Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 20, Issue 4, 2020
PRINT ISSN 2284-7995, E-ISSN 2285-3952

HOW TO USE PRODUCTION FUNCTIONS CHARACTERISTICS OF ECONOMIC PROCESSES IN AGRICULTURE. PHYSICAL (TECHNICAL) FUNCTIONS

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Abstract

Fundamental to economic analysis is the idea of production function. It and its close concept of utility function form the poles of the neoclassical economy. The producer - one of the main players in the market economy - aims to perform those activities that ensure the desired output. Thus, the production factors intervene, the combination of which results in different levels of production. The classical theory represents this conditionality between the production factors and their result with the help of production functions. In this paper we characterize the phases of the production function specific to agriculture.

Key words: *physical production function, production factor, economic analysis, agriculture, marginal and average production*

INTRODUCTION

Functions can provide valuable information at farm level [1].
A function can be interpreted from the point of view of the influence of the analyzed factor on the result in physical expression, without taking into account the economic aspect [6]. If resources and production are given values, the physical function is transformed into an economic function [9].

MATERIALS AND METHODS

Physical production functions can be grouped into two categories [10]:
The first category includes physical functions whose independent variables cannot be quantified in value and therefore cannot be transformed into economic functions [2]. Functions of this type can give indications on the degree of influence of each natural factor on the production, and knowing the way of manifestation of the culture at the analyzed factors can contribute to their better distribution on the territory in order to obtain as many products per hectare [8].

The second category includes the physical production functions in which the factors and results can be quantified in value.
In order to understand the production function, it is necessary to know some economic notions:
The total physical product (y) represents the total amount of production expressed in physical units.
We explain the function $y = F(x_1, x_2, \ldots, x_n)$ with the hypothetical data in Table 1 which contains the average, marginal production in response to the nitrogen fertilizer.

Table 1. Average and marginal production as response to the nitrogen fertilizer:

Input level	**Δx_1**	**(y)**	**Δy**	**$y/\Delta x$**	**$\Delta y/\Delta x$**
0	40	1,170	-	0	-
1	40	1,750	550	44	14.5
2	40	2,450	700	36	17.5
3	40	2,680	230	22	5.75
4	40	2,870	190	18	4.75
5	40	2,990	120	15	3
6	40	2,890	-100	12	2.5

(y) → Total physical production, corn grains per ha
$y/\Delta x$ → Average physical product
$\Delta y/\Delta x$ → Marginal physical product

Source: [9].

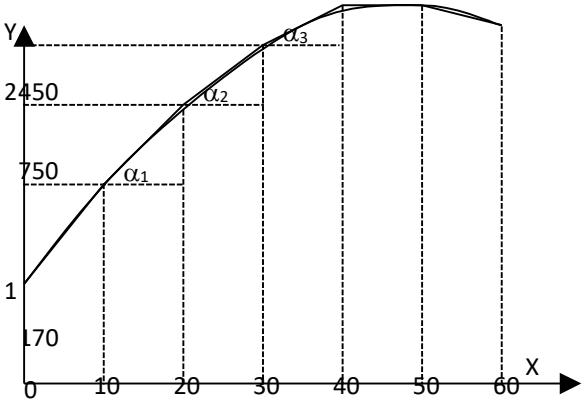

Fig.1. The curve of the marginal physical product
Source: [9].

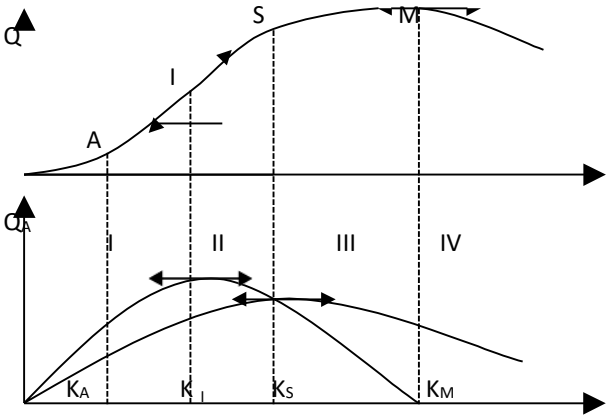

Fig. 2. The three phases of the production function specific to agriculture
Source: [9].

The average physical product or average physical productivity (y_1) represents the production quantity obtained per unit of variable factor consumed at a certain level of the production and at a certain level of the allocated factor. It is calculated as the ratio between the total physical product and the amount of variable factor:

$$y_1 = \frac{y}{x1}$$

The marginal physical product or the marginal physical productivity (y_1) represents the increase or decrease of the physical product as a result of the increase of the consumption of factors starting with a determined level of usage [5], as follows:

$$y_1 = \frac{\Delta y1}{\Delta x1}$$

The curve of the marginal physical product ($\Delta y/\Delta x_1$) derives from the production function and is measured by the slope of the curve of the total physical product (y) [3].

RESULTS AND DISCUSSIONS

The phases of the production function of a single variable factor

In general, in plant culture, production does not react strictly ascending or descending. At the first added quantities, marginal production increases, after which it remains constant, then it begins to decrease until it reaches zero and even negative [4].

Characterization of the three phases of the production function specific to agriculture:

In zone I, as the amount of x1 factor increases, the marginal physical product increases.

In this phase the marginal physical product is higher than the average product per unit factor, while $Ex_1 = \frac{\Delta y}{y} : \frac{\Delta x1}{x1} > 1$ and the maximum value is reached when the marginal product is maximum.

In this area the factor is in insufficient quantities from a technical point of view, its use within this allocation range is detrimental to production and resources are not being fully used either [7].

Zone II is between the maximum marginal production and the average production per resource highest in this zone, although the marginal production decreases, however the average production per resource unit is still increasing The limit of this area is at the point where the marginal production is equal to the average production, namely when the elasticity of the production becomes equal to 1. It is the point of maximum absolute efficiency per resource unit.

Zone III is between the maximum average production and the zero marginal production.

Zone III is an area of intensification of agricultural production, in which a maximum of production per hectare can be obtained but with a growing need for resource quantities per unit of production. The point at which the marginal production is equal to zero, coincides with the maximum of total physical

production and which is also called technical maximum.
The area of technical interest is zone III. At its beginning it is the maximum of average physical production, and at its end the maximum of total physical production.
Zone IV is the area of production losses. The addition of resources becomes harmful, due to which the marginal physical product is negative and due to the negative influence of the marginal product, the production elasticity in this area is negative.

CONCLUSIONS

The analysis of the production function phases provides the manager with the necessary foundations regarding the decision to develop a branch or a product. Knowledge of the technical function is essential for the economic foundation of the decision to allocate factors.

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