LAND FUND AND USE OF AGRICULTURAL LAND

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Abstract

Protecting the environment, as a practical activity on the field, must start form and clear definition of environmental policies. The basic elements of these policies must target the protection of soil, water, air, forests, plantations, farms and habitats, through the delimitation of areas in which implementation of activities that affect the environment are limited or forbidden. Also, within these environmental policies, it is raised a permanent and constant international problem, both in the legal domain and the domain of monitoring the environment and of practical co-working actions in order to avoid, where it is needed, the limitations and stopping the effects of pollution-generating factors.

Key words Law of Multiple Proportions, optimal group size

INTRODUCTION

In agriculture, land is the main means of production without which the actual agricultural production could not take place.

Based on the above prerequisite, the calculation and analysis methodology concerning the main indicators related to agricultural land use and thus the economic efficiency of calculation and analysis is fully justified. It is also important to achieve ways of enhancing economic efficiency, with a particular focus on the qualitative assessment of the land and the influence thereof on the yield per surface unit.

MATERIAL AND METHOD

Land fund and use of agricultural land

Size of the land fund

The **land fund** includes all land plots (including land covered by waters) that are included within a certain administrative-territorial unit (i.e. agricultural holding/exploitation, commune/village, county, etc.). In terms of destination, the lands that make up together the land fund are divided into two categories of land use i.e. agricultural land and non-agricultural land. The size of the land fund is measured in hectares (ha.) and is determined according to the next formula:

$$S_t = S_{agr.} + S_{nonagr.} \quad (1.1)$$

where:

- S_t - total surface (land fund) – ha.;

- $\mathbf{S_{agr}}$ - agricultural area – ha.;
- $\mathbf{S_{nonagr}}$ - non-agricultural area - ha.

The **agricultural area** comprises the following categories of land use: arable land, pastures, orchards, vineyards and it is expressed using the formula below:

$$\mathbf{S_{agr.} = a + p + h + v + o} \quad (1.2)$$

where:
- a = arable land – ha.;
- p = pastures areas – ha.;
- f = hayfield – ha.;
- v = vineyards and vineyard nurseries – ha.;
- o = orchards and orchard nurseries - ha.

The **non-agricultural area** includes the following categories of land use: forests, localities, ponds, lakes and special purpose land, and is expressed using the formula below:

$$\mathbf{S_{nonagr.} = S_f + S_l + S_w + S_{sp}} \quad (1.3)$$

where:
- $\mathbf{S_f}$ = land areas covered with forests and other areas covered with forest vegetation – ha.;
- $\mathbf{S_l}$ = land areas of localities (housings, courtyards, shelters, animal shelters, factories, markets, etc.) – ha.;
- $\mathbf{S_w}$ = land areas which is permanently under water – ha.;
- $\mathbf{S_{sp}}$ = land areas with special destination (roads, railways, hydro-technical engineering constructions, power transmission routes, telecommunications, mining and oil exploitations, quarries of any kind, nature reserves and nature monuments, etc.)

The categories of agricultural land use are divided into upper (intensive) categories, including arable land and vineyard-orchards plantations, and inferior (extensive) categories, including natural meadows (pastures and hayfields). The size of the land fund is of particular importance in determining the optimal size of agricultural holdings.

Ways to use the land fund

Knowledge of the use of land and especially of agricultural land provide the necessary data to assess the type of farming that can be practiced, and to finding the possibilities of transformation of intensive land use categories and to expanding agricultural area, etc.

Economic indicators used to assess the land fund are the following:

a) Size of the land fund;
b) Structure of the land fund, agricultural land and arable land;
c) Share of land use;
d) Intensity of land use.

a) **Size of the land fund** is measured in hectares (ha.). As regards an agricultural unit, the proper sizing of an area should be carried out according to the technical equipment and financial resources available, etc., that is the optimal sizing to achieve a good management of production and labour. At the macroeconomic level, what we are interested in is the average size of the agricultural holding in order to establish the level of production concentration.

b) **Structure of the land fund** expresses the percentage of the various categories of land use depending on the surface of the land or agricultural land. It is possible to determine both the structure of the land fund and the structure of the agricultural land over time, highlighting the changes that both different categories of use underwent in each year, and from year to another.

If after carrying out land improvement works the structure of the land fund changes, it is then necessary to calculate the index of the modification of this structure.

The land fund structure by categories of use provides some guidance on the profile of area submitted for analysis.

This can be determined using the formula below:

$$X_s = \frac{S_i}{S_t} x100 \qquad (1.4)$$

where:

- X_s = the structure index - (%);
- S_i = the area in the category of land use - "i" – ha.;
- S_t = the total area to which land use category "i" is related - ha.

c) **Share of land use** is of interest in the case of agricultural land and especially with regards arable land. The share of land use is assessed according to the total or partial cultivation of the entire land at the disposal of the agricultural holding, the land share occupied by the irrigated areas and those occupied by the double and rotated crops.

The share of land use is expressed as a percentage using the formula below:

$$S_u = \frac{S_{pp}}{S_a} x\ 100 \qquad (1.5)$$

where:

- S_u = the share of land use
- S_{pp} = the production area for spring crops;
- S_a = the arable land surface.

d) **Intensity of land use**. It is expressed using the intensive farming land use index calculated on the basis of the ratio between the area of agricultural land (expressed in ha of conventional arable land) and its real (physical) area/surface, as follows:

$$V_{ui} = \frac{S_i \times K_i}{S_{agr}} \quad (1.6)$$

where:
- V_{ui} = the intensive farming land use index;
- S_i = the area of the "i" category of agricultural land use;
- K_i = the conversion factor in ha of conventional arable land of the "i" category of agricultural land use.

RESULTS AND DISCUSSION

Calculation example:

Calculate the degree of land use intensity knowing that the agricultural land areas are as follows:

- Arable land - 282ha.
- Pastures - 79ha.
- Hayfield - 21ha.
- Vineyards - l6ha.
- Orchards - 10ha.
- Irrigated arable land - 11ha.

Total agricultural land area - 408ha.

Conversion factors coefficient are as follows:

- Arable land - 1.00
- Irrigated arable land - 1.30
- Pastures - 0.20
- Hayfield - 0.50
- Vineyards - 8.00
- Orchards - 5.00

The results are inputs in the Table 1 below.

Table 1

The agricultural land areas and the conversion factors coefficient

No.	Use category	Physical area	Conversion factor	Conventional arable land area	Farming land use index
1	Non-irrigated arable land	271	1.00	271.0	0.66
2	Irrigated arable land	11	1.30	14.3	0.06
3	Pastures	79	0.20	15.8	0.04
4	Hayfields	21	0.50	10.5	0.03
5	Vineyards	16	8.00	128.0	0.31
6	Orchards	10	5.00	50.0	0.12
	Total arable land	408	-	489.6	1.22

The optimal size of agricultural holdings

The optimal size of agricultural holdings is provided by the land area or the amount of livestock allowing the maximization of revenue per land / livestock unit with minimum cost per product unit.

The following methods are used to determine the optimum size:

1.) Statistical grouping; is based on two distinct procedures, namely:

a) the scoring process;

b) the optimum coefficient process.

2.) Statistical and mathematical methods (production functions, cost and profit functions, mathematical programming, game theory, etc.)

3.) Standard Gross Margin Method (G.M.M.).

Statistical grouping method

Determining the optimal dimension by means of statistical grouping requires analysis of agricultural holdings with similar natural and economic conditions and similar production profiles.

Establishing the optimal size of an agricultural holding through the scoring process

This process involves the determination of some distinct and homogeneous groups, depending on a grouping feature. The number of units that fall into one the group must be large enough to express its typical features economic phenomenon, and the interval between groups should highlight significant differences.

For each group, both analytical and synthetic efficiency indicators are calculated, of which we mention the following:

- Total income per ha;
- Labour productivity per worker;
- Net profit per ha.

The process is based on the fact that the size of an indicator can be encompassed between 0 and 100 points. The lowest score may be 0 and the highest 100 points. Intermediate values are calculated by the Law of Multiple Proportions.

The synthetic indicator results from the summation of the score ranges corresponding to economic indicators.

The optimal group size will be that corresponding to the synthetic indicator the highest value (the highest score).

Calculation example:

Both agricultural holdings within a community and the level of economic indicators are grouped by size groups as shown in Table 2. below.

Table 2

Determine the optimal group size

No.	Size group	Economic indicators level (thousand Lei)		
		Monthly revenue	Labour productivity (thousand Lei / worker)	Profit (thousand Lei / worker)
1	25 - 50	700	139	278
2	51 - 75	732	188	289
3	76 - 100	758	188	376
4	101 - 125	752	134	402
5	126 - 150	746	117	350
6	151 - 175	750	82	325
7	176 - 200	735	75	300
8	201 - 225	716	70	286

Using the Law of Multiple Proportions, we calculate the score (number of points) corresponding to the level of each economic indicator.

Thus, for the Total Revenue indicator we have:

maximum value - 758
minimum value - 700
Difference 58

CONCLUSIONS

In the author's opinion, protecting the environment in rural areas cannot be resumed to a few principles and should not be handled only by NGOs and local or regional organizations. **The environmental protection must be integrated into a global ecological strategy that embraces a stable and unitary legislative framework, at a regional and European level.**

Protecting the environment, as a practical activity on the field, must start form and clear definition of **environmental policies**. The basic elements of these policies must target the protection of soil, water, air, forests, plantations, farms and habitats, through the delimitation of areas in which implementation of activities that affect the environment are limited or forbidden. Also, within these environmental policies, it is raised a permanent and constant international problem, both in the legal domain and the domain of monitoring the environment and of practical co-working actions in order to avoid, where it is needed, the limitations and stopping the effects of pollution-generating factors.

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