Laws of Returns to Scale

- Laws of returns to scale refer to the long run analysis of the laws of production. In the long run all factors of production are variable. No factor is fixed. Thus, in the long run, output can be increased by varying all factors.
- The law of returns to scale states when there is a proportionate change in the amounts of inputs, the behavior of output also changes.
- **Scale** refers to quantity of all factors which are employed in optimal combinations for specified outputs.
- The term **'returns to scale'** refers to the degree by which output changes as a result of change in all inputs.
- The degree of change in output varies with change in the amount of inputs. For example, an output may change by a large proportion, same proportion, or small proportion with respect to change in input.

On the basis of these possibilities, laws of returns can be classified into three categories:

i. Increasing returns to scale

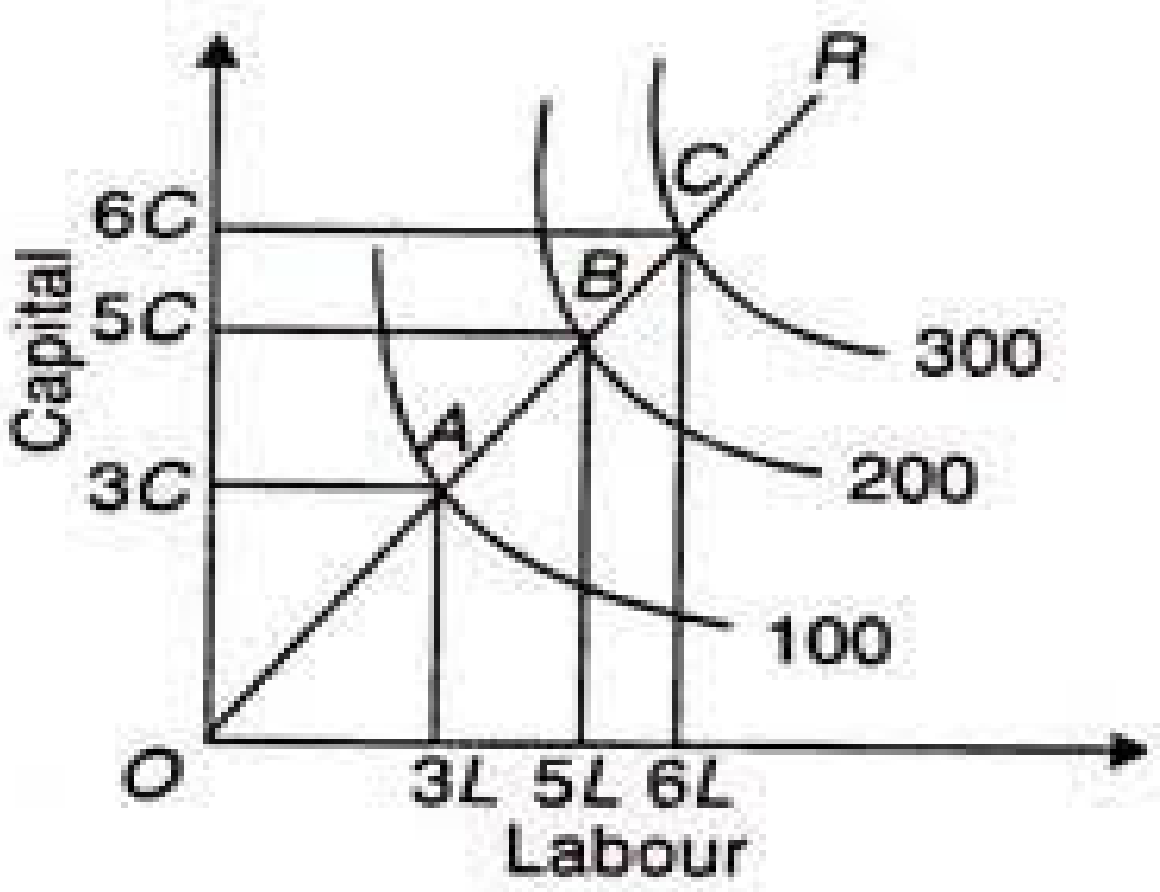
ii. Constant returns to scale

iii. Diminishing returns to scale

Increasing Returns to Scale

If the proportional change in the output of an organization is greater than the proportional change in inputs, the production is said to reflect increasing returns to scale.

- For example, to produce a particular product, if the quantity of inputs is doubled and the increase in output is more than double, it is said to be an increasing returns to scale.



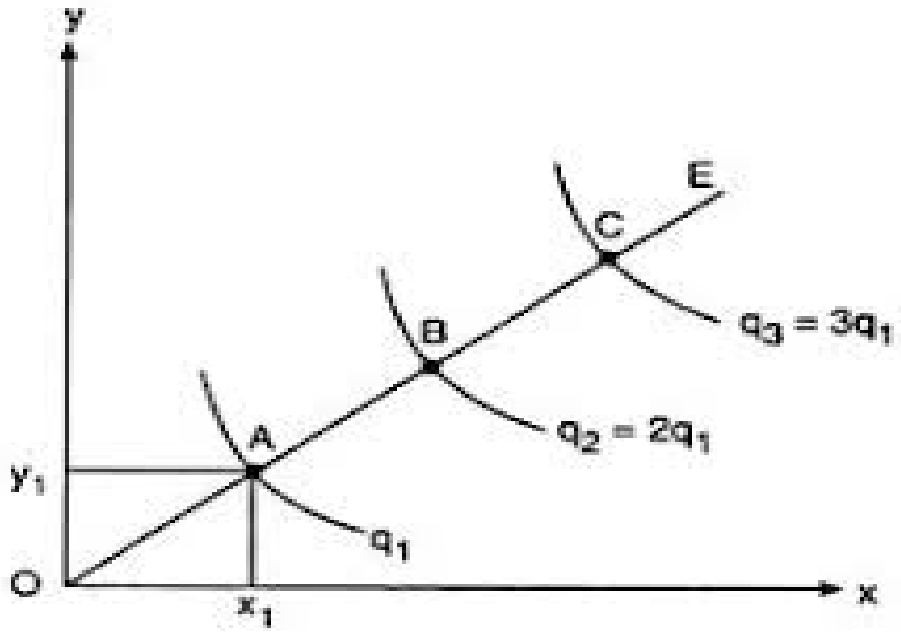
- When the returns to scale are increasing the distance between successive isoquants becomes less and less, i.e. OA >AB>BC.
- It means that equal increase in output i.e. of 100 units at each isoquant is obtained by smaller and smaller increments in inputs.
- In other words, doubling the inputs, the output is more than doubled.

Causes of Increasing Returns to scale

- **Indivisibilities**: Indivisibility means that certain factors are available only in some minimum sizes. Certain inputs particularly machinery, management etc. are available in large and lumpy units. Such inputs cannot be divided into small sizes to suit the small scale of production. Such inputs have to be employed even if the scale of production is small. Therefore, as the scale of production increases, these indivisible factors are utilized better and more efficiently. This leads to increasing returns to scale.
- **Greater Specialization**: As the scale of production increases, the efficiency of labour increases due to division of labour and specialization of labour. Similarly, when the scale of production increases, it becomes possible to use specialised machines and the services of specialized and expert management.
- This results in productivity of inputs leading to increasing returns to scale.

Constant Returns to Scale

- Constant returns to scale or constant cost refers to the production situation in which output increases exactly in the same proportion in which factors of production are increased. In simple terms, if factors of production are doubled output will also be doubled.
- The case of constant returns to scale are also called linear homogenous production function. This is shown in the following diagram.



- In the diagram, OE is the scale line. It can be observed in the diagram that the distance between successive isoquants is equal, i.e. OA = AB = BC.
- It means that if both labour and capital are increased in a given proportion the output expands in the same proportion.

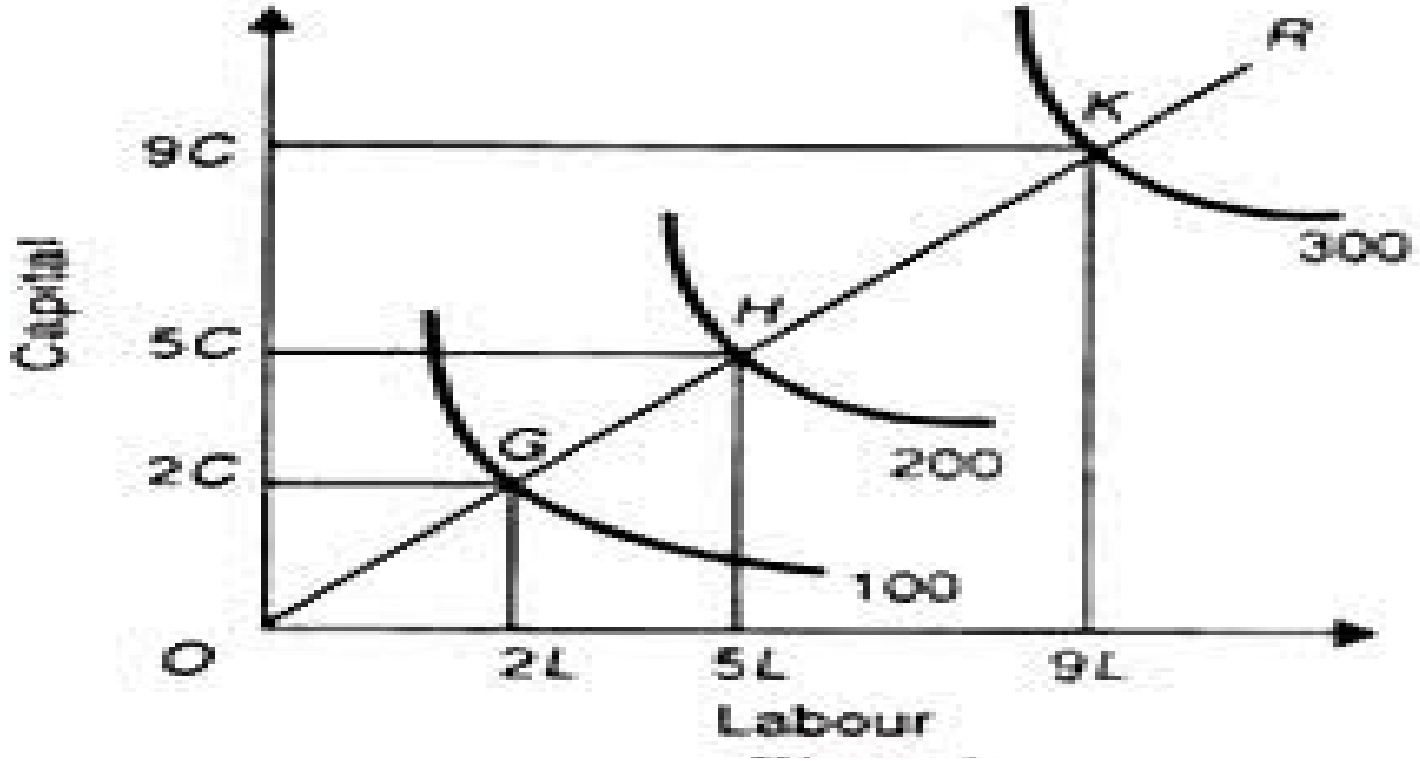
Causes of constant Returns to scale

- **Limits of Economies of scale:** Increasing returns to Scale cannot go on indefinitely. There is a limit to these economies of scale. When the economies of scale are exhausted and diseconomies are yet to start, there may be a brief phase of constant returns to scale.

- **Divisibility of Inputs:** Constant returns to scale may occur in certain productive activities where the factors of production are perfectly divisible. For example, we may double the output by setting up two plants (factories) which use the same quantity and the same type of workers, machinary, raw materials and other inputs.

Diminishing Returns to Scale

- Diminishing returns refer to that production situation, where if all the factors of production are increased in a given proportion, output increases in a smaller proportion. It means, if inputs are doubled, output will be less than doubled.



- In the diagram, OR is the scale line. It can be observed in the diagram that the distance between successive isoquants is increasing, i.e. OG < GH < HK.
- It means that if both labour and capital are increased in a given proportion the increase in output is proportionately less.

Causes of Decreasing Returns to scale.

- **Complexity of management:** Increase in the scale of production on beyond a point may create the problem of proper management, leading to a decrease in managerial efficiency. Large scale of production creates the problem of lack of proper, larger bureaucracy, red-tapism, lengthy chain of communication and command between the top management and men on the production line. As a consequence of all these, the overall efficiency of management decreases.
- **Entrepreneur is a fixed factor:** According to some economist decreasing returns to scale arise because entrepreneur is a fixed and indivisible factor. An increase in scale may come to a point where the abilities and Skills of the entrepreneur may be fully utilised. An increase in the scale beyond this point may decrease the efficiency of the entrepreneur. This gives rise to diseconomies of scale.
- **Exhaustibility of Natural Resources:** Another factor responsible for the diminishing returns in some activities is the limitation of natural sources. For example, if we double the fishing fleet, the number of fish catch will not double because the availability of fish may decrease when fishing is carried out on an increasing scale.

- The returns to scale can be measured in terms of the coefficient of output elasticity.

$$\mathbf{QE} = \frac{\%\ \boldsymbol{change\ in\ output}}{\%\ \boldsymbol{change\ in\ all\ inputs}}$$

If QE = 1, we have constant returns.
If QE >1, we have increasing returns.
If QE <1, we have decreasing returns.

Economies and Diseconomies of Scale

- **Economies of scale** are defined as the cost advantages that an organization can achieve by expanding its production in the long run.
- In other words, these are the advantages of large scale production of the organization. The cost advantages are achieved in the form of lower average costs per unit.
- It is a long term concept. Economies of scale are achieved when there is an increase in the sales of an organization. As a result, the savings of the organization increases, which further enables the organization to obtain raw materials in bulk. This helps the organization to enjoy discounts. These benefits are called as economies of scale.

The economies of scale are divided in to internal economies and external economies discussed as follows:

i. Internal Economies:

Refer to real economies which arise from the expansion of the plant size of the organization. These economies arise from the growth of the organization itself.

Internal economies are classified into:

a. Real Economies
b. Pecuniary or Monetary Economies

Real Economies of Scale

Real Economies are associated with a reduction in the physical quantity of inputs such as raw materials. They are mostly associated with indivisibilities of units of factors of production. The important types of real economies are:

a. Production Economies of Scale: They arise from the use of factors of production. They are in the form of –

i) Labour Economies: as the size of the output rises the firm enjoys labour economies due to –

- Specialization
- Time saving
- Automation of the production process
- Cumulative volume economies – experience gathered from cumulative effect

b. Technical economies of scale:

Occur when organizations invest in the expensive and advanced technology. This helps in lowering and controlling the costs of production of organizations. These economies are enjoyed because of the technical efficiency gained by the organizations. The advanced technology enables an organization to produce a large number of goods in short time. Thus, production costs per unit falls leading to economies of scale.

c. Inventory economies of scale:

The role of inventories is to help the firm to meet the random changes in the input and the output sides of the operation of the firm. Inventories on spare parts, raw materials and finished products increase with the scale of production but they do not increase proportionately with the increase in the size of the output. Therefore, as the size of output increases, the firm can hold smaller percentage of inventories to meet random changes.

b. Marketing economies of scale:

They occur when large organizations spread their marketing budget over the large output. The marketing economies of scale are achieved in case of bulk buying, branding, and advertising. For instance, large organizations enjoy benefits on advertising costs as they cover larger audience. On the other hand, small organizations pay equal advertising expenses as large organizations, but do not enjoy such benefits on advertising costs.

c. Managerial economies of scale:

Occur when large organizations employ specialized workers for performing different tasks. These workers are experts in their fields and use their knowledge and experience to maximize the profits of the organization. For instance, in an organization, accounts and research department are created and managed by experienced individuals, So that all costs and profits of the organization can be estimated properly.

d. Transport and Storage Economies:

As the output increases, the unit cost of transportation of raw materials, intermediate products and finished products falls. This is because a large firm can have its own transportation system or use larger vehicles. Similarly its storage cost also falls.

Pecuniary Economies

- They are realised by the firm from paying lower prices for the factors used in production and distribution of the product due to bulk buying by the firms. They accrue to the firm on account of discounts it can obtain due to its large scale production. They reduce the money cost of the factors for a particular firm.
- They are realised in the following ways:
- Raw material at lower prices
- Funds at lower cost due to reputation in the market
- Lower advertising rates
- Lower transportation cost

Internal Diseconomies of Scale

- Internal economies exist only up to a certain size of a plant. This size is called as optimum plant size. At this plant size all possible economies of scale are fully exploited. If the size of the plant is expanded beyond this optimum size there arise diseconomies of scale (i.e. decreasing returns to scale) especially from managerial economies.
- Important cause of diseconomies of scale is the diminishing returns to management. As the output grows beyond a certain level, the top management becomes overburdened. It makes managerial structure more complex and reduces its overall efficiency.
- Another cause is the exhaustibility of the natural resources.

External Economies

- They arise outside the firm as a result of improvement in the industrial environment in which firm operates. They may be realised from the actions of other firms in the industry. They leave an impact on the prices of factors and therefore on the short-run and long-run average cost curves.
- In other words, external economies of scale occur when a whole industry grows larger and firms benefit from lower long-run average costs.

- The important external economies are as follows:

1. **Cheapening of Materials and equipment:** Expansion of an industry leads to increase in demand for the raw materials and capital equipment. This will lead to a large scale production of these items. It will reduce their prices and therefore these inputs will be available to the firms at a cheaper rate.
2. **Growth of Technical Know-how:** Expansion of industry can lead to discovery of new technical know-how. As a result, the firms will be able to use improved technology to increase the output and this will reduce the cost of production.

3. Development of Skilled labour:
As the industry grows, the training facilities also develop. This leads to development of skilled workers which will increase the productivity of the firms.

4. Growth of Subsidiary and Ancillary Industries: Expansion of industry leads to growth of subsidiary and ancillary industries that provide tools, equipment, machines, etc to the main industries. Firms may also develop to transform waste of the main industry into something useful. This reduces cost of production.

5. Development of Transportation and Marketing Facilities:

6. Development of Information Services:
External economies also arise from the exchange of technical information between firms. This exchange can happen through publication of important information through industry journals. Firms may also set up joint research institutions to develop improved techniques.

External Diseconomies

- External diseconomies of scale occur when an industry growing in size causes negative externalities – and rising long-run average costs.
- For example, if an industry grows rapidly in size it can cause pollution of rivers and lakes. It may also lead to traffic bottlenecks.
- Alternatively, the competition for scarce resources may push up the cost of rent/ labour / raw materials.
- For example, many financial firms wish to set up in the City of London to benefit from the existing infrastructure, but as a result, they face very high cost of renting.
- Expansion of an industry may also drive the wages of skilled labour up as its supply is limited in the short run. This will increase the cost of production.