CONCENTRATION OF STANDARD OUTPUT AND NUMBER OF FARMS IN THE EUROPEAN UNION BASED ON THE ECONOMIC DIMENSION

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Abstract

The paper aimed to analyze the concentration degree of standard output (SO) and number of agricultural holdings (AH) in the EU countries in the year 2020 by economic dimension in terms of standard output size class. The data collected from Eurostat were used to calculate Gini-Struck coefficient according to which the countries were classified. The EU has a moderate concentration both concerning SO (GSC = 0.3938) and AH (GSC = 0.3276) by SO class. Discrepancies were noticed referred to these two indicators in the member states. Regarding SO, GSC varied between 0.7941 in Denmark and 0.1597 in Romania. Six countries (22.3%) have a low concentration, 12 countries (44.4%) have a moderate concentration and 9 countries 9933.3%) have a high level. 13 countries: Bulgaria, Cyprus, France, Luxemburg, Sweden, Estonia, Hungary, Germany, Belgium, Slovakia, Netherlands, Czechia and Denmark exceeds the EU GSC= = 0.3938. Regarding AH, GSC values ranged from 0.1204 in Denmark and 0.7004 in Romania. A number of 17 countries (63%) registered a low concentration level of the number of farms by SO class, other 9 countries (33.3%) recorded a moderate concentration and one country, Romania (2.7%) had the top position with the highest concentration of the number of farms. Taking into *consideration GSC values both for Standard output and number of farms by SO class, it was found that 8 countries (29.3%) have a high concentration of SO and a low concentration of AH; 7 countries (25.9%) have a moderate concentration of SO and a low concentration of AH; 5 countries (18.5%) have a moderate concentration of SO and a moderate concentration of AH, all these three categories summing 73.7%. As a final conclusion, the concentration of standard output by SO class is a moderate one in 44.4% of the EU countries and in 33% is a high.*

Key words: concentration degree, standard output, number of farms, Gini-Struck coefficient, European Union

INTRODUCTION

European Union's is characterized by a large agricultural potential which varies from a country to another regarding the performance in production, productivity and efficiency of land use [1, 13].
The variety of farms regarding the aspects related to the type of the farms, most of them being family subsistence and semi-subsistence holdings, with a small physical size in UAA, low technical endowment, productivity, and efficiency [2, 3, 4, 6]. Family farms represented 94% of the EU agricultural holdings in the year 2020 [5, 7, 8].
Compared to the year 2013, when the EU had 10.84 million farms, in 2020 it had 9.1 million. Their number is in a continuous decline, which favours the increase of average farm size, which in the year 2020 reached present is 17.4 ha/farm, compared to 16.1 ha in 2013 [10, 13, 18].
Farm structure, applied technologies, environmental conditions in terms of soil quality and fertilization level, climate in terms of temperatures and humidity, technical endowment and labor and capital inputs,

labor's training level and skills, land productivity per UAA are important factors with a deep impact on agricultural output intensity [11, 15, 16].

About 50% of labor used in agriculture is represented by family members [12].

Qualification level and input of labour force in agriculture have an important impact on productivity and quality of products [14, 17].

The dispersion of labor force and the connection between farmers income and minimum salary confirm this feature of the EU agriculture [11].

EU countries could be easily analized regarding output intensity from the perspective of the assumptions of the concept of sustainable development [19].

The economic size of the farms is expressed in their standard output, which is a measure of the monetary value of agricultural output at farm-gate prices for crops and livestock. In contrast, the physical size of farms is expressed in utilized agricultural area.

In 2013, about 69% of the EU farms were very small and small farms, subsistence households with a standard output less than 2,000 Euro and, respectively between 2,000 and 8,000 Euro.

At the other pole, there were about 680,000 very large farms (6.3% of the total number of farms) producing at least 100,000 Euro standard output, that is 71.4% of the EU standard output in the year 2013 [9].

In the year 2020, the EU standard output accounted for 350 billion Euro, compared to 331.5 Billion in 2013.

At present, 74 % of the farms produce a standard output higher than 100,000 Euro and 39.3$ holdings produce 39.3 % of the EU total standard output [8].

Structural analysis of the distribution of standard output (SO) and number of agricultural holdings (AH) could contribute to the creation of an image on the actual situation of the EU agriculture in terms of economic power and dimension.

More than this, it may reflects the dispersion of SO and AH by SO size classes which allows to assess the disparities existing in the agriculture of each EU member state.

The dynamic analysis is always useful to quantify the progress achieved for different tome series and in what measures it covers the expectations concerning the decrease of AH and the growth in SO.

The structural analysis also could emphasize the changes of the shares of different SO classes in total SO in the agriculture of each EU member state and also at the EU level, reflecting the trends of the economic dimension of AH.

In this context, the paper aimed to assess the degree of concentration/diversification of SO and AH in the EU in the year 2020, for which there are available data on Eurostat, using Gini-Struck Coefficient.

MATERIALS AND METHODS

The research study is based on the statistical data collected from Eurostat regarding SO and AH by SO classes as established by the EU.

The data were processed using Gini-Struck Coefficient (GSC), calculated using the well-known formula:

$$GSC = \sqrt{\frac{n\sum_{i=1}^{n} g_i^2 - 1}{n-1}} \quad ....(1)$$

where:
n= number of SO classes
g_i = the share of each SO class in total SO.
According to GSC values, the countries were classified into three groups as follows:
(a) Countries with a low concentration degree of SO (LCSO), where GSC < 0.3;
(b) Countries with a moderate concentration of SO (MCSO), where 0.3 >GSC < 0.5;
(c) Countries with a high concentration degree of SO, where GSC > 0.5.
GSC values closer to zero reflects the equal dispersion of SO by classes, that is a balanced share of SO by class.
The distribution of AH by SO class was analyzed using the same formula, where:
n= number of SO class
g_i = the share of AH by each SO class.
Based on GSC calculated values, for the concentration degree of AH by SO class, the EU member states were divided on three groups as follows:

(a) Countries with a low concentration degree of AH(LCAH), where GSC < 0.3;
(b) Countries with a moderate concentration of AH (MCAH), where 0.3 >GSC < 0.5;
(c) Countries with a high concentration degree of AH, where GSC > 0.5.
GSC values closer to zero reflects the equal dispersion of SO by classes, that is a balanced share of SO by class.
Also, the countries were again divided into nine groups based on the combination of GSC value for SO and AH.
The results were graphically represented and also displayed in tables.
Comparison method was used to establish the hierarchy of the countries and to select them

and include in each group according to the GSC value.
Also, the differences between countries where emphasized.

RESULTS AND DISCUSSIONS

Concentration degree of standard output (SO) in the EU countries by SO size class
At the EU level, GSC had the value of 0.3938 reflecting a moderate concentration of SO among classes.
However, GSC values varies from a country to another, more exactly from GSC =0.7941 in Denmark, the highest value, to GSC = 0.1597 in Romania, the lowest value (Fig. 1).
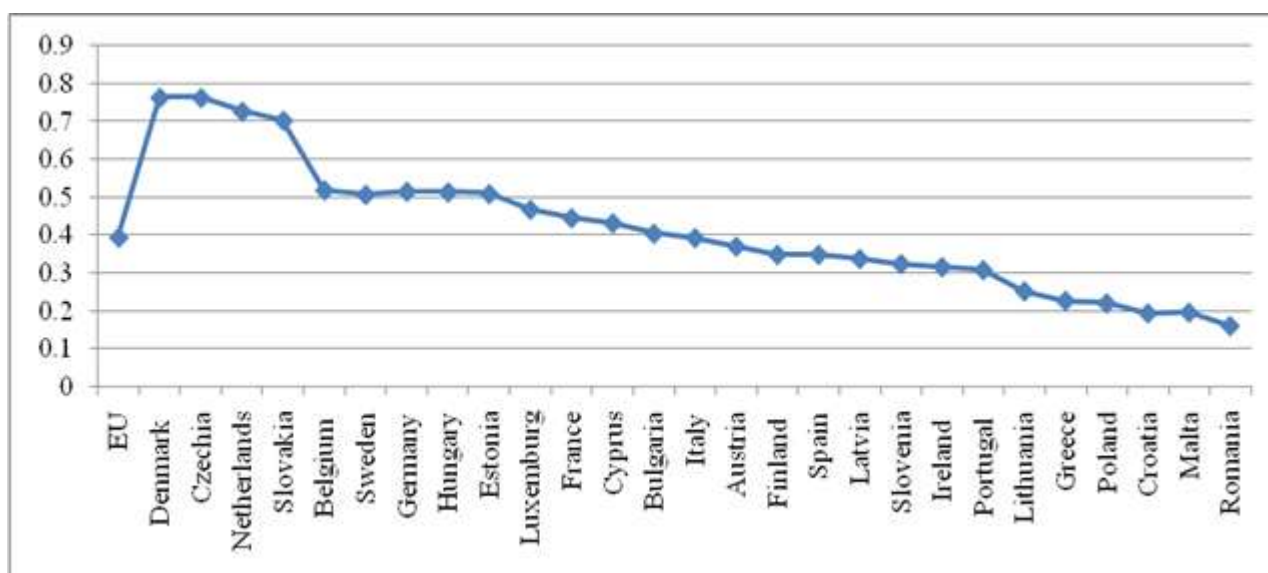

Fig.1. Gini-Struck Coefficient (GSC) reflecting the concentration of standard output (SO) by SO class and by EU member state in the year 2020
Source: Own calculation and design based on Eurostat data [8].

Table 1. EU countries grouped based on GSC for SO concentration by SO class

Group (a) LCSO GSC < 0.3		Group (b) MCSO 0.3<GSC < 0.5		Group (c) HCSO GSC > 0.5	
1. Lithuania	0.2514	1.Luxemburg	0.4647	1.Denmark	0.7911
2.Greece	0.2263	2.France	0.4452	2.Czechia	0.7633
3.Poland	0.2197	3,Cyprus	0.4320	3.Netherlands	0.7274
4.Croatia	0.1933	4.Bulgaria	0.4041	4.Slovakia	0.7034
5.Malta	0.1852	5.Italy	0.3826	5.Belgium	0.5188
6.Romania	0.1597	6.Austria	0.3700	6.Germany	0.5152
		7.Spain	0.3483	7.Hungary	0.5137
		8.Finland	0.3483	8.Estonia	0.5093
		9.Latvia	0.3374	9. Sweden	0.5070
		10.Slovenia	0.3239		
		11.Ireland	0.3158		
		12.Portugal	0.3077		

Source: Own calculation based on Eurostat data [8].
Note: LCSO = low concentration, MCSO= Moderate concentration, HCSO= High concentration

Based on GSC values, the EU countries were included in the following groups:

(a) Countries with a low concentration of SO, [GSC < 0.3], which in the decreasing order were: Lithuania, Greece, Poland, Croatia, Malta and Romania, the GSC varying between 0.2514 in Lithuania and 0.1597 in Romania.

This reflects a relative uniformity of dispersion of SO in these countries with small differences among SO classes.

(b) Countries with a moderate concentration of SO, [0.3<GSC < 0.5], including a number of 12 member states, whose descending order based on GSC was: Luxembourg, France, Cyprus, Bulgaria, Italy, Austria, Spain, Finland, Latvia, Slovenia, Ireland and Portugal.

(c) Countries with a high concentration of SO, [GSC > 0.5], the group including 9 member states: Denmark, Czechia, Netherlands Slovakia, Belgium, Germany, Hungary, Estonia and Sweden (Table 1).

The structured image of the EU countries in these three groups for SO concentration is shown in Fig, 2.

The shares reflect a moderate diversity regarding the distrubution of the EU countries based on GSC value for SO by SO size class.
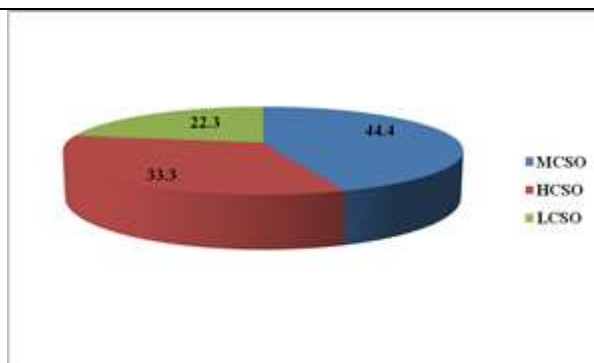

Fig. 2. The EU strcutured SO concentration
Source: Own calculation based on the GSC results.

The increase of SO is directly conditiones by the agricultural development in each EU country, production and quality og agricultural products, offer diversification and farm structures.

Concentration of the number of farms (AH) by standard output (SO) classes

At the EU level, in the year 2020, the concentration degree of AH in terms of GSC accounted for 0.3276, reflecting a moderate concentration and diversity among the member states.

Taking into account GSC values calculated by country, we may easily notice the discrepancies existing from a member state to another.
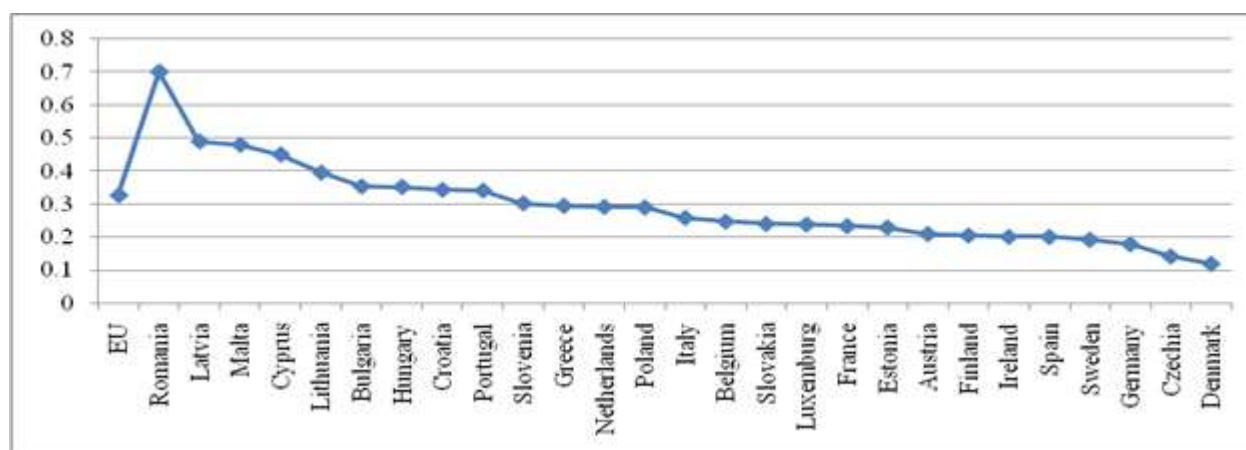

Fig. 3. GSC values reflecting the concentration of agricultural holdings by SO class and EU member state in the year 2020
Source: Own calculation an design based on Eurostat data [8].

Romania comes on the top position for GSC =7004 reflecting a high concentration of number of farms, in other words, the large differences among the agricultural holdings by SO economic dimension class.

At the other pole, it is Denmark with GSC =0.1204, the lowest concentration level of farms by SO class, reflecting that their distribution is uniform assuring a balanced economic power (Fig.3).

A number of 17 member states recorded a GSC < 0.3, their range in the decreasing order being: Greece, Netherlands, Poland, Italy, Belgium, Slovakia, Luxemburg, France, Estonia, Austria, Finland, Ireland, Spain, Sweden, Germany, Czechia and Denmark.

In these countries, the concentration degree of AH by SO class is low, reflecting a uniform distribution.

Other 9 countries had a moderate concentration of AH by SO class, as their GSC value ranged between 0.3 and 0.5, more exactly between 0.4899 in Latvia and 0.3032 in case of Slovenia. The situation of these countries in the decreasing order is: Latvia, Malta, Cyprus, Lithuania, Bulgaria, Hungary, Croatia, Portugal and Slovenia.

Finally, Romania is the only country which registered the highest GSC value higher than 0.5, more exactly 0.7004, reflecting a high concentration of AH by SO class and, obviously, large discrepancies (Table 2).

Table 2. EU countries grouped on GSC values for the number of agricultural holdings (AH) by SO class

Group (a) LCAH GSC < 0.3		Group (b) MCAH 0.3<GSC < 0.5		Group (c) HCAH GSC > 0.5	
1. Greece	0.2955	1.Latvia	0.4899	1.Romania	0.7004
2.Netherlands	0.2923	2.Malta	0.4802		
3.Poland	0.2904	3,Cyprus	0.4509		
4.Italy	0.2592	4.Lithuania	0.3960		
5.Belgium	0.2479	5.Bulgaria	0.3541		
6.Slovakia	0.2407	6.Hungary	0.3527		
7.Luxemburg	0.2393	7.Croatia	0.3441		
8.France	0.2342	8.Portugal	0.3419		
9.Estonia	0.2300	9.Slovenia	0.3032		
10.Austria	0.2105				
11.Finland	0.2060				
12.Ireland	0.2019				
13. Spain	0.2014				
14. Sweden	0.1930				
15.Germany	0.1794				
16.Czechia	0.1426				
17.Denmark	0.1204				

Source: Own calculation based on Eurostat data [8].
Note: LCAH= low concentration, MCAH= Moderate concentration, HCAH= High concentration
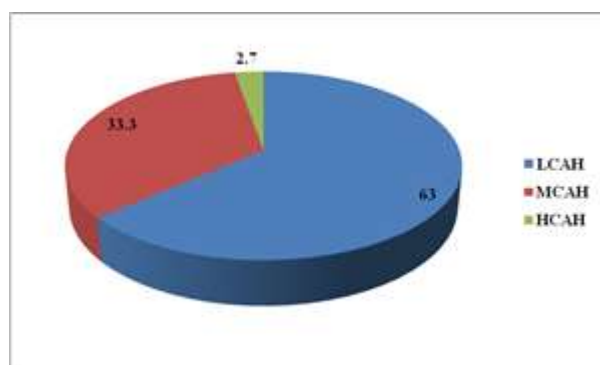

Fig. 4. The EU structure of the number of farms concentration by SO class and group of countries
Source: Own results and design.

Figure 4 shows the weight of the concentration degree of the number of agricultural holdings (AH) by SO class.
The shares reflect a large diversity and discrepancy among the groups of countries regarding the concentration level of the farms by SO class.

The group of countries with LCAH dominates the EU agriculture (63%), one third of the countries has a moderate concentration of farms and 3.7% have a high concentration of AH, it is the case of Romania.

Classification of the EU countries based on the concentration degree both of SO and AH

The EU countries were again divided into groups taking into account the GSC values both for SO and for AH. Therefore, 9 groups were established as follows:

-LCSO+ LCAH= low concentration for SO and low concentration for AH

-LCSO+MCAH= low concentration for SO and moderate concentration for AH

-LCSO+HCAH= low concentration for SO and high concentration for AH

-MCSO+LCAH= moderate concentration for SO and low concentration for AH

-MCSO+MCAH= moderate concentration for SO and moderate concentration for AH

-MCSO+HCAH= moderate concentration for SO and high concentration for AH

-HCSO+LCAHA= high concentration for SO and low concentration for AH

-HCSO+MCAH= high concentration for SO and moderate concentration for AH

-HCSO+HCAH= high concentration for SO and high concentration for AH

The distribution of the countries by group based on these combinations of GSC is shown in Table 3, which reflects the following aspects:

- 8 countries have a high concentration of SO and low concentration of AH;

- 7 countries have a moderate concentration of SO and a low concentration of AH;

- 5 countries have a moderate concentration of SO and a moderate concentration of AH;

-3 countries have a low concentration of SO and a moderate concentration of AH;

- 2 countries have a low concentration of SO and also a low concentration of AH;

-1 country has a low concentration for SO and a high concentration for AH;

- 1 country has a high concentration of SO and a high concentration for AH.

Table 3. Distribution of the EU countries by group of concentration degree for combined two criteria SO and AH by SO class

LCSO + LCAH	LCSO + MCAH	LCSO + HCAH	MCSO + LCAH	MCSO + MCAH	MCSO + HCAH	HCSO + LCAH	HCSO + MCAH	HCSO + HCAH
1.Greece	1.Croatia	1.Romania	1.Ireland	1.Bulgaria	-	1.Belgium	1.Hungary	-
2. Poland	2.Lithuania		2.Spain	2.Cyprus		2.Czechia		
	3.Malta		3.France	3,Latvia		3.Denmark		
			4.Italy	4.Portugal		4.Germany		
			5.Luxemburg	5.Slovenia		5.Estonia		
			6.Austria			6.Netherlands		
			7.Finland			7.Slovakia		
						8.Sweden		

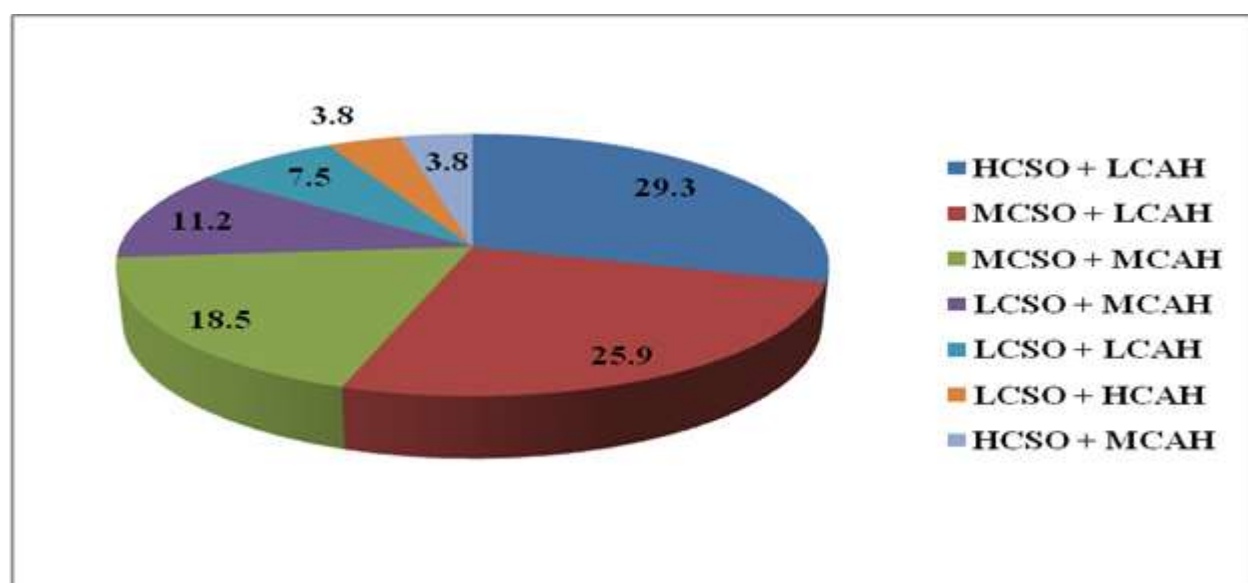Source: Own determination based on the obtained results

Fig. 5.The EU structure by group of member states based on GSC value combined for the two criteria SO and AH by SO class.
Source: Own results and design.

Figure 5 reflects the EU structure of the concentration level of Standard output (SO) and number of agricultural holdings (AH), two criteria expressed in various combinations

according to Gini-Struck Coefficient value for each criterion.

Looking at the shares, we may consider that 12 countries have a moderate concentration of standard output accounting for 44.4%, and 12 countries have a high concentration of standard output meaning 33%.

The low concentration of standard output is found in 22.5% of the countries.

Exceptions regard Romania, which has a low concentration of standard output, but the highest concentration of agricultural holdings, and Hungary which has a high concentration of standard output and a moderate concentration of agricultural holdings.

Looking at Table 3, we may see that there is none country in the EU with a moderate standard output and high concentration of agricultural holdings, and also there none country with a high concentration of standard output and high concentration of agricultural holdings.

CONCLUSIONS

The paper analyzed the degree of concentration and diversity regarding Standard output and number of agricultural holdings in the EU in the year 2020, using as econometric tool Gini-Struck Coefficient method, whose values were calculated based on the primary empirical data provided by Eurostat.

In the year 2020, the results reflected that at the EU level it is a moderate concentration both concerning standard output and number of farms by SO class, more exactly GSC = 0.3938, and respectively, GSC = 0.3276.

But, there discrepancies regarding the concentration of these two indicators in the member states as proved by Gini-struck Coefficient values.

For standard output, GSC values varied between 0.7941 in Denmark, the highest value and 0.1597 in Romania, the lowest value.

A number of 6 countries (22.3%) have a low concentration of standard output, 12 countries (44.4%) have a moderate concentration and 9 countries have a high level (33.3%).

Over the EU Gini Struck Coefficient accounting for 0.3938, there were 13

countries, in the increasing order of their GSC being: Bulgaria, Cyprus, France, Luxemburg, Sweden, Estonia, Hungary, Germany, Belgium, Slovakia, Netherlands, Czechia and Denmark.

For the number of agricultural holdings, GSC values ranged from 0.1204 in Denmark and 0.7004 in Romania.

A number of 17 countries (63%) registered a low concentration level of the number of farms by SO class, other 9 countries (33.3%) recorded a moderate concentration and one country, Romania (2.7%) had the top position with the highest concentration of the number of farms.

Taking into consideration GSC values both for Standard output and number of farms by SO class, it was found the following situation:

-8 countries (29.3%) have a high concentration of SO and a low concentration of AH;

- 7 countries (25.9%) have a moderate concentration of SO and a low concentration of AH;

- 5 countries (18.5%) have a moderate concentration of SO and a moderate concentration of AH, all these three categories summing 73.7%.

A few number of countries, more exactly 6 have a low concentration of SO, but 3 countries (11.2%) have a moderate concentration of AH, 2 countries (7.5%) have a low concentration of AH and 1 country (3.8%) has a high concentration of AH.

Only one country (3.8%) has a high concentration of SO and a moderate concentration for AH.

As a final conclusion, the concentration of standard output by SO class is a moderate one in 44.4% of the EU countries and in 33% is a high.

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