

EFFICIENCY OF MATERIAL ASSETS- THE ROLE AND IMPORTANCE IN PERFORMANCE INCREASING OF AGRICULTURE

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Abstract

Romania is one of the European Union countries with important resources for agriculture, occupying the 6th place in the EU in terms of utilised agricultural area but the agrarian structure is not adapted to the EU developed countries. Unlike other fields of activity, in agriculture a number of specific factors arise, which determine certain particularities of the use of the material assets, of the means of production and of the labor force. In the technological process in agriculture there is a combination of three important factors: natural factors (the land), the human factors and material factors. In order to achieve a superior economic performance, it is necessary for the farms to effectively manage these factors.

The general objective of the research consists in analyzing the efficiency of the material assets in agriculture based on the financial accounting information and identifying the factors that influence the performance in agriculture in order to use the resources effectively.

In this article it is developed a synthetic theoretical framework regarding the essential features of the Romanian agriculture, the land and fixed assets efficiency, a large case study regarding the indicators of evaluation and measurement of the efficiency of the material assets in agriculture.

Key words: agriculture, fixed assets, efficiency, production, profit.

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Introduction

In Romania, agriculture is one of the most important branches of the national economy, being one of the main sources of income for the rural population and in the same time is generating effects on the whole national economy because it ensures food security and contributes to the sustainable development of rural areas.

The importance of agriculture in the national economy is due to the existing potential in terms of natural resources and the labor force involved.

The rural territory enjoys a great growth potential, with a favorable endowment in terms of natural resources and human resources. The rural areas represent 87.1% of the country's territory and 47.2% of the population. With all the existing resources, they have had a relatively limited influence on the restructuring and development of agriculture. Romania represents 7% of the utilized agricultural area of the European Union, occupying the 6th place, and 4% of its population.

Romania has a significant agricultural potential but insufficiently exploited and not adapted to the current economic requirements, although it has benefited from consistent funds destined to align with European requirements and market conditions. Although 62% of the agricultural area of the country is represented by agricultural lands, there are a number of imbalances in the Romanian rural economy, due to the large number of small farms and the low degree of technology.

The implementation of the Common Agricultural Policy (CAP) has opened new horizons of development based on competitiveness, market orientation, productivity growth, food security, etc. The CAP after 2020 aims to the transition to a sustainable, smart,

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competitive agricultural sector and the development of dynamic rural areas that will provide high quality and safe food for the population.

In the 21st century, agriculture is still a basic instrument in the fight against poverty and sustainable development. The main role of agriculture consists of economic activities, environmental services, and livelihood (*Lazíková, Lazíková, Takác, Rumanovská, Bandlerová, 2019, p.1-17*).

The analysis of main factors of agriculture's assets and capital efficiency is strongly related to the factors of technical development. Technical development of agriculture is based on four pillars: biological, chemical, technical and human factors (*Takács, 2008, p.1*).

The efficiency is a complex category, its precise definition depends on the context in which it is measured and often is identified with effectiveness, efficacy, performance and productivity (*Zabolotnyy, Felczak and Wasilewski, 2018, p.41-60*).

The efficiency in agriculture is influenced by a number of internal and external factors, but must be stressed the importance of the following factors (*Bórawski, Grzybowska-Brzezińska, William Dunn, 2015, p.175-183*): land prices, inflation, investment in agriculture and hunting, the balance of trade and GDP.

1. Efficiency of the land

The land is the basis of agricultural production, the economic activity in agriculture being directly and indirectly linked to the land. The production capacity of the land varies according to the territories and areas, which influence the production results, and implicitly the performance and the profitability of the agricultural holdings.

Professor Constantin Cojocaru stresses the need for rational use of land for modern agriculture: "The fact that the land is a great national wealth and at the same time a fundamental factor in agricultural and even non-agricultural production - but limited in extent-its integral, intensive, efficient use and as rational as possible from the point of view of environmental protection becomes a first-rate objective in modern agriculture and obviously with decisive implications on the entire economic-financial activity of agricultural holdings" (*Cojocaru, 1997, p.428*).

Compared to the other means of production, the land presents a series of characteristics that give it a specific role in agricultural production (*Iancu, 2007, pp. 76-80*):

- The land has unlimited production potential but can participate in obtaining goods only together with other means (mechanical, biological, chemical) that act on it through the labor force;
- The land is limited in extent and as agricultural use;
- The land is not subject to depreciation, participating in an unlimited number of production cycles;
- For agriculture the land is a production factor that cannot be replaced, therefore it is irreplaceable;
- The land is characterized by spatial immobility and uneven distribution;
- From the point of view of the natural production potential, the land is varied, so that through the improvements brought to it it contributes to the value creation.

It is known that Romania has a significant area of agricultural and non-agricultural land but nevertheless the share of agriculture in the national economy is low. The causes of this situation are multiple, among which: the very large number of subsistence farms, the low degree of technology, difficult access to bank loans for agriculture, etc. In this context, it is necessary to carry out an *analysis of the quality of agricultural land*.

The quality of agricultural land represents a set of operations to quantify the natural capacity of the lands, it expresses their quality according to the existing pedoclimatic and economic conditions of production (*Oțiman, Mateoc-Sirb and Manescu, 2013, p.60*).

Normally the land quality is determined for each plant but an average of the land quality can be calculated.

The methodology for determining quality of agricultural land implies the grouping of the factors that participate in the production, in two categories (*Otoman, Mateoc-Sirb and Manescu, 2013, p.71*):

- natural factors: relief, climate, soil, hydrology
- technical-economic factors: fertilization, terracing, irrigation, drying, pollution combating.

For the efficient use of material resources in agriculture, it is necessary to carry out an economic analysis of the land structure, the growth factors of the average production per hectare, the use of agricultural land, the efficiency of land use, etc.

In accordance with Law 18/1991, as amended and supplemented, article 2, the main categories of land use are:

- agricultural land, comprising: arable land; natural pastures; meadow; vineyards and nurseries; orchards, nurseries, fruit trees.
- non-agricultural land, comprising: forests; water; other land.

In the current context of the market economy, it is important to carry out an analysis of the land use in accordance with the market demands and the natural conditions of the agricultural holdings, thus identifying the reserves for increasing the agricultural areas. It can be identified two ways of analyzing the land at an agricultural farm, one of them refers to the analysis of the profit integration in the projected structure of the area, and the second refers to the dynamic analysis of the weight of the different categories of use in the total area.

The analysis of the land use is made on the *spring productive area* that represents the land occupied by the crops at the end of the sowing campaign and from which will be obtained the production in that year. The spring productive area can be calculated according to the formula below (*Hinescu et al, 2005, p. 109*):

$$Sw = St - Sc + Sp + Sa \quad (1)$$

Sw- the spring productive area

St- the area sown in the previous year autumn

Sc- the area of the crops compromised in autumn and winter

Sp- the area sown in spring

Sa- the area occupied by old perennial crops, cultivated meadows, greenhouses, solariums.

By comparing the spring productive area to the arable area, it is obtained the coefficient of use of arable land (K), which expresses the degree of use of arable land, (*Hinescu et al, 2005, p. 110*).

$$K = \frac{Sw}{Sar} \quad (2)$$

$$Sar = Sw + Sr \quad (3)$$

Sar - the arable area in use

Sr- the area of the pasture and the area remaining without seed.

If we refer to the *spring productive agricultural area*, it is determined according to the relation:

$$Sagr = Sw + Sr + Spr + Spn + Sfn + Sv + Sp \quad (4)$$

Sagr- the spring productive agricultural area

Spr – the area of natural pastures

Sfn- the area of natural grass

Sv- the area of vineyards, nurseries

Sp- the area of the orchards and nurseries orchards, fruiting shrubs.

In agriculture, an important factor is the soil fertility, which is expressed through the average production per hectare. The main ways of increasing the soil fertility are (Todea et al, 2005, p.95):

- the proper fertilization of the land;
- applying amendments;
- use of pesticides;
- increase of irrigated areas;
- respecting the production technologies;
- mechanization of agriculture;
- seeding with quality seeds.

Regarding the land efficiency, it can be measured using certain indicators (Burja, 2009, p.191-192):

➤ turnover per hectare $Ef = \frac{CA}{S}$ (5)

➤ value added per hectare $Ef = \frac{VA}{S}$ (6)

➤ profit per hectare $Ef = \frac{Pr}{S}$ (7)

Ef- land efficiency

CA- turnover

VA- value added

S- area

Pr- profit.

The indicators mentioned above can be analyzed on the whole area of the farm or on the certain crop.

We present below (table no. 1) the analysis of the land efficiency for wheat cultivation, which occupies the most significant weight within the agricultural holding.

Table no.1: Indicators regarding the cultivated area

Denumire	Symbol	2015	2016	2017	2018
Area (ha)	S	390	390	395	395
Obtained production (t)	Q	2550	2652	2765	2844
Average production, kg/ha	q	6538	6800	7000	7200
Delivered production (t)	Ql	2100	2200	2500	2600
Share of production delivered	ql	82	83	90	91
Sale price (lei/ton)	p	450	460	465	468
Turnover (lei)	CA	945.000	1.012.000	1.162.500	1.216.800
Total expenses (lei)	Ch	585.800	685.000	780.000	805.000
Profit (lei)	Pr	359.200	327.000	382.500	411.800
Cost per unit (lei/ton)	c	279	311	312	310
Profit rate, (%)	pr	38.01	32.31	32.90	33.84
Profit per hectare, lei/ha	Pr/S	921	838	968	1043
Turnover per hectare, lei/ha	CA/S	2423	2595	2943	3081

Source: author's view according to the data provided by the agricultural holding

The efficiency of land using calculated on the profit obtained per hectare had a fluctuating evolution, decreased by 83 lei in 2016 compared to 2015 (respectively by 9%), increased by 75 lei in 2018 compared to 2017 (respectively by 8 %). Although the turnover

has a continuous growth during the analyzed period, its growth rate is lower compared to the growth rate of the total expenses, resulting in the fluctuation of the profit per hectare.

The change in profit per hectare is explained by the following factors (*Burja, 2009, p.193-194*):

➤ turnover per hectar change $\Delta \frac{\text{Pr}}{S} \left(\frac{CA}{S} \right) = \left(\frac{CA_1}{S_1} - \frac{CA_0}{S_0} \right) x pr_0$ (8)

$$\Delta \frac{\text{Pr}}{S} \left(\frac{CA}{S} \right)_{2015-2016} = 66 lei$$

$$\Delta \frac{\text{Pr}}{S} \left(\frac{CA}{S} \right)_{2017-2018} = 55 lei$$

1. change in average production per hectare $\Delta \frac{\text{Pr}}{S} \left(\bar{q} \right) = \left(\bar{q}_1 - \bar{q}_0 \right) x gl_0 x p_0 x pr_0$ (9)

$$\Delta \frac{\text{Pr}}{S} \left(\bar{q} \right)_{2015-2016} = 37 lei$$

$$\Delta \frac{\text{Pr}}{S} \left(\bar{q} \right)_{2017-2018} = 28 lei$$

2. change of the delivered production $\Delta \frac{\text{Pr}}{S} (gl) = q_1 (gl_1 - gl_0) x p_0 x pr_0$ (10)

$$\Delta \frac{\text{Pr}}{S} (gl)_{2015-2016} = 7 lei$$

$$\Delta \frac{\text{Pr}}{S} (gl)_{2017-2018} = 11 lei$$

3. change of unit price $\Delta \frac{\text{Pr}}{S} = q_1 x gl_1 (p_1 - p_0) x pr_0$ (11)

$$\Delta \frac{\text{Pr}}{S}_{2015-2016} = 21 lei$$

$$\Delta \frac{\text{Pr}}{S}_{2017-2018} = 6 lei$$

➤ change of the profit rate (profit at 1 leu turnover)

$$\Delta \frac{\text{Pr}}{S} (pr) = (pr_1 - pr_0) x \frac{CA_1}{S_1}$$
 (12)

$$\Delta \frac{\text{Pr}}{S} (pr)_{2015-2016} = -148 lei$$

$$\Delta \frac{\text{Pr}}{S} (pr)_{2017-2018} = 28 lei$$

1. Change of unit price $\Delta \frac{\text{Pr}}{S} (p) = \frac{CA_1}{S_1} \left[\left(1 - \frac{c_0}{p_1} \right) - \left(1 - \frac{c_0}{p_0} \right) \right]$ (13)

$$\Delta \frac{\text{Pr}}{S} (p)_{2015-2016} = 388 lei$$

$$\Delta \frac{\text{Pr}}{S}(p)_{2016-2017} = 338 \text{ lei}$$

$$2. \text{ Change of unit cost } \Delta \frac{\text{Pr}}{S}(c) = \frac{CA_1}{S_1} \left[\left(1 - \frac{c_1}{p_1} \right) - \left(1 - \frac{c_0}{p_1} \right) \right] \quad (14)$$

$$\Delta \frac{\text{Pr}}{S}(c)_{2015-2016} = 330 \text{ lei}$$

$$\Delta \frac{\text{Pr}}{S}(c)_{2016-2017} = 348 \text{ lei}$$

Analyzing the above data, it turns out that the profit obtained per hectare is influenced in different proportions, both by the turnover changing and by the profit rate changing. Regarding the turnover, it registered a gradual growth in the period 2015-2016 (it increases by 7% in 2016 compared to 2015 and by 5% in 2018 compared to 2017), its dynamics being influenced by the production sold and by the selling price, both components are increasing.

It is noted that the cultivated area is constant in the period 2015-2016 and 2017-2018, seeing a slight increase of 1.23% in the period 2017-2018 compared to 2015-2016. If we analyze the production obtained compared to the delivered production, it is observed that in the period 2015-2016 both increase by about 4% while in the period 2017-2018, the obtained production increases by 3% while the delivered production increases by 4%, thus increasing the quantity of sold production sold.

A significant influence on the profit is carry out by the total expenses, so that their growth rate is higher compared to the growth rate of the turnover (in the period 2015-2016), which underlines an inefficient management of costs and leads implicitly to the decrease of the obtained profit. The share of the obtained profit in the turnover is between 32% -38%, which means that for the total turnover about 65% represents expenses.

As a general conclusion, the analyzed indicators highlight an efficient use of the land and a positive evolution of the result indicators compared to the utilised agricultural area and the related expenses.

2. Efficiency of fixed assets

In the agricultural holdings, the existence of an adequate technical-material base is an important objective because the intensification of the production depends on the existing fixed capital. The fixed capital, as a whole, has certain peculiarities, it is used in several production cycles, being subjected to the physical and moral depreciation. It is necessary to mention that, in agriculture, in the category of fixed assets are included, besides, machines, installations, land etc. the labor and reproduction animals, the plantations of fruit trees and vines.

The technical-material basis in agriculture represents the determining factor for the efficient development in this branch. The components of the technical-material basis can be expressed in material units (such as the means of production, the factors of production) and in value expression such as the production funds that are elements of the agricultural capital (Popescu, 2001, p. 160).

There are significant gaps between Romania and the EU, so that the endowment with equipments of the Romanian farms compared to EU 15 is about 25 times lower (350 euros in Romania, 9000 euros in the EU (*Cadrul Național Strategic pentru dezvoltarea durabilă a sectorului agroalimentar și a spațiului rural în perioada 2014-2020-2030*, p. 20). In this context, and considering the contribution of agriculture within the national economy, we consider that the extension of the mechanization of agriculture in Romania is a fundamental necessity. On the other hand, the mechanization requires significant funds, an opportunity in this regard being the National Rural Development Program 2014-2020. It is important to mention that during 2007-2013, Romania had at its disposal significant amounts through the

National Rural Development Program for endowment with equipments, extending the production capacity, but nevertheless the degree of technology is reduced compared to the member countries of the European Union.

The level and dynamics of fixed assets are characterized by two indicators (*Hinescu et al, 2005, pp 140-141*):

- *the value of fixed assets at the end of the year.* During the year, a series of changes in the volume of fixed assets can occur, due to inputs and outputs, so that the value of the fixed assets can be determined according to the relationship:

$$Ff = Fi + I - E \quad (15)$$

Ff - the value of fixed assets at the end of the year

Fi- the value of fixed assets at the beginning of the year

I-the value of the fixed assets entered during the year

E- the value of fixed assets issued during the year

- given that the fixed assets may enter and exit at different times of the year, it is necessary to calculate the *average annual value of fixed assets* (Fa).

$$Fa = Fi + \frac{IxTf}{12} - \frac{ExTs}{12} \quad (16)$$

Tf- the number of months of operation until the end of the year of the fixed assets purchased

Ts – the number of months of non-functioning of the fixed assets who went out.

The analysis of the *efficiency of the use of the tractors and agricultural machinery* requires greater attention due to the initial investments and the maintenance costs incurred.

The economic efficiency of using fixed assets reflects the ratio between the economic effects obtained (for example: turnover, profit, agricultural production, etc.) and the efforts employed, respectively the value of the fixed used to generate the effects.

The efficiency of the fixed capital using is determined by the following indicators (*Voicu, Dobre, 2003, p.338*):

- operating income (V) at 1000 lei fixed capital (CF) $\frac{V}{CF} \times 1000 \quad (17)$

- turnover (CA) at 1000 lei fixed capital $\frac{CA}{CF} \times 1000 \quad (18)$

- value added (VA) at 1000 lei fixed capital $\frac{VA}{CF} \times 1000 \quad (19)$

- profit (P) at 1000 lei fixed capital $\frac{P}{CF} \times 1000 \quad (20)$

Table no. 2: The efficiency of using fixed assets

Indicators	201 5	201 6	201 7	201 8
Agricultural production at 1000 lei fixed assets	520	580	410	401
Turnover at 1000 lei fixed assets	485	590	360	389
Value added at 1000 lei fixed assets	120	115	89	80
Profit at 1000 lei fixed assets	18	17	9	8

Source: author's view according to the data provided by the agricultural holding

The indicators of the fixed assets efficiency presented in the table no. 2 shows an accentuated tendency of diminishing of all four indicators, except for the first two that register

an increase in the period 2015-2016 (because there is a slight decrease of the fixed assets in 2016 compared to 2015). This situation is explained by the fact that the growth rate of fixed assets is higher than the growth rate of agricultural production, turnover, value added, profit. The profit obtained at 1000 lei fixed assets is reduced and decreases significantly from year to year, decreasing by 56% in 2018 compared to 2015, which highlights an inappropriate use of fixed assets in generating effects, respectively profit.

The indicators values for table no. 2 reflects an inadequate management of fixed assets mainly due to the fact that while the fixed assets increase, the effects generated by their use decrease.

The efficiency of the fixed capital use can also be determined through the *break-even point* that refers to the area (hectares) worked during a year as well as the number of operating hours, below which the fixed asset does not generate profit.

Thus, in assessing the efficiency of tractors and agricultural machinery, a number of their characteristics must be taken into account:

- increased depreciation and therefore a shorter operating period;
- the variation of the production capacity of the working machines according to the natural conditions in which the operation takes place;
- the efficiency of the use of the machines in relation to the technical-economic parameters of the machine as well as according to the satisfaction of the requirements of plants and animals under different climatic conditions depending on the area.

The increase of the economic efficiency in agriculture depends significantly on the *mechanization degree*. A high level of mechanization contributes to: reducing expenses; increasing productivity; reducing the works execution time.

The factors that determine the increase of the economic efficiency of the mechanization are (*Popescu, 2001, p.163*):

- optimization of registration with mechanized means;
- quality of tractors and agricultural machinery;
- the price of mechanized means;
- increasing the use of mechanized means;
- the classification of the mechanized means within the optimum operating limits.

Conclusions

Due to the special nature of the agricultural enterprises (especially the seasonality of agricultural), those must pay attention to the management of assets with the strongest circulation in the company.

Efficiency of farm assets is a very important factor of competitive production, it is in correlation with profitability. One of the most important factor of the farm assets is the fixed assets, especially machinery.

From our point of view the main measures to be taken in order to increase the land efficiency are:

- improving soil fertility which leads to a higher quantity and quality production;
- diversifying the retail market and selling the production at a higher price, which is justified considering the increase of the production quality;
- the efficient use of the available resources which can lead, on the one hand, to the reduction of expenses, and on the other hand to the increase of the profit;
- increasing the value of the obtained production, respectively the decreases as far as possible of the production remained unsold;
- reducing the period between the moment of obtaining the production and the sale in order to avoid financial bottlenecks, etc.

We consider that the increase of the fixed assets efficiency can be achieved by an equilibrium between the fixed assets, the degree of their use as well as the agricultural area served by the fixed assets.

In order to be efficient the fixed assets for agriculture must meet the following requirements: to ensure the increase of labor productivity and the reduction of expenses; to ensure the improvement of working conditions; to reduce the environmental pollution; to contribute to improving the quality of work and reducing the periods for carrying out work.

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