **total capacity** – not just short term capacity
  - Associated with a change in the **scale of production**
  - The period of time varies according to the firm and the industry
  - In electricity supply, the time taken to build new capacity could be many years; for a market stall holder, the 'long run' could be as little as a few weeks or months!

Analysis of Production Function: Long Run

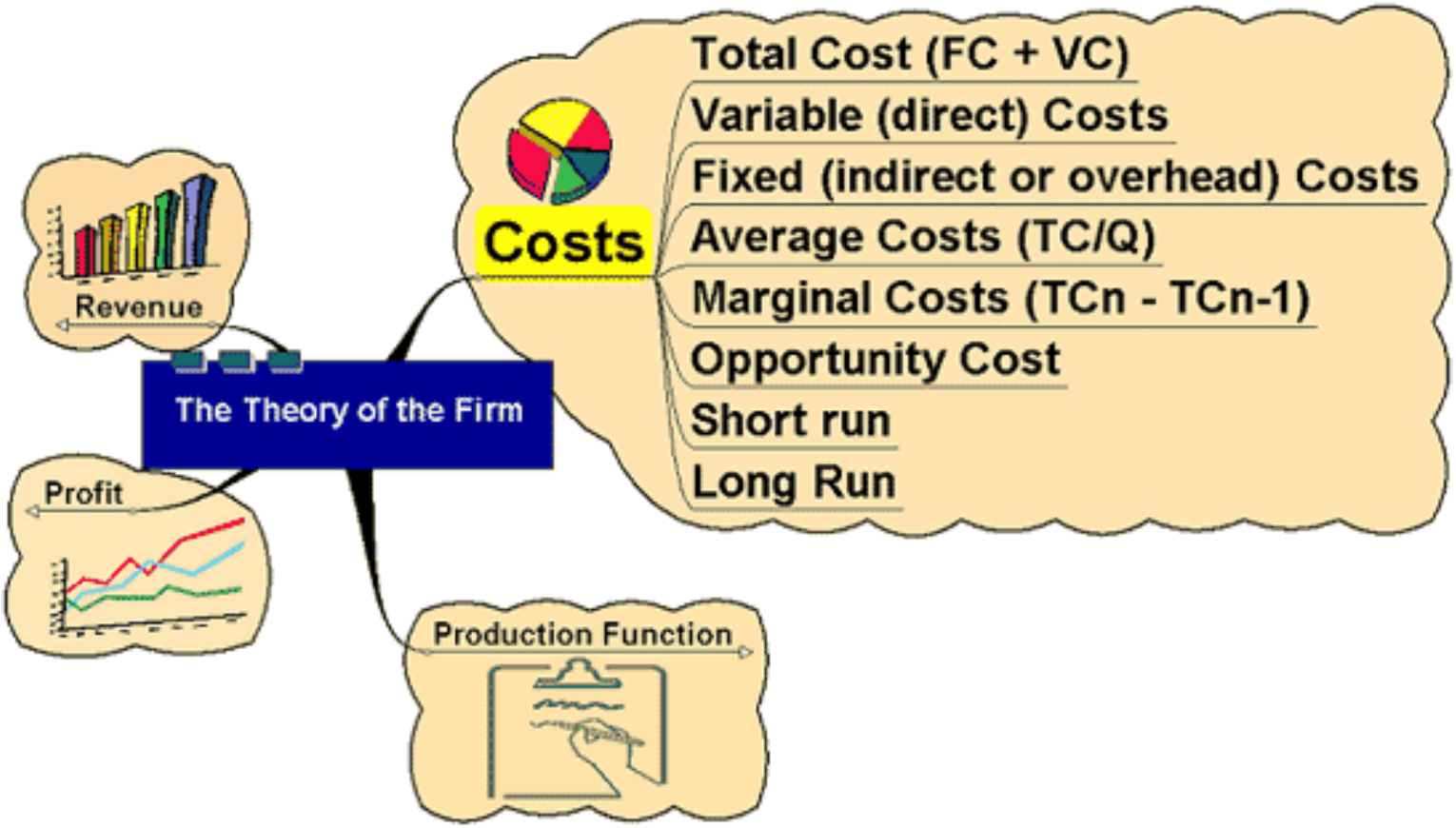


In the long run, the firm can change all its factors of production thus increasing its total capacity. In this example it has doubled its capacity.

Production Function

- Mathematical representation of the relationship:
  - **Q = f (K, L, La)**
- Output (Q) is dependent upon the amount of capital (K), Land (L) and Labour (La) used

Costs


Total Cost (FC + VC)
Variable (direct) Costs
Fixed (indirect or overhead) Costs
Costs
Average Costs (TC/Q)
Marginal Costs (TCn - TCn-1)
Opportunity Cost
Short run
Long Run
Revenue
The Theory of the Firm
Profit
Production Function

Costs

- In buying factor inputs, the firm will incur costs
- Costs are classified as:
  - **Fixed costs** – costs that are not related directly to production – rent, rates, insurance costs, admin costs. They can change but not in relation to output
  - **Variable Costs** – costs directly related to variations in output. Raw materials primarily

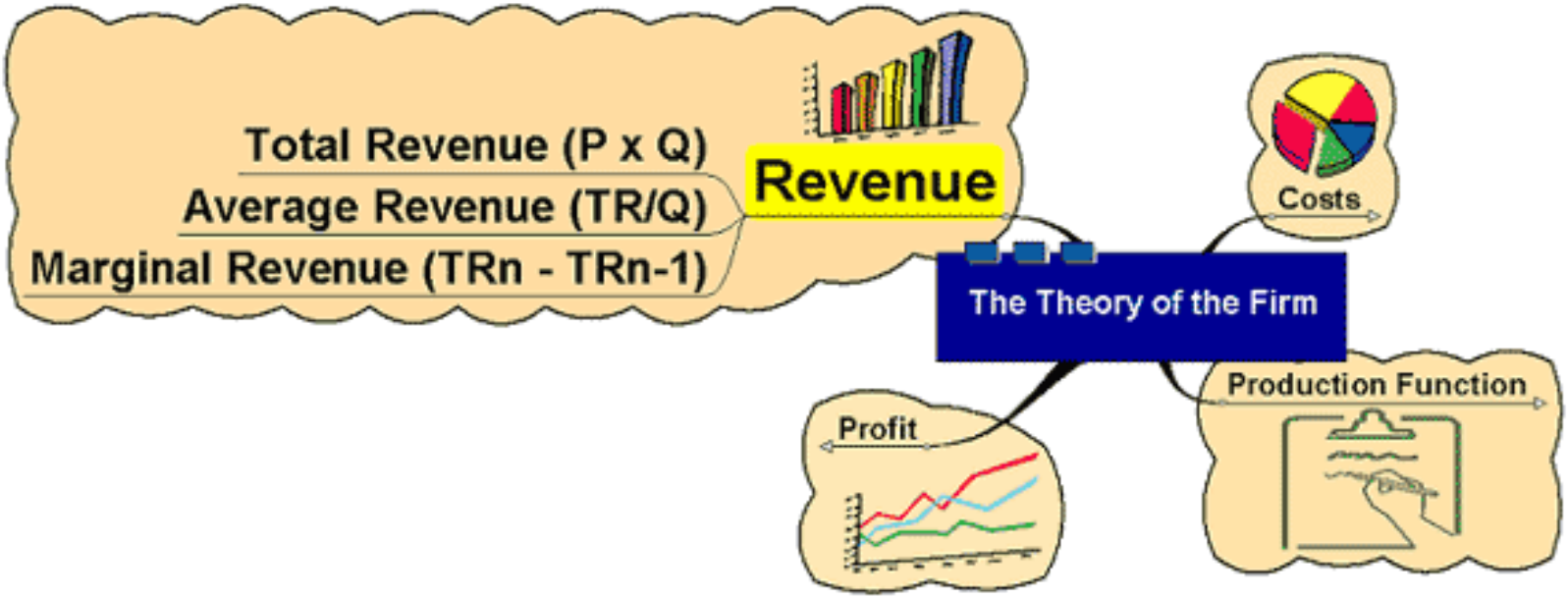
Costs

- **Total Cost** - the sum of all costs incurred in production
  - **TC = FC + VC**
- **Average Cost** – the cost per unit of output
  - **AC = TC/Output**
- **Marginal Cost** – the cost of one more or one fewer units of production
  - **MC = TC_n – TC_{n-1} units**

Costs

- **Short run** – Diminishing marginal returns results from adding successive quantities of variable factors to a fixed factor
- **Long run** – Increases in capacity can lead to increasing, decreasing or constant returns to scale

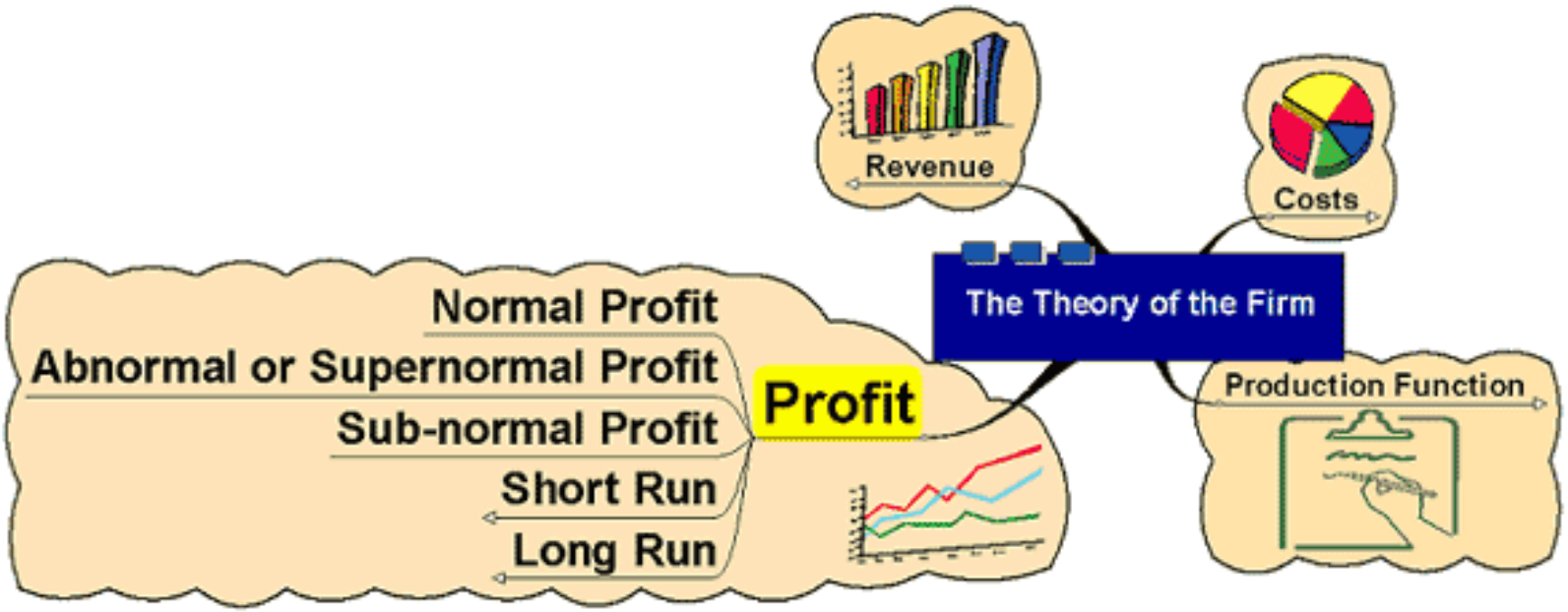
Revenue


Total Revenue (P x Q)
Average Revenue (TR/Q)
Marginal Revenue (TRn - TRn-1)
Revenue
Costs
The Theory of the Firm
Profit
Production Function

Revenue

- **Total revenue** – the total amount received from selling a given output
  - **TR = P x Q**
- **Average Revenue** – the average amount received from selling each unit
  - **AR = TR / Q**
- **Marginal revenue** – the amount received from selling one extra unit of output
  - **MR = TR_n – TR_{n-1} units**

Profit


Revenue
Costs
The Theory of the Firm
Production Function
Normal Profit
Abnormal or Supernormal Profit
Sub-normal Profit
Profit
Short Run
Long Run

Profit

- **Profit = TR – TC**
- The reward for enterprise
- Profits help in the process of directing resources to alternative uses in free markets
- Relating price to costs helps a firm to assess profitability in production

Profit

- **Normal Profit** – the minimum amount required to keep a firm in its current line of production
- **Abnormal or Supernormal profit** – profit made over and above normal profit
  - Abnormal profit may exist in situations where firms have market power
  - Abnormal profits may indicate the existence of welfare losses
  - Could be taxed away without altering resource allocation

Profit

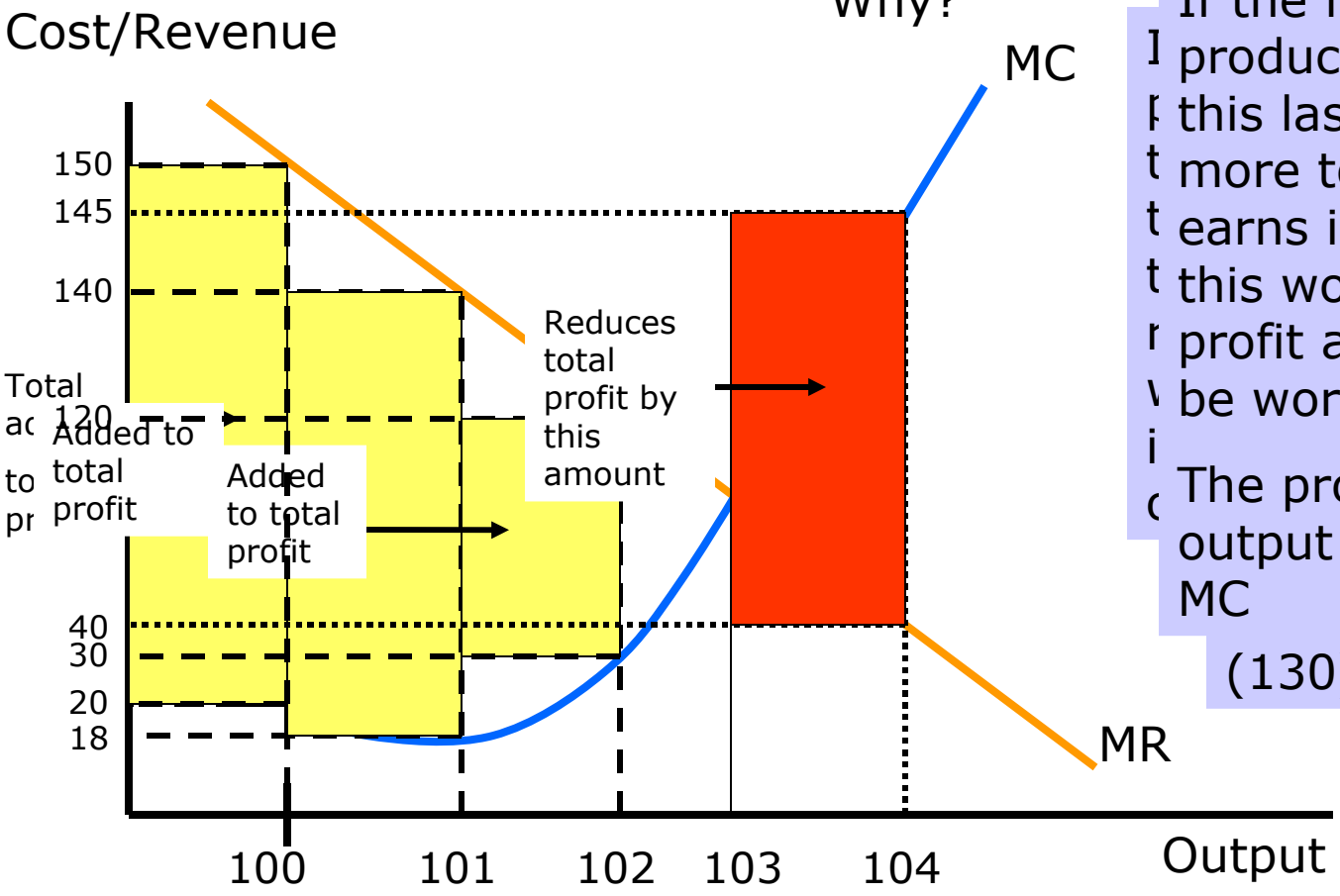
- **Sub-normal Profit** – profit below normal profit
  - Firms may not exit the market even if sub-normal profits made if they are able to cover variable costs
  - Cost of exit may be high
  - Sub-normal profit may be temporary (or perceived as such!)

Profit

- Assumption that firms aim to maximise profit
- May not always hold true - there are other objectives
- Profit maximising output would be where MC = MR

Profit

Why?



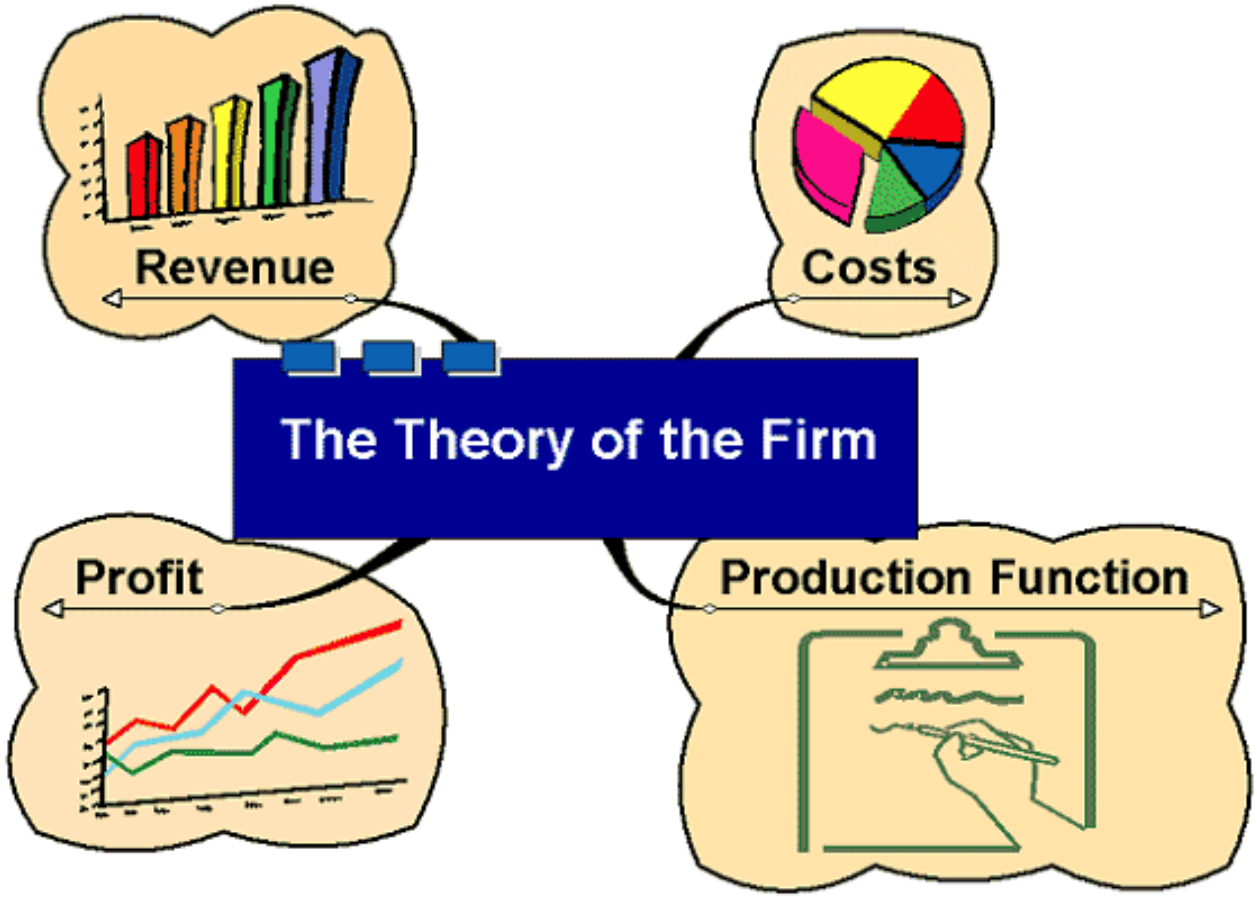
If the firm were to produce the 104th unit, this last unit would cost more to produce than it earns in revenue (-105) this would reduce total profit and so would not be worth producing.

The profit maximising output is where MR = MC

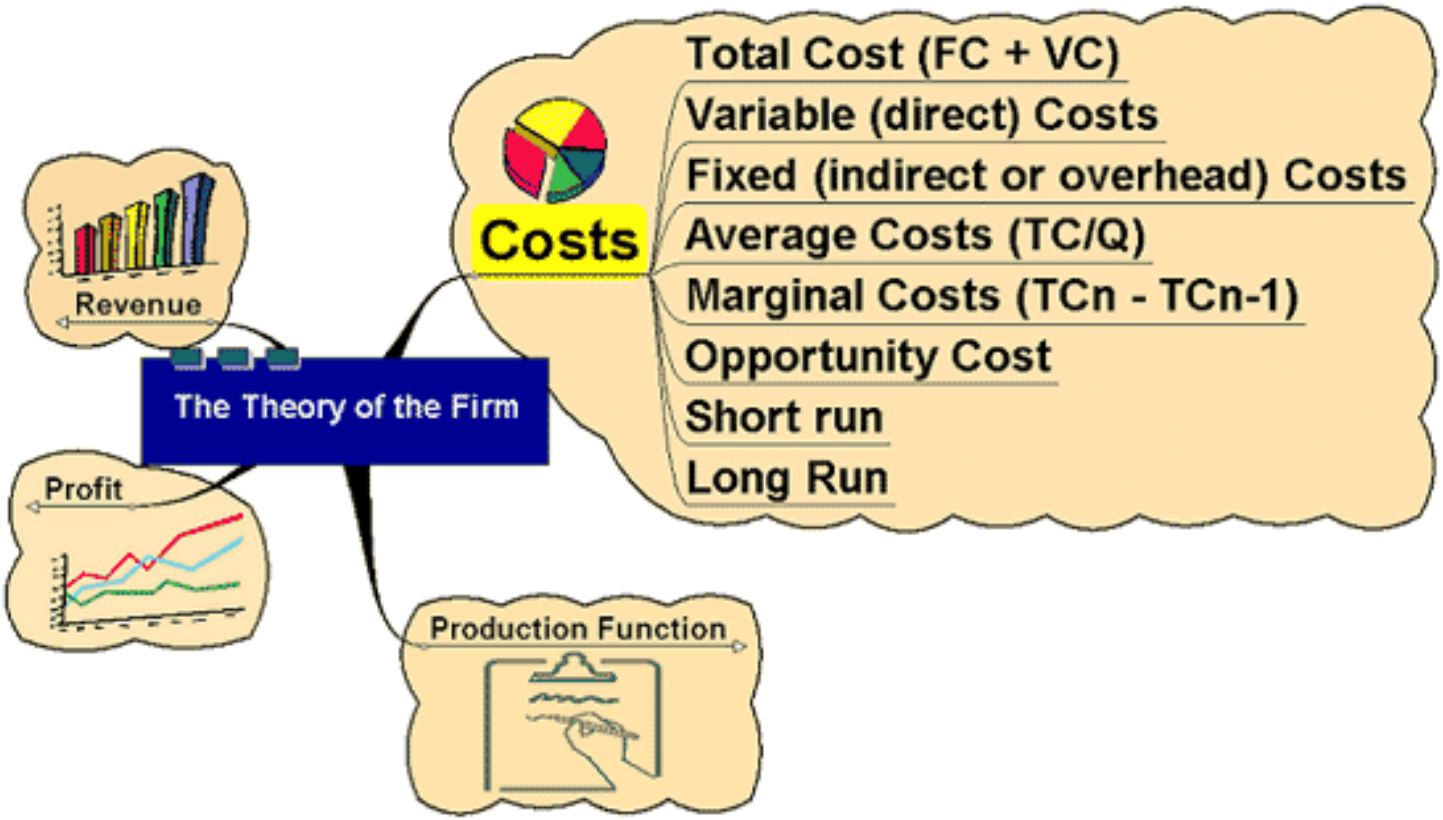
(130)

The Theory of the Firm

The Theory of the Firm



Costs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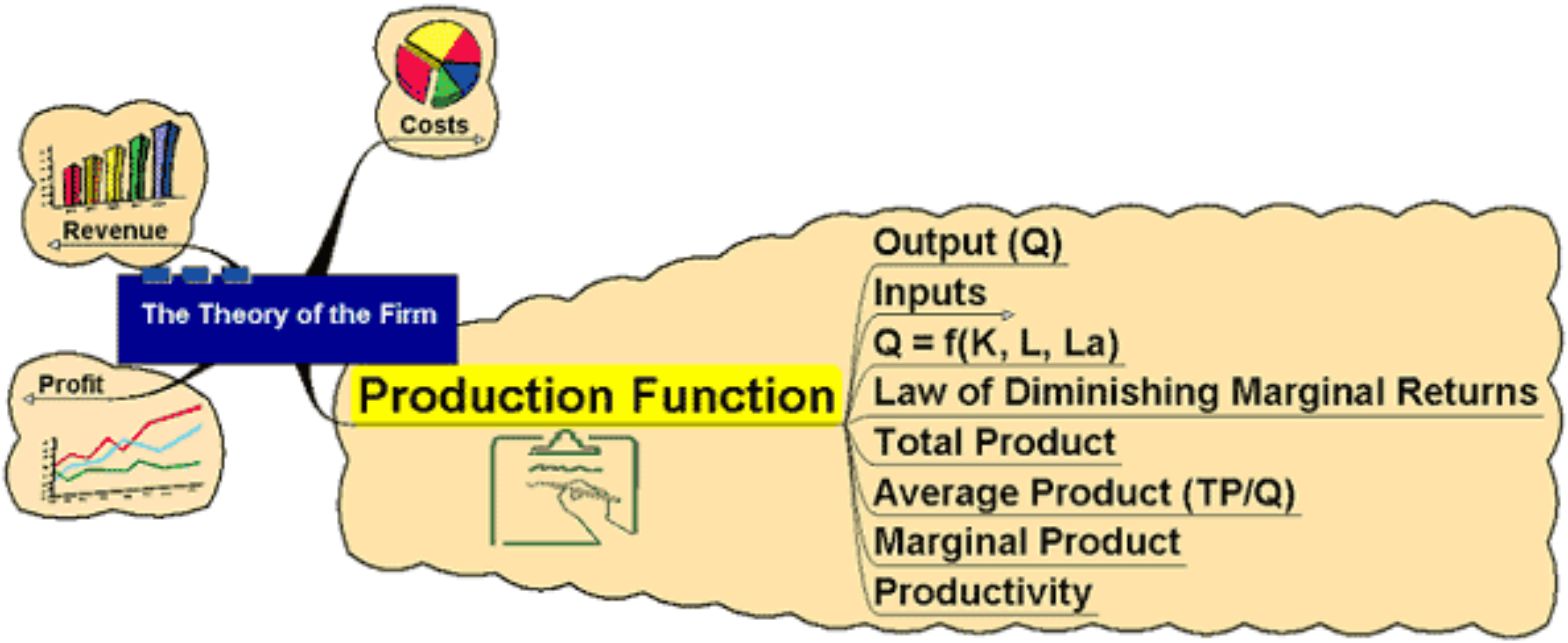
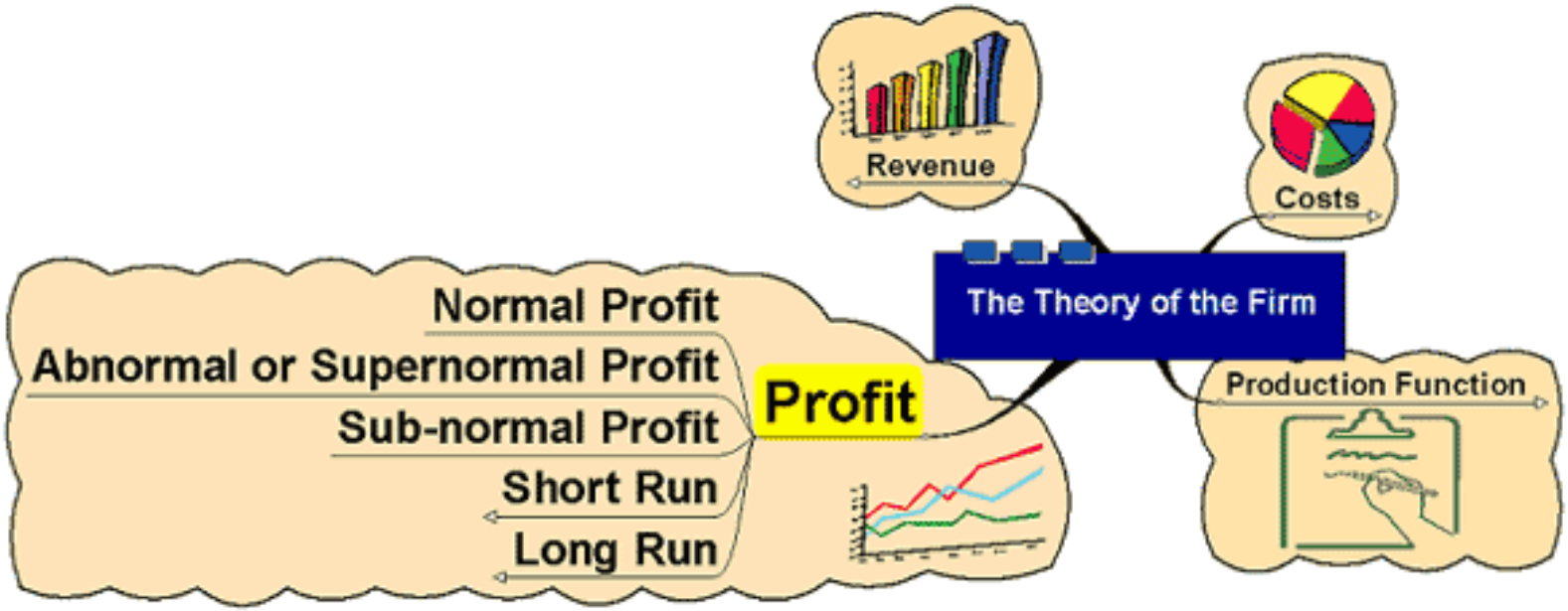
Production Function



Inputs

- Capital (K)
- Land (L)
- Labour (La)

Profit


Revenue
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Profit

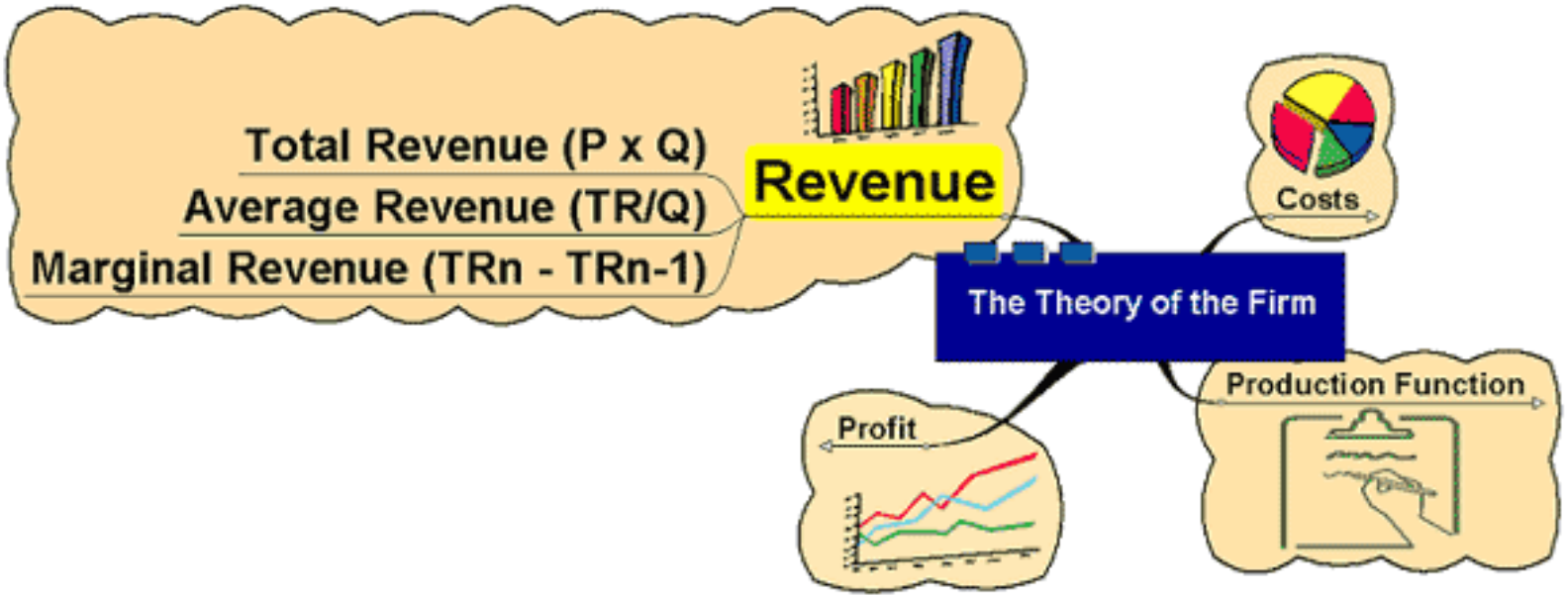
Short Run

- At least one factor fixed

Long Run

- All factors variable

Revenue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Theory of Firms

Costs, Revenues and Objectives

Theory of Firms

- Profit:
  - Difference between Revenue and Cost

$$\Pi = TR - TC$$

Theory of Firms

- Revenue = amount received from the sale of goods or services

$$TR = P \times Q$$

Theory of Firms

- **Total Cost** is the sum of all costs – fixed, variable and semi-fixed
- **Fixed Costs** – do NOT depend on quantity produced- Rent, Rates, Insurance, etc.
- **Variable Costs** –vary directly with the amount produced – raw materials
- **Semi–Fixed Costs** - may vary with output but not directly – some types of labour, energy costs

Theory of Firms

- **Factor Costs**:
- **Labour** – wages/salaries
- **Land** – rent
- **Capital** – interest
- **Enterprise** - profit

Theory of Firms

- Average Cost = Total cost divided by the number of units produced

$$AC = TC/Q$$

$$AVC = TVC/Q$$

$$AFC = TFC/Q$$

Theory of Firms

- Marginal Cost
- The cost of producing one extra or one less unit of output

$$\mathbf{MC = TC_n \text{ units} - TC_{n-1} / Q}$$

- If TC of 100 units = £500 and TC of producing 101 units is £505, MC = £5.00
- Important concept

Theory of Firms

- Short and Long run:
- **Short run** – **some** factors fixed and cannot be increased/reduced
- **Long Run** – time taken to vary all factors of production
- Short and long run vary in all industries:

Theory of Firms

- **Railways** – short run –'easy' to increase labour, long lead times for new rolling stock – 5 years?
- **Supermarkets** – short run – can buy new shelving, hire staff, etc but opening of new stores takes several years
- **Local Builder** – short run buys new tools, hires assistant; long run – purchasing a new van – a couple of months?

Theory of Firms

- Diminishing Marginal Returns
- Assumptions – some factors fixed (e.g. capital and land)
- Adding variable factor – (labour)
- Total Product
- Average Product – TP / Q variable factor (Qv)
- Marginal Product ΔTP/ΔQv

Theory of Firms

- Increasing the variable factor:
- TP rises at first, slows then falls
- AP rises at first then starts to fall
- MP rises, then falls, cuts AP at highest point of AP, cuts horizontal axis at point where TP starts to fall

Theory of Firms

- Objectives of firms:
- Profit maximisation
- Profit satisficing
- Long term survival
- Share price maximisation
- Revenue maximisation
- Brand loyalty
- Expansion and market dominance