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A FEW CONSIDERATIONS ON THE UNUTILISED AGRICULTURAL AREAS – EVOLUTION AND INFLUENCE FACTORS

ABSTRACT

The utilisation of land resources has a direct impact on the environmental change, influencing the quality of life, ecosystems and global infrastructure. The paper analyses the changes that took place in the farmland use categories in 2002–2016. The dynamics of the number and size of holdings indicates a significant diminution in the number of farms and utilised agricultural area overall, highlighting the key changes in the structure of its land use categories. The diminution by 10.3% (1.43 million hectares) of the utilised agricultural area in 2016, as compared to 2002, indicates a potential risk of agricultural land abandonment, since these land areas are not included in the structure of any other land use categories.

Key words: utilised agricultural area, land use categories, agricultural holdings.

JEL Classification: Q12, Q24, Q57.

1. INTRODUCTION

The analysis of structural trends in the land use by agricultural holdings is one of the determining factors for supporting the development, implementation and evaluation of agricultural policies. Information on land use practices adopted at farm level allows the analysis of several farm productivity drivers and, consequently, facilitating the development of a sustainable strategy tailored to the general objectives of agricultural competitiveness, as well as to the sustainability of the environment and of rural communities. The paper aims at assessing the risk of farmland abandonment from the perspective of the analysis of the evolution of agricultural holdings total area, utilised agricultural area and unutilised agricultural area in the period 2002–2016, while trying to identify the potential factors that may lead to farmland abandonment and the support measures to alleviate this phenomenon.

2. STATE OF KNOWLEDGE

The agricultural structure in the European Union (EU) Member States shows significant variations due to geological and regional differences, infrastructural particularities, as well as to the diversity of social habits. Agricultural land abandonment can have various effects, such as the impact on the ecosystem by the increase in carbon sequestration (when the land use shifts from farmland to forestry use) (Silver *et al*., 2001), by reducing soil erosion (Tasser *et al*., 2003), or by water quality increase (Hunsaker and Levine, 1995). On the other hand, in the case of farmland abandonment, traditional cultural landscapes are increasingly lost (Palang *et al*., 2006), also resulting in biodiversity decline (Brouwer *et al*., 2001). The reasons for farmland abandonment (either through prolonged non-utilisation or through land exit from the agricultural use category) are not systematically (statistically) monitored but can be sociologically revealed and may be related to various political or socio-economic shocks occurring at local, regional or global level.

3. MATERIAL AND METHODS

The study is based on statistical data research, quantitative analysis and interpretation, allowing for the characterization of the dynamics of unutilised agricultural areas on the agricultural holdings from the perspective of farmland abandonment risk. For this purpose, the main sources of information on unutilised agricultural area were analysed:

(i) statistical indicators;

(ii) land registration system.

The analysis of the unutilised agricultural area dynamics was carried out for the period 2002–2016 and had as main objective the comparative analysis of the evolution of the following indicators: total number of agricultural holdings; utilised agricultural area; unutilised agricultural area; other land areas on the farm; total area of agricultural holdings; land structure by categories of use.

The metadata related to the main analysed area indicators are:

– *The agricultural holding* – an independent technical and economic unit, with autonomous management, which carries out agricultural activities by using agricultural areas and/or raising animals or activities maintaining the agricultural land in good agricultural and environment conditions, either as main activity or as secondary activity. It is an independent unit on which all the production means (labour force, land, agricultural machinery, etc.) are used in common. The autonomous management of the agricultural holding implies the existence of a person or group of persons with legal and economic responsibility. The agricultural activities referred to are the following: (i) Cultivation of non-permanent crops, (ii) Cultivation of

permanent crops, (iii) Crop breeding, (iv) Cultivation of mushrooms, (v) Animal husbandry, (vi) Crop and livestock production mix, (vii) Maintaining the agricultural land in good agricultural and environment conditions. (insse.ro).

– *Total area of agricultural holdings* – an aggregate indicator that includes: utilised agricultural area, unutilised agricultural area, other areas of the agricultural holding (buildings, courtyards, access roads, wooded areas, lakes, ponds, etc.) which do not fall into the two above-mentioned categories.

– *Utilised agricultural area (UAA)* – designates the area actually used for farming. It includes the following categories of land: (i) arable land, (ii) pastures and hayfields, (iii) permanent crops, and (iv) kitchen gardens. The indicator does not include the unutilised agricultural land, forests and land under buildings, pavements, roads, ponds and other similar areas (not used as agricultural land).

– *The unutilised agricultural area (NUAA)* – defined as "the agricultural area that has not been worked in the reference year of the farm structure survey, has not been included in the crop rotation system and is not maintained in good agricultural and environmental conditions. This area can be cultivated again using the available farm resources" (Farm Structure Survey Textbook, 2016).

4. RESULTS AND DISCUSSIONS

The utilised agricultural area (UAA) in Romania diminished by 10.25% in 2016 as compared to 2002, which, in absolute figures, represents a decrease by 1.43 million ha. The number of agricultural holdings decreased by 23.7% (–1.1 million agricultural holdings) and the average size of the holding increased by 17.4%, from 3.11 to 3.65 ha/farm. UAA per inhabitant was down by 1.14%, from 0.64 to 0.63 ha/ inhabitant (Table 1).

Table 1

Evolution of the main structural indicators – total agricultural holdings

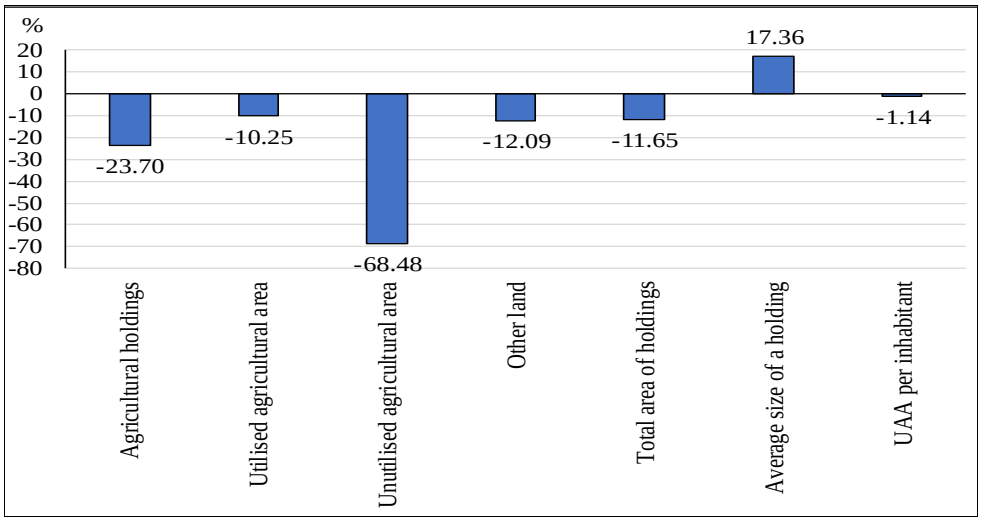
Item	**Unit**	**2002**	**2005**	**2007**	**2010**	**2013**	**2016**	**2016–2002 difference**
Agricultural holdings	thou	4,484.9	4,256.2	3,931.4	3,859.0	3,629.7	3,422.0	–1,062.9
Utilised agricultural area	thou ha	13,930.7	13,906.7	13,753.0	13,306.1	13,055.9	12,502.5	–1,428.2
Unutilised agricultural area	thou ha	330.5	236.3	165.4	576.7	155.0	104.2	–226.3
Other land areas	thou ha	1,446.8	1,299.4	1,346.2	1,812.2	1,466.8	1,271.9	–174.8
Total area of agricultural holdings	thou ha	15,708.0	15,442.3	15,264.7	15,695.0	14,677.7	13,878.6	–1,829.3

Table 1 (continued)

Average size of holding	ha	3.11	3.27	3.50	3.45	3.60	3.65	0.54
Inhabitants (on July, 1)	thou pers.	21,675.8	21,319.7	20,883.0	20,246.8	19,985.8	19,760.3	1,915.5
UAA per inhabitant	ha	0.64	0.65	0.66	0.66	0.65	0.64	–0.01

Source: calculations using data from the General Agricultural Census (GAC) 2002, 2010 and Farm Structure Survey (FSS) 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, National Institute of Statistics (NIS).

Overall, the total area of agricultural holdings decreased by 1.83 million hectares, i.e. by 11.65% (Figure 1).



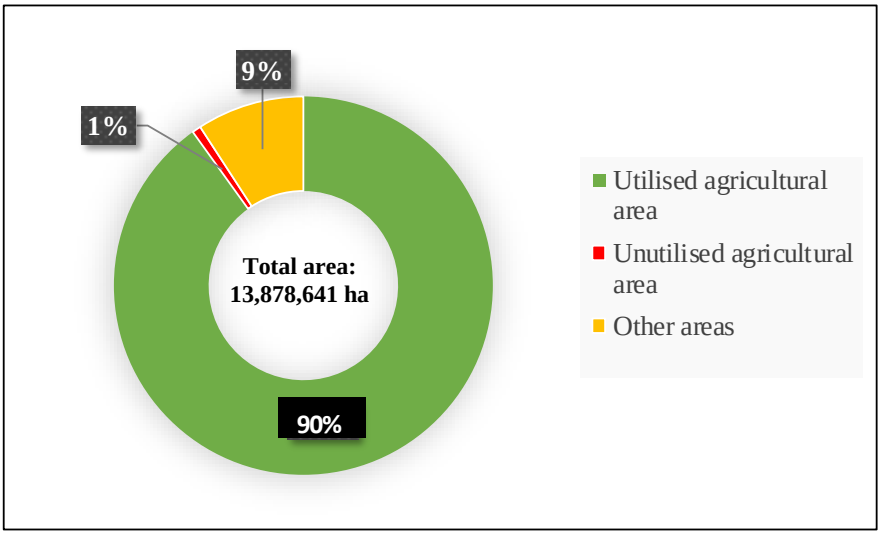
Source: calculations using data from the General Agricultural Census (GAC) 2002, 2010 and Farm Structure Survey (FSS) 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, National Institute of Statistics (NIS).

Figure 1. Main structural indicators of agricultural holdings – 2016/2002 difference (%).

In the year 2016, the total area of agricultural holdings (13,879 thousand hectares) had the following structure: 90% utilised agricultural area (UAA), 9% unutilised agricultural area and 1% other land areas (Figure 2).

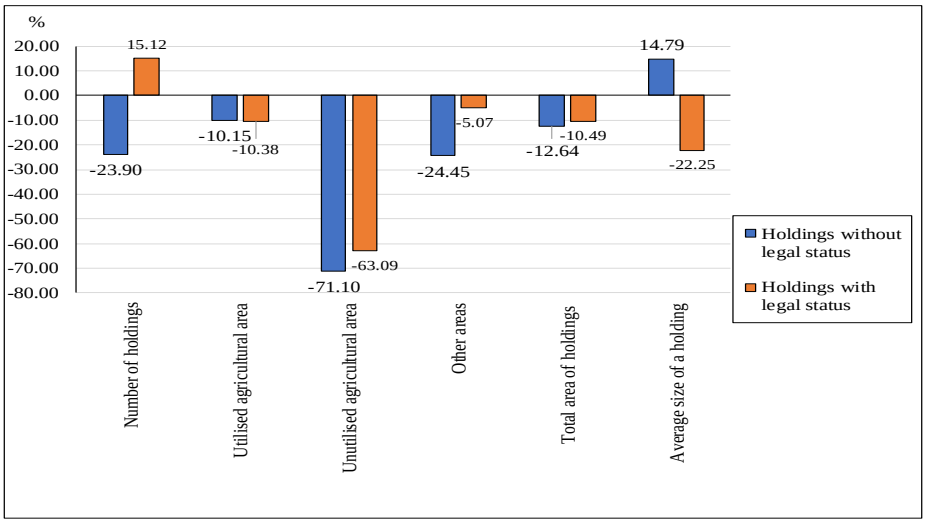
The agricultural holdings with legal status manage 45.2% of Romania's total UAA. UAA diminution by 1.43 million hectares is almost equally distributed by the two types of holdings, namely UAA diminution by 782.5 thousand hectares on the holdings without legal status and UAA diminution by 645.7 thousand hectares on the holdings with legal status. At the same time, as compared to 2002, the number of agricultural holdings without legal status decreased by 23.9% (–1.07

million farms) in 2016, while the number of agricultural holdings with legal status increased by 15% (+3429 farms as compared to 2002 (Figure 3).



Note: "Other areas" include: wooded areas, areas under buildings, roads, ponds, lakes, marshes etc.
Source: calculations using data from Farm Structure Survey, 2016, NIS.

Figure 2. Total area of agricultural holdings by main land use categories (2016)

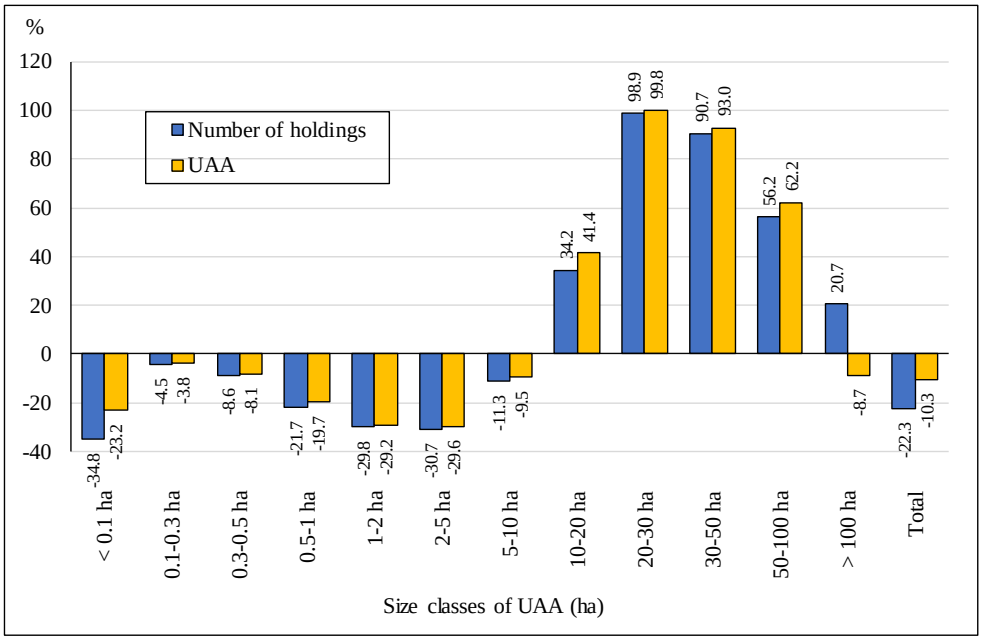


Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

Figure 3. Main structural indicators – total holdings without/with legal status: 2016/2002 difference (%).

Significant differences were also noticed in the evolution of the average size of UAA on both types of holdings. The average UAA size on the holdings without legal status increased by 14.8% (from 1.74 to 2.17 hectares per holding), while the average UAA on holdings with legal status decreased by 22.3% (from 319.9 to 248.8 hectares per holding). Over the period 2002–2016, a decrease in the number of farms was noticed in all size classes up to 10 hectares, while for all size classes over 10 hectares the number of farms increased. The highest increase (almost double) occurred in the size classes 20–30 hectares and 30–50 hectares (> 90%) respectively.

A similar trend was also noticed in the evolution of UAA. Thus, in all size classes up to 10 hectares, a decrease in the total area of holdings took place (Figure 4).



Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

Figure 4. Total number of agricultural holdings and utilised agricultural area, by size classes of UAA – 2016/2002 difference (%).

As compared to 2002, in the year 2016 the average size of total area of holding increased by 15.19% and the unutilised agricultural area on holding decreased by 14.68%. UAA per holding increased by 13.06%, the highest increase being noticed in the arable land use category (27%), from 2.59 to 3.29 ha of arable land per holding (Table 2).

The average size of a holding using pastures and hayfields increased by 19.7%, from 2.86 to 3.42 ha pastures and hayfields per holding, while the average

size of a holding with permanent crops increased by 14.6 %, from 0.27 to 0.31 ha of permanent crops per holding (Table 2).

Table 2

Average size of agricultural holding, by agricultural land use categories (ha per holding), 2002–2016

Item	Average size of a holding, by agricultural land use categories (ha/holding)						2016 /2002 difference (%)
	2002	2005	2007	2010	2013	2016	
Utilised agricultural area	3.24	3.37	3.57	3.57	3.66	3.74	15.46
Arable land	2.59	*2.63*	*2.75*	*3.01*	*3.15*	*3.29*	*26.99*
Kitchen gardens	*0.06*	*0.07*	*0.07*	*0.07*	*0.07*	*0.07*	*19.30*
Pastures and hayfields	*2.86*	*2.96*	*3.33*	*2.98*	*3.26*	*3.42*	*19.68*
Permanent crops	*0.27*	*0.30*	*0.31*	*0.28*	*0.28*	*0.31*	*14.55*
Unutilised agricultural area	1.55	1.76	1.09	1.80	1.32	1.03	–33.35
Other land areas	0.37	0.35	0.37	0.54	0.47	0.40	7.04
Total area of holding	3.52	3.64	3.89	4.08	4.05	4.06	15.22

Note: The average land area for a certain category of use was calculated by dividing the area of that particular land use category by the total number of holdings owning/using land from the respective category.

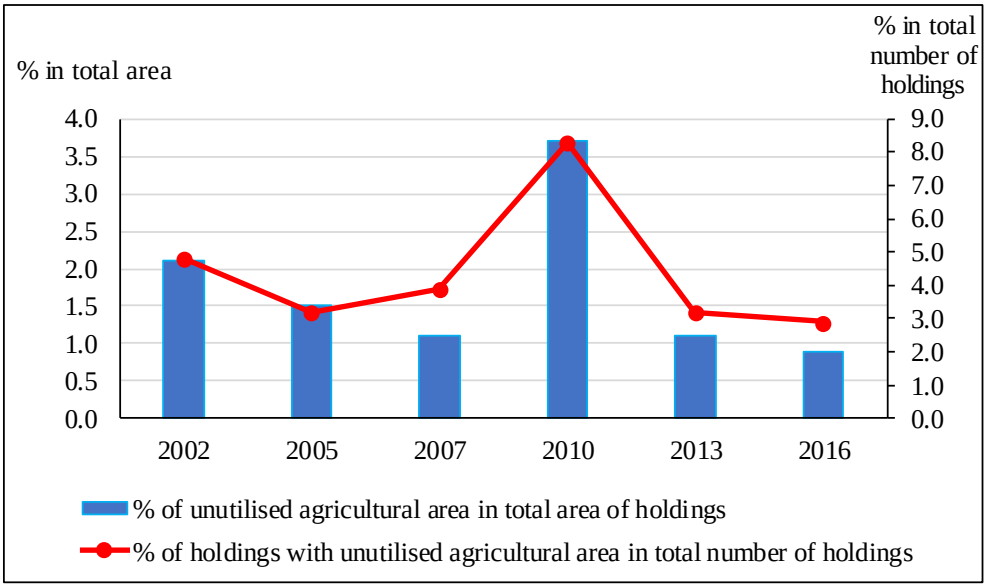
Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

4.1. EVOLUTION OF UNUTILISED AGRICULTURAL AREA

The unutilised agricultural area (NUAA) and the number of holdings with unutilised agricultural area showed an overall decreasing trend between 2002 and 2016. A notable exception is the year 2010, for which the data of the General Agricultural Census show a sharp increase. Ministry of Agriculture and Rural Development estimates have shown that in 2010, from 9.4 million ha of arable land, 2.9 million ha (i.e. 31%) were not cultivated, i.e. almost double as compared to the 2007 estimate (1.5 million ha of non-cultivated arable land). However, one should notice the major difference between the estimation and the statistical records, as well as the difference in content between "non-cultivated arable land" and the indicator "NUAA – unutilised agricultural area" (e.g. NUAA does not include the arable land left uncultivated for one year, to let it recover its productive capacity).

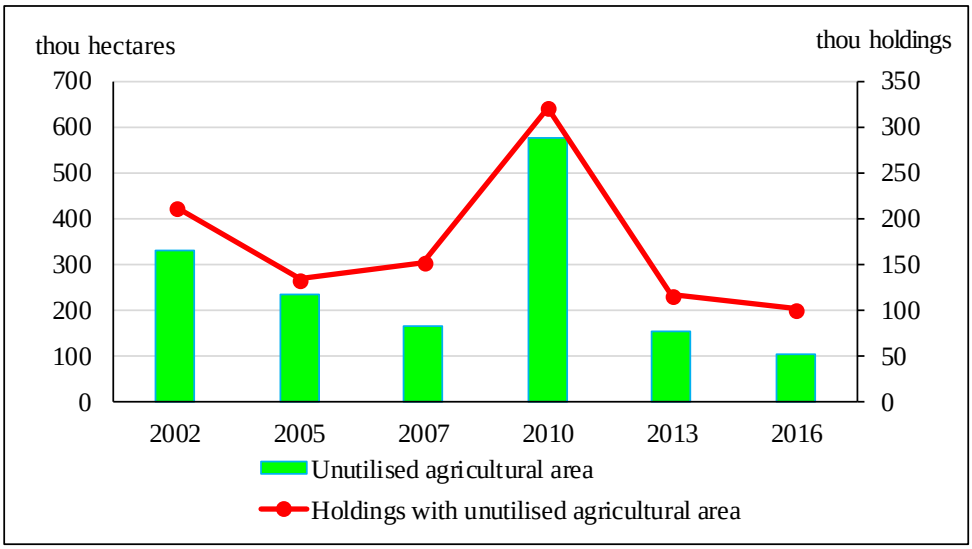
The share of agricultural holdings with unutilised agricultural areas in total farmland decreased to 0.9% in 2016, compared to 2.1% in 2002 (Figure 5).

As compared to 2002, a diminution by two-thirds (68.48%) of the unutilised agricultural area was noticed in 2016, from 330.5 thou ha in 2002 to 104.2 thou ha in 2016. The number of agricultural holdings with unutilised agricultural areas decreased by more than half (53.2%), from 212,863 in 2002 to 100,832 in 2016 (Figure 6).



Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

Figure 5. Share of agricultural holdings with unutilised agricultural area in the total number of holdings and share of unutilised agricultural area in the total area of holdings (2002–2016).

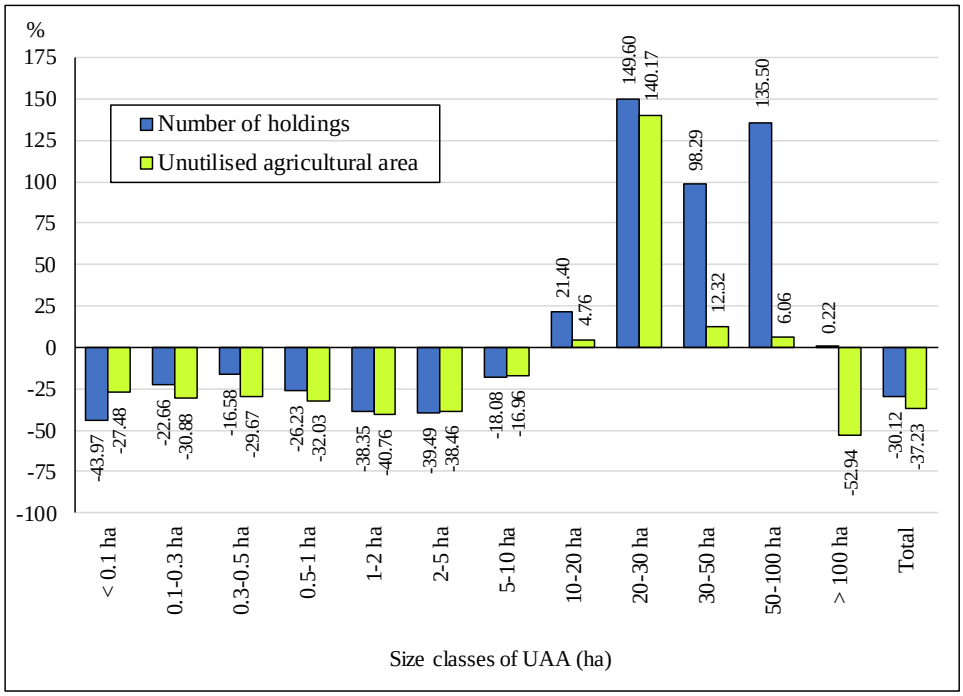


Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

Figure 6. Unutilised agricultural area (NUAA) and number of holdings with unutilised agricultural areas (2002–2016).

As compared to 2002, the diminution of the number of holdings with unutilised agricultural areas in 2016 occurred in all size classes less than 10 ha, but also on holdings over 100 ha (Figure 7). The number of medium-sized holdings (between 10 and 100 ha) with unutilised areas significantly increased instead.

In 2016, 22% of the unutilised agricultural areas were found on holdings below 1 ha, 51% of NUAA were found on holdings below 5 ha and 35% of NUAA on holdings over 50 ha. In 2016, as compared to 2002, the largest increase (2.4 times) in NUAA was noticed on the holdings of 20–30 ha (Figure 7).



Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

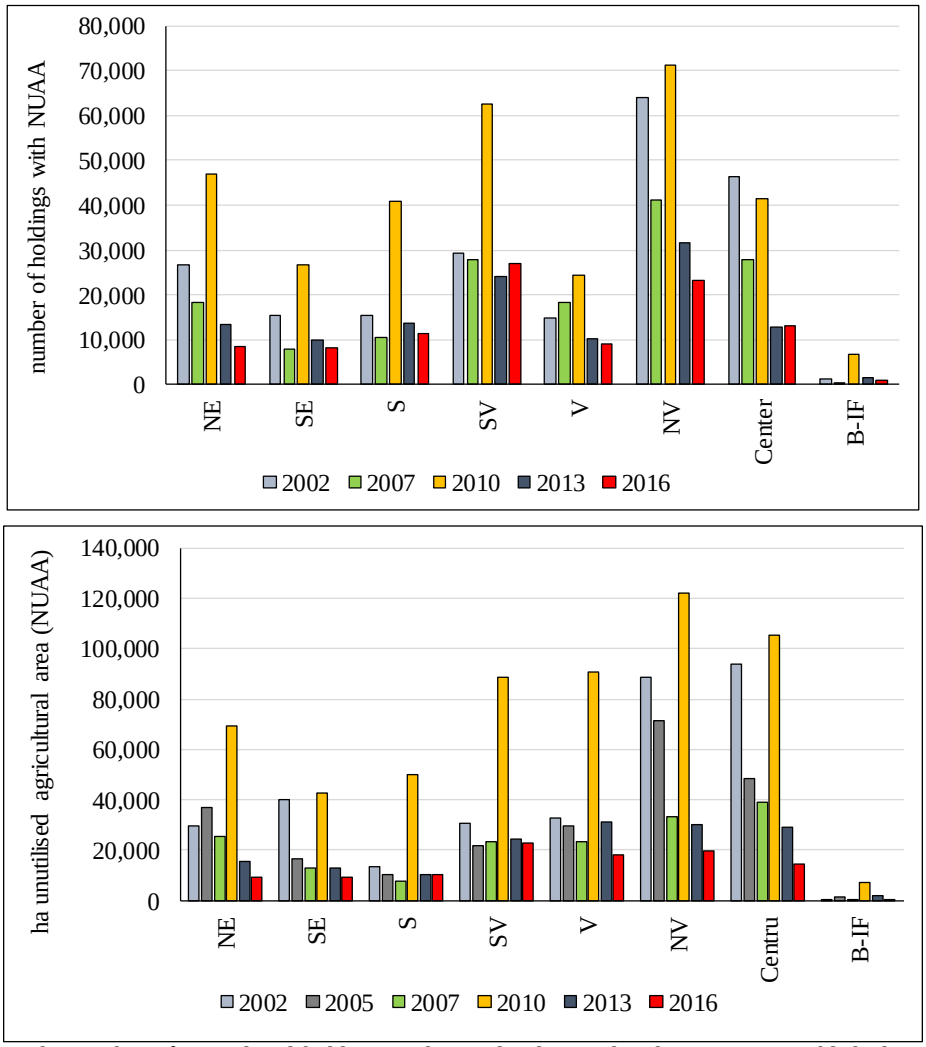
Figure 7. Total number of holdings with unutilised agricultural areas and the unutilised agricultural area by size classes of UAA, 2016/2002 difference (%).

At regional level, the highest frequency of holdings with unutilised agricultural areas is found in North-West region, followed by the Central and South-West regions (Figure 8).

In the year 2010, the economic crisis hit the whole Romanian economy, including agriculture, and the scarcity of financial resources had as immediate result a significant increase in the unutilised agricultural areas (NUAA), which were 1.5–4.5 times higher as compared to both 2007 and 2013, according to the development region; the highest differences were observed in South, South-East

and North-East regions. At national level, in 2010, the number of holdings with NUAA was 2.11 times higher than in 2007 and 2.74 times higher than in 2013.

In terms of unutilised agricultural area, in 2010 there were 2.7–6.5 times more hectares than in 2007 and 2013, meaning that the NUAA increased more on larger farms located in the South, North-West and North-East regions.



Note: the number of agricultural holdings with unutilised agricultural areas is not published in the Farm Structure Survey 2005.

Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2005, 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

Figure 8. Total number of holdings with unutilised agricultural areas and the unutilised agricultural area by development regions (2002–2016).

The average unutilised agricultural area per holding differs significantly by development regions. Thus, the South-East, West and Central regions showed the highest values (over 2 ha/holding); in 2016 the average values decreased in all regions below 1.2 ha/holding (table 3).

Bucharest-Ilfov region is an exception, as it is the only region in the country where the number of holdings with NUAA, the number of hectares NUAA and the average unutilised area per holding increased in 2013 and 2016 as compared to 2002. The most likely explanation could be the very high demand for land for non-agricultural uses.

Table 3

Average unutilised agricultural area
per holding by development regions, 2002–2016 (hectares/holding)

Region	**2002**	**2007**	**2010**	**2013**	**2016**
NE	1.11	1.40	1.49	1.14	1.06
SE	2.62	1.63	1.60	1.30	1.13
S	0.89	0.73	1.22	0.77	0.91
SV	1.04	0.83	1.42	1.02	0.85
V	2.23	1.28	3.75	3.04	2.01
NV	1.39	0.81	1.71	0.95	0.85
Centre	2.03	1.40	2.54	2.26	1.12
B-IF	0.48	1.24	1.05	1.33	0.32
Total	1.55	1.09	1.80	1.32	1.03

Note: the number of agricultural holdings with unutilised agricultural areas is not published in the Farm Structure Survey 2005.

Source: calculations using data from the General Agricultural Census 2002, 2010 and Farm Structure Survey 2007, 2013, 2016; Romania's Statistical Yearbook, 2016, NIS.

4.2. POTENTIAL DETERMING FACTORS OF AGRICULTURAL LAND NON-UTILISATION

Among the potential determinants of agricultural land non-utilisation, we can mention: land fragmentation, lack of production factors, limited access to operational and investment capital, lack of specialized training, lack of agricultural cadastre, desertification phenomenon, increased demand for land with non-agricultural use (mainly for buildings), etc.

The excessive land fragmentation resulting from the application of successive land laws, as well as from the generation changes (division of land by inheritance) has had a significant negative impact on the possibility to utilise the land under economic efficiency conditions. The lack of mechanization means (tractors, agricultural machinery and implements) adequate to small-sized farms, the low access to credits for working capital and investments also contribute to this situation.

Land lease has slightly reduced the negative impact of land fragmentation, yet in many cases the income obtained from land lease is quite small, contributing to maintaining the poverty situation of a part of the rural population.

The association/land sale potential is often hindered by the lack of updated inheritance documents, and mainly by the lack of cadastre. At the same time, the legislation regulating the land market is not stimulating for its dynamism, with costly and complicated procedures.

According to experts, the desertification phenomenon has been intensified in recent years, mainly due to the increase in frequency of the extreme weather events (as a consequence of global heating), and to the lack of rainfall in particular. According to studies, one-third of Romania's territory is affected by desertification, mainly the Romanian Plain, Dobrogea and southern Moldova. According to the National Research and Development Institute for Soil Science, Agro-Chemistry and Environment, the absence of water in soil, the chaotic deforestation and the temperatures rising from one summer to the next have resulted in an alarming desertification phenomenon, which affects about 400,000 hectares in Romania's agricultural area, most of them located in the southern part of the country. The lack of irrigation systems, their deficient utilisation in the areas where they still exist, and the small farmers' very limited access to irrigations (out of technical and economic reasons) have also largely contributed to the increase of agricultural land abandonment/non-utilisation risk.

The taxes on agricultural land are established according to land location (inside or outside the localities) by multiplying the area of land by a sum established by the Local Council (within the legal limits), depending on the land use category to which the correction coefficient is applied, given by the rank of the locality (municipality, town, village, etc.). The areas under new vineyards and orchards (until they come into bearing), the land under forests up to 20 years old and under forests with protection role, the non-productive land and the land areas outside the localities located in natural protected areas are tax exempted. According to the latest amendments to the Fiscal Code, for the agricultural land left uncultivated for 2 consecutive years (regardless of its location, inside or outside the localities), the tax rate may be increased by Local Council's Decision. Yet this regulation leaves room for arbitrariness rather than contributing to agricultural land abandonment/non-utilisation diminution.

5. CONCLUSIONS

Throughout the investigated period, the number of holdings diminished by one million, while the utilised agricultural area decreased by 1.43 million hectares. The decline in the number of small and medium-sized farms, together with the slower diminution of UAA explains the increase in number of larger-sized farms. The average farm size increased from 3.11 to 3.65 ha/farm in the last decade and a half. The fact that the UAA decrease in percentage (–19.07%) is much higher than the diminution in percentage of total area of agricultural holdings (–6.56%) does

not indicate that the land areas exited from the agricultural land use categories entered the category of non-utilised agricultural area or of other non-agricultural areas, having in view that, in absolute figures, the total area of agricultural holdings diminished by more than 1 million hectares.

The labour force in the Romanian agricultural sector has an inadequate training level by comparison with that of other EU member states. Thus, according to the European Commission's data, 96.4% of the Romanian farmers declared that they acquired their agricultural knowledge and skills strictly from their practical experience, as against 70.9% of farmers at EU level. Farmers' training level in Romania is below the agricultural training level in the EU New Member States, such as Hungary and Poland, where 17.9% and 47.8% of farmers respectively declared that they received formal basic or full training in agriculture. Another problem characteristic to the Romanian agricultural sector in terms of human resources is that there is no clearly-defined farmer professional status. This has strong implications on taxation, social security and health care.

Romania is on the penultimate place in the European Union in terms of farm capitalization. Among the causes of this low capitalization level we can mention the high land fragmentation level (lack of economies of scale and of the possibility to easily get financing), low farm incomes and farmers' low agricultural training level. The low capitalization in agriculture significantly affects yields. Less than 2% of the agricultural holdings in Romania have at least one tractor. The main hindrance to the technological endowment of Romanian farmers is the small area of agricultural holdings, which together with the absence of farmers' association does not allow for the efficient use of modern technological means and does not justify investments in modern farm technology.

Romania also lags much behind other European countries in terms of the irrigation system, in the conditions in which drought frequently affects more than 50% of the agricultural land but only 12% of the agricultural land areas are equipped with a viable irrigation system.

In relation to the significant difference between the statistical and cadastral records concerning the agricultural land, it is possible that the agricultural land areas registered in the category of use *agricultural land* may have become improper to agricultural practice as a result of desertification phenomena or under the influence of other factors that led to the infertility of land registered as *agricultural land* in the land fund structure. At the same time, if at the moment of conducting a farm structure survey, certain land areas, although into the ownership/use of certain economic operators, no longer comply with the requirements of agricultural holding definition (commonly agreed by the EU member states, definition also responding to FAO recommendations), these land areas cannot be the object of statistical survey, as the object of agricultural census/FSS is represented by land utilisation and not by land ownership. Land ownership is one of the indicators that characterize the land tenure modality of the utilized areas and it is not an intrinsic

objective of farm structure surveys, given that the information is obtained by the declarations of surveyed persons and not on the basis of presenting justifying documents.

It is very important that these differences should be objectively clarified following the new cadastral measurements that will be made under the new legal framework for the cadastral registrations (according to updates and amendments to Law 7/1996 of 2017). The two figures coming from different sources may be slightly but not fundamentally different.

REFERENCES

1. Brouwer, F., Baldock, D., La Chapelle, C. (2001). *Agriculture and nature conservation in the candidate countries: Perspectives in interaction.* Agricultural Economics Research Institute, The Hague. [http://edepot.wur.nl/37456].
2. Commission of the European Communities Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy, 2006.
3. European Commission, DG-Agri, Agri-environment Measures, Overview on General Principles, Types of Measures, and Application, 2005.
4. EUROPEAN UNION, Directorate FOR Agriculture and Rural Development (2011), *Agriculture in the European Union, Statistical and Economic Information-2014,* March 2011.
5. EUROSTAT, European Commission, Eurostat, *Handbook on implementing the FSS and SAPM definitions, Rev 10., CPSA/SB/* Ver. 10, Luxembourg, 2012.
6. Hunsaker, C.T., Levine, D.A. (1995). *Hierarchical Approaches to the Study of Water Quality in Rivers*, Bioscience, 45(3), pp. 193–203.
7. Palang, H., Printsmann, A., Gyuró, E.K., Urbanc, M., Skowronek, E., Woloszyn, W. (2006). *The Forgotten Rural Landscapes of Central and Eastern Europe*, Landscape Ecology, 21(3), pp. 347–357.
8. Silver, W.L., Ostertag, R., Lugo, A.E. (2001), *The Potential for Carbon Sequestration Through Reforestation of Abandoned Tropical Agricultural and Pasture Lands*, Restoration Ecology, 8(4), pp. 394–407.
9. Tasser, E., Mader, M., Tappeiner, U. (2003), *Effects of Land Use in Alpine Grasslands on the Probability of Landslides*, Basic and Applied Ecology, 4(3), pp. 271–280.
10. *** National Rural Development Programme 2014–2020.
11. *** General Agricultural Census, 2002 and 2010, National Institute of Statistics.
12. *** Farm Structure Survey, 2005, 2007, 2010, 2013 and 2016, National Institute of Statistics.
13. ***http://www.insse.ro/cms/files/chestionare/asa_2016/MANUAL-ASA2016.pdf.