6 THE THEORY OF THE FIRM

THE THEORY OF PRODUCTION

Production refers to any activity that helps in the satisfaction of human wants.
It consists of those activities that deal with the creation of goods & services which people prepare to pay a price for.

Stages / levels of Production.

1. Extractive Industry. (Primary Level).
The production of physical things begins with the extraction of some basic material such as wood, stones, minerals etc.
- The extractive industry :. deals with those economic activities in extraction of raw materials from their natural sources. It deals with those economic activities directly dealing with natural resources eg farming, mining, quarrying, forestry, fishing etc.

2. Manufacturing & Construction Industry. (Secondary Level).
- This involves the conversion of raw materials into final products.
- It consists of those economic activities concerned with construction & manufacturing eg energy processing plants, food processing etc.

3. Service Industry. (Tertiary level).
- This includes all the economic activities that deal with the provision of services.
- Services are intangible economic goods.
- There are two main categories.
a) Direct / personal services eg hairdressing.
b) Commercial services (aids to trade) eg banking, advertising, insurance.

FACTORS OF PRODUCTION.

06/05/2016.

- This refers to the sum total of all the economic recources available for the creation of goods & services in order to satisfy the human wants.
- They are considered to be the inputs within the production process & they are usually referred to as the factor inputs.
- Traditionally, there are 4 factors of production namely;
i) Land - rent
ii) Labour - wages
iii) Capital - interest
iv) Enterprise - profit

i) LAND:
- This refers to all the natural recources over which people have the power of disposal & which they can use to yield an income.
- This includes the space in which to organise the economic activities eg climatic conditions, fertile soils, minerals, rivers etc.

- The reward for land is rent.

3. LABOUR:
- This refers to the human effort both physical & mental which is directed towards the creation of goods & services.
- For such an effort to be categorised as labour it must be undertaken for reward such as wages which is the reward.

4. CAPITAL:
- These are produced producer goods
- It is a man-made resource which is a product of labour & land resources for further use in production.
- These factors facilitate the creation of goods & services in that they increase the productivity of labour.
- Capital is usually categorised into two,

a) Working capital.
~~These~~ This can be defined as that part of capital that is used up or changed during the production process eg raw materials, stocks or finished goods etc.

b) Fixed capital
It is that part of capital that does not change its form in the process of production.

- The reward for capital is interest.

5. ENTERPRISE:
- These refers to that factor of production that fulfils the following functions;

a) He buys or hires the other factors of production

b) He combines the other factors within the production process.

c) Rewards the other factors of production.

d) He takes risks by producing goods & services in antiapation for demand consequently profits.

- The enterprenuer ∴ can be seen as the decision making factor of production.
- The reward is profit.

SUPPLY, EFFICIENCY, DIVISION OF LABOUR AND SPECIALIZATION.

Supply of Labour.

- This refers to the number of hours of work which are offered at a given wage rate over some given period of time.
- This will be determined by the no. of workers & the average no. of hours each worker is prepared to offer.

Factors Affecting Supply of Labour.

1. Population Size.
- In any given economy, the size of the population determines the upper limit of the supply of labour. ie there cannot be more labour than there is population.

2. Ages Structure.
- The population in any society can be divided into 3 age groups;
  i) The young age 0-18 yrs
  ii) Working age 18-60 yrs.
  iii) Old age over 60 yrs.
- The working age group is the one that determines the labour supply.

3. Working Population.
- Not everybody in the working age group will be in the labour force. i.e. labour force refers to the people who are in the working age group & they are either working or actively looking for work.
- This excludes the sick & full-time students.

4. Education System.
- If students are kept in school longer, this will affect the supply of labour force in the country.

5. Working Patterns (Length of the working week).
This determines the labour supply in terms of man-hours ie the fewer the holidays, the higher the labour supply.

6. Remuneration.
- A well paying industry will attract labourers from other industries.
- This implies that it will have a higher supply of labour.

7. Extent of Barriers to Entry of Particular Occupations.
Some particular types of occupations require special talents which act as barriers to entry into such occupations.

For such occupations the supply of labour will be curle law.

Efficiency of Labour:

This refers to the ability to achieve a greater output within a relatively short period of time without comprising the quality of the work done

Factors Affecting Effiency of Labour.

1. Climatic conditions.
Some climatic conditions are suitable for working while others may discourage the willingness to work.

2. Education & Training.
Education provides knowledge, skills & attitutes which are required for working.

3. Health of the worker.
- This relates to both the physical & the mental state ~~of health~~ of the worker.
- The state of health will depend on the employee's ability to meet his basic needs.

4. Motivating Factors.
These are those factors which go to boost the moral of workers eg better pay, medical benefits.

5. Working Conditions.
Good working conditions will increase the efficiency of the workers eg better sanitation, ventilation, lighting etc.

6. Extent of Division of Labour & Specalisation.
Division of labour & specialisation increases the efficiency of labour because of its advantages.

Division of Labour & Specialization.

- This refers to the dividing up of the economic task of production into sub-tasks in which people specalize.
- Each individual then concentrates on one activity & is said to specalize on that activity.

Advantages of Division of Labour & Specialisation.

1. **Greater skill per worker.**
- The constant repetition of a task results to increase in expertise & performance.
- The worker improves the skill with constant repetition.

2. **Individual development.**
- Division of labour allows people to concentrate on those productive activities which they are based at ie where they are best talented.

3. **Innovation & Invention (Use of machinery).**
- Specialization makes it possible to use machinery, ~~spelt~~ specific to particular tasks.
- The use of machinery in production is effort saving.

4. **Easy supervision.**
Specialisation allows the manager to monitor the workers more closely since the production process has been broken down into separate tasks

5. **Time saving.**
A worker will accomplish more by keeping to a single operation as there is less time wasted btwn jobs or operations.

DISADVANTAGES OF DIVISION OF LABOUR & SPECIALISATION.

1. **Monotony & Boredom.**
- The reptition of a simple task will most likely lead to monotony & boredom.
- The worker ends up being frustrated.

2. **Increased risk of unemployment.**
- Specialisation implies that workers do not have a wide industrial training & experience.
- If for some reason their skill is no longer required in the labour market it is very difficult to find alternative employment.

3. **Increased inter-depedence.**
A specialised system of production increases the extent to which the different sectors of the economy depend upon each other.

4. **Loss of craftsmanship.**
The increased use of automatic machinery in production means that the basic skills have been transferred from the hands of the workers to the machine.

5 Applicability.
Division of labour & specialisation can only apply in large industries.

MOBILITY OF THE FACTORS OF PRODUCTION

There are 2 main aspects of mobility of factors of production;

a) Geographical Mobility.
This is defined as the ease of movement of the factors of production from one geographical location to another.

b) Occupational Mobility.
It is the ease of movement of the factors of production from one form of employment to another ie from one use to another.

Land.
Land is not mobile in the geographical sense but some of it has a high degree of occupational mobility. ie it can be put into diff. uses eg cultivation, construction etc.

Capital
- Some forms of capital are mobile both geographically & occupationally eg vehicles, equipments & tools.
- Some other categories of capital, however are immobile in both senses eg railway lines.

Labour
- It is expected to be the most mobile factor of production however there exists both geographical & occupational barriers towards mobility of labour.

Barriers Towards Mobility of Labour.

Geographical Barriers.

1. Monetary costs
The cost of moving from one location to another may prove to be very high for the worker.

2. Availability of social amenities.
This includes housing, electricity, water, recreational services etc. This is particularly a difficult problem in the case of rented accomodation.

3. Social ties (Social factors).
Many people are reluctant to leave behind friends & relatives & face the prospect of establishing new social relationships in a strange environment.

4. Education.
Many families tend to be mobile in certain stages of the children's education.

is common where diff parts operate diff sys of education.

5 Other factors
eg Language barriers, political instability, climatic conditions, international barriers eg visas & work permits.

Occupational Barriers.

1. Natural abilities
People differ in their natural abilities yet some occupations require high level of intelligence or particular natural attitudes possessed only by a small proportion of the country's population.

2 Training period.
Some professions demand long periods of training & this may act as a barrier to people willing to enter into such careers eg Medicine, architecture etc.

3 Capital.
in order to establish oneself in a particular occupation, capital is needed to purchase the necessary stock & equipments. This may be very costly for certain professions such as dentistry.

4 Social class.
The existing social class structure is responsible for some restriction on the occupation mobility of labour eg a bright student from a poor background may be unable to pursue a certain career due to lack of finance.

Policies to Assist Mobility of Labour.

Geographical Policies.

1. Provision of information on regional job opportunities.
This can be done through the establishment of employment exchange & job centres that will enable the potential workers to be fully informed.

2. Ease Cater for cost of moving.
Employers can enhance job mobility by offering assistance in the cost of moving.

3 Hardship allowances
esp during relocation ~~by to~~ of workers by employees to remote areas.

4 Promotion.
Linking movement to promotion in the sense that a higher wage is offered to the employees being relocated.

5. Housing
Employees can offer low cost housing to areas ~~being~~ to where the employees are being relocated.

Occupational policies.

1. Provision of Information
Provision of info on job opportunities available in diff. occupations.

2. Financing
The arrangement of financial assistance to people willing to start their own businesses.

3. Legislation.
To reduce the role of trade unions & to remove professional barriers to entry into diff. occupations.

4. Re-training schemes.
Where people can learn new skills which can be used to find alternative employment. May 2016 Q4 Dec 2015 3c.

Significance of the Mobility of the Factors of Production.

1. Least cost combination.
Factor mobility enables the producers to settle for the least cost combination.

2. Su
Mobility facilitates the movement of the factors from the surplus to the deficit areas.

3. Transfer of expertise
This enables functioning of inefficient areas of production.

4. Motivational
The possibility of vertical occupational mobility of labour ie promotion can have motivational effects on workers.

5. Minimizes monotony.
Occupational mobility minimizes monotony & all the negative consequences associated with specialisation.

PRODUCTION FUNCTION ANALYSIS

- Production involves the transformation of resources into final products.
- This transformation involves the combination of the factors of production.
- A production function is a mathematical relationship btwn inputs & outputs.

PRODUCTION PERIODS

Given the state of technology & assuming technological efficiency, a firm can only increase its level of production by employing more factor inputs.

Question 1.

The following data relates to a household's consumption of commodit x

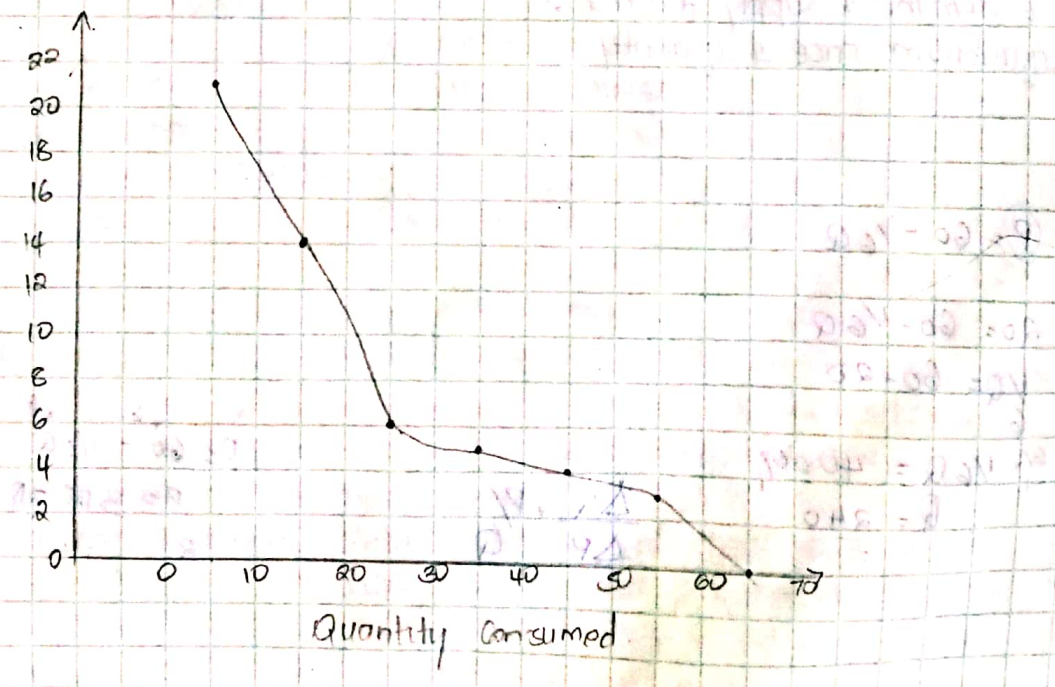
MU: $\frac{\Delta TU}{\Delta Q}$

Required:

i) Plot the marginal utility curve & comment on the shape of the graph.

Quantity consumed	Total utility.	
0	0	
10	210	21
20	350	14
30	410	6
40	460	5
50	500	4
60	530	3
70	530	0

$MU = \frac{\Delta TU}{\Delta Q}$



The M.U curve is downward sloping to illustrate the law of D.M.U to show that

Question 2.

The demand function of product x is given by the following functions.

$P = 60 - \frac{1}{6}Q$ where P = unit price in sh.

Q = Quantity demanded in units.

Required:

The price elasticity of demand when P = ~~10~~ sh 20. Interpret & the magnitu... of your result.

Price elasticity.

$\frac{\Delta Q}{\Delta P} = \frac{P}{Q}$

$P = 60 - \frac{1}{6}Q$

$20 = 60 - \frac{1}{6}Q$

$\frac{1}{6}Q = 60 - 20$

$\frac{1}{6}Q = 40$ $Q = 66.67$.

$\frac{60 - \frac{1}{6}Q}{-6}$

$60 - Q^{-6-1}$

$-Q^{-7}$

$= -\frac{1}{7}Q$

$\frac{-1}{7} = \frac{20}{66.7}$

$P = (60 - \frac{1}{6}P)^{\times 6}$

$6P = 360 - P$

$\frac{1}{6}Q = (60 - P)^{\times 6}$

$Q = 360 - 6P^{20}$

$Q = 360 - 120$ 26 / 120 / 240

$Q = 240$

$P = Q$

$Q = 360 - 6P$

$360P^{0-1} - 6^{\times 1}P^{1-1}$

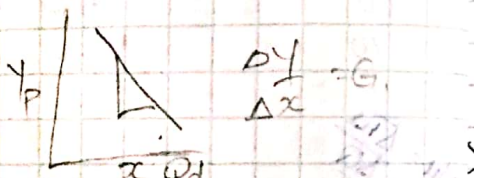
$Q = -6$

$-6 \times \frac{20}{240} = \frac{-1}{D}$

Question 3.

The table below shows the demand & supply schedules for a product.

Price (sh per kg)	Demand (kg)	Supply (kg)
10	210	40
20	170	90
30	130	140
40	90	190
50	50	240.



$\frac{\Delta Y}{\Delta x} = -6$

Required:

i) The demand & supply functions.

ii) Equilibrium price & quantity.

$Y = mx + c$

$\frac{10 - 20}{210 - 170} = \frac{-10}{40} = -0.25$

$P = 60 - \frac{1}{6}Q$

$Y = -0.25x + C$

$10 = -0.25(210) + C$

$20 = 60 - \frac{1}{6}Q$

$\frac{1}{6}Q = 60 - 20$

$\frac{6}{1} \times \frac{1}{6}Q = 40 \times \frac{6}{1}$

$Q = 240$

$\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$

$P = 60^{\times 6} - \frac{1}{6}Q^{\times 6}$

$P = 360 - Q$

2

Question 4.

The market for slim mobile phones is represented by the following functions; $Q + \frac{1}{3}P = 36$ where P = price

$Q + 9 = \frac{1}{2}P$ Q = Quantity.

Required:

i) Identify the demand & supply functions.

ii) The equilibrium price & quantity.

i) Step 1. ~~Remove the denominator~~ Make P the subject.

$Q + \frac{1}{3}P = 36$ $\quad \frac{1}{3}P = 36 - Q$ $\quad P = 108 - 3Q$

$Q + 9 = \frac{1}{2}P$ $\quad P = 2Q + 18$

Step 2: Get rid of the denominator.

Step 3: Come up with schedule.

Price	Quantity.
105	1
102	2
99	3

$P = 108 - 3Q$

Demand function

Price	Quantity.
20	1
22	2
24	3

$P = 2Q + 18$

Supply function.

ii) At equilibrium demand = supply.

$108 - 3Q = 2Q + 18$

$108 - 18 = 2Q + 3Q$

$\frac{90}{5} = \frac{5Q}{5}$

$Q = 18$

i) Substitute Q

$108 - 3(18) = 54$

$2(18) + 18 = 54$

$54 = 54$

$P = 20$

$60 - \frac{1}{6}P$

$60 - \frac{1}{6} \times 6Q$

$6P = 60 - Q$

$120 = 60 - P$

$120 - 60 = Q$

PRODUCTION PERIOD. 12/08/2016.

- However it is not always possible for a firm to vary the quantities of all inputs in order to produce at a chosen output level.
- A firm has 2 production periods; Short-run period less than a yr
  Long-run period. more than 3 yrs.

a) Short Run Period.

- This is said to be that period of time at which at least one factor of production cannot be varied. eg a firm wishing to expand its production is unlikely to have a bigger factory overnight; However it can increase its inputs of labour, raw materials, fuel etc.

- These factors of production which can be varied within the short run known as variable factors
- These which cannot be varied are known as fixed factors
- The short run period is said to be that period of time which is so short t such that;

a) Some inputs must remain fixed
b) A firm cannot change its scale of plant as determined by the variable inputs
c) A firm cannot quit the industry as it will not have enough time to liquidate
d) A new firm cannot join the industry as it will not have enough time to establish a plant & start operations.

b) Long-Run Period.

- This is said to be that period of time over which the inputs of all factors of production can be varied. ie there are no fixed factors in the long run
- The long run is said to be that period of time which is long enough such that;

a) The firm can vary ~~can~~ all its factor inputs
b) The firm can vary its scale of plant as well as the line of production
c) A firm can quit the industry
d) A firm can establish a plant & join the industry.

NB: The long run consists of a number of short-run periods.

Short-Run Changes in Production.

	Labour	Total Product	Average Product	Marginal Product
Wheat farmer a fixed b variable	0	0	0	
	1	4	4	4
	2	14	7	10
	3	25·5	8·5	11·5
	4	40	10	14·5
	5	60	12	20
	6	72	12	12.
	7	77	11	5
	8	80	10	3
	9	81	9	1
	10	81	8·1	0
	11	76	6·9	-5

- As a firm increases its production in the short run it eventually turns up against the law of diminishing returns.
- To illustrate this law a simple arithmetic example is considered. Consider a wheat farmer under the following conditions;

Column 2 which is labeled as TP (Total Product) shows the total output as the no of workers is varied.
The total product of which reaches its max. when 10 workers are employed beyond which it decline

1. He has a given area of land
2. He has a given quantity of capital equipment
3. The state of technology is given.
4. Labour is variable & homogenous. ie all workers are alike

- Under these conditions, the firm's production function for wheat can be written as follows;

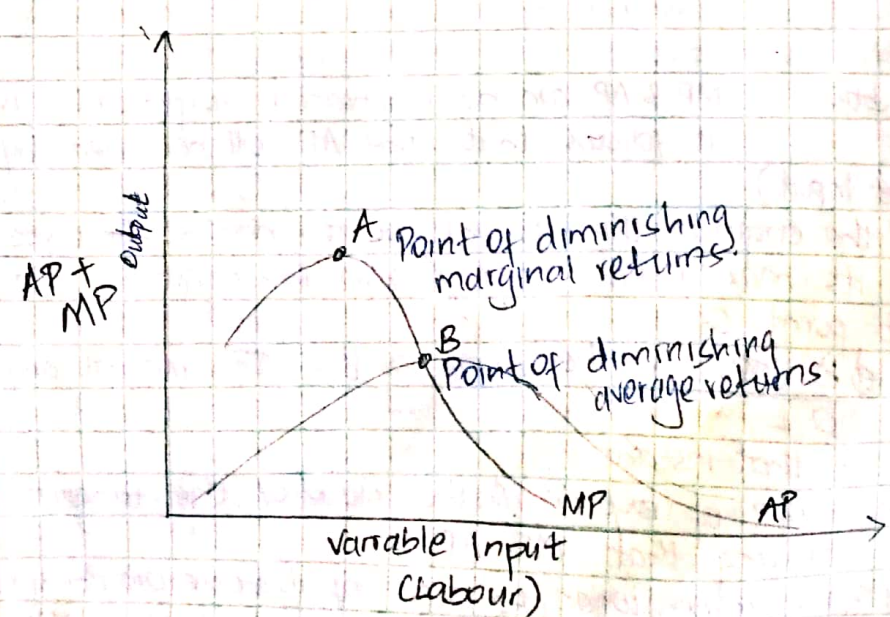
$Q_w = f(\overline{Lb}, \overline{K}, \overline{Ld})$

where Q_w = output of wheat
Lb = Labour input
K = Capital Input
Ld = Land input.

Average Product $= \frac{\text{Total Product}}{\text{Variable Input}}$

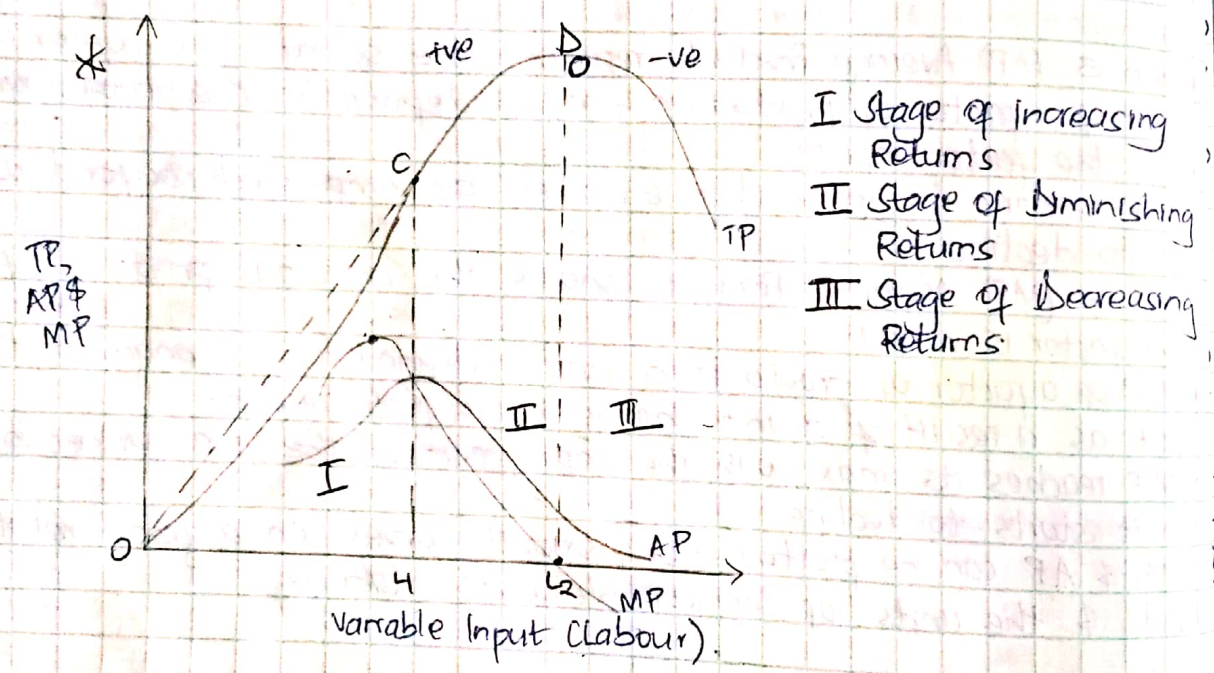
Marginal Product $= \frac{\Delta TP}{\Delta L \text{ variable input}}$

- The symbols Ld & K have bars on top indicating that they are both fixed.
- Column 3 (AP) Average Product represents the output per worker.
- The AP of a factor of production can be defined as the total output per unit of the factor input.
- The AP reaches its max. when 6 workers are employed beyond which it starts to decline.
- Column 4 (MP) Marginal Product shows the marginal product of labour as the factor is varied
- The MP of a factor of production can be defined as a change in the total output as a result of a unit change in the factor input.
- The M.P reaches its max with the employment of the 5th worker beyond which it starts to decline.
- The MP & AP can be plotted using smooth curves on a graph relating output & the units of the variable factor labour.



- Starting with low levels of employment, the M.P increases with increase in labour employment upto a point A where it achieves a max. beyond which it starts to decline.
- Point A where MP is at the max is referred to as the point of diminishing marginal returns
- The AP reaches its max. at Point B beyond which it starts to decline. Point B is referred ~~at~~ to as the point of diminishing average returns.
- Both MP & AP eventually decline as more & more units of labour are employed to a fixed amount of other factors.
- This illustrates the law of diminishing returns which states that as additional units of variable factor are added to a given quantity of fixed factors with a given state of technology, the ~~AP &~~ MP of the variable factor will eventually decline.

Relationship Between T.P, MP & AP



- The relationship btwn TP, MP & AP can be illustrated graphically as above. Since $AP = \frac{TP}{L(\text{Variable Input})}$ it follows that the AP will be given by the slope of a ray from the origin to the relevant point on the TP curve.
- The AP reaches its max. where the ray from the origin is tangent to the TP curve ie at point C
- $MP = \frac{\Delta TP}{\Delta L} = \frac{\partial (TP)}{\partial L}$ is the slope of the TP curve at any point ie rate of change at that instant.
- At point C, the slope of ray OC & the slope of the tangent at Point C are just equal implying that MP = AP
- The T.P reaches its max. when L_2 units of Labour are employed.
- At this point, the M.P is equal to 0 as confirmed by the slope of

the TP curve.
- If additional units of labour are hired, beyond this point, the TP falls & the MP becomes negative.

STAGES OF PRODUCTION.

15/08/2016.

The production of a firm as it varies its variable inputs can be broken down into 3 stages;
1. Stage of Increasing Returns
2. Stage of Diminishing Returns
3. Stage of Decreasing Returns.

$\frac{MU_x}{MU_y}$ MRS_{xy} $= \frac{MU_x}{MU_y} = \frac{P_x}{P_y}$ Budget line

i) Stage of Increasing Returns
- When the units of labour are varied upto L, the firm experiences increasing average return to the variable factor.
- This defines stage I of production where;
a) Both AP & MP are positive. (above 0)
b) AP is increasing
c) MP is initially increasing up to a point where it reaches a max. beyond which it starts to decline.
d) TP is initially increasing at an increasing rate upto a point where MP reaches its max beyond which it is still increasing but at a decreasing rate as the MP is falling.

ii) Stage of Diminishing Returns.
- This stage begins where AP starts to decline upto the point where MP becomes 0
- The TP achieves its max where MP=0.
- In this stage;
a) Both AP & MP are declining but MP is declining at a faster rate than the AP
b) Both MP & AP are positive.
c) TP is increasing but in less proportions to increases in labour employment.

iii) Stage of Decreasing Returns.
- This stage begins where MP becomes negative.
- ~~A~~ At this stage;
a) MP is negative & ~~det~~ declining.
b) AP is positive but declining.
c) TP is declining because MP is negative thus pulling it down with it.

- Firms will avoid operating in stage I as it involves utilising the fixed factor inefficiently
- This is because the variable factor is spread too sparsely over the fixed inputs.

- Firms will also avoid operating in stage III as it involves decreasing returns because the MP is negative.
- A rational producer will find stage II economically efficient as both MP & AP are positive but declining.

Importance of the Law of Diminishing Returns or Law of Variable Proportions.

1. Decision making on Resource allocation.
The law assists the entrepreneur in making resource allocation decisions since he can decide in which stage it will be rational to produce. eg the entrepreneur will never produce in stage III since any additional unit of the variable factor contributes to a fall in output.

2. Understanding short-run curves.
It provides a basis for understanding the short-run cost curves.

3. Explaining poverty & unemployment in 3rd world countries.
- The law of diminishing returns can be said to operate in practical situations esp in the less developed countries where an increase in population on fixed land leads to disguised unemployment.
- This is because a point reaches in the operation of diminishing returns where the M.P of labour is zero or negative.

4. Least cost combination.
It helps a firm to achieve a least cost combination.

Long-Run changes in Production

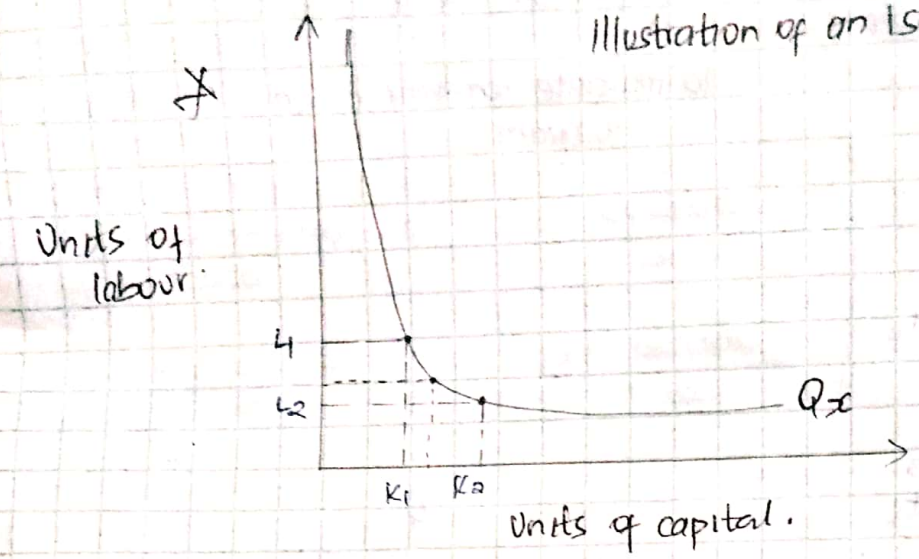
- In the long run, all the factors of production can be varied & ∴ the firms will choose the input combinations which optimize their output & at the same time minimize their cost.
- This can be illustrated by the use of;

a) Isoquant / Isoproduct line Iso = same.
b) Isocost line.

a) Isoquant / Isoproduct line.

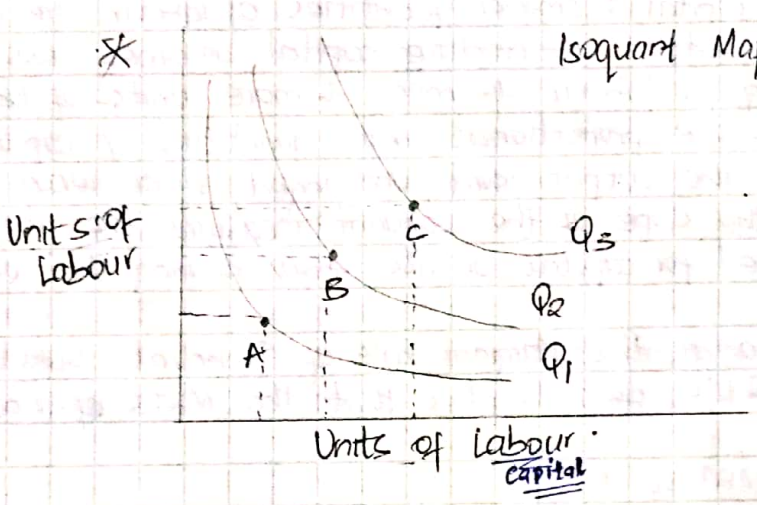
- An isoquant can be defined as a locus of points representing efficient combination of factor inputs which yield the same level of output.
- Consider the production of good x under the following conditions;
a) Only two factors of production, capital & labour are employed.
b) It is possible to substitute labour for capital or vice versa continously in the production process of good x.
- It follows that a given output of good x can be produced using very many diff combinations of capital & labour.
- This can be illustrated below;

Illustration of an Isoquant curve.



- Curve Q_x joins all the combination points of labour & capital yielding the same output level.

Isoquant Map.



- A set of Isoquants will form an isoquant map
- Combinations of labour & capital on the highest Isoquant represents the highest level of output.

Properties of Isoquants.

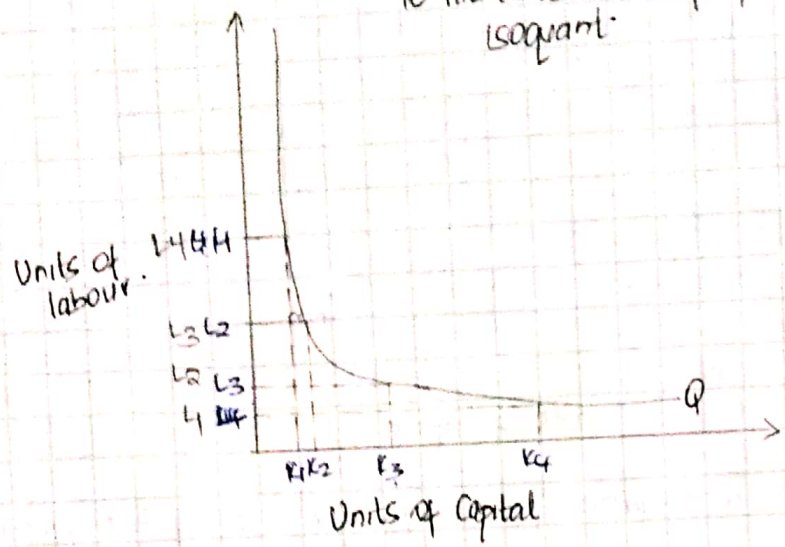
1. Isoquants will have a negative slope.
- If both inputs of capital & labour have positive MP's to maintain a constant level of output, when the quantity of one is reduced, the quantity of the other must be increased.
- This inverse relationship will yield an Isoquant with a negative slope.

2. Do not intersect.
Intersection of Isoquants would be a contradiction of logic since it is not possible to produce diff. outputs on the same isoquant.

3. Convex to the origin.
- If Labour & capital are substitutes, though not perfect substitutes, there

follows that isoquants will be convex to the origin.
- This is illustrated below,

To illustrate convexity of an isoquant.



- As bigger quantities of capital & smaller quantities of labour are used to produce a given level of output, ~~to produce~~ capital becomes less & less capable of substituting for labour as more & more units of labour are given up ~~successful~~ successive proportional larger quantities of capital must be hired in order to keep the output level unchanged & vice versa.
- The absolute value of the slope of the isoquant measures the rate at which labour can be substituted for capital or vice versa keeping the level of output unchanged.
- This rate is referred to as the Marginal Rate of Technical Substitution.
- When written as MRTS LK, ~~the~~ it implies that the MRTS of labour for capital ($MRTS_{LK}$).

$$MRTS_{KL} = \frac{MP_K}{MP_L} = \frac{P_K}{P_L}$$

~~EQUILIBRIUM OF THE FIRM~~

Iso-cost line
This represents a locus of points representing combinations of two inputs that cost the same.

$C = P_L \cdot L + P_K \cdot K$

Cost = $P_L L + P_K K$

C	Cost of firm.
P_L	Price of labour
P_K	Price of capital.
L	Units of labour hired.
K	Units of capital.

Make L the subject;

$L = \frac{C - P_K \cdot K}{P_L}$ If no capital is hired $L = \frac{C}{P_L}$

$K = \frac{C - P_L \cdot L}{P_K}$ If no labour is hired $K = \frac{C}{P_K}$

Dec 2014 sol d

Dec 2019 sol

P_K = sh 6000, P_L = sh 5000

Budget = sh 240,000.

Comment: When the budget falls the isocost line shifts to the left.

$C = P_L \cdot L + P_K \cdot K$

$K = \frac{240000}{6000} = 40$ ✓ $\quad L = \frac{240000}{5000} = 30$ ✓

$C = P_L \times L + P_K \cdot K$

$240{,}000 = 5000L + 6000K$

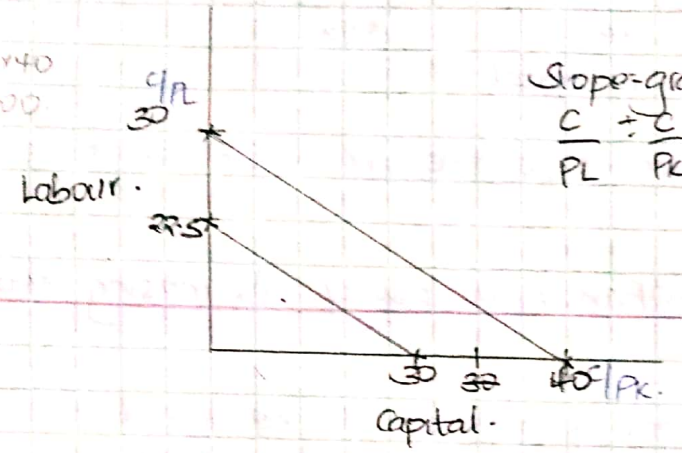
$K = \frac{240000}{6000} = 40$ ✓ $\quad L = \frac{240000}{5000} = 30$ ✓

$K = \frac{150000}{6000} = 30$ $\quad L = \frac{150000}{5000} = 22.5$

$C = P_L \cdot L + P_K \cdot K$

$C = P_L \cdot L + 6000 \times 40$

$C = P_L \cdot L + 240{,}000$



Slope-gradient

$\frac{C}{P_L} \div \frac{C}{P_K} = \frac{C}{P_L} \times \frac{P_K}{C} = \frac{P_K}{P_L}$

$\frac{6000}{8000} = 0.75$

16/08/2016

To illustrate the isocost line, assume that:

1. Only 2 factors labour & capital are employed to produce good x
2. The firm takes the input prices as given by the market.

EQUILIBRIUM OF THE FIRM / OPTIMAL INPUT UTILISATION

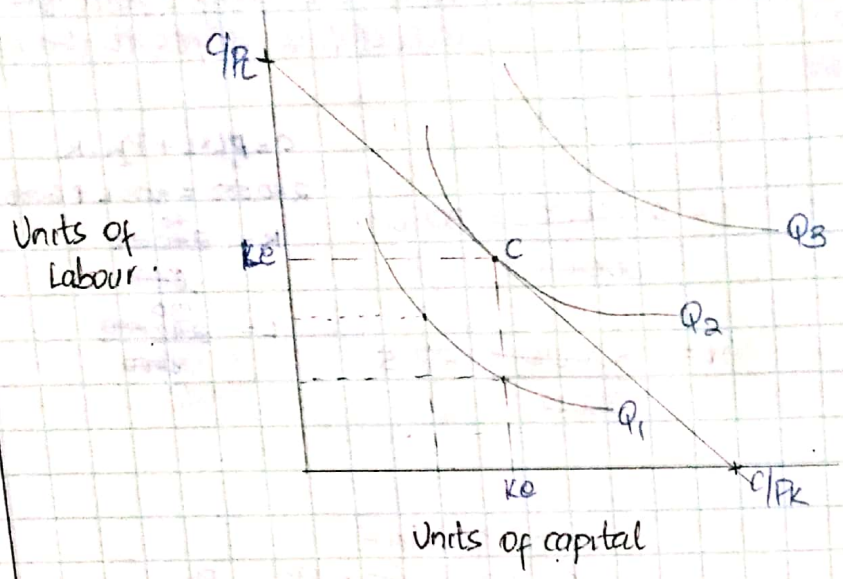
- The firm aims to maximise output at the lowest possible cost
- There are 2 conditions that must be fulfilled for the firm to optimize;

1. The isocost must be tangent to the isoquant curve ie their slopes are equal at that point. → necessary condition.

$MRTS_{KL} = \frac{MP_K}{MP_L} = \frac{P_K}{P_L}$ — interest rates (r) / wages (w)

2. The isoquant should be convex to the origin → sufficient condition. implying that it becomes increasingly hard to substitute one factor for another as you move along the isoquant ($\Delta MRTS$)

- MRTS measures the no. of units of an input that must be given up to acquire another unit of an input.

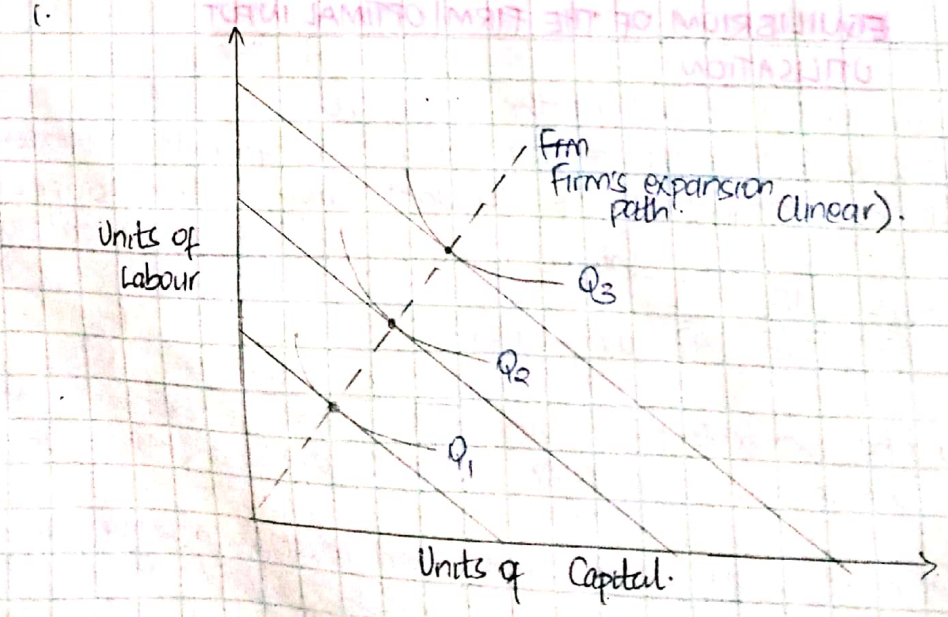


- The firm achieves equilibrium at point c where both conditions for equilibrium are fulfilled.

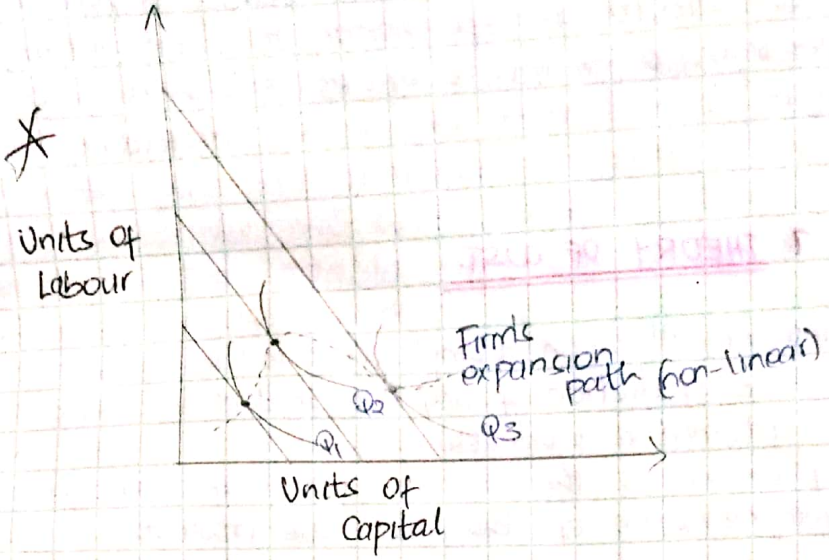
The Firm's Expansion Path & The Law of Decreasing Returns To Scale.

Firms Expansion Path.

- In the long run all the factors of production can be varied & ∴ there is no limitation to the firm's expansion as it varies its output
- The objective of the firm is to choose the optimal way of expanding its output so as to minimize its costs.
- With given factor prices, & a given production function the optimal expansion path is determined by the points of tangency of successive isocost lines & successive isoquants



2.



- If the production function is homogenous, (ie both are increased in the same proportion) the firms expansion path will be a straight line through the origin as illustrated in diagram (1)
- If the production function is non-homogenous, the firm's expansion path will not be a straight line as illustrated in diagram 2.

*

	Scale of plant	Units of Labour	Units of land	Output TP.
Increasing Returns to scale	1	2 (50%)	20 (50%)	50 (100%)
	2	3 (33.3%)	30 (33.3%)	100 (50%)
	3	4 (25%)	40 (25%)	150 (25%)
Constant Returns to Scale	4	5 (20%)	50 (20%)	187.5 (20%)
	5	6 (16.67%)	60 (16.7%)	225 (16.7%)
	6	7 (14.3%)	70 (14.3%)	262.5 (16.7%)
	7	8 (12.5%)	80 (12.5%)	280 (6.7%)
Decreasing Returns to scale	8	9 (11.1%)	90 (11.1%)	290 (3.6%)
	9	10	100	300 (3.4%)
	10	11		

- In the long run, as the firm expands, its output level or as it increases its scale of plant, it will encounter the law of decreasing returns to scale.
- It states that successive proportional increment in all inputs ~~sim~~ simultaneously will ~~eve~~ eventually lead to a less than proportionate increase in output.
- To illustrate this law the following assumptions are made;

1. Production of a good x requires the inputs of labour & land.
2. Both inputs are increased in the same proportions to obtain the output levels.

- In cases where an increase in the factor inputs causes more than proportionate increase in output, the firm is said to be experiencing increasing returns to scale.

- In cases where an increase in factor inputs causes proportionate increase in output, the firm is said to be experiencing constant returns to scale.
- In cases where an increase in inputs causes less than proportionate increase in output, the firm is said to be experiencing decreasing returns to scale.