

Microeconomics production theory

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3. 2 PRODUCTION FUNCTION OR INPUT-OUTPUT RELATIONSHIP SHORT RUN AND LONG RUN PRODUCTION FUNCTION Production function may be defined as the functional relationship between physical inputs that's factors of production (land, labour etc) and physical outputs that is quantity of goods produced. Thus the production function expresses the relationship between quantity of output and the quantities of various inputs used in production. The physical relationship between a firm's physical input and output depends on a given state of technological knowledge. Production function shows the maximum amount of output that can be produced from a given set of input in the existing set of inputs in the existing state of technologie. the output will change when the quantity of any input is change. In real life a manufacture wants to know how much of the various factors or inputs that is land, natural resources, labour and capital will be required to produce a unit or a given quantity of a commodity during a given period of time. It is necessary for him (manufacture) to know this so that he may be able not only to asset his requirements of productive services but also roughly to estimate probable cost. Since production function is concerned with physical aspects of production, it is more a concern of an engineer or a technitation than of an economist. Only a techniqation can say what specific quantity of a good can be produced by the use of various productive resources and their combinations. Production function depends upon: a. Quantity of resources used b. State of technical knowledge c. Possible processes d. Size of the firms e. Natural of firms and organizations f. Relative prices of factors of production As these things change production function will change to. e. g output can be increased by increasing the quantity of factors of production

or of some of them. Adoption of more efficient techniques of production will add to the output. The less efficient of the techniques the smaller the output.

Long run and short run production Long run refers to a period of time in which the supplies of all the inputs or variables can be changed that is the supply response is elastic. The short run refers to a period of time in which the supply of certain inputs or variables like buildings or machines are fixed or the supply response is in elastic. PPF changes with the period of time, in the very long period it changes all together because the same inputs produce different outputs. In the long run the production function depicts the whole set of choices opened to the producer that is what inputs will produce, what output. In the short run the choices open to the producer are restricted because some of the factors are fixed and can not be changed in the short period only some can valid. In this situation the producer tries to find out the relation between variable inputs and outputs. PPF can be expressed as $x = f(a, b, c, d, \dots)$ here x is the output of a commodity per unit of time. a, b, c, d are the various production resources which go into the making of the quantity of commodity. F is the function.

3. 3 LAW OF DIMINSHING RETURNS OR LAW OF VARIABLE PROPORTIONS OR SHORT RUN PRODUCTION FUNCTION

Marshall stated the law" an increase in capital and labor applied in the calculation of land, cause in general less than proportionate increase in the amount of product raised. Unless it happens to coincide with an improvement in the arts of agriculture. " Assumption 1. The state of technology is assumed to be given and unchanged. 2. There must be some inputs whose quantity is kept fixed 3. The law is based upon the possibility of varying the proportions in which the various factors can be combined to

UNITS OF LABOUR	TOTAL PRODUCT (IN QUINTALS)	MARGINAL PRODUCT (IN QUINTALS)	AVERAGE PRODUCT (IN QUINTALS)
1	80	80	80
2	170	90	85
3	270	100	90
4	368	98	92
5	430	62	86
6	480	50	80
7	504	24	72
8	504	0	63
9	495	-9	55
10	470	-25	47

Stage of increasing returns Stage of diminishing returns
 Stage of -ve returns Assume that there is a given fixed amount of land with which more variable factor labor is used to produce wheat with a given fixed quantity of land as a farmer raises employment of labor from one unit to seven units, total product increases from 80 quintals-504 of wheat. Beyond the employment of 7 units of labor total product diminishes, it is worth nothing that up to the use of 3 units of labor, total product increases at an increasing rate and afterwards it increases at a diminishing rate. This fact is clearly revealed from column 3 which shows successive marginal products of labor as extra units of labor are used. Marginal product means the increment in total output due to the use of an extra unit of labor. In the above table it will be seen from column 3 that the marginal product of labor initially rises and beyond the use of 3 units of labor it starts diminishing thus when 3 units of labor are employed marginal product of labor is 100 and with the use of 4th and 5th units of labor marginal product of labor falls to 98 and 62 respectively. Beyond the use of 8 units of labor total product diminishes and therefore marginal product becomes -ve. 3 stages of the law of variable proportions the behavior of output when the In the above graph on the x-axis is measured the quantity of the variable factors and on the y-axis are measured the total product(TP). the TP goes on increasing to a point and after that it starts declining. Average and marginal product curves also rise

and the decline marginal product curve starts declining earlier than the average product curve. STAGE 1 STATE OF INCREASING RETURNS In this stage total product to a point increases at an increasing rate from the origin to point F, slope of TP is increasing upto point F which means marginal product (MP) rises. from the point F on wards during the stage1 the total product curve goes on rising but its slope is declining which means from point F onwards the TP increases at a diminishing rate. the point F where TP stops increasing at an increasing rate and starts increasing at diminishing rate is called the point of inflation. corresponding vertically to this point inflation MP is maximum after which it slopes downwards STAGE 2: DIMINISHING RETURNS In stage 2 the TP continues to increase at a diminishing rate until it reaches its maximum point H where its second point6 ends. in this stage both the MP and average product of the variable factors are diminishing but are positive. at the end of the 2nd stage that is at point M, MP of the variable factor is 0. STAGE 3: -VE RETURNS In stage 3 TP declines and therefore the TP curve slopes downwards as a result MP of the variable factor is –ve and the MP curve goes below the x-axis in this stage variable factors is to much relative to the fixed factor. this stage is called the stage of –ve returns. since the MP of the variable factor is –ve during this stage