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The evolution of the economic dimension of agricultural farmings in Romania

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THE EVOLUTION OF THE ECONOMIC DIMENSION OF AGRICULTURAL FARMINGS IN ROMANIA

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Abstract: *This paper presents a general analysis of agricultural holdings in Romania. Thus, in this study, the economic size of the agricultural holding, the used agricultural area, the total crop production and the gross income of the farms were analyzed, depending on the size of the agricultural holdings expressed in standard output. In addition, to clearly highlight the existing situation, statistical indicators such as standard deviation, coefficient of variation and growth rate were calculated. The current disparities are significant, and there is no clear evidence that they will be reduced or eliminated, because the structural problems facing Romanian agriculture can only be debated over a long period of time. The data used were extracted from the Agricultural Accounting Information Network (RICA), for the period 2007-2021. The obtained results support the fact that the average economic size at the level of agricultural holdings in Romania is relatively stable, as far as this indicator is concerned. At the same time, the agricultural areas used decrease and the total productions of the crops increase for all types of economic sizes, except for holdings between 8 000 and 25 000 euros.*

Keywords: *Agricultural holdings, economic dimension, Romania*

JEL classification: *Q10*

INTRODUCTION

Agriculture is the foundation of a country's economy because it is responsible for providing food resources, which is the main source of food for mankind, taking into account the demographic explosion found in most states with a less developed economy. Also, agriculture is the main supplier of raw material for various industries (Micu et al., 2013; Dumitru et al., 2020). However, at the level of the European Union, the agricultural sector is the main user of land, representing approximately 50% of the total area of the region (Giannakis and Bruggeman, 2015). Among the EU member states, in Romania, the agricultural structure is the most fragmented, with 31.8% of the total farms in the entire region, mostly small farms (under two hectares) (Sterie et al., 2020). The current situation of Romanian agriculture and implicitly of rural areas is linked to the agricultural structure of the country, being an important problem, both from a social and economic point of view, that Romania is currently facing (Otiman, 2012; Ciutacu et al., 2015; Feher et al., 2017). Fragmentation and the high number of small holdings are the result of the application of the laws regarding the privatization of companies in the agricultural sector as well as the application of the laws related to land.

As a result of the application of common agricultural policies for more than 50 years, family farms have been established and supported in all EU member states. Many EU member states are characterized by agricultural holdings with areas between 10 and 50 hectares and between 10 and 100 hectares, for example, in France they represent an important percentage of the agricultural area of the Union. The structure of French farms has developed over time under market conditions as well as with policy support, especially measures from the CAP policy program (Piet et al., 2012).

Large farms of over 1000 hectares can be found in Germany as well as in Portugal and Spain. Despite significant differences in their agriculture, they eventually reached a structure of similar size (Bašek and Kraus, 2011; Arnalte and Ortiz, 2013).

Also, the Netherlands is one of the countries where high-performance agriculture is practiced with high production efficiency. Production efficiency is greatly influenced by the large number of

livestock on the farm (Bašek and Kraus, 2011). The evolution and differences in the structure of farms in the European Union vary from state to state. While, in the Eastern part of Europe, the main differences between the agricultural structures of the states are represented, in general, by the situations and moments related to the history of the agricultural sector from the communist period, later these differences were the result of the emergence of agrarian reforms. In the states of Western Europe, these differences between agricultural structures are highlighted by both institutional and political factors, but also by market conditions (Choisis et al., 2012).

However, Romania will not be able to align itself with other member states, such as France, Germany or Germany, in terms of the agricultural system. The studies show that the value of the unitary agricultural production in Romania, until the year 2038, would be 1,390 euros/hectare, while in the other states it would exceed 2,000 euros/hectare. In this sense, a scenario was created, which was based on an increase in the production value of 3%/year, noting that by the year 2038, the unit production value should be 2297 euros/hectare, which would mean that Romania would align with the average registered at the EU level. Also, another, optimistic scenario was realized, using as a base, a 4% increase in the value of production, which would mean that by 2038, Romania should have a unitary agricultural production of 2,868 euros/hectare, which is impossible to achieve, observing the average annual growth level of approximately 3% recorded in Romania from 1998 to the present (Feher et al., 2022).

In accordance with the legislation on the classification of farms and agricultural holdings (law 37/2015), there are a number of criteria according to which they are classified as follows:

- Farms that specialize in crops (field crops, permanent crops and horticulture);
- Farms that are specialized in animal production (breeding of herbivorous animals and breeding of granivorous animals)
- Farms specializing in mixed productions (mixed crops, animal husbandry, mixed crops and animal husbandry and unclassified holdings).

In addition, agricultural holdings are also classified according to economic size as follows:

- Farms with an economic size below 1,999 euros, are found under the name of semi-subsistence farms. Within these farms, the production obtained is totally used for own consumption.
- Farms with an economic size between 2,000 and 7,999 euros are found under the name of small commercial farms. Within these farms, more than half of the production obtained is subject to commercialization.
- Agricultural holdings with a size between 50,000 and 999,999 euros are found under the name of commercial farms or medium-sized agricultural holdings. Within these farms, 100% of the production obtained is marketed.
- Agricultural holdings with an economic size greater than 1,000,000 euros are found under the name of commercial farms or large agricultural holdings. Within these farms, production is 100% marketed.

MATERIAL AND METHOD

The data used to carry out the quantitative and qualitative analysis come from the Agricultural Accounting Information Network (RICA). This network was established in the European Union in 1965. The network uses data representing more than 5,000,000 holdings from the 27 EU Member States, a percentage of more than 90% of the total agricultural production of the European

Union. The purpose of this network is to collect data related to both the production and the economy of the holdings in order to be able to determine the incomes and business analyzes of the agricultural holdings.

Selected indicators at the level of Romania were analyzed according to the economic size of the holdings, for a period between 2007 and 2021, being the most recent data available, as follows:

INDICATOR	CODE	DESCRIPTION
Economic size	SE005	Expressed in 1000 euros of standard production (based on the Community typology).
Total agricultural area used	SE025	It does not include areas used for mushrooms, land occasionally rented for less than a year, wooded areas and other agricultural areas (roads, ponds, fallow areas, etc.). It consists of land occupied by owners, leased land, land in operation (remuneration related to the production of the land made available). This includes agricultural land that is temporarily not cultivated for agricultural reasons or that is withdrawn from production as part of agricultural policy measures. It is expressed in hectares (10,000 m ²). As of 2014, it includes kitchen gardens (Ha).
Total crop production (euro/ha)	SE136	[Sales + farm utilization + farm consumption + (closing valuation - opening valuation)]/ha (excluding short-term leased area and non-production area).
Gross income of the farm	SE410	Output; - Intermediate consumption; + Balance current subsidies and taxes.

Figure 1. Description of indicators used

Source: Agricultural Accounting Information Network (RICA)

Based on the data, the statistical indicators were calculated as follows:

- Standard deviation: $\sigma = \sqrt{\frac{\sum (xi - \mu)^2}{N}}$ where;
 σ = standard deviation;
 xi = each value in the sample;
 N = sample size;
 μ = sample mean;
- Coefficient of variation $CV = \frac{\sigma_x}{|\bar{x}|}$ where;
 σ = standard deviation;
 $|\bar{x}|$: It is the mean of variable X in absolute value with $\bar{x} \neq 0$
- Growth rate $\bar{R} = (\bar{I} * 100) - 100$ where;
 \bar{I} = average global growth index;

RESULTS AND DISCUSSION

Analyzing the intervals regarding the economic size, it is observed that increases in the average economic sizes are recorded only for semi-subsistence holdings (2,000-8,000 euros) and for small holdings (8 000-25 000 euros). Thus, semi-subsistence holdings show the most pronounced

growth, of 40.5%, in 2007 the average economic size of holdings was 4.2 thousand euros, reaching 5.9 thousand euros in 2021. At the same time, the a more representative decrease can be found in the case of holdings between 25,000 and 50,000 euros, decreasing by 7.5% in 2021 compared to 2007, when the average of agricultural holdings was 37.3 thousand euros. And in the case of agricultural holdings with economic sizes between 50 000 – 1 000 000 euros, 100 000 – 500 000 euros and over 500 000 euros, there are decreases of 5.2%, 0.4% and 3.3% respectively in the last year compared to the values averages recorded in 2007 (Figure 2).

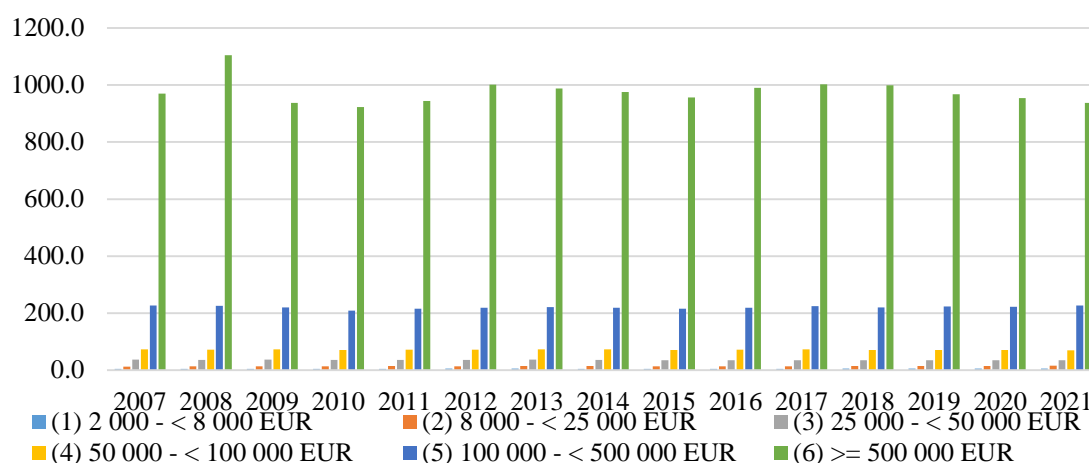


Figure 2. (SE005) The economic size of the holding expressed per 1,000 euros of standard production at the level of Romania (thousands of euros)

Source: Graphic representation based on data provided by FADN Public Database (SO);

From the analysis of the statistical indicators calculated for the economic size of the holding at the level of Romania, in the analyzed period the following results were obtained: the standard deviation registered limits between 0.67 hectares for the agricultural holdings whose economic size is between 2 000 – 8 000 euros and 43.54 hectares for large agricultural holdings, those with an economic size of over 500 000 euros. The coefficient of variation oscillated between 4% for agricultural holdings with an economic size of over 500 000 euros and 14% for small holdings, having an economic size between 2 000 – 8 000 euros. The growth rate is characterized by positive values only for agricultural holdings with an economic size between 2 000 – 8 000 euros and 8 000 – 25 000, this having the value of 2% and 1%, respectively. For the other intervals regarding the economic size of agricultural holdings, the pace was characterized by negative values, -1% for agricultural holdings with an economic size between 25 000 – 50 000 euros, -0.4% for those between 50 000 – 100 000 euros, -0.03% for those between 100 000 – 500 000 euros and -0.2% for agricultural holdings over 500 000 euros (Table 1).

Table 1. Statistical indicators calculated for the economic size of the holding expressed per 1 000 euros of standard production at the level of Romania

Economic size	Min	Max	Average	Standard Dev.	Coef. Var (%)	Growth Rate (%)
(1) 2 000 - < 8 000 EUR	4	6	5	0.67	14%	2%
(2) 8 000 - < 25 000 EUR	12	15	14	0.77	6%	1%
(3) 25 000 - < 50 000 EUR	35	37	36	0.80	2%	-1%
(4) 50 000 - < 100 000 EUR	69	73	72	1.10	2%	-0.4%
(5) 100 000 - < 500 000 EUR	208	227	221	4.92	2%	-0.03%
(6) >= 500 000 EUR	924	1.105	977	43.54	4%	-0.2%

Source: FADN Public Database (SO);

The total agricultural area used, at the national level, registered significant decreases, with the exception of small holdings, those in the range of 8 000 – 25 000 euros, which registered increases of approximately 14% in 2021 compared to 2007. The most significant decreases were registered within holdings with an economic size between 100 000 – 500 000 euros and over 500 000 euros, being 36% in 2021 compared to the first year analyzed (Figure 3).

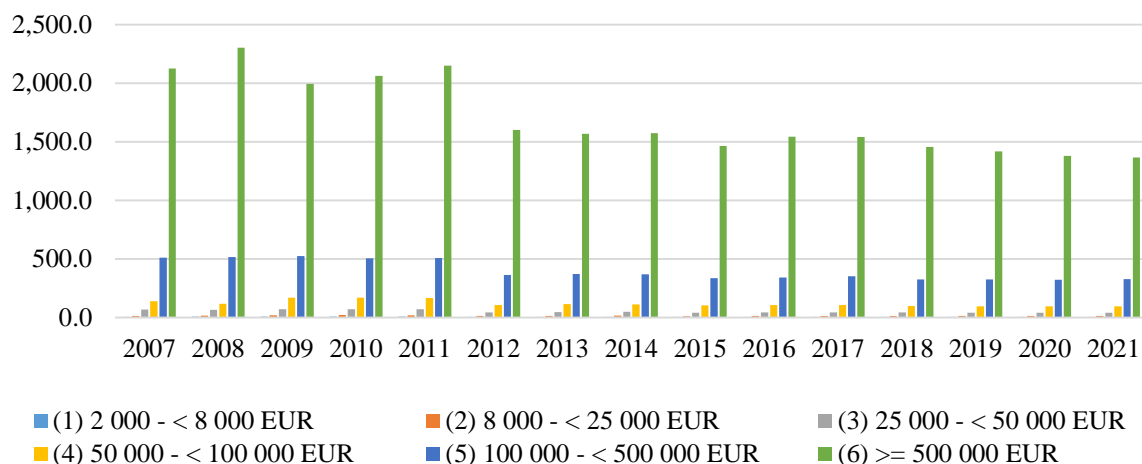


Figure 3. (SE025) - Total agricultural area used in Romania (ha)

Source: Graphic representation based on data provided by FADN Public Database (SO);

From the analysis of the statistical indicators calculated for the total agricultural area used at the level of Romania, in the analyzed period the following results were obtained: the standard deviation recorded limits between 0.91 hectares for agricultural holdings with an economic size between 2 000 – 8 000 euros and 323.93 hectares for large agricultural holdings, those with an economic size of over 500 000 euros.

The coefficient of variation oscillated between 15% for agricultural holdings with an economic size between 2 000 – 8 000 and 24% for agricultural holdings between 25 000 – 50 000 euros. The rate is characterized by negative values for all six intervals regarding the economic size of agricultural holdings, this having the value of 1% (Table 2).

Table 2. Statistical indicators calculated for the total agricultural area used in Romania

Economic size	Min	Max	Average	Standard Dev.	Coef. Var (%)	Growth Rate(%)
(1) 2 000 - < 8 000 EUR	5	8	6	0.91	15%	-0.6%
(2) 8 000 - < 25 000 EUR	12	21	15	2.50	16%	0.9%
(3) 25 000 - < 50 000 EUR	42	72	53	12.51	24%	-3.4%
(4) 50 000 - < 100 000 EUR	97	171	121	27.37	23%	-2.6%
(5) 100 000 - < 500 000 EUR	322	525	400	84.12	21%	-3.1%
(6) >= 500 000 EUR	1.365	2.302	1.702	323.93	19%	-3.1%

Source: FADN Public Database (SO);

Regarding the indicator regarding the total production of crops at the level of Romania. It's recording. in general. an upward trend. Total crop production refers to total sales along with farm utilization. holding consumption and closures assessment from which the opening assessment is reduced in relation to the number of hectares (except for the area leased for a short period of time and the area not in production).

So, at the level of categories of agricultural holdings. classified according to economic size. the most significant increases were registered in the case of large holdings. which have an economic dimension of over 500 000 euros, the total crop production being 86% higher in 2021 compared to 2007, when the production value was 376.9 euros/ha. Instead, total crop production obtained in small holdings, it decreased by 8% in 2021, compared to the production recorded at the level of the first year analyzed. Thus, the investments made in the technology of holdings through financing programs. their effects are felt (Figure 4).

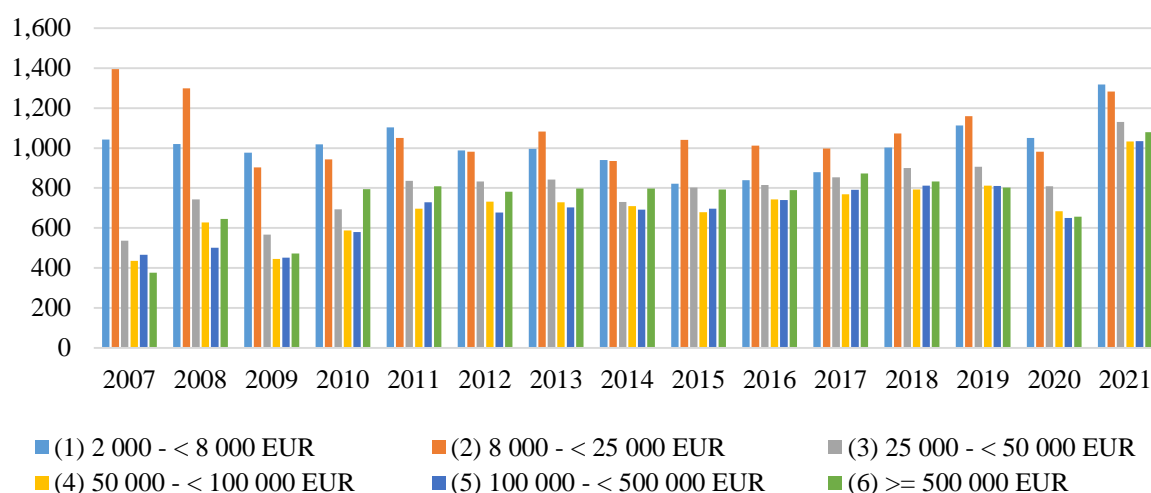


Figure 4. (SE136) – Total crop production in Romania (euro/ha)

Source: Graphic representation based on data provided by FADN Public Database (SO);

From the analysis of statistical indicators calculated for total crop production. in the analyzed period, the following results were obtained: the standard deviation recorded limits between 121.2 euros/hectare for agricultural holdings with an economic size of 2 000 – 8 000 euros and 165.4 euros/hectare for agricultural holdings with an economic size of over 500 000 euros.

The coefficient of variation oscillated between 12% for farms with an economic size between 2 000 – 8 000 euros and those over 500 000 euros and 22% for farms with an economic size between 100 000 and 500 000 euros and those over 500 000 euros.

The growth rate is characterized by positive values. with the exception of agricultural holdings whose economic size is between 8 000 – 25 000 euros, this having the value of -0.6% (Table 3).

Tabel 3. (SE136) – Indicatori statistici calculați pentru producția totală a culturilor

Economic size	Min	Max	Average	Standard Dev.	Coef. Var (%)	Growth Rate(%)
(1) 2 000 - < 8 000 EUR	821	1318	1007	121.2	12%	1.7%
(2) 8 000 - < 25 000 EUR	903	1395	1076	145.8	14%	-0.6%
(3) 25 000 - < 50 000 EUR	536	1130	800	141.6	18%	5.5%
(4) 50 000 - < 100 000 EUR	436	1032	698	144.9	21%	6.4%
(5) 100 000 - < 500 000 EUR	452	1035	689	151.1	22%	5.9%
(6) >= 500 000 EUR	377	1079	753	165.4	22%	7.8%

Source: FADN Public Database (SO);

In Romania, gross farm income by category of agricultural holding, at the level of the 2007 period, it decreased, for small agricultural holdings (8 000 – 25 000 euros) and for agricultural holdings with an economic size between 25 000 – 50 000 euros, of 0.3% and 41% respectively, in the

year 2021 compared to the year 2007. However, the most important increases were registered within holdings with an economic size of over 500,000 euros, being 49% in 2021 compared to the first year analyzed (Figure 5).

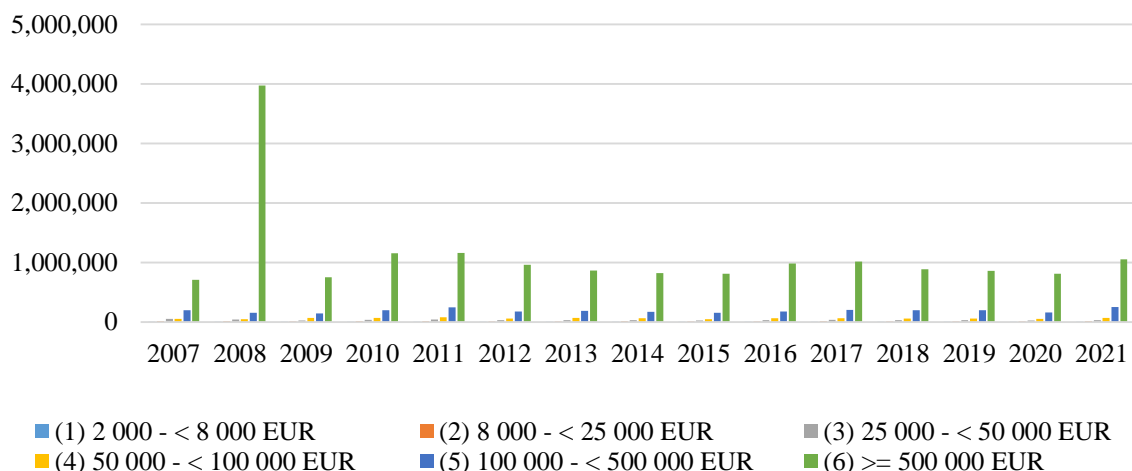


Figure 5. (SE270) - Total inflows (euro) at the level of Romania

Source: Graphic representation based on data provided by FADN Public Database (SO);

Following the analysis of the statistical indicators calculated for the gross income from the farm at the level of agricultural holdings in Romania, a standard deviation between 508 euros was noted for holdings with an economic size between 2 000 and 8 000 euros and 30 909 euros for holdings with an economic size greater than or equal to 500 000 euros. Regarding the coefficient of variation, it was between 5% for holdings with an economic size of 8 000 - <25 000 euros and 15% for those with an economic size between 2 000 – 8 000 euros (Table 4).

Table 4. (SE270) - Statistical indicators calculated for total entries at the level of Romania (euro)

Economic size	Min	Max	Average	Standard Dev.	Coef. Var (%)	Growth Rate (%)
(1) 2 000 - < 8 000 EUR	2 199	4 267	3.474	508	15%	1.4%
(2) 8 000 - < 25 000 EUR	6 893	12 516	10.460	508	5%	0.0%
(3) 25 000 - < 50 000 EUR	21 906	53 186	32.095	1362	4%	-3.7%
(4) 50 000 - < 100 000 EUR	46 426	76 906	60.039	7559	13%	1.7%
(5) 100 000 - < 500 000 EUR	141 008	247 555	185.041	8167	4%	1.7%
(6) >= 500 000 EUR	706 537	3.974 723	1.119.434	30909	3%	2.9%

Source: FADN Public Database (SO);

CONCLUSIONS

The polarization between large and small agricultural holdings in Romania is a complex subject, with social, economic and environmental implications. On the one hand, small farms are crucial for rural communities. They not only provide a means of livelihood for a significant population, but also contribute to the preservation of a rural way of life and biological diversity through traditional agricultural practices. On the other hand, large agricultural holdings are essential for food security and competitiveness in the international market, often having access to more efficient technologies and practices. Maintaining a balance between these two types of agricultural

holdings is essential for sustainable development in order to ensure the sustainability of rural communities, food security, biological diversity and resilience, as well as social cohesion.

The average economic size at farm level in Romania registers significant increases only for agricultural holdings with an economic size between 2 000 and 8 000 euros, respectively 8 000 – 25 000 euros, while those of medium and large sizes show decreases. In the case of small holdings, this increase is attributed to the decrease in the number of subsistence and semi-subsistence agricultural holdings determined by the measures adopted in the last two development programs, an aspect that contributed to their merger. These types of holdings have been absorbed by medium-sized and large ones. Although the agricultural areas used in Romania decreased in general for most of the intervals analyzed, the total production of crops (euro/ha) registered considerable increases for all types of economic sizes, except for small agricultural holdings, those with an economic size between 8 000 – 25 000 euros.

The decrease in areas and the increase in total crop production simultaneously can be attributed to the increase in crop yield, which is possible due to the increase in the degree of mechanization, as well as the rational use of new agricultural techniques.

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