RESEARCH INSTITUTE FOR AGRICULTURE ECONOMY AND RURAL DEVELOPMENT

ACADEMY OF AGRICULTURAL AND FORESTRY SCIENCES
"GHEORGHE IONESCU-ȘIȘEȘTI"

Bucharest, Romania

INTERNATIONAL SYMPOSIUM

AGRARIAN ECONOMY AND RURAL DEVELOPMENT - REALITIES AND PERSPECTIVES FOR ROMANIA

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CONTENT

Section 1. Economics, management and agricultural marketing

SECTION 1

Economics, management and agricultural marketing

TRENDS IN THE EVOLUTION OF SUBSIDIES PER HECTAR AND PER ANIMAL, BY CLASS OF ECONOMIC DIMENSION OF AGRICULTURAL HOLDINGS, IN ROMANIA AND SOME EUROPEAN COUNTRIES, FOR THE PERIOD 2007-2018

ILIE DIANA MARIA [1], BEREVOIANU ROZI [2],
RĂDOI RALUCA-ALEXANDRA[3], DRĂGHICI MANEA[4]

Summary: *Agricultural subsidies are an important strategy of the European Union, for improving farm incomes, economic consolidation of the agricultural sector, raising living standards and thus ensuring food security. This paper tries to answer at two questions. First, if there were significant changes between 2007-2013 and 2014-2018, of the indicators: direct payments for crop production per hectare of agricultural land and direct payments on UVM (Large Cow Unit), as direct indicators and the share of direct payments in the product of the farm and the gross product per UAM (Annual unit of work) as impact indicators. Second, if the differences of these indicators compared to the European Union average deviate significantly. The statistical indicators used were: average, standard deviation.*

Keywords: *subsidy, economic size of agricultural holdings, test t*

JEL classification: *H23, O38, Q18*

INTRODUCTION

One of the first Community policies adopted by the European Union is the Common Agricultural Policy (CAP), which is the most integrated European policy. At EU level, the CAP has undergone a series of successive reforms, so that in 2013 it materialized in a set of regulations establishing the legislative framework for the period 2014-2020. Thus, the Council and the European Parliament initiated four regulations on: direct payments, the single common market organization (CMO), rural development and a horizontal regulation on the financing, management and monitoring of the CAP. All CAP reforms have sought to simplify the way grants are awarded, streamline and reduce budget costs, evolving from an agricultural policy that initially provides support for the development of production (coupled production payments), to a market-oriented policy, focused on qualitative, ecological and food security parameters (decoupled production payments), with an emphasis on efficient use and sustainable resources.

In Romania, the implementation of the CAP determined the gradual elimination of the support schemes applied until 2006. For the period 2014-2020, Romania had allocated significant amounts for the application of the new CAP. They contributed to the increase of the competitiveness of the Romanian farmers and of the rural economy, respectively the improvement of the living standard in the rural environment. The condition by which the Romanian state can absorb European funds is the creation of a system to ensure the administration and rigorous control of farmers' payment claims (IACS) and its implementation and management falls within the remit of the Agency for Payments and Intervention for Agriculture (APIA). In 2017, Romania was on the first place to access European funds, in March and August to EAGF funds and in the second quarter to EAFRD funds, say officials from Agriculture.

Legislative proposals for the future of the common agricultural policy include the following objectives: to ensure a fair income for farmers, to improve competitiveness, to restore the balance of power in the food chain, to combat climate change, to protect the environment, to preserve generational renewal, to help revitalize rural areas, to protect food quality and health [1].

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MATERIALS AND WORKING METHODS

In the evaluation of the subsidy trend, the following indicators were used: average, standard deviation, error standard, the confidence limits for delimiting the intervals for a given probability, the coefficient of variation, the annual growth rate, the coefficient of elasticity.

In order to better capture the evolution of subsidies on agricultural holdings, they were used to study them by economic size classes ((1) 2,000 - <8,000 EUR; (2) 8,000 - <25,000 EUR; (3) 25,000 - < 50 000 EUR; (4) 50 000 - <100 000 EUR; (5) 100 000 - <500 000 EUR; (6)> = 500 000 EUR) [2].

Arithmetic mean = $\overline{x} = \frac{\sum xi}{n}$; in which x was GDP/capita as an average per year or at the level of a country or as an average for one year at the level of the countries of the European Union.

An empirical picture of the data spread around the average is given by the coefficient of variation (CV%). Variable coefficient (CV%) = (Std / Xmed) * 100.

The following empirical limits for CV% were established in the applied statistics: below 10%, indicates a homogeneous average; between 10% -20%, a relatively homogeneous average; between 20% -30% indicates a relatively heterogeneous average; higher than 30%, indicates a heterogeneous average (Dragomirescu L., Drane JW, 2009) [3].

For the evaluation of the statistical significance of the data around the mean, the confidence limits corresponding to a given risk = X +/- ðx * tp were used, in which:

X = arithmetic mean $\overline{x} = \frac{\sum xi}{n}$;

ðx = standard deviation error ($\partial x = \sqrt{\frac{\sum(\overline{x} - xi)^2}{n(n-1)}}$;

tp = value given by GL (degrees of freedom) and probability of transgression (risk).

In our case, for the evaluation of direct subsidies and on UVM, the formula for delimiting the intervals of the confidence limits is:

(X + ðx * tp) for the upper limit and (X-ðx * tp) for the lower limit.

Annual growth rate (r%), calculated with the formula = ((sqrt (∏p1 / po) 1 / n) -1) * 100; where: ∏p1 / po = chained growth indicators; the number of years of the period (Anghelache C, et al., 2012) [4].

The coefficient of elasticity represents α from the equation: Y = A.X1$^{\alpha}$, in which Y is the gross product per 1 UAM; X1 is the subsidy on a farm and α is the coefficient of elasticity [5]. The solution was made by logarithm of the expression, which resulted in: lnY = ln A + αlnX1.

To determine the significance of the logarithmic equation for calculating the coefficient of elasticity and the correlation coefficient, the F test was used (Fcalculated> Ftheoretical => Sf)

The comparison method was used in the analysis of the data series that included the classes of economic dimension, by country, which were statistically compared with the European Union average, for probabilities of 95%, 99% and 99.9% (Tănăsoiu O. & Iacob Andreea , 2017) [6].

The data source was RICA (Agricultural Accounting Information Network), for the period 2007-2018 [7].

RESULTS AND DISCUSSIONS

1. The current situation

Today, and largely thanks to the CAP, European agriculture guarantees the food security of more than 500 million Europeans, provides regular employment for 22 million people (44 million if the whole agri-food chain is considered) and Europe is the first agri-food exporter in the world. The CAP has 40% of the community budget and yet benefits only 5% of the population. The subsidies are largely related to the cultivated area, so that 80% of them are intended for 20% of the owners, while small farmers practically have little or no amounts. However, the European

Commission sees the continuity of this aid system as a way to close the gap between farmers 'incomes and workers' average incomes.

Analyzing the distribution of the number of holdings by classes of economic dimension that benefited from direct payments in the period 2007-2018, in Romania it is easily observed from the data presented in table no. 1 that their number decreased in the analyzed period, so that in 2018 there are 763650 farms less than in the beginning year of the period, representing a decrease of 59%. The analysis highlighted the fact that the largest number of farms is in the class of economic size of 2000-8000 €, with a share of 89.5% in total agricultural holdings since 2007. At the level of 2018 there is a decrease of the number of holdings in this class, by 70.5%, compared to 2007 holding a share of 64.7% in the total holdings.

In the case of the other classes of economic size, the number of farms increases, so that, in 2018, compared to 2007, there are 34960 (+ 30.5%) more in the size class 8,000 - <25,000 €, by 4170 (+38, 3%) more agricultural holdings in the economic size class of 25,000 - <50,000 €, with 7010 (+ 135.9%) more farms in the size class of 50,000- <100,000 €, with 3010 (+38, 9%) more holdings in the economic size class 100,000 - <500,000 €, and in the case of holdings in the economic size class> = 500,000 € there was an increase of 790 holdings (+ 96.3%)

there are significant increases in the case of farms in the economic size class 8,000 - <25,000 €, which in 2007 had a share of 8.9% of total farms, in 2014 it increased to 13%, and in 2018 they represented 28, 4% of the total agricultural holdings in Romania.

Increases are also recorded in the case of the number of holdings in the other classes of economic dimension, so that:

- the holdings from the economic dimension class 25,000 - <50,000 €, in 2007 they represented 0.8% and at the level of 2018 they reach 2.9% of the total holdings in Romania
- the holdings from the economic dimension classes 25,000 - <50,000 € and 100,000 - <500,000 € in 2007 represented 0.4% and 0.3% respectively and at the level of 2018 they reach 2.3% and 1.4% respectively of the total holdings from Romania
- and in the case of holdings in the class of economic dimension > = 500,000 € there were increases from a share of 0.1% in 2007 to 0.3% in 2018.

Table 1. Structure by classes of economic dimension of the number of agricultural holdings in Romania, beneficiaries of Community subsidies, for the period 2007-2018

The year	**UM**	**2,000 - <8,000 €**	**8,000 - <25,000 €**	**25,000 - <50,000 €**	**50,000- <100,000 €**	**100,000 - <500,000 €**	**> = € 500,000**	**Total**
2007	No	1,153,540	114,480	10,880	5,160	4,370	820	1,289,250
	%	89.5	8.9	0.8	0.4	0.3	0.1	100
2010	No	916,210	97,330	12,650	6,180	5,450	1,000	1,038,820
	%	88.2	9.4	1.2	0.6	0.5	0.1	100
2014	No	951,290	147,400	18,730	7,770	6,830	1,500	1,133,520
	%	83.9	13	1.7	0.7	0.6	0.1	100
2018	No	339,950	149,440	15,050	12,170	7,380	1,610	525,600
	%	64.7	28.4	2.9	2.3	1.4	0.3	100

Processed after: RICA Database, 2018 [7]

Analyzing the structure of direct payments by economic size classes of the beneficiary farms in Table 2, it is observed that at the level of 2007 most of these payments, 36.5% of the total, belong to farms of economic size class 2,000 - <8,000 €. They are followed by a share of 23.4% of the total holdings in the class 8,000 - <25,000 €. In third place they benefited with a share of 13.6% of total direct payments, holdings in the economic size class 100,000 - <500,000 €. This ranking by economic size classes of farms that benefited from direct payments changed in 2018. Thus, in the first place, holding 23.4% of total direct payments are farms in the economic size class 100,000 - <500,000 €, followed by holdings in the class of 8,000 - <€ 25,000, with a share of 22.9% of total direct payments.

Table 2. Structure by classes of economic dimension of direct payments on an agricultural holding in Romania, beneficiaries of Community subsidies, for the period 2007-2018

The year	UM	2,000 - <8,000 €	8,000 - <25,000 €	25,000 - <50,000 €	50,000- <100,000 €	100,000 - <500,000 €	> = € 500,000	Total
2007	%	36.5	23.4	10.6	6.1	13.6	9.8	100
2010	%	36.5	13.2	6.7	7.9	21.4	14.4	100
2014	%	29	16.5	7.7	7.5	20.8	18.5	100
2018	%	14.2	22.9	7.2	12.8	23.4	19.6	100
Coefficient of variation	%	23.96	42.66	49.85	26.29	15.12	32.74	42.14
Annual rhythm	%	1.77	-3.34	-6.98	1.78	-0.59	-0.64	7.67

Processed after: RICA Database, 2018 [7]

2. Subsidy Size Analysis

With regard to the subsidy per hectare, it is found that at EU level in the period 2007-2018, holdings of the economic size class >= € 500,000 received the highest amount with an average of 264.5 euros / ha (table no. 3). The weighted average at EU level in the analyzed period is 247.2 euro / ha.

Table 3. The subsidy size in the vegetal sector (euro / ha) by size classes and the significance of the difference from the European Union average, for the period 2007-2018

Country / Class	UM	2,000 - <8,000 €	8,000 - <25,000 €	25,000 - <50,000 €	50,000- <100,000 €	100,000 - <500,000 €	> = € 500,000	Total
EU (Mt)	€ / ha	215.4	248.1	244.1	226.9	256.1	264.5	247.2
BG	€ / ha	175.6	186.0	188.1	172.4	150.0	144.8	153.8
	(+/-) € / ha	-39.8	-62.1	-56.0	-54.5	-106.1	-119.7	-93.4
	SMF	N	Θ	N	Θ	ΘΘΘ	ΘΘΘ	ΘΘΘ
ES	€ / ha	249.1	223.2	196.4	184.2	186.9	256.5	201.0
	(+/-) € / ha	33.7	-24.9	-47.6	-42.7	-69.2	-8.0	-46.2
	SMF	*	ΘΘ	ΘΘΘ	ΘΘΘ	ΘΘΘ	N	ΘΘΘ
FR	€ / ha		1376.0	225.0	239.0	276.0	290.8	264.2
	(+/-) € / ha		1128.0	-19.1	12.1	19.9	26.3	17.0
	SMF		***	ΘΘ	*	N	*	*
OF	€ / ha			321.0	319.4	324.6	311.9	319.0
	(+/-) € / ha			76.9	92.5	68.5	47.4	71.8
	SMF			***	***	***	***	***
HUN	€ / ha	198.8	211.1	212.4	213.0	219.3	247.8	223.9
	(+/-) € / ha	-16.6	-37.0	-31.6	-13.9	-36.7	-16.7	-23.3
	SMF	N	ΘΘ	Θ	N	ΘΘΘ	N	Θ
PL	€ / ha	223.4	222.7	222.3	219.2	211.8	209.1	219.0
	(+/-) € / ha	8.0	-25.4	-21.7	-7.7	-44.3	-55.4	-28.2
	SMF	N	ΘΘ	ΘΘ	N	ΘΘΘ	ΘΘΘ	ΘΘ
EN	(+/-) € / ha	135.9	145.5	145.9	151.9	142.6	156.4	143.4
	€ / ha	-79.5	-102.5	-98.2	-75.0	-113.5	-108.1	-103.8

Processed after: RICA Database, 2018, Semf (GL = N1 + N2-2; tcal> t:> 0.05 *;> 0.01 **;> 0.001 ***; <0.05$^{\theta}$; <0.01$^{\theta\theta}$; <0,001$^{\theta\theta\theta}$)[7]

Comparing the average subsidies per hectare in some European countries with the EU average, it is found that (table no. 3):

- In Bulgaria there are differences between -39.8 euro / ha (farms in class 2,000 - <8,000 €) and -119.7 euro / ha (for farms in class > = 500,000 €) compared to the EU average,
- In the case of Spain, the holdings in the first class of economic size show significant increases compared to the EU average by +33.7 euro / ha, but there are decreases in the case of the other size classes of holdings, the most significant being -69,2 euro / ha corresponding to the class between 100,000 - <500,000 €,

- A distinctly significant increase is observed in France on farms with an economic size of 8000 - <25000 €, exceeding the EU average by 1128 euro / ha ,
- Subsidies granted to farms in Germany during the period exceeded the EU average for all classes of economic size, as shown in Table 3,
- In Hungary we find a situation similar to Bulgaria with decreases compared to the EU average between -13.9 euro / ha in the case of holdings in the class of 50,000- <100,000 € and -37 euro / ha in the case of those in the class of 8,000 - <25,000 €,
- in Poland we find a situation similar to Spain, so in the first class there is an increase in the average subsidy by 8 euro / ha compared to the EU average and in the case of the other classes there are decreases,
- In Romania, compared to the other countries studied, there are distinctly significant differences in the average subsidies granted in the period 2007-2018 compared to the EU average. The differences from the EU average of subsidies granted to farms by economy class are between -75 euro / ha for farms in the economic size class 50000- <100000 € and -113.5 euro / ha for farms in the economic size class 100000 - <500000 €.

The average subsidy granted in the livestock sector, expressed in euro / UVM, for farms in the EU and some member countries was also analyzed (table no. 4). It is found that at EU level the highest value of the subsidy as an average of the period 2007-2018 was granted for farms in the economic size class 50,000- <100,000 € of 47.4 euro / UVM and the lowest for farms in the size class economic of> = 500,000 € of 7.9 euro / UVM. The weighted average at EU level in the period 2007-2018 is 25.2 euro / UVM.

Table 4. The subsidy size in the livestock sector(euro / UVM) by size classes, in some community countries and the significance of the difference compared to the European Union average, for the period 2007-2018

Country / Class	**UM**	**2,000 - <8,000 €**	**8,000 - <25,000 €**	**25,000 - <50,000 €**	**50000- <100000 €**	**100,000 - <500,000 €**	**> = € 500,000**	**The country**
EU (Mt)	€/UVM	32.6	44.2	46.8	47.4	25.2	7.9	25.2
BG	€/UVM	42.3	72.4	76.0	71.8	52.3	12.0	42.1
	(+/-)€/UVM	9.7	28.3	29.2	24.4	27.1	4.1	17.0
	smf	N	*	*	*	**	N	*
ES	€/UVM	68.3	91.4	80.9	68.9	32.8	2.7	32.2
	(+/-)€/UVM	35.7	47.2	34.2	21.5	7.5	-5.2	7.1
	smf	*	***	***	***	**	ΘΘΘ	**
FR	€/UVM		252.7	123.6	91.6	36.1	4.8	42.5
	(+/-)€/UVM		208.6	76.8	44.1	10.9	-3.1	17.3
	smf		***	***	***	***	ΘΘ	***
OF	€/UVM			2.9	2.5	0.8	1.6	1.3
	(+/-)€/UVM			-43.9	-45.0	-24.5	-6.3	-23.9
	smf			ΘΘΘ	ΘΘΘ	ΘΘΘ	ΘΘΘ	ΘΘΘ
HUN	€/UVM	32.2	56.9	79.7	83.4	45.3	37.1	45.5
	(+/-)€/UVM	-0.4	12.8	32.9	36.0	20.1	29.2	20.4
	smf	N	N	**	**	*	***	**
PL	€/UVM	21.6	25.5	23.5	17.7	5.1	0.3	14.2
	(+/-)€/UVM	-11.0	-18.6	-23.3	-29.7	-20.1	-7.5	-10.9
	smf	N	N	Θ	ΘΘΘ	ΘΘΘ	ΘΘΘ	N
EN	€/UVM	32.7	71.8	130.0	92.8	105.2	58.8	56.5
	(+/-)€/UVM	0.0	27.6	83.2	45.4	80.0	50.9	31.4
	smf	N	N	N	N	**	**	N

*Processed after: RICA Database, 2018; Semf (GL = N1 + N2-2; tcal> t:> 0.05 *;> 0.01 **;> 0.001 ***; $<0.05^{0}$; $<0.01^{00}$; $<0.001^{000}$)[7]*

Comparing the average subsidy granted by classes of economic dimension in some member countries with the EU average in the period 2007/2018 we find the following:

- In Bulgaria, the amount of subsidy granted per 1 UVM exceeds the EU average for all classes of economic size,
- In Spain they increased significantly with the exception of subsidies granted to farms in the economic size class of> = € 500,000, where there were distinctly significant differences of -5.2 euro / UVM compared to the EU average. Such a situation is also found in France,

- In Germany, subsidies on 1 UVM decreased significantly compared to the EU average for all economic size classes in the period 2007-2018, the highest being -45 euro / UVM (50,000-<100,000 €),
- In Hungary, the average subsidy decreased insignificantly, by -0.4 Euro / UVM compared to the EU average, granted for farms in the economic size class 2,000 - <8,000 €, and in the case of farms in the other classes there are very significant increases,
- We find a situation similar to Germany, in Poland where the average subsidy is below the EU average, with differences between -7.5 euro / UVM for farms in the class of> = 500,000 € and -29.7 euro / UVM for farms in the class of 50,000 - <100,000 €,
- Romania, compared to the other countries studied, exceeds the average subsidy at EU level with significant differences in the case of farms in the economic size classes included in between 25,000 - <50,000 € (+ 83.2euro / UVM) and between 100,000 - <500,000 € (80 euros / UVM).

3. Analysis of the impact of the grant

Direct payments to farms in the EU and Member States make a significant contribution to the formation of the gross product. By farm size classes, it is found that at EU level, in the period 2007-2018, the share of direct payments in GDP is on average 20.7% in the case of farms in the economic size class between 8,000 - <25,000 € and of 19.5% for holdings in the economic size class between € 25,000 - <€ 50,000. The payments granted to very large holdings of over € 500,000, of 7.7%, have a lower share. The weighted average contribution of direct payments to the formation of PB at EU level in the period 2007-2018 is 13.2%.

Table 5. The share of direct payments in the gross product, in some community countries, by size classes and the significance of the difference compared to the European Union average, for the period 2007-2018

Country / Class	UM	2,000 - <8,000 €	8,000 - <25,000 €	25,000 - <50,000 €	50,000- <100,000 €	100,000 - <500,000 €	> = € 500,000	Total
EU (Mt)	%	17.6	20.7	19.5	17.6	12.6	7.7	13.2
BG	%	11.9	**20.6**	**24.2**	**23.3**	20.4	13.8	16.6
	(+/-)%	-5.8	-0.1	4.7	5.6	7.8	6	3.4
	SMF	ΘΘ	N	N	*	***	***	*
ES	%	**27.7**	**22.0**	**20.5**	18.4	13.5	3.4	15.6
	(+/-)%	10.1	1.3	1.1	0.7	0.9	-4	2.4
	SMF	*	N	N	N	N	ΘΘΘ	**
FR	%		23.4	**25.5**	21.4	14.3	5.2	14.1
	(+/-)%		2.7	6.0	3.8	1.6	-2	0.9
	SMF		N	***	***	*	ΘΘΘ	N
OF	%			**19.5**	15.7	11.2	11.3	11.9
	(+/-)%			0.0	-2.0	-1.4	4	-1.3
	SMF			N	ΘΘΘ	Θ	***	N
HUN	%	18.8	**22.2**	**23.1**	**22.1**	18.6	13.1	17.1
	(+/-)%	1.2	1.5	4	4	6	5	4.0
	SMF	N	N	**	***	***	***	***
PL	%	**26.9**	**21.4**	16.8	13.8	9.8	9.2	15.3
	(+/-)%	9.3	1	-3	-4	-3	2	2.2
	SMF	***	N	ΘΘΘ	ΘΘΘ	ΘΘΘ	*	**
EN	%	10.4	13.1	17.1	**21.3**	**20.5**	15.0	13.8
	(+/-)%	-7.2	-7.6	-2.4	3.7	7.8	7	0.7
	SMF	ΘΘΘ	N	N	*	***	***	N

*Processed after: RICA Database, 2018; Semf (GL = N1 + N2-2; tcal> t:> 0.05 *;> 0.01 **;> 0.001 ***; <0.05⁰; <0.01⁰⁰; <0.001⁰⁰⁰)[7]*

Referring to the average contribution of direct payments on gross product formation (GDP) in some Member States compared to the EU average, showed significant differences between countries.

Thus, in Bulgaria the highest share of direct payments in GDP is 24.2% for farms in the economic size class 25,000 - <50,000 €, exceeding the EU average by 4.7%. In the case of Spain, the share of direct payments in GDP is higher for first-class farms of economic size, with a period average of 27.7%, exceeding the EU average by 10.1%. In France, Germany and Hungary, we find the largest share of direct payments in PB for farms in the economic size class between 25,000 - <50,000 €, of 25.5%, 19.5% and 23.1% respectively. In Poland we find a situation similar to Spain in which the largest share of direct payments to PB is 26.9% for farms in the first class of economic size.

In the case of Romania, the situation is totally different from all the countries studied, the contribution of direct payments to PB being higher (21.3%) in the case of large farms with economic size between 50000- <100 000 €, and 20.5% in the case of holdings in the class 100,000 - <500,000 €.

The link between direct payment and Gross Product per 1 AWU (Annual Work Unit) is given in Table 6 by calculating the correlation coefficient at EU and Member State level. At the level of the European Union for the analyzed period 2007-2018, the correlation coefficient is significant with values between 0.26 for the economic dimension class 8000 - <25000 € and 0.54 for the class> = 500000 €. The weighted average in the EU in the period 2007-2018 of the correlation coefficient is 0.98.

Table 6. The correlation and coefficient of elasticity between the Gross Product per 1 AWU and the total subsidy per holding in some European countries, by classes of economic dimension, for the period 2007-2018

Country / Class	**UM**	**2,000 - <8,000 €**	**8,000 - <25,000 €**	**25,000 - <50,000 €**	**50,000- <100,000 €**	**100,000 - <500,000 €**	**> = € 500000**	**Total**
EU (Mt)	Elastic coefficient	0.24	0.15	0.58	0.62	0.79	1.53	1.27
	Corel coef	0.43	0.26	0.83	0.82	0.65	0.54	0.98
	semf	St.	St.	St.	St.	St.	St.	St.
BG	Elastic coefficient	0.75	0.14	-0.03	-0.06	0.60	1.54	0.89
	Corel coef	0.89	0.20	0.03	0.07	0.42	0.80	0.99
	semf	St.	N	N	N	St.	St.	St.
ES	Elastic coefficient	0.96	0.83	0.97	1.05	0.57	0.50	1.02
	Corel coef	0.91	0.78	0.92	0.93	0.64	0.37	0.86
	semf	St.	St.	St.	St.	St.	St.	St.
FR	Elastic coefficient		0.55	0.83	0.69	0.71	1.73	0.99
	Corel coef		0.97	0.97	0.90	0.60	0.91	0.99
	semf		St.	St.	St.	St.	St.	St.
OF	Elastic coefficient			0.94	0.99	1.11	1.01	0.96
	Corel coef			0.69	0.83	0.96	0.70	1.00
	semf			St.	St.	St.	St.	St.
HUN	Elastic coefficient	0.42	0.26	0.51	0.56	-0.14	-0.14	1.03
	Corel coef	0.50	0.32	0.66	0.78	0.21	0.21	0.92
	semf	St.	St.	St.	N	St.	N	St.
PL	Elastic coefficient	0.67	0.74	0.77	0.61	-0.14	-0.32	1.03
	Corel coef	0.98	0.96	0.97	0.90	0.21	0.18	0.92
	semf	St.	St.	St.	St.	St.	St.	St.
EN	Elastic coefficient	0.17	-0.21	0.04	-0.25	0.60	1.54	0.89
	Corel coef	0.12	0.23	0.06	0.15	0.42	0.80	0.99
	semf	St.	St.	N	N	St.	St.	St.

Processed after: RICA Database, 2018; Semf (Fcalculated> Ftheoretical => Sf) [7]

With regard to the coefficient of elasticity, its value indicates that an increase in direct payments of 1% leads to an increase in gross product per 1 AWU by 0.24% in the case of holdings with an economic size between 2000 - <8000 €, 0.15% for class 8 000 - <25000 €, by 0.58% for holdings in class 25 000 - <50000 €, by 0.62% for holdings in class 50000- <100000 €, by 0.79% for holdings in class 100000 - <500000 €, and by 1.53% in the case of holdings> = 500000 €, as can be seen in the figure below.

Analyzing the coefficients for the studied countries, the following were highlighted:

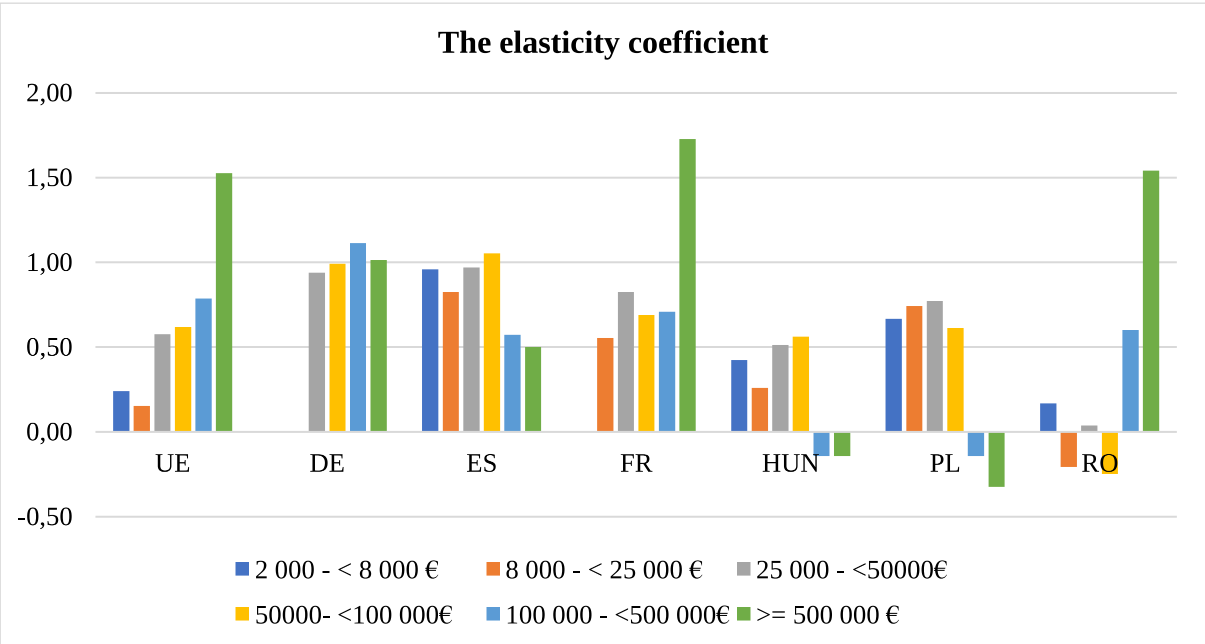
In Bulgaria the link between direct payments and gross product per 1 AWU is significant for holdings in economic size classes between 2000 - <8000 € (0.89) between 100000 - <500000 € (0.42) and> = 500000 € (0.80). The coefficient of elasticity indicates that by increasing direct payments by 1%, PB / 1AWU also increases by 0.75% for first class farms of economic size and 1.54% for last class farms. For holdings in the classes 25 000 - <50000 € and 50000- 100000 € indicates a negative influence of the increase of direct payments by 1% on PB / 1AWU decreasing by -0.03% and -0.06% respectively.

In Spain, the correlation coefficient indicates a significant link between direct payments and gross product per 1 AWU on holdings of all classes of economic size. Also, the coefficient of elasticity indicates a positive influence of the increase of direct payments by 1% on PB / 1 AWU , at the holdings from all classes of economic dimension, the highest being the increase of 1.05% for the class 50000- <100000 €. The same situation is encountered in France and Germany, the elasticity coefficient indicating an increase of PB / 1 AWU by 1.73% in the case of holdings of the last economy class and 1.11% for holdings in the class 100000 - <500000 €, in case of increase of direct payments by 1%.

In Hungary, the correlation coefficient shows a significant link for holdings in the first three classes of economic size and for those in the class of € 100,000 - <€ 500,000. The elasticity coefficient has a positive influence of the increase of direct payments by 1% on the increase of PB / 1AWU in the case of holdings from the first four classes of economic dimension, and instead for the last holdings this increase would have a negative influence.

In the case of Poland, the correlation coefficient indicates a significant link between direct payments and PB / 1 AWU for holdings of all economic size classes, and in the case of the elasticity coefficient we find the same situation described above in Hungary.

Finally, the analysis of the coefficients calculated for Romania highlighted a significant link between direct payments and PB / 1AWU for the first and last two classes of economic dimension and the elasticity coefficient indicates an increase of PB / 1 AWU by 0.17% for farms from class 2,000 - <8,000 €, by 0.04 for holdings from class 25,000 - <50,000 €, by 0.60% and 1.54% for holdings from classes 100,000 - <500,000 € and respectively> = 500,000 €, in the case of increasing direct payments by 1%.



Processed after: RICA Database, 2018 [7]

CONCLUSIONS

Based on the analysis, we conclude that the number of farms decreased in Romania in 2018, registering 59% less compared to the first year of the analyzed period. The highest share of the total holdings is held by the economic size class 2,000 - <8,000 €, which in 2007 occupied a percentage of 89.9%, decreasing until the end of the period to 64.7%. The share of holdings in the second class of economic dimension increased considerably, from 8.9% in 2007 to 28.4% in 2008.

Also, analyzing the structure of direct payments granted to farms, it is found that most of them in 2007 belong to those in the class 2,000 - <8,000 € (36.5%), but this changes in 2018 when most direct payments are received by farms in the class of 100,000 - <500,000 € (23.4%) and those in the class 8,000 - <25,000 € (22.9%).

Regarding the subsidies received in the plant and animal husbandry sector (euro / ha and euro/ UVM), the analysis showed that in the period 2007-2018, the largest amount in the plant sector belongs to farms in the size class economic> = 500,000 € with an average of 264.5 euro / ha, and in the case of the zootechnical sector it was granted for the farms from the class of economic dimension 50,000- <100,000 € of 47.4 euro / UVM. In Romania, compared to the other countries studied, there are distinctly significant differences in the average subsidies granted in the period 2007-2018 compared to the EU average, between -75 euro / ha for farms in the economic size class 50,000- <100,000 € and -113, 5euro / ha in the case of farms in the economic size class 100,000 - <500,000€.

In the livestock sector, subsidies granted in Romania exceed the EU average for all holdings, but the highest value is recorded for holdings in the class 25,000 - <50,000 € with 83.2euro / UVM and for holdings between 100,000 - <500,000 € of 80 euros / UVM.

At EU level, the highest share of direct payments in gross product, in the period 2007-2018, is 20.7% for holdings in the economic size class between 8,000 - <25,000 €. In most European countries, the contribution of direct payments to the formation of the gross product is oriented towards small and medium-sized farms, compared to Romania where they are directed to large and very large farms.

The calculation of the correlation coefficient in the EU indicated a significant link between direct payments and gross product per 1 AWU for holdings analyzed by economic size classes. The coefficient of elasticity indicates that an increase in direct payments of 1% leads to an increase in gross product per 1 AWU for all holdings. In Romania, the analysis of these two coefficients highlighted a significant link between direct payments and PB / 1AWU for the first and last two classes of economic dimension. The coefficient of elasticity indicates that an increase in direct payments of 1% has a negative influence on the gross product per 1 AWU for holdings in classes 8,000 - <25,000 € and 50,000- <100,000 €.

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THE EVOLUTION OF FOREST COVERAGE. WOOD TRADE AND ITS IMPACT ON FOREST FUNCTIONS

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Abstract: *The material presents the problem of forests, deforestation becoming nowadays a real global problem of mankind. Many millennia ago, population growth required the sacrifice of the forest to make way for crops, today forests are cut primarily for profit, wood being one of the most precious commodities. It is true that in some parts of the world the forest is also sacrificed to increase the arable area. In countries like Romania, for example, both legal and especially illegal logging is done only for money, wood being over 10 times more expensive than any other agricultural product. The consequences of deforestation on many functions performed by the forest are evaluated, such as: carbon dioxide absorption and oxygen release, recreation function, preventing soil erosion with serious consequences on its quality, but also floods, floods, inhabited areas, roads transport and other objectives. The material also tries an evolution in time of the phenomenon both in Romania and globally.*

Keywords: *forest, wood, deforestation, profit, erosion*

JEL classification: *Q13, Q27*

INTRODUCTION

The need for economic research on forests is not only timely but also highly relevant given the beneficial role of forest cover in many respects, unfortunately associated with an increasing rate of deforestation throughout the world. If in ancient times - measuring millions of years - the forest was sacrificed to make room for crops. We have data about this beginning only about 10,000 years ago, when the population of the planet was 8-10 million inhabitants. This period, Cailleux calls it "primitive hoe farming". About that period - one of the longest in history - is believed to have reduced annual rainfall by 200-250 mm while producing floods and landslides.

History this time even confirms the destruction of irrigation systems in the Tigris and Euphrates Valley, which eventually led to the loss of Mesopotamian civilization (Ionescu and Staicu, 1980). Historical data confirm that at the beginning of agriculture 70-80% of the land area was covered by forests. It is famous that Carol V's armies crossed Spain, then France, reaching northern Europe without leaving the forest.

But it was not only the need for arable land that was the cause of deforestation. As the population multiplied, other needs arose. In the northern areas, fire was needed to heat homes, trade and wars required wooden ships, steel development, housing construction, the expansion of the railway network and many other human needs required wood. The story of using wood is long and there is no place here to troubleshoot it. Even today, forests are being cleared to increase the cultivable area and for pasture, but the main reason why they are currently being cleared is money. Wood and wood trade is one of the most lucrative businesses, the price of raw wood even (logs) is over 10 times more expensive than any agricultural product.

MATERIAL AND METHOD

The material is largely bibliographic. Forest cover is analyzed in evolution both globally and in Romania. At the national level, the analysis is deeper, taking into account the catastrophic effects of deforestation in all aspects. Legislative gaps, the inability of the administration to control deforestation have led to the phase in which damage of all kinds, but especially those caused to agriculture, are difficult to assess. The method used is that specific to economic research: material

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collection, selection and processing, comparison, synthesis, conclusions and possibly proposals. No special analysis or data processing techniques were used.

RESULTS AND DISCUSSIONS

World forest heritage. At the end of the twentieth century, forests occupied an area of 3,898.0 million ha, representing 30% of the planet's land area (Table 1). According to the data in the table at the level of large geographical regions large areas of forests are found in South America 829.4 million ha (47.3% of the world total), USSR (former) 827.8 million ha (37.8 %) and Central and North America 709.8 million ha (33.2%). On the continents, the most favorable ratio is held: South America (47.3%) and Central and North America (33.2%). As a role, at the planetary level in the first place are the forests of the Amazon area, the tropical forests of Africa and the forests of the region of Indonesia considered the three lungs of the planet (M. Bulgaru, 1996). By countries, the largest forest areas are in Russia, Brazil, China, Australia, R.D. Congo, Indonesia, Peru, India, accumulating 2/3 of the world's surface (St. Mâșu, 2011).

Table 1 The size of the global and continental forest fund in 1991

Continent	Land surface -mil.ha-	Forest fund area-mil.ha-	The share of the forest fund in total area %
Worldwide total	***13041,7***	***3898,0***	***29,9***
Africa	3964,0	684,7	23,1
Asia	2679,0	531,7	20,0
America Centrală și de Nord	2137,0	709,8	33,2
America de Sud	1752,9	829,4	47,3
Europa	472,7	157,3	33,3
URSS (fosta)	2190,1	827,8	37,8
Oceania	845,3	157,3	18,6

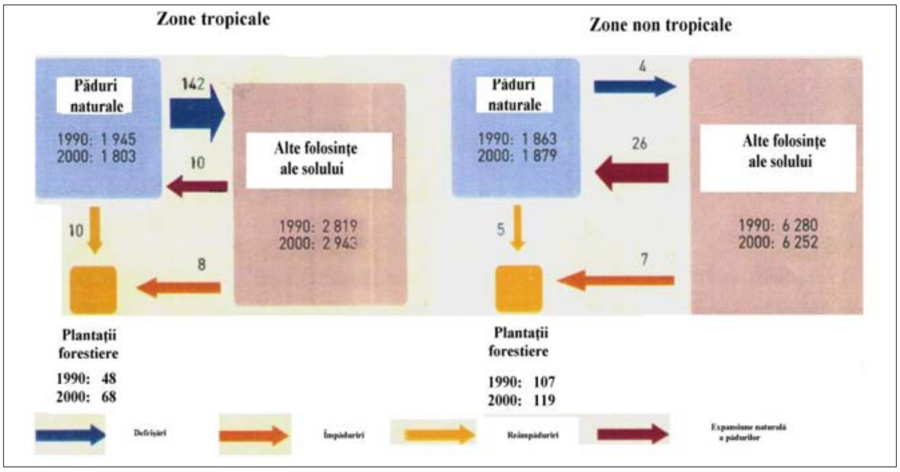
Source: *World Resources 1994* (citat de M.Bulgaru, 1996)

What is serious is the fact that in the countries with the largest forest areas the degree and rate of deforestation is the most advanced, such as in Brazil where the deforestation area represents almost half of the world total, it represents almost half of the world total, this to makes room for grazing for animals (Al.Gore, quoted by Mâșu, 2011). On the other hand, Christioan de Perthuis (quoted by Mâșu, 2011) states that in order to ensure agri-food products, it is preferable to make more intensive use of existing agricultural land. It is estimated that 13 million hectares or 30,000 hectares are cleared daily.

A relatively recent FAO study (2001) shows that while in the tropics the deforestation process continues, in non-tropical areas there is even an increase in forested area, a deforested area of 142 million ha in 10 years in the tropics and an increase of 1.6 million ha in non-tropical areas in the same period (fig.2).

However, it is estimated from the database - that the pace of deforestation is declining. The same study mentions that in the last decade of the twentieth century, countries such as China, India, the Libyan Arab Jamahiriya, Turkey, Uruguay are foresting more than they are clearing. Some countries, such as Thailand and the Philippines, have banned the exploitation of natural forests. Among the factors that reduce the pace of deforestation are urbanization - cities giving up firewood, economic development, increasing the productivity of agricultural land in operation. But there are also poor countries that have to export timber to buy foreign exchange.

Such situations benefit developed countries that conserve their forests by importing timber from poor countries that need to clear their forests to obtain the much-needed foreign exchange: "*Although the annual volume of timber growth exceeds the cut we need so much wood that the United States has been a major importer since 1950. This policy contributes to deforestation in other countries, depriving them of too little fuel and facilitating the growth of carbon dioxide in the atmosphere. Extensive use of wood means that our forests can be preserved only at the cost of their extinction in countries (Buciuman, 1996)*



Source: FAO, 2001

Figure 1 . Evolution of forest areas (mil.ha) in the years 1990 and 2000

Moreover, the correlation between the level of development of some territories (states) expressed by GNP / place and the share of the forest fund in the area can be proved statistically as can be seen in the data of a World Bank study (tab.2). It follows from the data that countries with a high share of the forest fund - over 30% of the total area - are generally rich countries (with a high value of GNP / place) while countries with a low share of the forest fund are on the contrary poor countries. whose GNP / place is four and almost six times lower, respectively.

As already mentioned for a long time, the forest vegetation had to be sacrificed to obtain arable land with food and non-food plants necessary for man. However, it seems that nowadays deforestation in order to obtain arable land for agriculture is no longer necessary even if in some sporadic cases such situations can still be encountered. The improvement of food production techniques and technologies have been improved so much that much larger crops can be obtained from the current cultivated areas. Land productivity has doubled and even tripled. From cereal crops of 2,500-3,000 kg / ha has reached or can reach 6,000-10,000 kg / ha. This performance in terms of land productivity has allowed some European countries to carry out extensive afforestation programs, including France, Germany, England.

Table 2. The relationship between the forest fund and economic growth

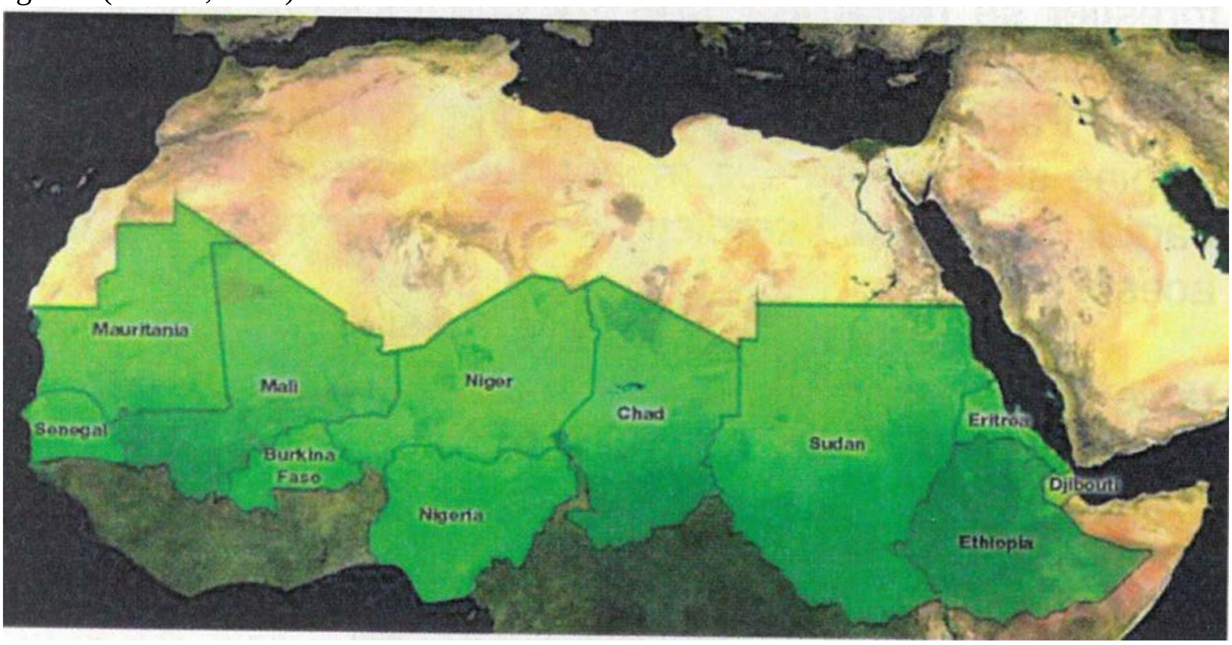
The share of the forest fund in the total area%	Number of territories	P.N.B. %	Population %	PNB/loc dolari
Over 30%	70	62,2	27,2	9624
15-29%	40	18,4	31,1	2490
Under 14%	52	14,3	34,6	1680
No data	45	-	-	-

Source: M.Bulgaru, 1996

"European national policies over the last 100 years have focused on protecting and expanding the productive potential of forest resources, by combating pests and preventing excessive felling. The European forestry potential has doubled in the last 40 years, to which the inventory and monitoring works carried out according to scientific methods contribute. At the same time, correlated with the new requirements of the forest, the investment needs increased, appealing both to the public funds and to the forest owners to cover the expenses. Many countries are struggling from this point of view, as the cost of forest maintenance works is below the level of demand. Thus, some European countries have long-term national programs that also aim to expand forested areas on unprofitable agricultural land. In France, between 1950 and 1990, the forest area increased by about 2.0 million ha, which can lead in the long run to a fairly important economic recovery. The forests of France have the largest area in Europe, being almost 15 mi.ha, occupying 25% of the country's surface and also 25% of the forest area of the 12 countries of the European Community. Among the forest species, deciduous trees are dominant in proportion of 62%, and in terms of property 71% belong to the private sector, 10% are owned by the state and 19% by some communal communities. In Germany, as shown by the report of the Ministry of Agriculture, Water and Forests (1993), the forests of Germany are

going through a difficult situation because 64% of the area is more or less critical. Thus, 32% of the oak species, 22% of the spruce species, 20% of the pine species and 55% of the fir species are sick. This situation is caused by air pollution, mainly due to oxides removed by vehicles. It is estimated that the car, which is the symbol of German economic power, kills the oak, which is the national emblem and the symbol of immortality. In England, the area occupied by the forest has continuously increased from 4% to 11% of the total national territory. Currently, England is again in an ambitious reforestation program, to improve timber production, increase recreation areas for population and development of forest-specific fauna and flora (Teaci, 1995).

But so-called third world countries have also noticed the adverse effects of deforestation and have initiated reforestation programs. For example, in 2010, eleven African states proposed a project entitled "The Great Wall of Africa" (Fig. 2) to combat the Sahara Desert. In Asia, China also has an extensive afforestation program that will compete with the Great Wall of China (4,400 km). South Korea, India and Vietnam also have ongoing reforestation programs. Other positive examples in such actions are provided by some Central American states, such as: Costa Rica or the Dominican Republic. Also in the new continent, the USA and Canada carry out reforestation programs (Bavaru, 2014).



Source:: Bavaru, Bercu, 2014

Figure 2. The great African green wall

Romanian forest fund. The case of forest cover in our country is one of the worst. Overall, the share of forests represents 26.9% of the country's territory, thus fulfilling the norms of the European Union of at least 22-25%, but the 27% forest fund is in total while the large agricultural areas are practically cleared of forests. In 2018, for example, the share of forests in the county was 5.2% in Brăila; 5.5% in Constanța; 11% in Tulcea, 5.7% in Ialomița; 9.3% in Olt; 10.4% in Giurgiu; 4.6% in Teleorman; 11% in Dolj.

The forested areas in thousands of ha are presented in table 2. From the same table we see that in 2018, the total area of forests decreased compared to 1989 by over 260 thousand ha, although in that period some reforestation was done.

Table 3. The situation of the Romanian forest fund at the end of 1989 and 2018

No	County	Years		No.	County	Years	
		1989	2018			1989	2018
	Total	***6678,5***	***6418,2***	21	Harghita	232,2	260,2
1	Alba	226,7	202,3	22	Hunedoara	312,4	312,0
2	Arad	212,9	207,4	23	Ialomița	25,9	24,8

3	Argeș	289,3	271,7	24	Iași	98,5	95,1
4	Bacău	279,3	266,4	25	Maramureș	293,5	253,2
5	Bihor	197,6	207,6	26	Mehedinți	149,2	146,8
6	Bistrița Năsăud	205,6	188,1	27	Mureș	215,8	213,6
7	Botoșani	57,4	55,9	28	Neamț	260,2	257,9
8	Brașov	199,3	202,2	29	Olt	57,8	51,3
9	Brăila	23,2	24,9	30	Prahova	152,3	144,2
10	Buzău	168,4	158,1	31	Satu Mare	78,4	71,0
11	Caraș-Severin	409,7	419,9	32	Sălaj	106,5	94,5
12	Călărași	21,8	21,2	33	Sibiu	202,6	199,1
13	Cluj	169,3	166,1	34	Suceava	456,8	425,2
14	Constanța	39,0	34,6	35	Teleorman	29,6	26,6
15	Covasna	167,4	169,7	36	Timiș	108,8	104,0
16	Dâmbovița	121,0	116,6	37	Tulcea	95,5	93,8
17	Dolj	81,5	81,6	38	Vaslui	83,4	71,7
18	Galați	44,4	35,4	39	Vâlcea	285,9	260,6
19	Giurgiu	37,7	36,7	40	Vrancea	191,4	177,2
20	Gorj	264,4	244,2	41	București	25,7	24,9

Source: Attic Yearbooks of Romania 1990 and 2019.

Also here we must mention the fact that in Romania, as everywhere in the world, the decrease of the areas occupied by forests is a historical trend. Regarding deforestation, the historical trend in Romania is also proven by the following quotations belonging to the 3rd decade of the twentieth century.

In the magazine Viața agricolă from November 1928, the future prof.univ. N.Cornățeanu writes: ,, the south of Dobrogea needs afforestation ... the population here uses tizic (used manure) and those who consume wood, consume wood brought from Bulgaria. Also in 1928, in the calendar of ploughmen M.Florescu, forest inspector, reproduces the words of the inheriting prince Ferdinand I from 1905: "he sinned a lot through the reckless exploitation of forests, although the forest fund represents a great national wealth ... enough forests, it is not possible ".

Without going too far in history even comparing the forested area in the second half of the nineteenth century and the first half of the twentieth century we will find that the area of forests has shrunk. In Dobrogea, for example, under Turkish occupation, the forest was leased to the English, who cleared it with mechanical saws powered by small steam engines (the ancestors of today's chainsaws).

In Romania in the first decades of the twentieth century, oak forests were cleared and later replaced and partially with acacia. And this happens in the most fertile areas such as the Romanian Plain. In a period atlas are presented the areas of the forest fund in the former counties bordering the Danube in 1931. Here are the results: Dolj forest fund 5,838 ha - 8.9% of the county area; Romanians 25,569 ha - 7.2%; Olt 25,275 ha - 8.8%; Teleorman 20,634 ha - 9.5%; Vlașca 44,197 ha -9.8%; Ilfov 45,612 ha - 8.8%; Ialomița 28,973 ha - 4.1%; Brăila 18,809 ha - 4.4%; Tulcea 72,059 ha - 7.3%; Constanța 13,621 ha - 2.0% (Statistical Atlas 1938).

Even during the totalitarian-communist regime, the figures representing the degree of forest cover do not have a real-positive evolution with all the apologetic comments specific to the epoch (tab.4).

Table 4 The evolution of the forest fund of Romania in the period 1950-1989, compared to 1938 -thousands of hectares-

Specification	1950	1960	1970	1980	1985	1986	1987	1988	1989
Total forest fund	6446	6403	6315	6337	6339	6342	6353	6361	6372
Total forest area	5729	6044	5870	6169	6182	6187	6210	6228	6249
Afforestation and reforestation	60100	59757	50453	50254	42380	39541	38290	46450	41409

Source: Statistical Yearbook of Romania, 1990.

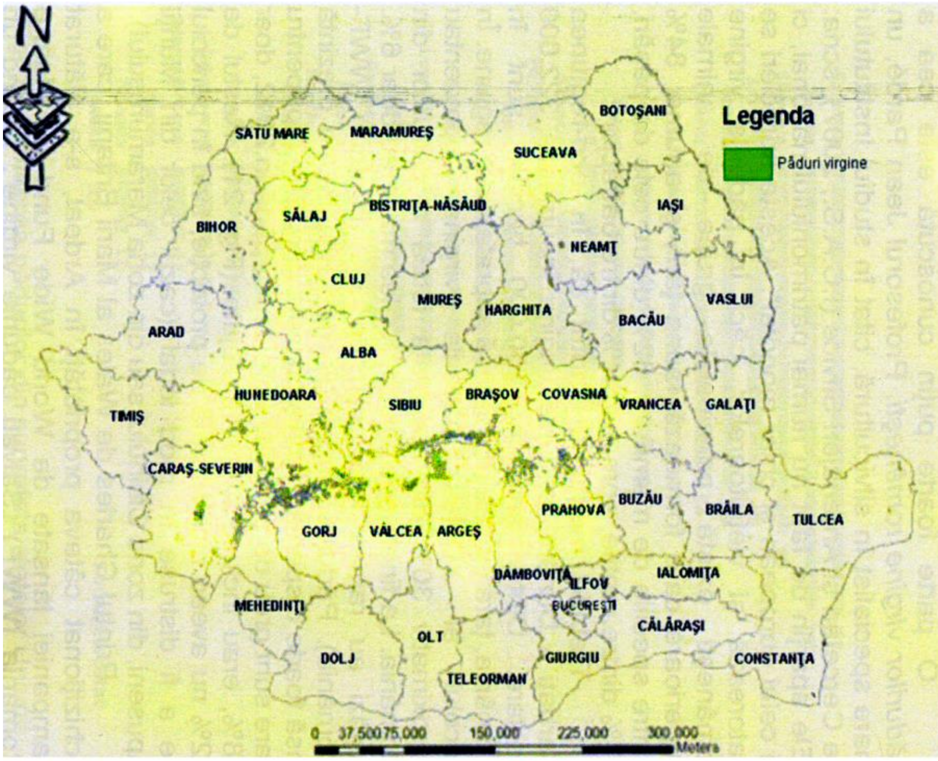
Regarding the structure of the species, at least in afforestation, priority was given to conifers, a fact criticized even by N. Ceașescu: "where beech has been growing for centuries, we introduced conifers with negative results on the soil" (Socialist Agriculture, January 8, 1985), "We will substantially reduce the share of conifers."

Exploitation of the forest fund during 1950-1989. About the forest fund during the communist-totalitarian period, professor Giurgiu after listing the notable achievements such as zoning and integral forest management, reforestation especially on empty and degraded lands, making curtains, etc. But much greater were the damages caused to the forestry between which we note the following:

- the brutal violation of the property right over the forests, their nationalization being done without compensations and compensations (the state owned until 1948, only 30% of the forest area. It should be added here that only in the period 1985-1989 the state exported 728.4 thousand cubic meters of wood for pulp; 5137 thousand cubic meters of timber; 445.4 thousand cubic meters of plywood; 22219 thousand cubic meters of veneer; 4454.1 thousand cubic meters of parquet; 5506.5 thousand cubic meters of chipboard; 526.8 thousand cubic meters of beech boxes furniture worth over 35 million lei foreign currency and others without paying anything to the former owners;
- excessive exploitation of forests, reaching in some years 26-28 million cubic meters well above the support capacity of the forest fund (21 million cubic meters / year)
- the creation of an oversized forest industry and the excessive export of timber and timber products;
- substitution of local and highly stable species (beech, sessile oak, oak, etc.) with species from other natural vegetation areas (spruce, pine, Euramenrican poplars, etc.), which has led to an ecological imbalance of many forests;
- generalization of chemical methods to control defoliating insects, which has long affected the balance of forest ecosystems;
- the promotion of non-forestry activities in the forest fund (sericulture, industrial salmon farming, horticulture, fish farming, etc.) which have diverted the attention of foresters from the fundamental problems of the forest;
- application of non-ecological wood exploitation technologies (crown tree technology);
- legislation and practice of grazing on 50-60% of the forest area

During this period, the highest rate of exploitation of virgin and quasi-virgin forests in Romania took place, their surface decreasing from about 700 thousand ha in 1948, to about 400 thousand ha in 1984. This narrowed and brutalized a exceptional natural heritage of the country and Europe. The establishment of protected areas in the forest fund was practically abandoned, especially after 1970.

In the last decades of the analyzed period, the phenomena of abnormal drying of the trees as a result of the ecological imbalance, the pollution of the pasture in the forests and the droughts have accentuated (Davidescu, 2000). Among the virgin forests (fig.3) there are also those from the reservation-national park Cheile Domogled-Valea Cernei, where there are still species of trees and plants characteristic of the Mediterranean climate (fig.4). Deforestation that Romania did not need was carried out in the 1960s (20th century) and in the Danube Meadow.



Source: Bavaru și Bercu, 2014

Figure 1. Map of the Romanian virgin forests in 2003

In 1962, Gh. Maurer, not as an ecologist but as prime minister, signed HCM 1050/1962 to drain 300,000 ha to increase the arable area of the former state households (future state agricultural enterprises).

On this occasion, an unsubmersible dam was built with a length of over 1,000 km, followed by high-performance irrigated agriculture. This did not happen because the water infiltrated through the dam was not kept under control, the land became impoverished quickly, there were saltings, swampy areas. Instead, on this occasion, an area of almost 90,000 ha was deforested and good quality wood was sacrificed, including centuries-old specimens as can be seen in fig.5.

Forest functions and trade in timber products. In an information of the National Forests Authority - Romsilva that manages the state-owned forest fund, it is mentioned that the Romsilva Authority that manages at the end of 1990, an area of 6,341,260 ha of forest still manages at the end of 2018, 3,135,927 ha of forest the remaining 3,205,333 ha being returned to the former owners (fig.6).

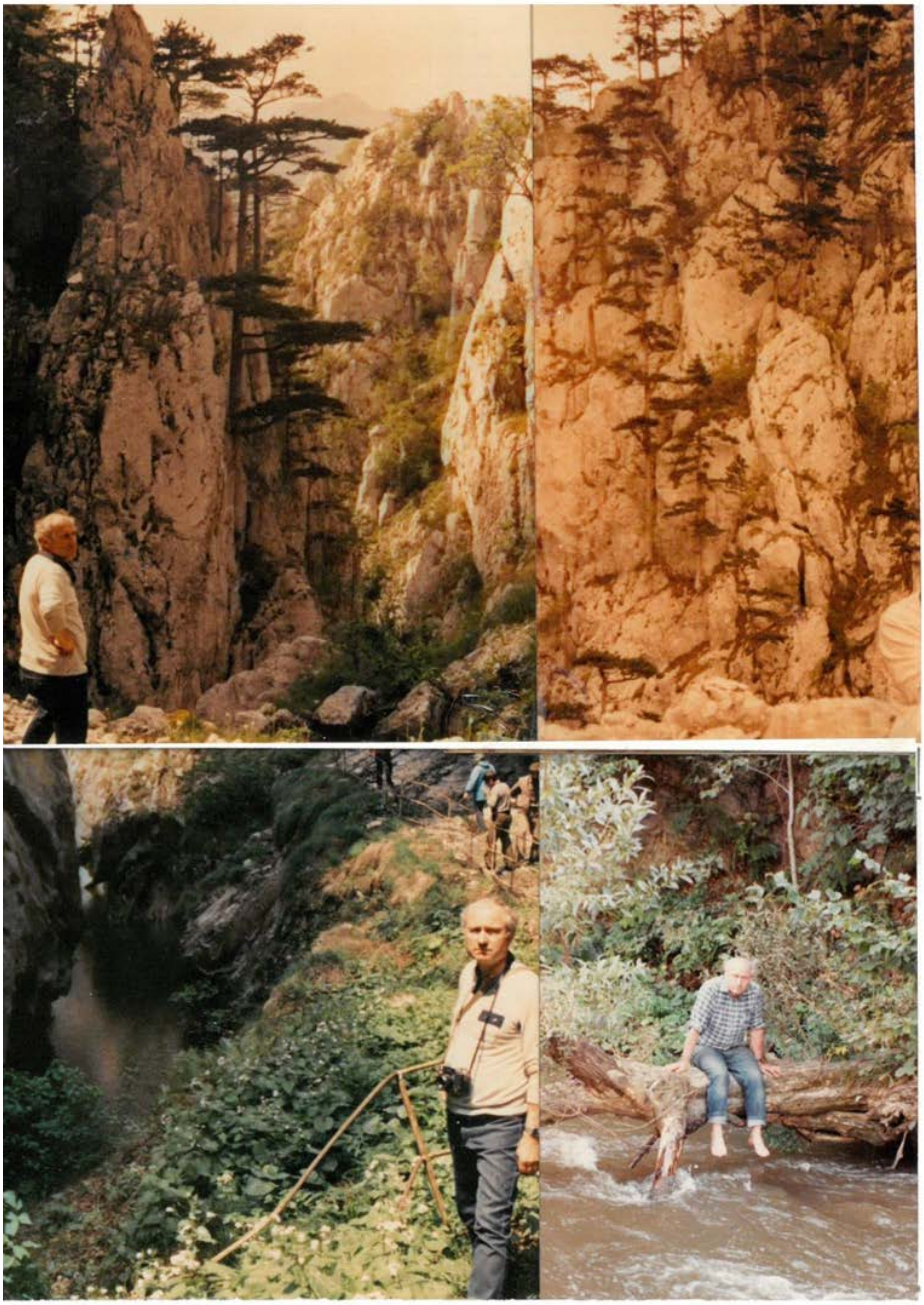
The state forests with an area of 3,135,927 ha are composed of:

- Lands covered by forest .... 3,031,700 ha
- Other categories of use .... 104,227 ha

In turn, the area actually covered by forests - 3,031,700 ha is divided into 2 functional groups:

- Functional group I (forests with special protection functions) ...... 1.99.014 ha with ugly distribution:
- Forests with water protection functions: 31%;
- Forests with land and soil protection functions: 42%;
- Forests with recreation functions: 11%;
- Forests of scientific interest and for the protection of the forest fund and the forest eco-fund: 10%, of which approx. 17,779 ha are included in the National Catalog of virgin and quasi-virgin forests.
- Functional group II (forests with production and protection functions 1,037,786 ha.

From the entire forest area managed by the Romsilva Agency, between 3 and 8 cubic meters of timber are harvested annually (Romsilva National Agency).

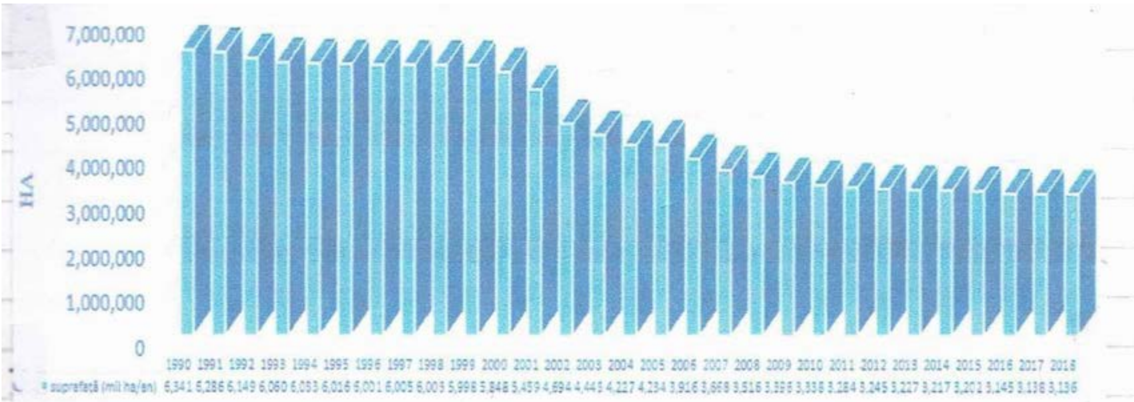


Source: A.Lup

Figure 4. Mediterranean vegetation (Banat black pine and aspects from the Domogled-Valea Cernei national park

Source: Stoiculescu, 2008

Figure 5. Good quality wood and multisecular specimens taken
from Danube meadow on the occasion of its drying



Source: Regia Romsilva

Figure 6. Graph representing the area of the forest fund at the end of 1990 and reduction of this area (2018)
due to the restitution of the forests of the former owners

The amount of wood harvested by Romsilva is insignificant compared to the illegal logs that occur annually. From the same source (Romsilva) we find out that in the period 2013-2018, the illegal cuts were as follows: 2013: 108,751 cubic meters; 2014: 56,836 m3; 2015: 57,080 m3; 2016: 47,788 m3; 2017: 47,713 m3 and 2018: 31706 m3; in total 349,874 cubic meters (Romsilva Agency). Valued only at 350 lei / cubic meter, it results that during this period wood was illegally cut in the amount of 122,455,900 lei or 20.4 million annually. In order to realize the profitability of the timber trade, we find out that in 2013 logs worth 63 million lei were sold on 900 ha (Bavaru-Bercu, 2014). Comparing the 63 million lei to 900 ha, we obtain no less than 70,000 lei / ha, the equivalent of 77.7 tons of wheat at current prices. This means the production of 10 ha of wheat, a production that is carried out by only a few top companies in Romania. And as a wheat production of over 3,800 kg / ha is obtained only in good years, the value of one hectare of illegally cut wood is equivalent to the value of over 20 hectares of wheat. In this way we come to realize why wood is stolen. In fact, Romanian folklore reflects the situation by singing "*money is made in the forest with lace and sackcloth, money, money*".

CONCLUSIONS

With all the beneficial role that the forest has in human life, but also in the economy, the forest fund is sacrificed for money, the timber trade being over 10 times more profitable than any agricultural product.

There are still poor countries where the forest is still sacrificed to increase the arable land or land.

Rich and poor countries have noticed the damage caused by deforestation and consequently set out to restore forest cover.

However, it seems that the reforestation effort will be slow and much less extensive than its reverse, deforestation.

In the 19th century Chateubriand wrote: The forest precedes the wood, the desert follows it.

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THE COMPETITIVENESS OF MOLDOVA'S AGRI-FOOD TRADE WITH E.U. AFTER DCFTA IMPLEMENTATION

LILIANA CIMPOIEȘ[1], OLGA SÂRBU[2]

Abstract: *This paper analyzes the changes that occurred in Moldova's trade of agricultural and food products since the implementation of the Deep and Comprehensive Free Trade Agreement (DCFTA) with European Union. The research will include the analysis of Moldova's foreign trade activity from the perspective of agricultural and food products, the changes that occurred in their structure, dynamics and competitiveness. The data used will underline the period 2015-2019, regarding the agricultural and food trade commodities. The competitiveness will be assessed through trade indicators as Revealed Symmetric Comparative Advantages (RSCA) and Trade Balance Index (TBI) based on product mapping approach. As result we delimitate four groups of products classified according to their comparative advantages/disadvantages and export specialization. By analyzing the obtained results we have found three agri-food products that have comparative advantages and are net exporters on E.U. market. About half of agri-food products that fall into the category of comparative advantage but are net importers. The competitiveness of this group has potential to grow and it could be improved.*

Key Words: *agri-food products, competitiveness, trade.*

Classification JEL: Q17, F10

INTRODUCTION

The transformation process and dynamic changes that occurred over the last decades imposed certain adjustments particularly for Eastern European countries. These adjustments refer also to the opportunities and threats of the agri-food sector that experience difficulties in assessing its competitive position on world markets. The term of competitiveness was widely discussed among economists. According to Freebairn (1986), competitiveness is an indicator of the "ability to supply goods and services in the location and form and at the time they are sought by buyers, at prices that are as good or better than those of other potential suppliers, while earning at least the opportunity cost of returns on resources employed".

Competitiveness and comparative advantage terms are related, both implying general equilibrium concept. However, competitiveness is a more broad definition, including also the distortions that might arise in the marketplace. Many studies imply the concept of competitiveness to analyze the performance of an sector or industry through all aggregate outputs or the main commodities (Frohberg and Hartmann, 1997).

According to trade theory, (international) competitiveness is based on the concept of comparative advantage (Latruffe, 2010). In this case, competitiveness is regarded as the country's ability to utilize efficiently its available resources and as result to benefit from a comparative advantage of the world market. In order to benefit from increased export activity is important to focus on the competitive segments of agri-food production that have comparative or absolute advantages in relation to the main trading partners (Ortikov, 2019).

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Agricultural and food commodities represent Moldova's the main exported goods. The trade structure and territorial distribution of agri-food commodities had experienced modifications during the last decade. Until 2005, C.I.S. used to be the main market for Moldova's agricultural and food products. Due to certain events and some trade preferences agreements(GSP+, ATP) slowly the trade relations with E.U. market became closer (Cimpoies, 2015, 2016). After signing the DCFTA agreement with E.U. in 2014, bilateral trade flows largely increased. Thus, the aim of this paper is to assess the major changes that experienced Moldova since the DCFTA was implemented.

MATHERIAL AND METHODS

In this paper the competitiveness of agri-food products will be estimated based on trade indicators. There are different approaches to estimate a country's trade competitiveness and advantages on world markets. One of the main indicators that allows to estimate the comparative advantages of a country or sector was introduced by Balassa (1965), called "Revealed Comparative Advantages" (RCA). Based on Balassa's approach the comparative advantages are revealed through the high share of a certain good/sector or its disadvantages reflected in low shares in the country's total exports (Balassa, 1991). Relative Comparative Advantages index (Balassa index) indicates the ratio of a commodity *i* in the total amount of country's exports and the share of this good in the total amount of world's exports. It can be computed as:

$$B = RCA = (X_{ij}/X_{it})/(X_{nj}/X_{nt}) \qquad (1)$$

where,

If RCA take values greater than one, a country presents comparative advantages in a group of products, and it presents disadvantages when this value is smaller than one.

It is considered that the values of RCA index is not possible to compare on both sides of one (Widodo, 2009). Thus, a better approach is considered the Revealed Symmetric Comparative Advantage (RSCA) index (Dalum and Laursen,1998). The RSCA is computed as:

$$RSCA_{ij} = (RCA_{ij} - 1)/(RCA_{ij} + 1) \qquad (2)$$

This index take values situated between minus one to greater than one. This implies that when $RSCA_{ij}$ is greater than zero country *i* has comparative advantage within the group of products j. The opposite is true when the index values are less than zero.

Another important trade indicator that allows to establish if a country is specialized in export/import for a specific product is Total Balance Index (TBI) (Lafay, 1992). TBI index allows to determine if a country is net exporter or net importer for certain group of products. TBI can be computed as:

$$TBI_{ij} = (X_{ij} - M_{ij})/(X_{ij} + M_{ij}) \qquad (3)$$

where, X_{ij} and M_{ij} represent the export and import flows of country *i* among the group of products *j*. Trade Balance Index values are situated below or over one. For values smaller than 1 the country is considered net importer and for values over 1 the country is a net exporter (Lafay, 1992).

In order to assess the country's competitiveness "product mapping" tool was used. The product mapping is based on the RSCA and TBI index and allows to divide the commodities into four groups creating a "matrix": A, B, C and D (Widodo, 2009). According to this "matrix" classification approach in group A commodities with comparative advantage and export specialization are included; in group B – commodities with comparative advantage but with lack of export specialization. For both group C and D commodities without a comparative advantage are included. The commodities in group C will have export specialization, while group D will lack export specialization (Widodo, 2009). The “product mapping” is presented in Table 1.

Table 1. Product mapping approach

RSCA>0	**Group B:** Comparative advantage Net-importer (RSCA>0 and TBI<0)	**Group A:** Comparative Advantage Net exporter (RSCA>0 and TBI>0)
RSCA<0	**Group D:** Comparative disadvantage Net-importer (RTA<0 and TBI<0)	**Group C:** Comparative disadvantage Net exporter (RTA<0 and TBI>0)
	TBI<0	TBI>0

Source: Widodo (2009)

This paper is based on the analysis of agri-food trade flows with E.U. The data includes an analysis of trade flows after signing the DCFTA agreement with E.U. Data are related to the 24 harmonized sections that belong agri-food products, divided in agricultural (HS 01-15) and food products (HS 16-24). The data were provided from National Bureau of Statistics (NBS), UN Comtrade database.

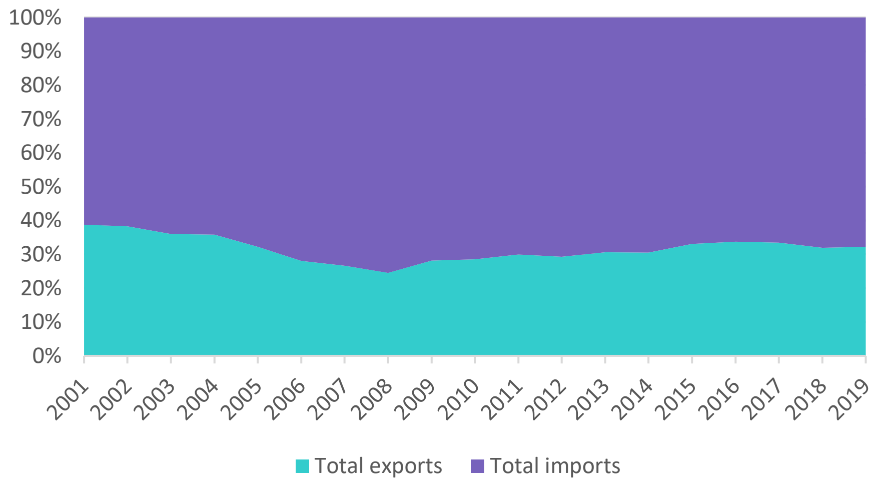
RESULTS AND DISCUSSIONS

Trade liberalization and economic transformations affected Moldova’s foreign trade dynamics and its distribution on the main partners. Currently Moldova is still experiencing a negative trade balance due its disadvantages of endowment in natural resources that leads to large amount of imports (mainly gas and other energetic resources). A major export share in Moldova’s trade activity is represented by the agricultural and food products. Its amount was slightly decreasing during the last decade but it still maintains about half of country’s exports.

The amount of total exported goods and services constituted 2779 million US dollars, while imports amounted 5842 million US dollars. Both exports and imports increased during 2001-2019 (Fig. 1).

Also, both trade flows increased during 2015-2019 comparing to its value in earlier period (2001-2014). In this case it should be mentioned that the value of total exports increased by 66 percent, while imports had grown by 45 percent.

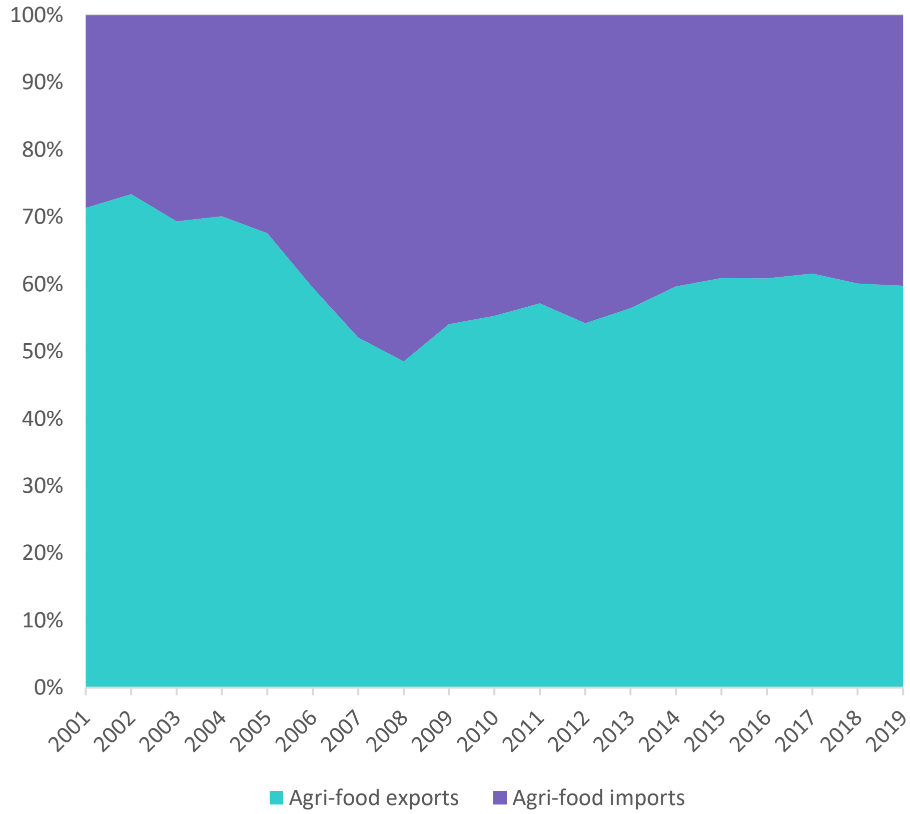
Figure 1. Dynamics of Moldova’s trade flows, 2001-2019



Source: based on data from National Bureau of Statistics

A similar trend is observed in the case of the agri-food trade flows. Exports of agricultural and food products represent 43 percent from overall traded commodities (2019). In average during 2015-2019 the agri-food commodities in overall exports had a share of 45 percent. Agri-food imports represent 14 percent in total imported goods. Both agri-food exports and imports increased in 2015-2019 comparing to the earlier period by 64 and 41 percent (Fig. 2). In total agri-food trade flows a greater share is represented by agricultural products (HS 01-15), while food products (HS 16-24) represent about 30 percent in 2019. Exports with agricultural products increased slowly after 2008, while imports of food products present an increasing trend since 2005.

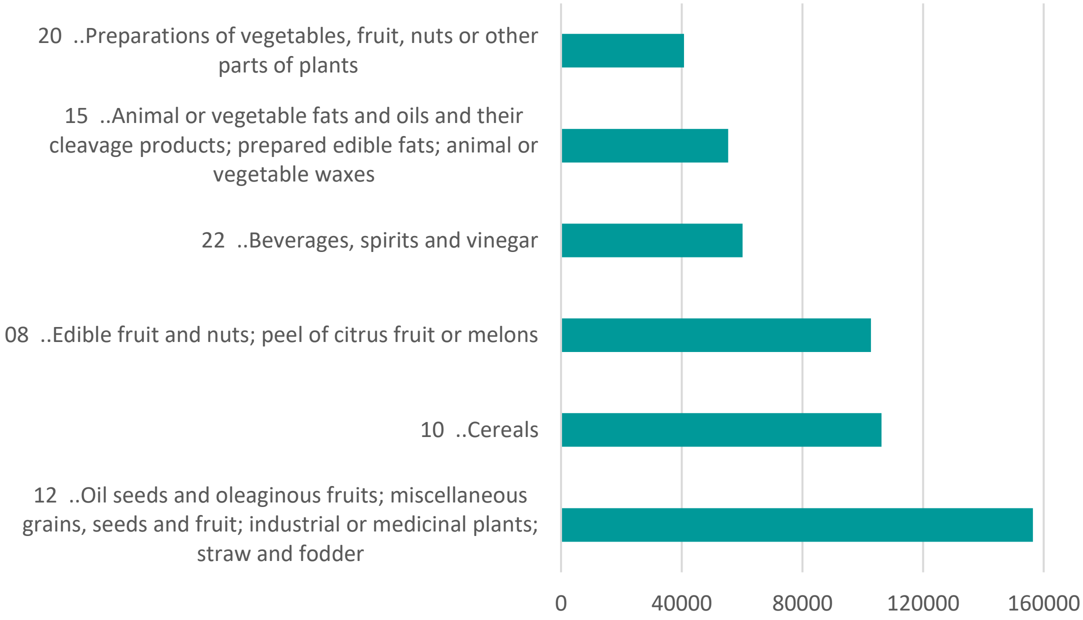
Figure 2. Dynamics of Moldova's trade flows with agricultural and food products, 2001-2019



Source: based on data from National Bureau of Statistics

Moldavian trade flows with E.U. countries had experienced great changes over the last two decades. An increase in trade flows to E.U. market was first noticed after 2005 when during a first interdiction the country had to reconsider its trade partners. The enlargement of E.U. family in 2007 by the accession of Romania and Bulgaria (important trade partners for Moldova) also contributed to a new increase in trade flows towards and from E.U. countries (Cimpoies, 2013). Also Moldova benefits from a greater access to the E.U. market from General System of Preferences (GSP+) since 2006 and Autonomous Trade Preferences in 2008. This contributed to the increase of trade flows to E.U. countries through free trade advantage regarding to certain products as beverages, some agricultural products, sugar etc. In 2014 Moldova signed a Deep and Comprehensive Free Trade Agreement that increase even more the advantages from a free trade with E.U. countries (Cimpoies, 2019).

Figure 3. Most exported agricultural and food products of Moldova to the E.U. market after DCFTA, average values 2015-2019

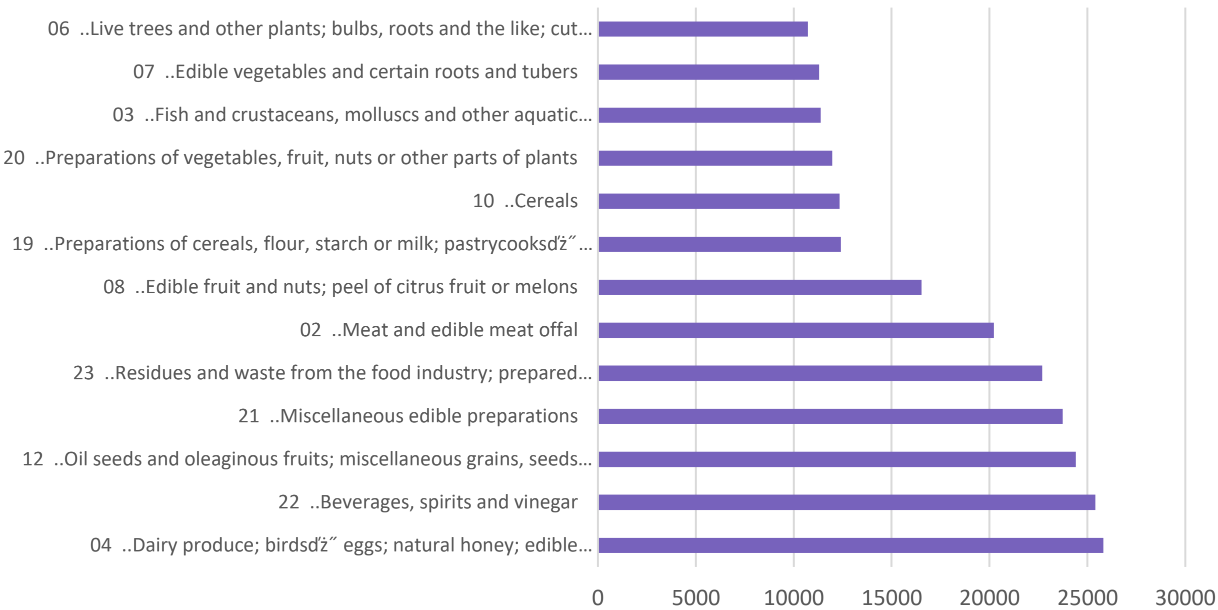


Source: based on data from National Bureau of Statistics

The structure of the most exported agri-food products during 2015-2019 (Fig. 3) did not experience significant changes. As before, six commodities represent 85 percent in total exported agri-food products. Currently, the leading place is for oil seeds and oleaginous fruits, cereals, edible fruit and nuts, followed by beverages.

In the same time, we could mention that the structure of agricultural and food imports is more diverse (Fig. 4). About 70 percent of the agri-food imports belong to thirteen commodities as: dairy products, beverages, oil seeds and oleaginous fruits etc. From these 40 percent belong to agricultural products.

Figure 4. Most imported agricultural and food products of Moldova from the E.U. market after DCFTA, average values 2015-2019



Source: based on data from National Bureau of Statistics

Table 2. The agricultural and food trade commodity structure with E.U. after DCFTA (average 2015-2019)

	Group B:					**Group A:**				
	HS	Exports	Share in exports	Imports	Share in imports	HS	Exports	Share in export	Imports	Share in imports
RSCA>0	01	0.04	0.00	6,097.87	2.1	08	102,721.15	17.69	16,535.69	5.7
	02	2.90	0.00	20,224.82	6.9	17	19,408.09	3.34	8,397.72	2.9
	04	10,504.4	1.81	25,817.32	8.9	20	40,801.49	7.03	11,967.17	4.1
	05	36.01	0.01	4,749.69	1.6					
	06	279.75	0.05	10,72401	3.7					
	07	2,827.65	0.49	11,289.88	3.9					
	10	106,234.96	18.30	12,341.94	4.2					
	12	156,468.28	26.95	24,407.30	8.4					
	16	0.29	0.00	7,519.54	2.6					
	21	1,358.89	0.23	23,745.97	8.2					
	23	3,945.75	0.68	22,696.58	7.8					
	24	1,572.72	0.27	10,278.15	3.5					
	Group D:					**Group C:**				
	HS	Exports	Share in export	imports	Share in imports	HS	Exports	Share in export	imports	Share in imports
RSCA<0	03	30.00	0.01	11,380.53	3.9	14	164.06	0.03	9.36	0.3
	09	1,550.01	0.27	6,895.23	2.4	15	55,411.03	9.54	5,708.05	2.0
	11	998.12	0.17	3,936.49	1.4	22	60,181.60	10.37	25,411.11	8.7
	13	2.95	0.00	804.14	0.3					
	18	4,117.75	0.71	7,913.67	2.7					
	19	11,947.72	2.06	12,410.81	4.3					
	TBI <0					TBI>0				

Source: own calculations

Moldova's export competitiveness is characterized by exports heterogeneity (the structure of agri-food exports is represented by only few aggregations).

According to the obtained results of "product mapping" there were not many changes in the agri-food products competitiveness before and after DCFTA implementation. Moldova' comparative advantage is still maintained by few commodities (Table 2). The majority of commodities that characterize Moldova's agri-food trade structure with E.U. are included in group A and B. The dominant positions nevertheless had changed. The advantages before were maintained by products as cereals, oil seeds and oleaginous fruits, beverages. Nevertheless the structure of this group changed after DCFTA implementation in favor of edible fruits and nuts, sugar, preparations of vegetables, fruits and nuts. The largest share of commodities in "product mapping" are part of group B with comparative advantage but net importer. The structure of this group did not change much before and after DCFTA, being included dairy products, products of animal origin, live trees, edible vegetables, tobacco etc. Moldova has trade comparative disadvantage but is a net exporter (group C) of three commodities after DCFTA: vegetable plainting materials, animal or vegetable fats or oils, beverages. Comparative disadvantage and net importer for Moldova is characteristic for some specific aggregations, mostly imported "exotic" commodities as fish products, coffee and tea, cocoa. This group has the smallest share in both exports and imports of agri-food products.

CONCLUSIONS

In average during the analyzed time series the share of agri-food products in total exports represent almost half of total exported goods. The share of agri-food imports is about 14 percent. Both agri-food exports and imports increased in the examined period. The structure of the most exported agri-food products did not experience significant changes in this period. Few commodities represent 85 percent in total exported agri-food products. Currently, the leading place is for oil seeds and oleaginous fruits, cereals, edible fruit and nuts, followed by beverages. In the same time, we could mention that the structure of agricultural and food imports is more diverse.

Moldova's export competitiveness is characterized by exports heterogeneity as the structure of agri-food exports is represented by only few aggregations.

Based on "product mapping" results Moldova' comparative advantage is maintained by few commodities. The majority of commodities that characterize Moldova's agri-food trade structure with E.U. are included in group A and B. The dominant positions are maintained by edible fruits and nuts, sugar, preparations of vegetables, fruits and nuts. The largest share of commodities in "product mapping" are part of group B with comparative advantage but net importer.

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THE BUSINESS MODEL CANVAS ”CAMELINA OMEGA 3 PLUS”

ION TONCEA[1], MIHAI IORDACHE[2]

Summary: *The Business Model Canvas ”Camelina omega 3 Plus” is a transpose in practice of the information from the best seller book ”Business Model Generation – A handbook for Visionaries, Game Changers and Challengers” written by the Alexander OSTERWALDER & Yves PIGNEUR and of the knowledge accumulated from the complex and diverse activities carried on during project H_{2020} - EU RUR-09-2017 ”Replicable business models for modern rural economies (RUBIZMO), financed under Grant Agreement Nº 773621, in which the Business Model Canvas is a basic tool. Firstly, the paper is focusing on a clear presentation of the structural elements (9) of the business model canvas – (PC) Key partners and partnerships, (AC) Key activities, (R-C) Key resources, (PV) Value propositions, (CA) Channels, (RC) Customer relationships, (SC) Customer segments, ($C) Costs structure and (FV) Revenue Streams. Further on it is presented the description, analysis and design of the Business Model Canvas ”Camelina Omega 3 Plus”, a case study for inspiration of those who are interested to develop or who are already running a sustainable business based on similar values as the company ”Camelina Omega 3 Plus”.*

Keywords: *business, model, canvas, camelina, omega 3*

JEL classification: *O31 (Innovation and Invention: Processes and Incentives)*

INTRODUCTION

The paper is inspired from the first chapter ”The business Model Canvas” (BMC) of the book ”Business Model Generation – A Handbook for Visionaries, Game Changers, and Challengers” written by the Alexander OSTERWALDER and Yves PIGNEUR in cooperation with 470 experts from 45 countries and published in 2010, simultaneous in USA and Canada, by John Wiley & Sons, Inc., Hoboken, New Jersey. The Business Model Canvas was proposed in 2004 by Osterwalder A. in his earlier PhD thesis ”Business Model Ontology, a Proposition in a Design Science Approach”. At that time there was no model to express a company's global business logic from a pure business point of view. The existing models essentially had an organizational or process perspective or covered only parts of a firm's business logic *(Osterwalder, A. PhD thesis 2004)*. This paper is based, also, on the knowledge accumulated from the complex and diversified activities carried on during EU H2020 project *”Replicable business models for modern rural economies – RUBIZMO”*, a new European initiative working to discover the vital ingredients for developing entrepreneurship and successful business models in high potential sectors as food and agriculture, new bio-based value chains and ecosystem services *(https://rubizmo.eu/project)*.

As follow from the declarations of those who used the ”BMC”, it is an efficient and simple instrument for discovering, describing, analysing and (re)design of any kind of business, and, maybe, of any phenomena or activity from society and nature. It is one-page visual graphics which facilitates reading and debate, stimulates the team work, a common language, imagination, holistic thought, not getting blocked in details and not offering direct solutions. In the same time, the BMC is a strategic management tool to quickly and easily define and communicate a business idea or concept, structuring the idea or concept in a coherent way *(Ebinum. M.; 2016)*. Also, BMC is a hands-on tool that fosters understanding, discussion, creativity and analysis *(Ostervalder, A. & Pigneur, Y. 2010)*, the essential elements which revolutionised the most of the business models of

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the world. BMC is based on nine (9) building blocks (pillars) - (PC) Key partners and partnerships, (AC) Key activities, (R-C) Key resources, (PV) Value propositions, (CA) Channels, (RC) Customer relationships, (SC) Customer segments, ($C) Costs structure and (FV) Revenue Streams that cover all areas of a business - Offering, Customers, Infrastructure and Financial Viability (Alexander Ostervalder, A. and Pigneur,Y 2010). The business case ”Camelina Omega 3 Plus” is studied using the canvas for the analysis of the business environment, as a business strategic management tool for the prevention of the short lifespan of the proposed business.

MATERIALS AND METHODS

The Business Model Canvas (BMC) needs equipment - laptop or tablet, recording devices, like mobile telephone, and objects and materials: - blackboard or whiteboard and flipchart; chalk for blackboard; dry erasable pens and markers for whiteboard; colour pens or/and markers or cardboards post-it; sponges, magnets, notebooks, writing paper, at least , in A4 size and/or posters etc. Also, the method is that proposed by the Osterwalder, A., & Pigneur Y. (2010) and many other experts which think it as perfect:

1. Draw or print the business model canvas, on blackboard/whiteboard or, preferable, on a poster paper, with all nine (9) business model pillars (Fig. 1), in a rational arrangement, in the left side - the pillars which means the costs or economic efforts, and in the right side - the pillars that means the value or economic effects, and then, in case of poster, post it on a wall or flipchart. Also, the business model canvas has to contains only information specific to each pillar and proper to each business model or business case, existent in the moment of canvas drawing.

Figure. 1. The Business Model Canvas Template
(Osterwalder, A., & Pigneur, Y. 2010)

<table>
<tr><td rowspan="2">(PC) Key Partners and Partnerships</td><td>(AC) Key Activities</td><td rowspan="2" colspan="2">(PV) Value Propositions</td><td>((RC) Customer Relationships</td><td rowspan="2">(SC) Customer Segments</td></tr>
<tr><td>(R-C) Key Resources</td><td>(CA) Transport Channels</td></tr>
<tr><td colspan="3">($C) Costs structure</td><td colspan="3">(FV) Revenue Streams</td></tr>
</table>

2. Form the working team from a limited number (4—8) of reliable persons who know the business model or case, with ages, education and experience similar, as well as different cultural environments – production of goods and services, management, marketing, finances, suppliers, consumers, customers, partners etc., among of them one will be moderator;
3. Present the concept of the business model using a language that all understand and in an attractive and simple style, without excessive simplification of the complex function of the business;
4. Start, simultaneous, the discussions and sketch out the business model with all team, each participant is requested to tell, on short and with arguments all he knows about the business model

or case, or, at least, an idea at each pillar. Also, the order of structural pillars study is aleatory, but it is not started other pillar study until the discussions about a pillar is not exhausted. The discussions and outline of the business model can be facilitated by the general questions proposed by Canvaziner 2,0 Demo blog *(https://canvanizer.com/new/business-model-canvas)* and many other sources. The questions are related to the type and characteristics of the business, affiliated, services – such as consultancy and technical assistance, premium products and personal services (post-sales), payment types etc. This activity is crucial for the development of BMC, because during this process can be discovered elements which were not observed before, such as connections between pillars and innovative elements of the business model. Also, it is to be taken into account that this activity is consumer of time, materials - paper (sometimes hundred meters), post-its, markers, chalk, energy and, of course, some protocol consumables: tea, coffee, water, juices, snacks etc.;

5. Synthesize the reading, discussion/debate and imagination results in a holistic manner, oriented to practice;

6. The BMC process final phase is communication of new business ideas and the estimation of economic, social and/or environmental results of the proposed business. Usually, in this phase it is presented the future business model innovations based on inspiring and adequate concepts, such as SMART or Sustainable Development concepts. These concepts are paving the way on how to make a profitable company, including how the business was run and how it will be designed in the future, for the transition from Red Ocean category, with strong competition and low revenues, in the Blue Ocean category, without or with less competition and low costs and satisfactory revenues.

RESULTS AND DISCUSSIONS

The business model canvas was not changed at all as shape and content since Osterwalder, A., & Pigneur, Y. published the book "Business Model Generation - A Handbook for Visionaries, Game Changers, and Challengers", most of the scientists and businessmen being concern themselves with understanding and successfully applying this concept into practice. In many cases the business model canvas seems to be a universal and revolutionary tool in businesses strategic management, like wheel discovery for the humanity. According to the results of analysis of many Business Model Canvas out existing on the internet, from the all domains *(production, distribution and trade)* and sectors *(public, private and social)* of economy - from industries involved in the extraction and production of the raw materials, the industries which produce finished usable goods or are involved in construction, services, research and development etc., all business models have nine (9) pillars: (PC) Key Partners, (AC) Key Activities, (R-C) Key Resources, (PV) Value Proposals, (RC) Customer Relationships, (CA) Channels, (SC) Customer Segments, ($C) Costs Structure and (FV) Revenue Streams and each pillar has, more or less, a small examples number: PC:1-9, AC:1-5, R-C:1-10, PV:1-7, RC:1-6, CA:1-10, SC:1-5, $C:1-14 and FV:1-5, as well as using a specific languages, no detailed, to each business model/case. However, why 9 pillars of BMC? Why not more many, as Osterwalder and Pigneur expected, or less because the (RC) Customer Relationships and (SC) Customer Segments belong to customers area? The number 9 of the structural pillars of BMC is, maybe, "the complete number of s total analysis *(Allendy, R., F.)*. Also, BMC structure cover all four areas of a business - *Offering (PV), Customers (RC and SC), Infrastructure (PC, AC, R-C, and CA)* and *Financial viability ($C and FV).* The famous business companies like: Air BnB, Alibaba, Amazon, Car&Go, Easybank, FounderCo, IPOD-ITUNES, GILLETE, HILTI, IKEA, LEGO, TESLA, ZARA, WALMART, WIKIPEDIA etc. do not use a very detailed business canvas *(Gira., M. 2020)*, each pillar of the BMC having between 1 – 5 patterns. The BMC can assist mainly the new and visionaries entrepreneurs, for classification of the business model according to business model definition of Osterwalder, A., & Pigneur, Y. (2010) – *The reason for what the enterprise or entrepreneurs Create, Supply and/or Attract Value*, in the business models based on: Creation, Supplying and/or Attraction of the Value.

Case Study: Business Model Canvas *”Camelina Omega 3 Plus”*

The business model canvas ”Camelina Omega 3 Plus” is probably, the first Romanian example explored by BMC method. Camelina Omega 3 Plus is a business company established in 2020 for commerce retail by direct marketing and electronic commerce *(NACE class 4791)*. Camelina is a niche agriculture crop cultivated to produce seeds rich in fats, proteins, cellulose, minerals, vitamin E etc. *(Toncea, I. 2014)*. Also, from Camelina seeds is extracted oil rich in omega 3 and omega 6, and is produced meal rich in proteins and cellulose *(Toncea, I., et all. – 2013).*
In the following paragraph, we will present the business model canvas ”Camelina Omega 3 Plus” (Fig 2), inclusive specific explanations and practical examples for each pillar.

(**CP) Key Partners and Partnerships** – each participant at the common activities or engaged in business transactions for decreasing the high costs, risk and uncertainty of business , as well as to get resources and develop new activities. In case of the business Camelina Omega 3 Plus, the main partners and partnerships are suppliers of Camelina seeds, oil and meal, respectively Affiliates - cooks, pharmacists and sport trainers, Research and Development Institutes for Agriculture and Bio-resources of food and Faculties of pharmacy and medicine (R&D) and the Orders Houses.

(AC) Key Activities – are specific to each business model and are the basis for creating, supplying and attracting value in order to maintain customer relationships and to gain revenues.
In most of the business cases the key activities are: *producing of goods and services* according to market quantitative demand and in the same time of superior quality; *finding solution(s)*, in the shortest time, for customer’s problems and *management and promotion* of the businesses.
According to official documents of establishment, the key activity of the Camelina Omega 3 Plus SRL is retail commerce by orders houses and internet (NACE class 4791), that belongs of management and promotion of the businesses.

Figure. 2. The Business Model Canvas ”Camelina Omega 3 Plus”

<table>
<tr>
<td rowspan="2">(PC) Key Partners and Partnerships

√ Partners: Camelina seeds, oil and meal Suppliers

√ Partnerships:
- Affiliates
- R & D
- Orders Houses</td>
<td>(AC) Key Activities

√ Commerce retail by orders houses and internet (NACE class 4791);</td>
<td rowspan="2" colspan="2">(PV) Value Propositions
√ Seeds clean and health and rich in fats, proteins, cellulose, minerals (mainly iron and zinc) and vitamin E

√ Oil premium with delicate aroma and rich in ω3 and ω6

√ Meal with good taste and rich in proteins and cellulose</td>
<td>(RC) Customer Relationships
√ Personal and dedicated personal assistance;
√ Online sharing information, knowledge and experience</td>
<td rowspan="2">(SC) Customer Segments

√ Niche market, with specific and specialised customer segments</td>
</tr>
<tr>
<td>(R-C) Key Resources

√ Experts in camelina cultivation and seeds processing, and marketing</td>
<td>(CA) Channels
√ Sales team
√ <u>www.camelina.ro,</u> and other online sites
√ Channels preferred by the customers</td>
</tr>
<tr>
<td colspan="3">($C) Costs Structure
√ fixed and variable costs;
√ diverse cost strategy</td>
<td colspan="3">(FV) Revenue Streams
√ revenue streams from the customer segments;</td>
</tr>
</table>

(R-C) Key Resources – are proper to each business case or business model and are important to create, deliver and attract value, in penetration of markets, in maintaining customer relationships and in getting revenues. Although, there are many key resources types – *material resource*, *human resources*, *financial resources* and *informational (intangible) resources*, Camelina Omega 3 Plus SRL is based, for the moment, on the high professional qualification and long practical experience of the human resource in the camelina cultivation and seeds processing, as well as in the marketing.

(PV) Value Propositions – is the reason why customers turn to one company over another *(A. Osterwalder, A., and Pigneur, Y.)*, because it satisfies their needs or solves a problem, it is a new and very attractive offer or a similar offer with another from the market, but it has additional characteristics and attributes. A value proposition of a good or service is sure when these are not returned/claimed and the customer comes back with further orders.
There are different types of Value propositions: *inventive* - which satisfy a new client's needs, *innovative* - with additional characteristics and attributes, *quantitative* - mainly as volume and diversity, and *qualitative* – accordingly with customer's needs and experiences. In the business case ”Camelina Omega 3 Plus", the value propositions consist in: *Seeds* clean, healthy and rich in fats, proteins, cellulose, minerals (mainly iron and zinc) and vitamin E; *Premium Oil* with delicate aroma and rich in ω3 and ω6; and *Meal* with taste good and rich in proteins and cellulose.

(RC) Customer Relationships – are according to the Romanian concept *”Our customer Our master*" because ”Customers comprise the heart of any business model" *(Osterwalder, A., and Pigneur, Y. 2010).* Each successful company is permanently preoccupied with customer relationships to attract more and more clients by listening to their wishes and identifying their needs, to transform customers in fans by offering solutions to their problems and increasing the sales by offering innovative goods and services. The customer relationships of the company ”Camelina Omega 3 Plus" are: *personal assistance* based on human interactions by which the customers can communicate with company representatives any time - before, during and after sales, *personal dedicated assistance* – the staff of the company maintains friendly relationships with the important costumers and *the use of the online communities* for sharing information, knowledge and experience.

(CA) Channels – the main interface of a company with its customers. These are the means by which a thing is transported or transmitted from a place to another, or from one person to another for buying the goods and services, for supplying a value proposition, for assistance of customers post-buying, for the evaluation of the value propositions by the customers and for promotion of the goods and services of a company. Therefore, there are many types of channels, but the Camelina Omega 3 Plus company uses only four channels: *sales team*, *the web-site www.camelina.ro*, *online sites of other companies* and *channels preferred by the customers*.

(SC) Customer Segments
For deep understanding and better services, the companies group customers by needs and common behaviours, in customer segments. The most known customer segments types are: *the mass market*, with no strong differences between customer groups as size and diversity, and with similar needs and problems; *the niche market*, with specific and specialised customer segments as is our business case study ”Camelina Omega 3 Plus"; *the segmented market* – with similar needs and problems, but with different size and value propositions; *the diversified market* – with diversified infrastructure

which can serve two or more customer segments and *the market platforms* - which bring together two or more distinct and interdependent customer segments.

($C) Costs Structure

Any business case or models implies financial resources, because at least one of the three pillars of BMC (Value propositions, Customer relationships and Revenues stream) induces costs. The economic sciences describe two types of costs: *fixed costs*, that remain the same indifferently of the goods and services production, such as: salary of the indirect productive staff, rents, physical facilities of production (consumptions of electric energy, natural gases, water etc.), taxes, building and equipment insurance, publicity expenses, phone subscription etc., and *variable costs*, that vary proportional with the volume of the goods and services produced and/or traded, such as salary costs of the personnel direct productive, consumption of raw materials for producing goods and services.
Also, each business model or business case has a cost strategy, depending on:
- value proposition: business with low value proposition, as the low cost strategy and business are based on high value proposition, with premium goods and exclusivity services;
- volume and diversity of goods and services: economy of scale – decreasing of unitary costs while the production is increasing, for example as result of low prices of wholesale acquisition and savings from specific activities – decreasing the unitary costs by increasing diversity of goods and services by using the same equipment and personnel.

The business case ”Camelina Omega 3 Plus” has both of the costs types - fixed and variable and belongs to the strategy of diverse costs.

(FV) Revenue Streams – represent the arteries of a business model and is based on revenue streams from customer segments side. There are many types of revenues streams, but the most important type, including for ”Camelina Omega 3 Plus”, is the revenue streams from the customers. Also, there are different modalities for revenue streams generation, such as participating at inter/national projects, sponsorships, sales of the actives, taxes or commissions for various services, subscriptions, publicity for specific goods or services, or brand etc. In our case study, the opportunities to participate at national and international development programmes are an option for financial resources.

CONCLUSIONS

1. The Business Model Canvas (BMC) is an ”universally goods” used by the new and visionaries entrepreneurs for analysis and generation of innovative business cases and models. It is enough to use just the framework of BMC for the complete and efficient description and analysis of any component of the phenomena or activities from nature and society.
2. The BMC is the first and the main step of business models generation, a hands-on tool that assures understanding of the business models and cases and fosters discussions, creativity and analysis;
3. The most important benefit of BMC is the holistic thought, that is not blocked into details;
4. The optimal structure of BMC is with 9 functional structural pillars because, maybe, *”The number 9 is perfect for a complete analysis.* Also, each structural pillar has to have 1-5 examples;
5. The case study of business ”Camelina Omega 3 Plus” is mainly based on the delivery of value, and, in the near future, on the creation and delivery of value;
6. In the context of the present study assisted by the BMC method, Camelina seems to be a crop with less economic and social unknowns, but with many technical challenges;

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EFFICIENCE OF REPUBLIC OF MOLDOVA STONE FRUIT SPECIES RESTRUCTURATION WITHIN THE CONDITION OF GLOBALISATION

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Summary : *In the article there are presented data regarding contribution of continuous development of stone fruit trees assortment for the republic of Moldova. As a result of comparative analysis evaluated researches and practical actions there are stands out enlargement of total surface of established orchards of stone crops by 45 thousand ha. Creation and implementation of new stone varieties there are directed to local and foreign modern fruit markets, especially for fresh consumption, obtained annual quantity has increased by more than 109 thousand tons.*

Key words: *stone fruit trees species, local and introduced varieties, adaptability, efficiency, Republic of Moldova*

Jel Clasification:

INTRODUCTION

Traditionally pomiculture has been and continues to be one of the major agricultural branches in the Republic of Moldova, due to the favorable natural conditions, the people's traditions, the high economic efficiency, and availability more than 100 thousand ha of land in slopes with a northern exposition and an inclination of 6-12 degree, which can be used in the most efficient manner by way of cultivating fruit trees species, particularly the stone and nuts [1,4].

In 2000 the area of orchards in the Republic of Moldova totaled over 100 thousand ha, of which around 75 thousand ha were in a satisfactory state and possessed an efficient productivity potential, which could be used through the application of modern technologies. were confronted in 2000-2008 the challenge of performing fundamental research in order to improve the situation in the pomiculture branch, by the way of rationalizing utilization of the available orchards with the inexhaustible productivity potential and by their replacement with orchards of a new ones, with a new locally created as well as introduced from different areas adaptable assortment and advanced technologies (including based on irrigation), that would ensure an early economic fructification, a high productivity of qualitative fruits (especially stone species), particularly moldovan organic etc. products, demanded and competitive both in the internal and external markets. Hawing these realities in view it is necessary to elucidate some aspects referring fruit growing development in the context of the unprecedented reduction of productivity of old orchards that have not yet explored regarding its possible potential and establishment of the new modern intensive and super intensive orchards [5-7].

MATHERIAL AND METHODS

The study refers the evolution of principal indexes achieved in the fruit growing of the Moldova Republic such as: development of fruit growing plantation area; development or canceled, of the cut clear areas and of those planted with fruit trees species, including small fruits and strawberry; evolution of fruit growing plantations, productivity and of the total production by species;

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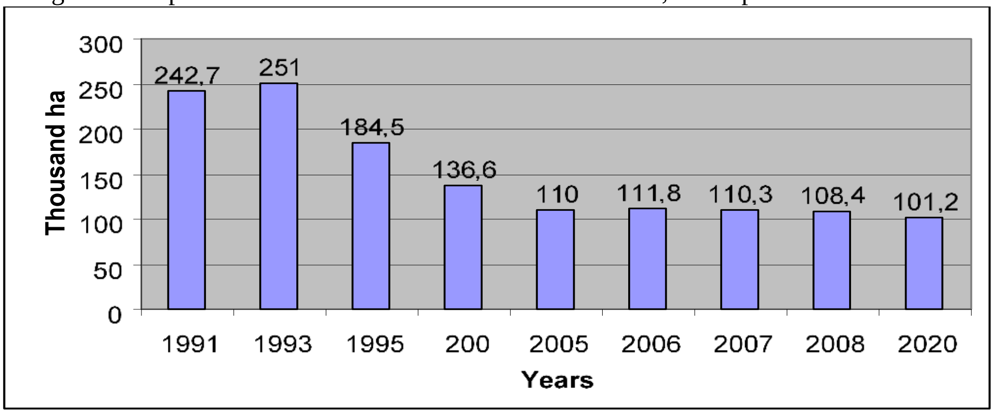
modalities of turning fruits to good account [2, 3]. According to official statistical data of the Republic of Moldova, results of researches of public scientific institutions, forecast of the Ministry of Agriculture, as well as a number of new elaborated strategies of respective domain will conduct research on the possibilities of applying the new methods of fruit trees culture, including organic ones. The collected data were analyzed using the aproved methods.

RESULTS AND DISCUSSION

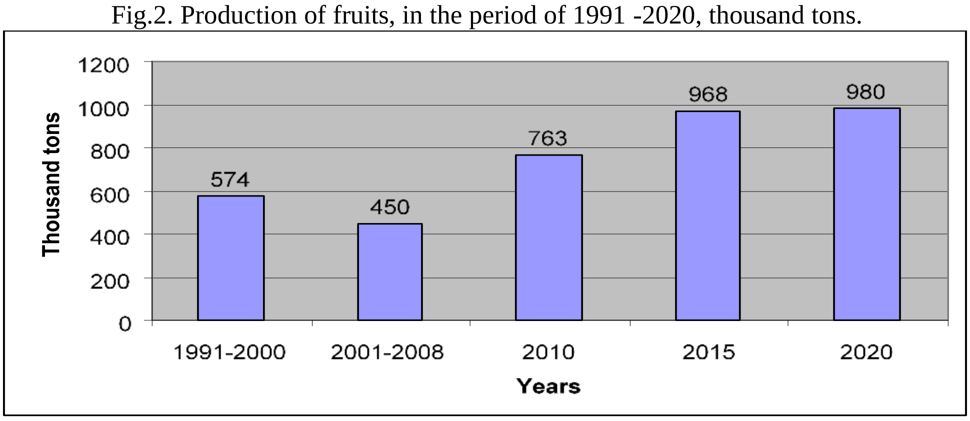
Acording accumulated data from 1993 the area of fruit growing plantations was ascent, reaching 251 thousand ha. Statistic data confirm the reduction of fruit growing plantations area of 2.2 times (fig.1, 2; tab 1,2) The area of the fruitful orchards until 1993 increased and constituted 173,5 thousand ha (70 % of the overall plantations). So, it is reduced up wards of 60 in comparison with 1993 and constitutes 101,2 thousand ha in 2008. Practically the total orchards area the Moldova Republic has equals to the fruitful orchards area. From statistic data results that while the cut clear areas had an ascendant tendency, the new plantations traversed an inverse sense. Extension of the fruit growing plantation area till 2007 was ascent reaching 5100 ha (Fig. 2). This the average production per ha and the analyzed total harvest had an irregular evolution. It is sufficient to mention that during the last 18 years only three times (1993, 1997 and 2003) the average harvest of fruit growing plantations has overcome the level of 5 t/ha, and the total harvest only in 1993 reached the level of one million tons of fruits – as for the rest of years these indexes are in average at the level of 3-4 t/ha and 300-400 thousand tons of fruits that constitute the level of associated fruit growing productivity comprising the specific pomiculture system and family gardens (Tab. 1, 2).

Fig.1 Development of areas with fruit trees and small fruits, in the period of 1991 -2020.



Source: Statistical Office of the Republic of Moldova

Fig.2. Production of fruits, in the period of 1991 -2020, thousand tons.



Source: Statistical Office of the Republic of Moldova

It should be noticed that with its favorable climate and geographical conditions, rich soil resources and biological diversity, agriculture continue to be main pillar of the Moldovan national economy. Orchards in Rep Moldova occupy 4.8% of area under agricultural land. As a rule, more than 50% of that surface is occupied by apple and plum orchards. (tab. 1,3). It is significant that in the Republic of Moldova there are cultivated a lot of fruit species of temperate zone (walnut, apples, plums, apricots, peaches, sour and sweet cherries, pears, almonds rarely quince, hazelnuts and cornelian cherry). For apples, plums and sour cherry there are valuable all distinguished pomological zones. The rest of crops need specific pedological and microclimatic conditions, they could be founded in relatively limited spaces in variable microzones/microareas of all Moldovan agricultural landshaft. For main industrially cultivated apple, walnut, plums there are included not only varieties created in Republic of Moldova, but also European and American modern assortment, which is sophisticated within changeable market.

Table 1.

Development of fruit crops surfaces and production in Republic of Moldova
(Source: National Bureau of Statistics of Rep. Moldova. 2016 year.)

Indexes	**2015**	**2016**	**Public propriety**	**Private propriety**
Plantations of orchards and shrubs, total thousands ha	135,6	134,6	0,7	133,0
Fruiting orchards, total thousands ha	110,4	110,1	0,6	109,7
Yield, total thousands tons	485,0	595,7	0,8	594,9
Pomme, stone and nuts crops, total thousands tons	132,6	131,4	0,6	130,8

Table 3.

Surfaces, global yield and average production of some multiannual crops in 2016 y., depending of type of propriety etc.
(Source: National Bureau of Statistics of Rep. Moldova. 2016 year.)

Indexes	**Private sector**		**Different Agricultural Enterprises with public and private type of proprieties**		
	Horticultural associations	**Individual sector**	**2015**	**2016**	**% in 2016 comparatively with 2015**
Plantations of orchards and shrubs, total thousands ha	20,3	85,1	51,9	49,5	95,3
Fruiting orchards, total thousands ha	18,4	73,7	38,9	36,4	93,4
Yield, total thousands tons	78,7	383,3	191,1	212,4	111,1
Apples, total yield, thousands tons	33,7	264,7	135,0	411,4	153,3
Plums, thousands tons	71,7	58,4	100,0	99,7	99,5
Nuts (mainly walnut), thousands tons	-	-	11,0	13,8	125,1

Some increase in fruit production is facilitated by: sufficient land resources and a numerous group of producers with new professional and marketing knowledge, as well as entrepreneurial spirit and innovativeness. Of course, actually development of Moldovan fruit PGI, PDO and TSG and organic fruits, especially based on local varieties could be an important promoter of socio-economic growth for whole country. Another important fruit trees in Republic of Moldova there is walnut-one of the oldest fruit trees species between the rivers Prut and Dnestr. Among the most important centers for the walnut tree culture in our country could be mention Central and South-East geographic areas of Republic of Moldova.

For Moldovan peasants nuts always was and will remain a valuable food product as well as an important product for trade. According to local plants census counts for more than 2,5 million walnut trees in rep. of Moldova, more than 85 % are in the fruitfulness period. The new look to walnut culture in the Republic of Moldova is done after adoption of Walnut Law (Nr. 658 – XIV from 29.12.1999), and the creation of the special national Walnut Fund, which sets as the goal preserving and development of the existing patrimony, as well as the promotion of the intensive industrial orchard culture based on irrigation (tab.2).

Republic of Moldova sells walnut kernels and in shell walnuts in more than 30 countries, main importers are France, Austria, Germany followed by Greece, Italy and Spain. Export of walnut kernels or in shell walnuts is organised by many local economic agents. As a rule nuts production is bought by different foreign companies (more than 70) on the basis of long-term contracts. Actually moldavian registered walnut assortment includes main 5 local varieties and more than 15 introduced (Catalogul soiurilor de plante al Republicii Moldova, Chisinau, 2020). Local varieties were obtained as a result of selection of valuable genotypes from local populations and its detailed biological and agronomical investigations including comportment in different competitive micro culture areas. Moldavian varieties are characterized by high adaptability to diverse local environmental (edaphical and microclimatical) conditions.

The principals trials of new cultivars selected for establishment of industrial plantations are: productivity (especially based on lateral type bearing) and nuts qualities. It should be that the development of many domestic fruit production, including local cultivars is concentrated around the cities. Main exported fruits of trees species are: walnut, apple, plum and in the last time sweet cherry,. Apple is the principal fruit tree species industrially cultivated in the Republic of Moldova, being developed especially at the north part of country. Actually according to the variety (mainly introduced), the fruit productions obtained in experimental high density apple orchard of 3,077 trees ha-1 (3.25 m x 1.0 m), were 19.3 up to 30.0 t ha-1 in the second year after planting and in the third year from 29.7 to 38.5 t ha. Orchards must produce earlier in order to generate an earlier return on investment and improve profitability. Thus, the investment recovery is achieved in 6-7 years from planting for apple, 6 years for sweet cherry and in 8-9 for plum, depending on planned duration of orchard exploitation (as a rule: 12-15 years for apple, 15-20 years for cherry and plum).

Culture tradition of European plum (species *Prunus domestica* L.) in the Republic of Moldova dates back to almost 2000 years ago, processed plumes (prunes) having significant socio-economic and heritage value. Starting from the 18-19 centuries plums there are cultivated practically in all home garden (domestic orchards). During the 1800 years in the territory of actual RM there were intensively established commercial plums orchards on the basis of local, as well as introduced European varieties. Actually in the R M more than 25000 private farmers there are involved in the production of fruits, especially plums. As consequence of dynamic expansion and reconversion of fruit trees plantation occurred. Of course at the same time continue to be abandoned and lost old plum genotypes. Now practically plum (including 1-2 old varieties) grow in all local yards and orchards, dried plumes (prunes) continued to having significant socio-economic and heritage value. There are promoted significant change of the agriculture in general, that moved from the land-owner old style management to the modern intensive farming. Some old moldovan plums occurs scarcely in a few papers (Cabluciko G. A. 1953, Pomologia Republicii Populare Romane. 1964; Juraveli A. M. et all. 2007). Old catalogues of 7-10 main local nurseries listed a lot of varieties (Cabluciko G. A., 1953). As consequence a dynamic expansion and reconversion of fruit trees plantation occurred. Of course at the same time continue to be abandoned and lost old plum genotypes. Therefore not only local creation and implementation of new varieties, but evaluation and establishment of germplasm of old local plums genotypes/varieties are indispensable.

Table 2.

Quantitative and qualitative species/varietal transformations within fruit growing domain, y.y. 1990-2020

Species	Totally registered varieties for propagation		In 2020 – varieties, permmited for testation in condition of partially cultivation	In 2020 varieties registered for multiplication in the Republic of Moldova
	1990	2011		
Apple-totally, incl.:	14	56	28	77
Summer varieties	4	9	-	13
Autumn varieties	2	15	-	16
Winter varieties	8	32	-	48
Pear-totally	14	19	5	22
Summer varieties	3	5	-	2
Autumn varieties	5	8	-	2
Winter varieties	6	6	-	20
Quince	4	9	-	10
European Plum	11	20	3	30
Japanese Plum	-	3	-	4
Peach	17	22	18	24
Apricot	5	12	8	20
Sweet cherry	9	23	9	34
Sour Cherry	5	10	2	13
Walnut	5	14	45	36
Almond	-	7	-	8
Hazelnut	2	-	16	5
Cornelian cherry	-	4	-	4
Ziziphus	2	5	-	5
Small fruits	9	10	18	40
Totally	**97**	**214**	**131**	**332**

Source: Catalogs of plant varieties of Rep. Moldova for 1990-2020 y.y.

Diversification of stone fruit varieties are targeted to increase capacity of storage in controlled conditions, being well adapted to local conditions, very attractive on the high market of fresh fruits. So, for plums actually there are interesting not only Stanley and Prezident, but also Centenar, Pitestean, Valor, Blue Free, Black Star, Empresso, Tophit, Haganta, Cacanska lepotica etc. For sweet cherry – Early star, Regina, Kordia, Big Star, Hebros,, Vinka, Van. Etc.Peach there are represent by Rich Lady, Big top, Quin Crest, Orion, Sweet Lady, Venus, etc. New implemented apricot varieties should have a long rest period of flower buds, tolerance to PPV, good ability to transportation. Among them we notice:Wondercot, Orangered, Pinkcot, Kyoto, Big Red etc.

CONCLUSIONS

Development of fruit trees production is a sure way to improve existing fruit production/exporting potential in the Republic of Moldova. Based on these results, this domain has a predisposition to become the region with driving force of development. Favorable characteristics of relief and climate factors are the basis for the development and improvement of fruit production directed to local and foreign market. Combining the advantages by introducing new European, etc. stone varieties with high level of adaptability and ecologic plasticity, new efficient agrotechnical production methods of fruits for fresh consumption, as well as with the good perspectives that products are sold to the international market, cause the development of the entire republican brunch.

Contribution of continuous development of stone fruit trees assortment for the republic of Moldova there are revealed. As a result of comparative analysis evaluated researches and practical actions there are stands out enlargement of total surface of established orchards of stone crops by 45 thousand ha. Creation and implementation of new stone varieties there are directed to local and foreign modern fruit markets, especially for fresh consumption, obtained annual quantity has increased by more than 109 thousand tons.

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RETROSPECTIVE ANALYSIS OF STATISTICAL INDICATORS FOR VEGETABLE AND ANIMAL AGRICULTURAL PRODUCTS OBTAINED IN THE CONVENTIONAL SYSTEM AND IN ECOLOGICAL AGRICULTURE

ANA URSU[1]

Abstract: *The aim pursued in the paper is the analysis of the transformations that took place, in the period 2007-2019, at the level of the two conventional and ecological production systems. The analysis of the statistical data series, INS Tempo-ONLINE and EUROSTAT data for conventional and organic agriculture, was used to reflect the level and trends of economic statistics in agriculture. The need to characterize the evolution and structure of agricultural phenomena also determined the calculation of statistical indicators (average, standard deviation, coefficient of variability, annual growth rate, etc.) from the perspective of cultivated areas, total yields, production yield per hectare and on the head of an animal, etc. This method responds to a well-defined goal: the data series through the calculated indicators highlight the upward / downward trend and help to determine the indicative socio-economic development of the regions taking into account the differentiated growth rates of the systems in each region. The study provides and contributes to information, by knowing the evolution over time of plant and animal agricultural products, obtained conventionally and in organic farming.*

Keywords: *agricultural products, statistical indicators, conventional system, ecological agriculture*

JEL Classification: *D20, O5, Q01, Q13, Q17, Q17.*

INTRODUCTION

"The European Commission's Farm to Fork strategy mentions organic products as a key sector to achieve the food ambitions of the European Green Agreement. The strategy states that "The organic food market is set to grow and organic farming needs to be further promoted". With the help of an organic action plan and common agricultural policy (CAP) measures, the European Commission aims to "achieve the target of at least 25% of the EU's agricultural area in organic farming by 2030 and a significant increase in organic aquaculture" (IFOAM , 2020). Studies show that organic farming is becoming more and more important both in terms of supply and demand. (M. Dobrescu, 2017). Other studies call for consumer information and education on the confusion between "bio" and "natural", the lack of a country strategy on organic farming, Romania's under utilized natural potential, organic farming market (Word Vision Romania Study, June 2019). In Romania, organic agriculture has been officially recognized (by I. Puia and V. Soran, cited by Romulus Gruia, 1998), in studies on agricultural ecosystems. Other studies are aimed at farmers, farmers and other categories of rural entrepreneurs, as well as consumers who love nature and organic agricultural and food products, of very good quality, clean and healthy. *(*I. Toncea, E. Simion, G. Ioniţă, Niţu D. Alexandrescu, V. A. Toncea, 2016).

Given the European Commission's goal of achieving at least 25% organic farming in Europe by 2030, as set out in the EU's "fork to fork" and "biodiversity" strategies, research requires knowledge and studies for specific needs. the agricultural sector, the present study becoming opportune and necessary for the study of the subject on "conventional and organic farming systems" in order to "design more sustainable food systems".

RESEARCH MATERIAL AND METHOD

This paper aims to find answers to the questions: What are the areas occupied by organic farming in Romania and whether they vary significantly from the environments? What is the yield of organic crops in the yields of conventional crops and what is the coefficient of variation? What

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are the livestock, the total productions obtained and how do they vary? Is there a market for organic products in Romania? The reference data are for the time horizon 2012-2019. The research method consists in the empirical analysis of the available data.

In order to highlight the existing differences in the evolution of the mentioned indicators, the following statistical indicators were determined: minimum, maximum, average, standard deviation, coefficient of variation (CV%) and annual growth rate (%). The coefficient of variation (CV) is a relative measure of data dispersion. CV represents the evaluation of the standard deviation in relation to the arithmetic mean. In order to compare the data, the framing groups of the variability coefficient will be used to assess the homogeneity of a statistical population: CV <10% homogeneous population; 10% <CV <20% relatively homogeneous population; 20% <CV <30% relatively heterogeneous population; 30% <CV heterogeneous population. (8)

RESULTS AND DISCUSSIONS

Data presented by the Research Institute of Organic Agriculture (FiBL) and Agricultural Market Information Company (AM) on organic farming in the EU revealed that at the end of 2018, in the European Union there were ecological areas of 13.8 million hectares (7.7%) managed of over 325 thousand producers, Table no. 1, col 2 and col 12. The countries with the largest organic agricultural areas are Spain (2.2 million hectares), France (2 million hectares), Italy (1.9 million hectares), Germany (1.5 million hectares) . Romania has an ecological agricultural area of over 326 thousand hectares (2.5%) managed by 7908 producers. The ecological areas, for the mentioned countries, are composed of pastures (21% - 60%), arable crops (35% - 74%), permanent crops (1% - 25%). Table no. 1, col 5, 7 and 9.

Table no. 1: Organic agricultural areas in the EU

Nr. crt	**Countries**	**Organic land area in 1000 ha**	**Percentage of agricultural land which is organic (%)**	**Organic land use**								**Producers (no)**	**Processors (no)**
				Grassland (ha)	**%**	**Arable crops (ha)**	**%**	**Permanent crops (ha)**	**%**	**Other (ha)**	**%**		
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1	EU- 28	13.8	7.7	6039434	44	6132824	44	1457093	11	0	1	327222	71960
2	Austria	638	24.5	385639	60	241101	38	10787	2	278	0	25795	1651
3	Italy	1.958	15.8	540012	28	946691	48	471342	24	0	0	69317	20087
4	Spain	2.246	9.6	1186905	53	487363	22	572207	25	0	0	39505	4627
5	Germany	1.521	9.1	809000	53	596656	39	20655	1	95003	6	31713	15441
6	France	2.035	7.3	728387	36	1166243	57	140394	7	0	0	41632	16651
7	Hungary	209	4.5	116389	56	74086	35	10937	5	7970	4	3929	515
8	Bulgaria	162	3.5	33713	21	65648	40	29478	18	33493	21	6471	181
9	Poland	485	3.4	99663	21	354793	73	30220	6	0	0	19224	533
10	Romania	326	2.5	66890	21	240800	74	18569	6	0	0	7908	161

Source: *Research Institute of Organic Agriculture (FiBL) and Agricultural Market Information Company (AM). Data compiled by Fibl based on Eurostat and national data sources.* *https://www.organicseurope.bio/about-us/organic-in-europe/*

According to the same sources, the most developed market for organic products is occupied by Germany (5.3%), where retail sales were 10.9 billion euros, followed by France (4.8%) with sales of 9.1 billion Italy, 3.2% with sales of EUR 3.4 billion and Spain (2.8%) with sales of EUR 1.9 billion. Romania in 2018 had retail sales of organic products of 41 million euros. Compared to 76 euros / capita per EU average, the amounts spent on organic products are 205 euros in Austria, 136 euros in Germany, 132 euros in France, 7 euros in Poland, 4 euros in Bulgaria, 3 euros/capita resident in Hungary, etc. Romania spends 2 euros / capita on organic products, on average.

Organic agriculture in Romania

In Romania, 2.5% of the land used is occupied by organic farming. The paper analyzes the statistical indicators related to areas and production yields in 12 arable crops grown in conventional system and in organic farming. Areas are analyzed with the idea that lower production yields require a larger area of land to achieve conventional production yields.

Tabel nr. 2: Utilised agricultural area and arable land 2012-2019 (ha)

Nr. crt	**Specification**	**Minimum ha**	**Maximum ha**	**Average 2012-2019 (ha)**	**Ab std (ha)**	**CV (%)**	Rate annual of growth **(%)**
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Utilised agricultural area						
1	Total fully converted and under conversion to organic farming	226309	395228	289575	52635	18.2	4.61
2	Fully converted to organic farming	103093	211487	161127	33567	20.8	10.81
3	Under conversion to organic farming	70353	185168	128448	45779	35.6	-0.11
	Arable land						
4	Total fully converted and under conversion to organic farming	156678	257664	192660	37285	19.4	5.71
5	Fully converted to organic farming	88627	164324	115128	24282	21.1	9.22
6	Under conversion to organic farming	49556	107639	77532	19461	25.1	1.17

Source: own processing according to EUROSTAT data

Coefficient of variability of ecological agricultural areas (18.2%), Table no. 2, col 6 line 1, is more stable compared to the coefficient of variability of the surfaces of ecological arable lands (19.4%), but has an annual growth rate of 5.71% / year compared to 4.61% / year cat it is the growth rate of ecological agricultural areas. Variability is given by fluctuations that may occur in producers' options to choose annual or perennial crops. If for the indicator the total arable area converted, the coefficient of variability is 20.8%, for the indicator arable area under conversion the coefficient of variability is 35.6%, Table 2, column 6 row 2 and row 3. The explanation is due to the trend of producers to opt for organic farming, motivated by the financial support provided for the conversion to organic farming methods, but the 5-year commitment period causes producers to give up this type of farming. Organic producers also face other determinants: volatile markets, changing policies and new societal expectations (6). Similarly, the explanation is justified for the case of arable land, where the coefficient of variability for the total converted areas is 21.1% compared to the arable areas in conversion (25.1%), Table no. 2, column 6 row 5 and row 6.

The annual growth rate of 1.17% in the areas under conversion may be an obstacle to the development of organic farming and may partially explain the stagnation of the number of conversions in recent years in Romania.

Table no. 3: Utilised agricultural area and arable land 2012-2019 - ecological

Nr. crt	**Specification**	**Minimum ha**	**Maximum ha**	**Average 2012-2019 (ha)**	**Ab std (ha)**	**CV (%)**	Rate annual of growth **(%)**
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	Arable land	88627	164324	115128	24282	21.1	9.22
2	Wheat and spelt	26170	47820	34091	7888	23.1	7.54
3	Barley	2986	10889	5438	2853	52.5	10.58
4	Grain maize and corn-cob-mix	11188	22937	15583	3967	25.5	5.65
5	Rice	1518	2945	2193	493	22.5	3.07
6	Potatoes (including seed potatoes)	53	303	173	94	54.5	-5.88
7	Sugar beet (excluding seed)	30	360	230	120	52.2	-1.95
8	Rape and turnip rape seeds	4096	11759	9017	2877	31.9	-19.02
9	Sunflower seed	15423	32679	21619	6277	29.0	14.65
10	Soya	6326	16361	10318	3317	32.1	20.93
11	Fibre crops	7	127	62	49	79.2	-29.62
12	Tobacco	0	29	15	0	0.0	0.00
13	Hops	17	31	23	7	32.5	-25.95

Source: own processing according to EUROSTAT data

Ecological arable land: The annual growth rate of organic arable land is 9.22%. The standard deviation (24282 ha) varies within narrow limits compared to the average (115128 ha). The value of the coefficient of variability is 21.1% which means that the dispersion of the data around the average is relatively homogeneous, and the data sample is statistically representative. In order to be able to highlight the ecological arable area indicator, the information resulting from the calculations performed reveals the following aspects:

- Higher annual growth rate of organic areas for barley crops (10.58% / year), sunflower (14.65% / year) and soybeans (20.93% / year) compared to the annual rate of increase in wheat (7.54% / year), maize grain (5.65% / year) and rice (3.07% / year) can be explained by the increased demand (social needs) for these products; Table no. 3 col 7 row 3, 9,10.

- The coefficient of variability, calculated as the ratio between standard and average deviation, defines the threshold for samples of areas cultivated with wheat and spelled (23.1%), maize (25.5%), rice (22.5%) and seed sunflower (29%), the analyzed samples being relatively heterogeneous (20% <CV <30%), the areas cultivated with these crops representing relatively large deviations from the average.

- Coefficient of variability for samples of areas cultivated with barley (52.5%), potatoes (54.4%), sugar beet (52.2%) and hemp for fiber (79.2%) in the 8 years of production , as heterogeneous groups, (CV > 30%).

Table no. 4: Arable land, 2012-2019 - conventional

Nr. crt	Specification	Minimum ha	Maximum ha	Average 2012-2019 (ha)	Ab std (ha)	CV (%)	Rate annual of growth (%)
0	1	2	3	4	5	6	7
1	Arable land	8058329	8737275	8330683	208765	2.5	0.98
2	Wheat	1997633	2168370	2099531	52478	2.5	1.36
3	Barley	206991	303969	268528	30211	11.3	4.76
4	Grain maize	2402082	2730157	2558475	112632	4.4	0.42
5	Rice	7427	12719	10162	1874	18.4	-6.46
6	Potatoes	140310	195055	160107	19506	12.2	-4.93
7	Sugar beet (excluding seed)	22729	31280	26863	2546	9.5	-3.50
8	Rape and turnip rape seeds	105295	632679	399463	169815	42.5	-1.34
9	Sunflower seed	998415	1282697	1060263	94637	8.9	3.23
10	Soya	67672	169422	121939	41382	33.9	10.33
11	Fibre crops	121	1688	876	631	72.1	50.98
12	Tobacco	745	1258	917	153	16.7	-7.55
13	Hops	225	257	241	13	5.6	4.51

Source: own processing according to EUROSTAT data

In order to be able to highlight the conventional arable area indicator for the 12 crops analyzed, the information resulting from the calculations revealed the following aspects:

- The annual growth rate of conventional areas is insignificant for wheat crops (1.36% / year), barley (4.76% / year), corn grains (0.42% / year) sunflower (3.23% / year) and significantly for soybeans (10.33% / year) and fiber hemp (50% / year). In the crops of rice (-6.46% / year), potatoes (-4.93% / year), sugar beet (-3.50% / year), rapeseed (-1.34% / year) a significant reduction in areas with these crops.

- The coefficient of variability, calculated as the ratio between standard and average deviation, (10% <CV <20%) defines the threshold for samples of areas cultivated with wheat, barley, maize, rice, potatoes, sugar beet, sunflower as homogeneous groups, the averages being representative, for the analyzed cases.

- The coefficient of variability for the samples of cultivated areas with soybeans (33.9%), rapeseed (42.5%) and hemp for fibers (72.1%), are characterized as statistically heterogeneous groups. (CV > 30%).

Table no. 5: Yield per hectare 2012-2019 in organic farming

Nr. crt	Specification	Minimum kg/ha	Maximum kg/ha	Average 2012-2019 (kg/ha)	Ab std. (kg/ha)	CV (%)	Rate annual of growth (%)
0	1	2	3	4	5	6	7
1	Wheat and spelt	2,400	4,035	3,447	0,655	19.0	4.16
2	Barley	1,582	3,488	2,672	0,703	26.3	6.37
3	Grain maize and corn-cob-mix	2,587	6,004	4,842	1,297	26.8	10.18
4	Rice	3,199	5,829	4,378	0,960	21.9	4.99
5	Potatoes (including seed potatoes)	4,952	11,640	8,026	2,139	26.7	-5.45
6	Sugar beet (excluding seed)	14,026	40,743	23,091	9,467	41.0	-1.71
7	Rape and turnip rape seeds	2,117	2,548	2,340	0,177	7.6	-1.67
8	Sunflower seed	1,869	2,353	2,196	0,177	8.0	-4.46
9	Soya	1,892	2,713	2,163	0,289	13.4	-6.96
10	Fibre crops	0,079	8,000	2,653	2,726	102.8	1.18
11	Tobacco	0,966	0,966	0,966	0,000	0.0	0.00
12	Hops	1,000	2,000	1,538	0,504	32.8	11.36

Source: own processing according to EUROSTAT data

Average production yield in organic farming (kg/ha): The annual growth rate of the average yield in organic crops varies from 1.18% / year for hemp for fiber to 11.36% / year for hops. Table no. 5, col 7. The coefficient of variability is CV <10% in rapeseed crops (7.6%) and sunflower (8.0%), which means that the dispersion of data around the average is homogeneous in wheat crops (19%) and soybeans (13.4%), the samples are relatively statistically homogeneous (10% <CV <20%), for rice crops (21.9%) and maize grains (26.8%) the samples are relatively heterogeneous (20% <CV <30%), and for hops (32.8%) and hemp for fiber (102.8%) there are very large variations in yield, samples being heterogeneous (CV > 30%). The explanation for statistically unrepresentative samples is given in the fact that production yields fluctuate from year to year due to climatic conditions. Table no. 5, col 6 and col 7.

Table no. 6: Yield per hectare 2012-2019 in conventional system

Nr. crt	Specification	Minimum Kg/ha	Maximum Kg/ha	Average 2012-2019 (Kg/ha)	Ab std. (Kg/ha)	CV (%)	Rate annual of growth (%)
0	1	2	3	4	5	6	7
1	Wheat and spelt	2652	4888	3983	783	19.7	3.30
2	Barley	2613	5090	4058	818	20.1	3.29
3	Grain maize and corn-cob-mix	2180	7644	4896	1749	35.7	4.64
4	Rice	3551	5384	4640	558	12.0	0.56
5	Potatoes	10579	18759	15668	2707	17.3	-1.13
6	Sugar beet	26363	44711	38427	5450	14.2	1.76
7	Rape and turnip rape seeds	1496	2835	2431	422	17.4	2.34
8	Sunflower seed	1310	3041	2244	613	27.3	5.72
9	Soya	1308	2748	2242	456	20.3	3.61
10	Fibre crops	256	5913	3170	2227	70.2	43.17
11	Tobacco	1066	1788	1455	213	14.7	-1.47
12	Hops	546	1103	833	170	20.4	3.43

Source: own processing according to EUROSTAT data

Average yield of production in the conventional system (kg/ha): The annual growth rate of the average yield of crops in the conventional system varies from -1.47% / year (tobacco) to 43.17% / year (hemp for fiber) . Table no. 6, col 7. The coefficient of variability has values between 12% (rice) and 19.7% (wheat), which means relatively homogeneous production yields from one year to another (10% <CV <20%); values between 20.1% (barley) and 27.3% (sunflower) (20% <CV <30%) - production yields being relatively heterogeneous from one year to another; and values between 35.7% (grain corn) and 70.2% (hemp for fiber) - production yields being heterogeneous (CV > 30%). Table no. 6, col 6.

Table no. 7: Comparison of yields obtained in the conventional system
and in organic farming, 2012-2019

Nr. crt	Specification	Average yield Conv kg/ha	Average yield Eco kg/ha	% of conventional yield
0	**1**	**2**	**3**	**4**
1	Wheat and spelt	3983	3447	86.54
2	Barley	4058	2672	65.85
3	Grain maize and corn-cob-mix	4896	4842	98.91
4	Rice	4640	4378	94.35
5	Potatoes (including seed potatoes)	15668	8026	51.22
6	Sugar beet (excluding seed)	38427	23091	60.09
7	Rape and turnip rape seeds	2431	2340	96.25
8	Sunflower seed	2244	2196	97.87
9	Soya	2242	2163	96.46
10	Fibre crops	3170	2653	83.69
11	Tobacco	1455	966	66.40
12	Hops	833	538	64.58

Source: own processing according to EUROSTAT data

The results show that organic yields represent over 51.2% (potatoes) and 98.9% (grain corn) of conventional yields, but the variation is significant at conventional yields. Table. no. 7 col 4.

With regard to the livestock sector, analyzed for species from the conventional system and from organic farming, the changes in the sector are due to variations, both in terms of numbers and production.

Table no. 7: Livestock in the conventional system (number), by species, 2012-2019

Nr. crt	Specification	Minimum (mii capete)	Maximum (mii capete)	Average period 2012-2019 (thousand heads)	Standard deviation (thousand heads)	Coefficient of variation (%)	Rate annual of growth **(%)**
0	1	3	4	5	6	7	8
1	Cattle	1923	2092	2019	298	14.8	-0.42
2	Cows and buffaloes	1139	1193	1172	153	13.1	-0.34
3	Swine	3834	5234	4657	797	17.1	-4.11
4	Sheep	8834	10359	9711	676	7.0	2.45
5	Goats	1266	1595	1445	251	17.4	3.24
6	Poultry	73289	80136	76501	3657	4.8	-0.72

Source: own processing according to INS TEMPO ONLINE data

Livestock in the conventional system (number): In the period 2012-2019 the annual growth rate is significant for sheep (2.45% / year) and goat species (3.24% / year). The sheep species also has a coefficient of variability of less than 10%, which means that the deviations from the average are not significant, the sample being statistically representative. A significant reduction occurs in the porcine species (-4.11% / year). The explanation is due to the appearance of swine fever which has reduced the number of species.

Table no. 8: Animal production obtained in the conventional system, by species, 2012-2019

Nr. crt	Specificare	Minimum (mii capete)	Maximum (mii capete)	Average pe riod 2012-2019 (thousand heads)	Standard deviation (thousand heads)	Coefficient of variation (%)	Rate annual of growth **(%)**
0	1	3	4	5	6	7	8
1	Milk (thousand hl)	42113	46615	44222	1436	3.2	-0.68
2	Beef (thousands of tons)	179	206	193	9	22.19	-1.50
3	Pork (thousands of tons)	512	588	554	25	5.27	-0.84
4	Sheep and Goat Meat (thousand to)	104	127	113	7	4.74	2.77
5	Poultry meat (thousand tons)	457	672	549	76	13.35	4.66
6	Eggs (mil.)	5564	6636	6179	391	6.3	- 1.19

Source: own processing according to INS TEMPO ONLINE data

Conventional total livestock production (hl/thousand tons/mil.): The annual growth rate of animal production is significant for sheep species (2.77%/year) and poultry meat (4.66%/year). The coefficient of variability in milk products (3.2%), pork (5.27%), sheepmeat (4.74%) and eggs (6.3%) is less than 10%, which means that deviations from the average are not significant, the sample being statistically representative, except for beef production, where it is found that variations in production compared to the average are large, the CV being 22.19%.

Livestock in organic farming (number): In the period 2012-2019 the annual growth rate is significant for goat species (17.94% /year) and poultry (10.04% /year). The other species analyzed have negative annual growth rates: live cattle (-0.64% /year), dairy cows (-7.67% /year), live pigs (-40.58% /year), sows (-41.01% /year), fattening pigs (-39.63% /year), sheep (-13.09% /year), laying hens (-1.91% /year), coefficient of variability for organic herds ranging from 25.1% (dairy cows) to 141% (fattening pigs) which means that the samples are heterogeneous and not statistically representative. (**Source:** own processing according to EUROSTAT data)

Total organic livestock production (hl/ton/pc): The annual growth rate of organic livestock production is found in the product eggs (1.1% / year), milk (-1.3% /year) and butter (-1% /year). The coefficient of variability is 4.9% for the raw milk product, 24.6% for the butter and 26.8% for the egg product. The organic products analyzed were meat, raw milk, butter, cheese, eggs. (**Source:** own processing according to EUROSTAT data)

Operators in organic agriculture: In Romania, the number of organic agricultural producers is decreasing (9277 producers in 2019), the minimum is met in 2017 (7908 producers), and the maximum in 2012 (15280 producers). The average growth rate is negative (-6.88%/year). Instead, we find increases in the number of processors (8.9%/year), importers (34.6%/year) and exporters (25.8%/year). The coefficient of variability is relatively homogeneous for producers (25.5%) and processors (22.6%), the samples being unrepresentative (CV > 30%), for importers (CV = 94.6%) and exporters (CV = 88, 6%).

CONCLUSIONS

The study highlights the existence of organic farming in Romania, with areas (2.5%) and yields that vary significantly from year to year. The analysis reveals that the difference in ecological / conventional yield varies depending on the crop and can occupy weights of over 90% of the conventional. Lower production yields can be an obstacle to the development of organic farming and partly explain the reduction in conversions in recent years. The reduction in the number of conversions is also due to "difficulties encountered by organic producers in finding customers, but also insufficient revenue to cover certification fees" (4). In the conventional livestock sector, there are increases in sheep and goats, with significant reductions in pigs, and in organic farming there are increases in goats and poultry.

The study also signals the existence of processors, importers and exporters, but also the existence of the market for organic products, especially retail sales. The analysis reveals an increase in the number of importers, which means more imports due to the Romanian consumer's demand for organic food, Romania thus becoming a market for imported organic products, but also a competitor.

Future research should focus on assessing the performance of both types of agriculture, at the economic level, at the management and marketing level in organic farming.

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THE EFFECTS OF THE ACCESSION TO THE EUROPEAN UNION ON THE EVOLUTION OF ROMANIA'S CEREAL SECTOR

MIHAELA KRUZSLICIKA[1]

Abstract: *The paper intends to examine the effects of the accession to the European Union on Romania`s cereal sector, in the period 2007-2016, in terms of evolution of areas cultivated with wheat and maize, production in volume and value terms, consumption and self-sufficiency, exports and imports, as well as the evolution of prices. The results reveal that unlike other sectors, the accession has steadily contributed to Romania`s cereal sector revigoration. Although yields in Romania are still substantially below those of the major European cereal producing countries, a steady growth trend can be noticed after 2007, due to the European funds that have allowed easier access to technological resources on the community market, and to a tendency for land consolidation, these advanced technologies being used more efficiently. The self-sufficiency degree has been reached and the trend is increasing, as it can be seen from the trade balance for cereals.*

Key words: *production, prices, productivity, cereals, consumption, trade, Romania.*

JEL Classification: *Q01, Q10, Q12, Q13.*

INTRODUCTION

In the pre-accession to EU period the main tool for the funding of the agricultural activities was SAPARD, a program which followed the competitiveness increase and re-rechnologization by acquisition of machines and performing equipments. The main measure by which modernizations were made in the farms- cereal producers was measure 3.1 „Investments in agricultural farms", the sub-measure Field Crops (1,186 projects approved, representing 19% of total projects), having in view, mainly, the acquisition of machines and equipments, and the total allocated value was of 112.5 mill. euro.

After the EU accession, through the National Rural Development Program 2007-2013 the cereals' sector benefited of 411.l mill. euro funding as result of the accessing the following measures: (a) Measure 112 „Young farmers installing", and by sub-measure „Field Crops" there were allotted 83.7 mill. euro; (b) Measure 121 „Modernization of agricultural farms –field crops" having in view mainly the acquisition of machines and equipments in value of 382.0 mill. Euro; (c) Measure 123 „Increase of value added at agricultural and forestry products" in value of 206.7 thousand euro; (d) Measure 142 „Foundation of farmers' groups- Field", and a value of 8.2 mill. euro.

The farmers who cropped cereals benefited, starting with the year 2007, of the following support forms as result of Common Agricultural Policy application, which are: The Single Area Payment Scheme (SAPS); the re-distributive payment; the payment for benefcial farm practices for climate and environment u; payment for the young farmers; The simplified scheme for the small farmers; the national transitional aids and the State aid for gas oil. All these support forms obtained by the farmers cropping cereals have permited them to better manage the cash flow at farm's level and be able to purchase inputs without appealing to supply loan, but also they had the possibility toobtain Guarantee letter from APIA for banking loan.

European context

The total EU cereal production in the period 2007-2017 knew an increase of 18%, while in Romania the increase was higher by 255%, mainly due to the average yield increase by 246%. The

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yields per ha, at cereals, although increasing, are low towards the EU average, hardly in the year 2017 the cereals average yield drew closer to a value of 94.5% towards that registered in the EU 28.

After the cereal production, Romania was on the 8-th place in the EU in the year 2007, as in the year 2017 to be on the 4-th place. This thing takes place in the conditions in which the area cropped with cereals was maintained relatively constant in the interval 2007-2017.

Romania situated on the 5-th position by the area cropped with wheat and on the first place by area cropped with maize, place maintained on the whole period 2007-2017.

In Romania the average wheat yield was at the level of 50% from the European one, in the interval 2007-2009, and the increase of the average wheat yield was not in the rate registered in the EU, such that in the interval 2012-2015 the average wheat yield represents only 42% of that registered in the EU. Whereas, the average maize yield had a more stressed increase, such that in the period 2007-2009 it represented 36% of the average EU 28 as in the period 2013-2015 to represent 53% of the average value registered at the EU 28 level. (Table 1).

Table 1. Cereals – area, average yield and total production

	U.M	2007-2009			2010-2012			2013-2016		
		Average Romania	**EU-28 average**	**Rank in EU-28**	**Average Romania**	**EU-28 average**	**Rank in EU-28**	**Average Romania**	**EU-28 average**	**Rank in EU-28**
Total area under cereals	thou. ha	5208	59546	5	5236	57124	5	5456	56685	5
Area under wheat		2078	25850	4	2036	25936	5	2115	26094	5
Area under maize		2435	8765	1	2473	9156	1	2556	9301	1
Average yield cereals	kg/ ha	2500	4900	26	3200	5100	24	3400	5100	22
Wheat average yield		2500	5000	25	2400	4900	24	2400	5000	24
Maize average yield		2700	7500	20*	3700	8000	22	4100	8100	21
Total cereal production	thou. tons	13171	291468	8	16793	286739	7	21005	314413	6
Total wheat production		5143	136099	8	6080	137113	7	7819	149415	5
Total maize production		6559	58675	4	8904	63487	2	9578	63583	2

*Without Denmark and Great Britain that did not report any maize yields for the period 2007 – 2009

Source: calculations based on Eurostat [apro_acs_a]

In the year 2017, the value of cereal production at the European Union level was of 46 billion euro, of which wheat represented 51% and maize 21%.

The first five producers at EU-28 level are totalling 67% of the value of wheat production and 71% of the value of maize production. These results are showing a very high degree of cereal production concentration.

Romania's cereal production value in the year 2017 was of 4.2 billion euro of which 34.2 % represent wheat, and 54% is represented by maize. By the value of cereal production Romania is situating on the 3-rd place in the EU.

With a value of the wheat production of 1.43 billion. euro, Romania situated on the 6-th place, while at maize it situated on the 1^{st} place with 2.26 billion. euro.

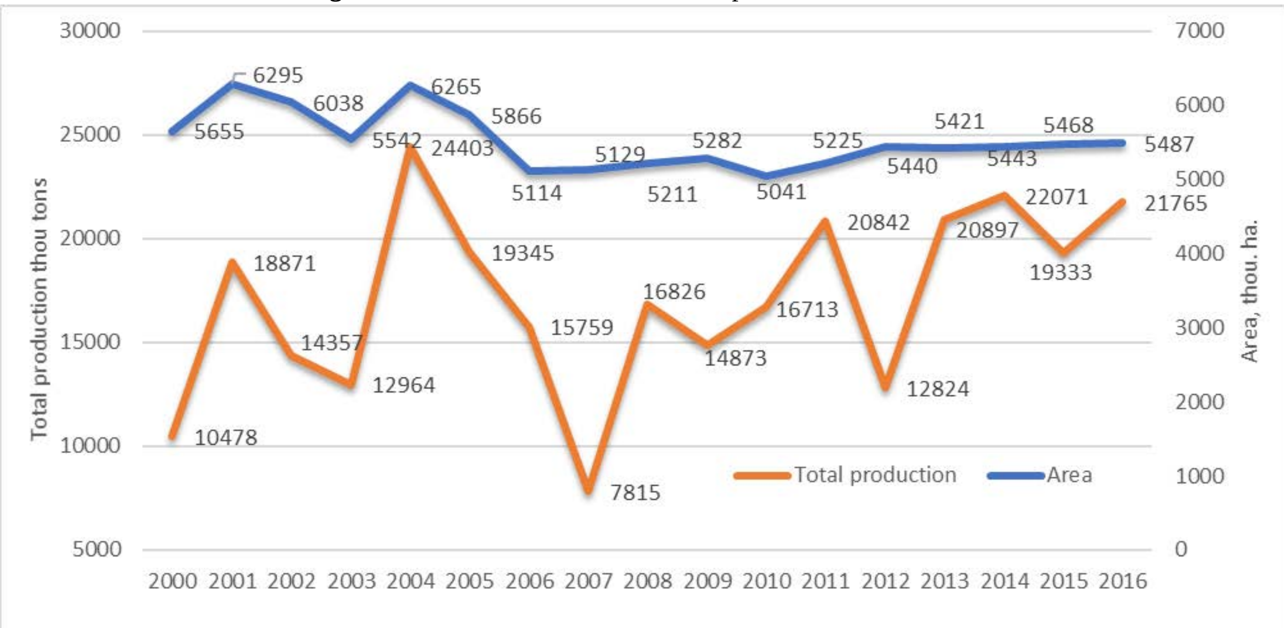
The total wheat production in the year 2015 at the EU-28 level was of 152.3 mill. tones, Romania situating on the 6-th place with cu 9.8 mill. tones, the first place being occupied by France with 38.7 mill. tones.

The low average yields in the case of Romania towards the big producers countries at European level are caused, on one hand by the extreme weather conditions as: droughts, floods or frosts, but also by the lack of some efficient measures for their melioration, through the development of the irrigation systems, mainly in the zones which are most exposed to the drought's effects. Also, there must be held in view other measures which should have as effect bigger average per ha yields as: enlargement of the high yield tractors and machines' park, the optimization of the fertilizing systems and fight with pests, and also the choice for some hybrids to ensure a higher resistence to the external environmental factors and pests. Another cause of the low average yields is the very high lands' fragmentation.

The existent situation

In Romania the area cropped with cereals in the year 2016 was of 5486.9 thousand hectares of which 39% where cropped with wheat, 47% with maize, 5% with barley, 3% with oat and 5% was represented by other cereals. The areas cropped with cereals remained somehow constant, with smaller variations after the year 2007 while the average yields are registering an increasing trend, fact reflected in the total wheat productions (fig.1). The dependence of the productions on the climate factors made that the cereal production present important variations, on the studied period.

Figure 1. Evolution of areas and cereal production in Romania



Source: tempo-online data, INS 2016 and DG AGRI 2016 data

From the point of view of the structure by size classes for the cereal farms, in Romania, we can see a constant tendency to amalgamate the land areas into medium size farms (20-99,9 ha) and big farms, of over 100 ha. Thus, the number of the medium and big size farms which are cropping wheat increased in the period 2003-2013 by 14.5 % and respectively by 56.4%, the area cropped by these ones registering increases of 37.6%, in case of the average farms and respectively 44.3% in case of the big farms.

Also, the farms specialized in the crops of maize have registered important increases in the interval 2007-2013, of 18.8% in the case of medium farms and 60.6% in the case of big ones, the area cropped by them increasing by 82.8% and respectively by 100.3% in case of big farms.

It is easy to learn that the average yields per ha are higher in case of amalgamated land areas, the farms with big areas of land, due to a centralized management, the employment of specialists, a better technical endowment than in the case of small size farms, the big farms having a more easy access to loans for investments in technological reshaping and warehouse capacities, obtaining a higher value added in the end.

On the other hand, the pre-accession to EU funds (SAPARD) and subsequently the National Rural Development Program, have facilitated the acquisition of performant agricultural machines and together with them, the know-how transfer, leading finally to land amalgamation into medium and big size farms.

The economic performance is positively correlated with the farm's economic size, such that: one farm from the smaller class than 2000 euro is producing averagely a value of 2709 euro/year per one work unit, while at a farm producing 500000 euro it produces averagely 59740 euro/year per one work unit, 22 times more than a small farm. This fact is explained by the high technologization degree in the big size farms.

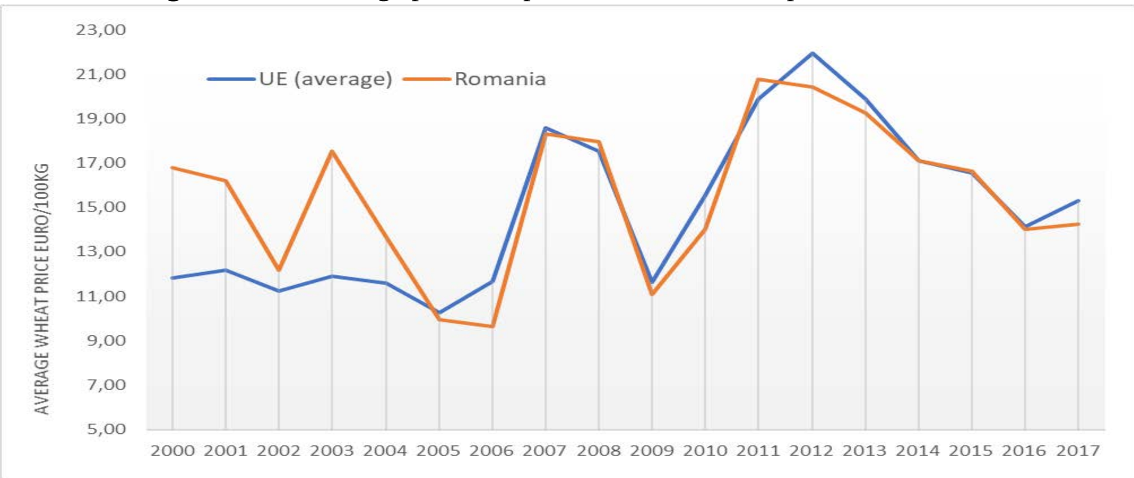
Labour productivity increased at all classes of economic size, but under different percentages. The higher increase is registered in the farms of class: 500000 euro and more (by 110%).

In the analysed period, 2005-2017, the trend for all studied indicators is of agricultural production concentration into big size farms.

Prices

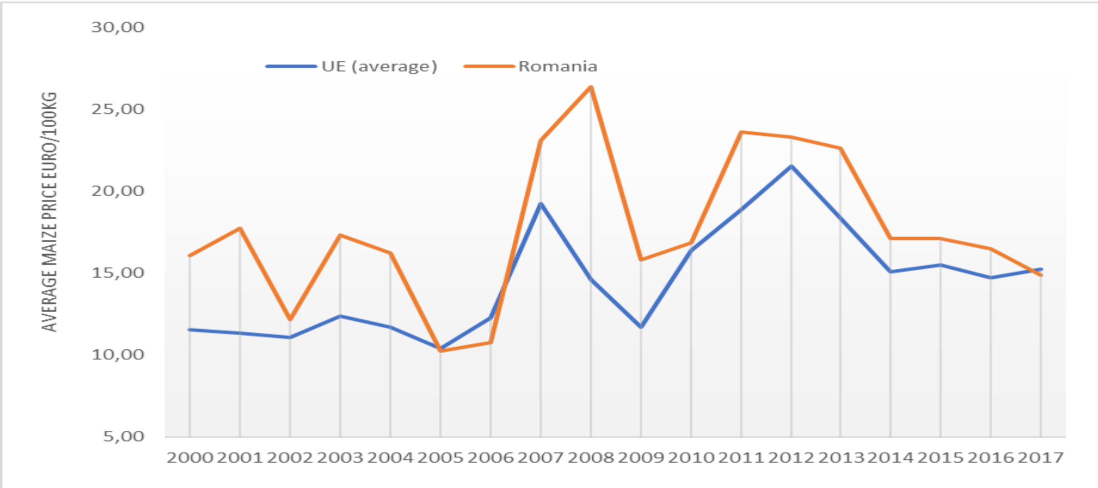
The average producer price, for wheat, in the period 2000-2017 (fig.2),varied in function of the conditions on the internal market (respectively the limited supply because of the un-favourable weather factors) and of the prices' evolution on the international market. If in the period 2000-2007 there were significant differences between the prices practiced in Romania towards those practiced in the EU, the accession to the EU, and also the cereals surplus destined to export had as result the elimination of this gaps. This thing is observed both in case of wheat and also at maize (fig.3).

Figure 2. The average producer price at wheat, for the period 2000-2017



Source: Eurostat [apri_ap_crpouta]

Figure 3. The average producer price at maize, for the period 2000-2017

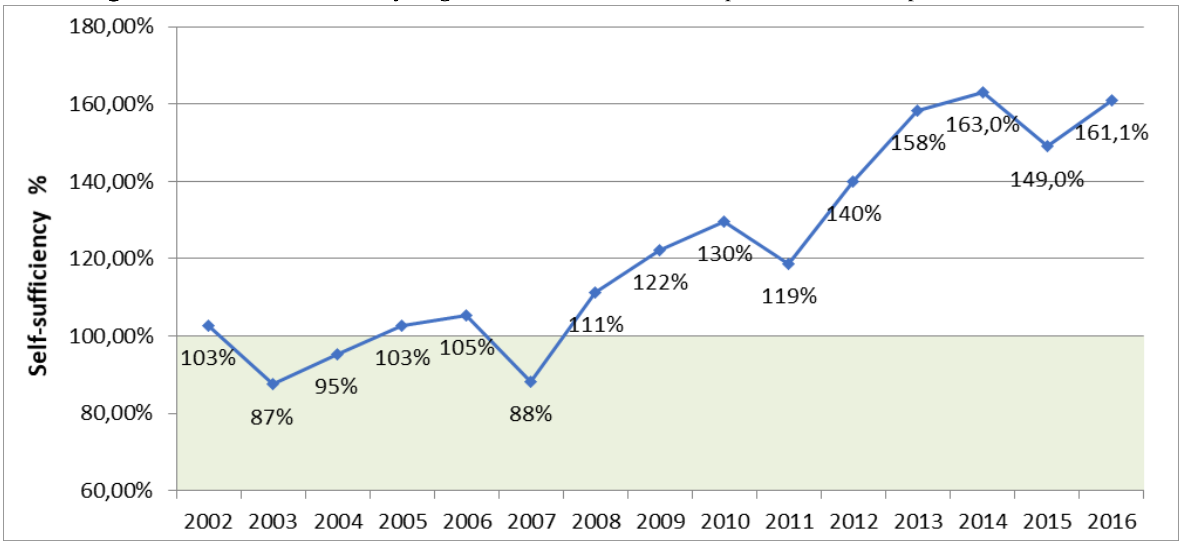


Source: Eurostat [apri_ap_crpouta]

The self-sufficiency degree

Cereals are from the group of products for which the self-sufficiency degree was reached starting with the year 2005, the only year which had a self-sufficiency degree of under 100% being the year 2007 when a severe drought was registered. The self-sufficiency degree of wheat and maize are registered a constant increasing trend, with maximum values, for wheat, in the year 2016 of 225% and for maize in the year 2015 ,of 144%. For the total group of cereals, the same trend is maintained, with a maximum of 163% in the year 2014 (fig. 4).

Figure 4. The self-sufficiency degree for cereals and cereal products, for the period 2002-2016



Source: calculations and processing after data in the Food Balances 2002-2016, NSI Bucharest

At total cereals, the internal availabilities for consumption are presenting a decreasing trend in the interval 2000-2016. Once self-sufficiency being reached, on the background of a relatively linear trend of cereals import and of a significant increase at cereal exports, mainly in the interval 2007-2016, the internal consumption availabilities are decreasing.

The human cereal consumption is relatively constant, situating itself at an average of 158 kg/capita /year, the available for human consumption registering small variations in the interval 2000-2016, the average being of 4416 thousand tones.

Also, small variations are met also at the cereals for seeds, these ones being correlated with the areas on which this type of crop was cropped, which having small variation coefficients are generating a relatively constant consumption .

An increasing trend is to be seen at the quantities of cereals destined to industrial processing, in the year 2016 being utilized 731 thousand tones increasing by 133% opposed to the year 2000.

The important variations of the available for consumption, caused mainly by the environmental are taken over by the fodder consumption. An important share in the cereals for foddrs consumption is held by maize, which represents 84.4% of the total cereals for fodders consumption, while wheat has a share of only 9.1%.

The average net annual consumption of wheat per inhabitant capita decreased since the year 2000 by 14%, to 122 kg/capita /year in 2016.

The maize consumption per inhabitant capita presented a slight increase trend in the studied interval with a value of 30 kg/capita /year in 2016.

Cereals import and export

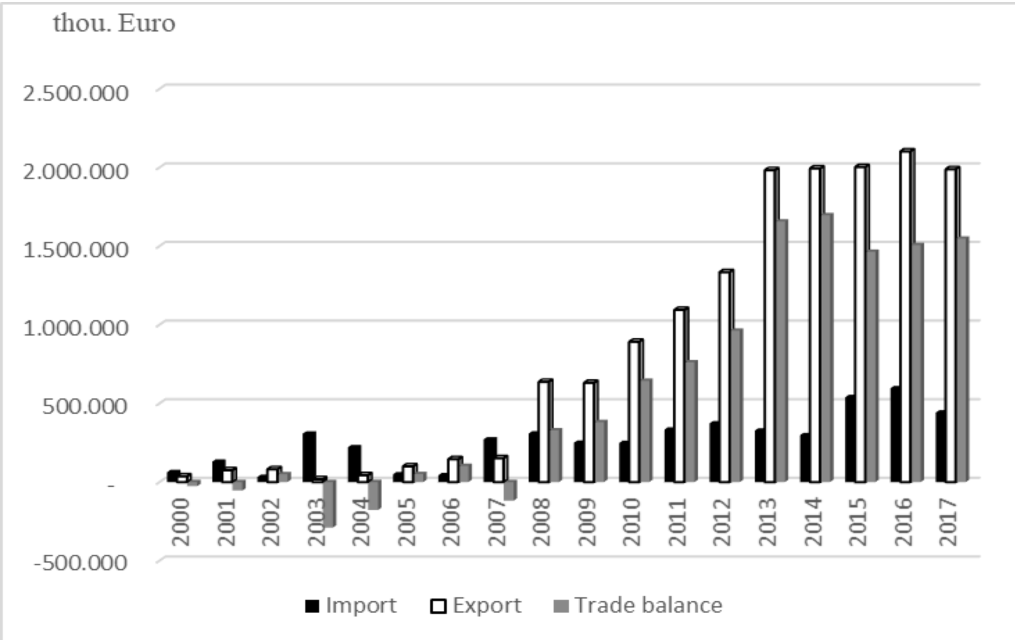
In the period 2000–2007 the trade balance in the trade with cereals registered fluctuations, with deficits (in the years 2003: -289,6 mill. euro; in the year 2004: -177.7 mill.euro and in the year 2007: -118,8 mill. euro), products of internal supply contraction caused by the un-favourable weather conditions, but also with surpluses, the biggest being registered in the year 2006, in value of 84.2 mill. euro.

Starting with the year 2008 the trade balance account is positive, for the period studied, it is observed a passing from a deficit of 118.8 mill. euro to a surplus increasing on whole studied period. In the year 2014, the surplus registered is of 1.7 billion. euro.

Together with the intra-community market liberalization, the trade exchanges intensified and their structure was modified. Thus, if in the period 2000–2007 the intra-community imports did not exceed 60%, after the year 2008 these were situating around the value of 93%. Also, the exports to the European Union diminished starting with the year 2007, reaching from 62% in the year 2007 to 38.6% in 2017, the main selling markets for cereals being the extra-community ones, respectively North Africa and Near and Middle East. Romania has a competitive advantage regarding the export on these markets due to the small transport costs .

The trade balances for wheat and maize are positive, with an obvious increasing trend in the interval 2008–2015, the total surplus at cereals in the year 2016 being of 1.5 billion. Euro, and in 2017 this was of 1.547 billion. Euro (fig.5) .

Figure 5. Romania: trade balance in cereals in the period 2000-2017, thou. euro



Source: Eurostat, COMEXT database, Code 10: Cereals.

The wheat imports on the intra-community market are registering an average annual percentage of 94 % in the interval 2008–2015 with maximums of 97% in the years 2008, 2009 and 2014. In general, from the intra-community space we import wheat destined to sowing. The structure of exports in wheat was also modified, such that the ratio of extra-community exports and intra-community ones reversed itself. If in the 2000–2007 the exports to EU were of 64%, on the interval 2008–2015, this reached to 36%. In value terms the trade exchanges registered a substantial increase in the interval 2008–2015 with an average annual value of 550.3 mill. euro, with peaks in the years 2013 of 976.9 mill .euro and 2014 of 959,3 mill. euro opposed to the interval 2000–2007 when the annual average was of 33.04 mill. euro.

CONCLUSIONS

In Romania, the most vast crop is that of cereals; the average of the last 25 years is showing that over 65% of the total arable area is cropped with cereals.

Although the average yields are still substantially under those of the European countries-big cereals producers-, after the year 2007 we can observe a trend of constant increase of them due to the easier access to technological resources on the community market, but also due to a tendency for land amalgamation, these advanced technologies being more efficiently utilized .

The trend in the case of small farms is decreasing, the number of medium and big farms obviously increasing. Even in such conditions the inland cereal production is relatively, strongly influenced by the climate factors, mainly drought, which leads to the conclusion that we must find new efficient modalities to stimulate irrigation of some bigger land areas taking advantage of the increase of big farms' number. Labour productivity, on the economic size of the farm, but under different percentages is increasing more in the case of big farms due to a coherent management of crops and technologies utilized in cereals cropping, of the high economic capacity, used in the renewal of the technological park and the use of high quality genetic material , but also the possibility to easier access to European Funds for the activity's development .

By accessing the projects within RDNP it was wished both the attraction of young farmers- in the rural space, and the modernization of agricultural farms together with the foundation of the farmers' groups. Also, of these projects there benefited the economic agents, who followed the increase of the value added of agricultural and forestry products, but also the subsistence farms.

The cereals' foreign trade knew a reshape in the period 2007-2017 opposed to the previous period, the trade exchanges intensifying themselves, the trade balance in the trade with cereals being positive and registering an increasing trend starting with the year 2008. Thus, if cereals' import are mainly made from the community market, the exports are done mainly towards countries outside the community space.

Starting with the year 2005 the self-sufficiency degree is of 100% and registers a constant increasing trend. Thus, the higher dynamics of the cereal production and the trend for constant decrease of cereal consumption led to a self-sufficiency degree of over 100% starting with the year 2008.

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INCREASING THE COMPETITIVENESS OF ROMANIAN FARMS IN THE POST-ACCESSION PERIOD

GAVRILĂ VIORICA[1]

Abstract: *The present study investigates various issues related to farm competitiveness, using viability indicators, such as Net Value Added and Net Income of farms, as well as indicators regarding factor productivity, highlighting the relationship between productivity, farm typology and farm size. EUROSTAT and European Commission statistics based on FADN survey from the period 2007-2018 were used. The results reveal that the evolution of income indicators mainly depended on the increase of the physical farm size and on labour force diminution. Both farm specialization and the physical and economic farm size are correlated with labour productivity. Improving the efficiency of production factors should contribute to reducing the disparities in the development level of the agricultural sector.*

Keywords: *farms, productivity, competitiveness*

JEL Classification: *Q12, J24*

INTRODUCTION

The literature emphasizes that there is no single general theory of competitiveness. However, most theories consider that technology and productivity are the main determinants of competitiveness on the long term (Zawalińska 2004). In the studies, there is a tendency to move from isolated indicators, which often weakly capture the spectrum of competitiveness determinants, to more complex approaches (Nowak; Kaminska, 2016).

The selection of data may depend on the competitiveness measures used. Some measures, such as those based on trade, can be calculated only with aggregated data (meso- or macroeconomic level). For other measures, each type of data can be used depending on the purpose of the analysis. Productivity, for instance, can be measured at farm level, at commodity level, at sectoral or national level. Generally, the use of micro-economic data makes it possible to account for variations between firms that would not be captured by using aggregate data (Latruffe, 2010).

One of the important CAP objectives is to support farmers to improve their farm productivity. By countries, there are significant differences, the incomes from Old Member States being generally higher than those from the countries that joined the EU in 2004 or later. The lowest incomes by full-time worker can be found in Romania, Slovenia and Croatia. At the other end of the scale, the factor income by full-time worker in the Netherlands is 3 times the EU average (DG AGRI, 2018). In a report on cereal farms it is shown that, if we consider the farm net value added by annual work unit as the main income indicator, the impact of the crisis from 2009 is very clear. This decreased from 20,221 EUR to 12,873 EUR / AWU (EC, DG AGRI, 2017).

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MATERIAL AND METHOD

In the EU, a detailed typology of agricultural holdings was established by economic size classes and type of farming. This is described in (EC) Regulation no. 1242/2008. The standard results describe in detail the economic situation of farms.

The FADN database and Eurostat were used as data sources. The following indicators were used in the analysis: Physical and economic farm size, Labour force, Utilised Agricultural Area. Several income indicators were used, which allow for different comparisons, such as Net Farm Income, Farm Net Value Added, partial labour productivity expressed as NVA/AWU, total factor productivity as total output to total input ratio; the total inputs sum up specific costs, overheads for agriculture, depreciation and external factors, while total outputs represent the agricultural output value. The period under investigation is 2007-2018.

The Net Farm Income (FI) is equal to the Net Value Added (NVA) minus the external factors (hired labour costs, rented land, loan capital), plus the balance of subsidies and investment taxes. Farm NVA is equal to total output value, plus the balance of current subsidies and taxes, direct payments included, minus intermediary consumption (specific costs and overheads for the farm) and depreciation. In order to highlight the differences in size or the structural decreases of labour force used in agriculture, NVA is expressed per annual work unit (AWU), which can be considered as a measure of partial labour productivity.

Total factor productivity is the main indicator for measuring changes in productivity, as it is considered more comprehensive than the partial productivity indicators, such as labour or land productivity. Total productivity increase can be defined as the ratio of changes in the production volume in a given period to the corresponding change in inputs (or factors) used for their production.

The data presented in the table are a subset of Standard Results (SE variables) available in the FADN public database. The variables represent average values per farm.

RESULTS AND DISCUSSIONS

The share of agriculture in total economic activity in the European Union amounted to 1.59% in 2007, and to 1.42% in 2018. In Romania, the share of Gross Value Added (GVA) in agriculture in Gross Value Added of the entire economy is higher, yet on a downward trend, from 5.49% in 2007 to 4.5% in 2018.

The value of crop output increased by 15% in the EU in the period 2007-2018, mainly based on growth in wine, fruit and vegetables, while livestock output increased by 22%. In the same period, crop production in Romania increased by 53%, mainly based on cereals and to a lesser extent on industrial crops, while livestock production decreased by 17%.

In 2013, out of the 10.8 million farms in the EU, 6.5 million (i.e. 59.8%) had a standard output of over 2 000 EUR. The utilised agricultural area (UAA) in EU-28 amounted to almost 175 million hectares. There was a growing trend in the average farm size in most member states. In 2013, the average farm size in EU-28 was 16.1 ha. In 2016, the number of farms decreased to 10.46 million and UAA to 173.3 million hectares. 61.5% of farms had an economic size larger than 2000 EUR and obtained almost 99% of the standard output value. The average UAA per farm was 16.56 hectares.

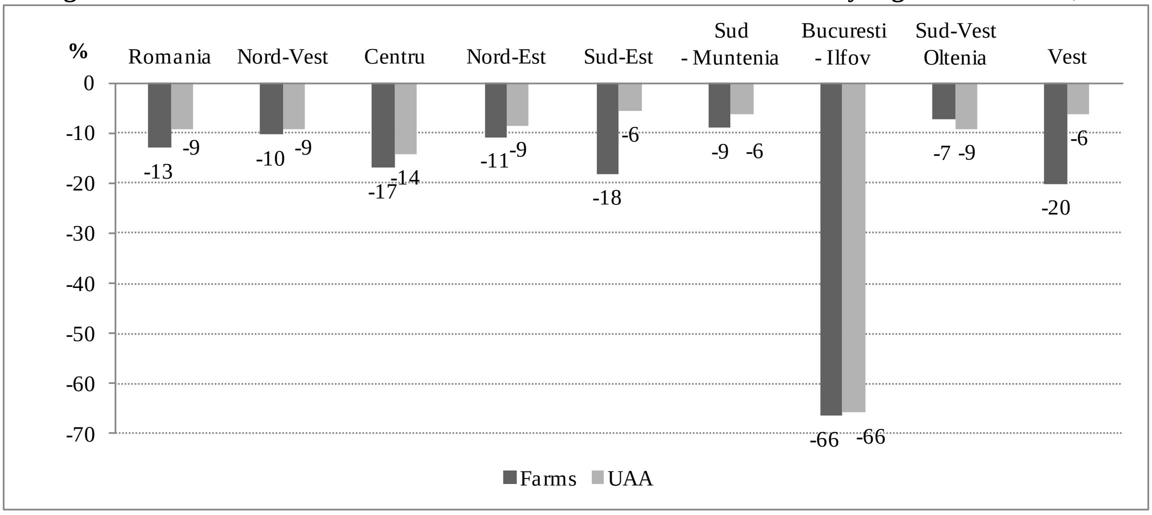
In the EU agriculture, the workforce amounted to 20.5 million persons in 2016. For many people, work on the farm was only a minor activity. When converted into annual work units

(AWU), the agricultural workforce is equivalent to 9.5 million full-time workers. This measure of labour input is used as a labour factor in measuring partial labour productivity.

In the year 2016, about 3.42 million farms with 12.5 million hectares UAA were active in Romania. This means an average farm size of 3.65 hectares. The farms with an economic farm size over 2000 EUR represent almost 32% of total farms and obtain 85% of the standard output value.

In Romania, the full-time or part-time agricultural labour force amounted to 6.1 million persons in 2016, equivalent to 1.64 million full-time workers in annual work units (AWU).

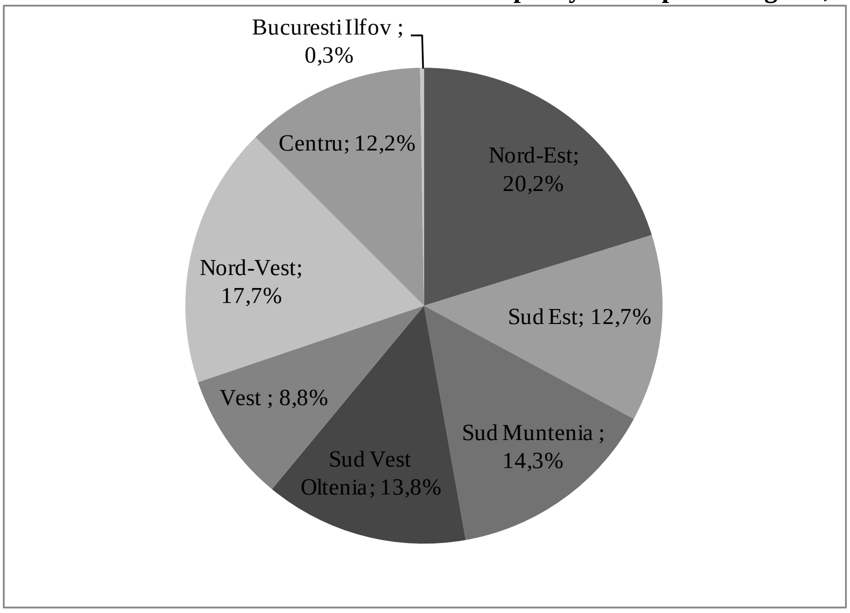
Figure 1. Evolution of the number of farms and UAA nationwide and by regions 2016/2007, %



Source: Eurostat [ef_m_farmleg]

In the period 2007-2016, more than 509 thousand farms ceased their operations, and UAA decreased by 1.25 million hectares. In real terms, the greatest decline was noticed in the Region Centru, by more than 250 thousand hectares. By regions, the largest percentage diminution was reported in the Region Bucureşti-Ilfov (Figure 1).

Figure 2. Distribution of farms in the FADN sample by development regions, 2018



Source: FADN

The FADN farm sample in Romania consists of more than 525 thousand units. Their distribution by regions shows that the greatest number of farms in the sample are found in Region

Nord-Est, i.e. the fifth part, while the farms in Bucureşti-Ilfov Region account for only 0.3% in total farms in the sample.

The most numerous farms in the sample are mixed farms specialized in crops and livestock, sheep and goat farms, next followed by dairy farms and farms specialized in cereals, oilseeds and protein crops (COP).

According to the FADN farm sample, the average farm size in the European Union was 39.68 hectares in 2018, up by 35% compared to 2007; the economic farm size increased from 49.2 thousand euro to 86.8 thousand euro (76%).

In the FADN sample, one farm averagely used 1.59 AWU in the European Union, with a diminution of labour input by 11% compared to 2007.

On the average, one farm from the EU produced a Net Value Added of 36,953 euro.

The net farm income in the EU was 23,343 euro in 2018, up by 27% from 2007, mainly based on the increase of crop and livestock production and of prices.

The average net value added in the EU was 23295.15 euro/AWU.

In Romania, the *average farm size* from the FADN sample was 17.71 ha, up by 116% from the accession year. The *economic farm size* in 2007 was 7.1 thousand euro and increased by 142%, to reach 17.2 thousand euro in 2018, which represented only 20% of the EU average. This increase in size has hidden significant differences across development regions. Thus, by regions, the largest economic farm size can be noticed in the region Bucureşti-Ilfov (26.2 thousand euro), followed by the regions Sud-Est (24.6 thousand euro), Vest (21.8 thousand euro) and Sud-Muntenia (20.5 thousand euro); it is in these regions that the greatest increase of the economic farm size was also noticed in the period 2007-2018. The increase of the economic farm size also correlates with the increase of physical size of farms, which can be confirmed if we analyse the farms in terms of their typology.

Table 1. Main indicators of Romanian farms, in the year 2018

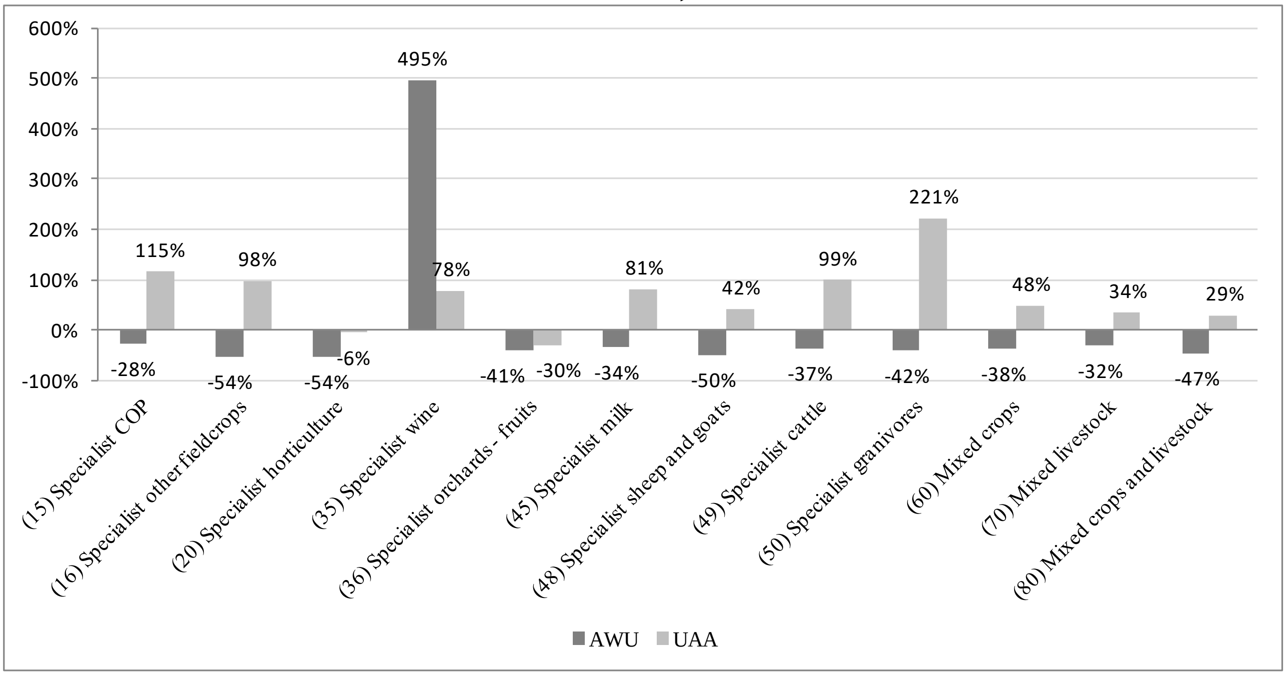
	Economic size (SE005) Thou. euro	**Total labour input (SE010) AWU**	**Total Utilised Agricultural Area (SE025) ha**	**Total livestock units (SE080)**	**Total output / Total input (SE132)**	**Farm Net Value Added (SE415) Euro/farm**	**Farm Net Income (SE420) Euro/farm**	**Farm Net Value Added /AWU (SE425) Euro/farm**
EU	86.8	1.59	39.68	31.56	1.13	36953	23343	23295.15
Romania	**17.2**	**1.24**	**17.71**	**7.63**	**1.33**	**11474**	**9051**	**9248.08**
Nord - Est	13.5	1.12	13.2	6.78	1.35	9212	7194	8260.17
Sud-Est	24.6	1.29	27.54	7.92	1.32	17302	13004	13398.53
Sud-Muntenia	20.5	1.1	21.64	6.35	1.38	13343	10109	12171.16
Sud-Vest Oltenia	12.9	1.37	12.75	4.23	1.26	6819	5485	4963.36
Vest	21.8	1.34	25.7	10.5	1.33	16870	13249	12576.88
Nord - Vest	13.8	1.1	12.53	7.54	1.42	9215	7878	7063.37
Centru	18.3	1.26	17.38	12.57	1.28	11111	9016	8810.51
Bucuresti-Ilfov	26.2	0.67	33.31	2.21	2.24	34647	30554	51989.77

Source: FADN

In the year 2018, the farms from Romania used 1.24 AWU/farm. As compared to the beginning of the investigated period, this indicator reveals a significant diminution of labour on the farms from the sample (-42%). In percentage terms, the largest labour decline was found on the farms from the regions Sud-Muntenia (-56%), Nord-Est (-53%) and Nord-Vest (-49%).

By farm secialization, the greatest labour diminution in percentage was noticed on the farms specialised in field crops, horticulture and on the sheep and goat farms. Only on the wine farms the labour force significantly increased (Figure 3).

Figure 3. Evolution of labour force and Utilised Agricultural Area by farm specialization, 2018/2007, %



Source: FADN

The gross farm income has high variations for all types of farms, and subsidies (excluding investment) support the farm income to a lesser or greater extent, namely: on the average, in the investigated period, subsidies had an important share in gross farm income, i.e. 37% on the COP farms and 31% on the cattle farms. The most disadvantaged from this point of view are the farms specialised in fruit, wine and horticulture, where subsidies supported farm incomes by 7%, 9% and 12%. On the horticultural farms, the only years when subsidies had an important share were 2008 and 2009, when quite consistent amounts were allocated from the national budget.

The Farm Net Value Added (FNVA) represents the remuneration for the fixed production factors (labour, land and capital), regardless of whether they are external or family factors. As a result, farms van be compared regardless of the family/non-family nature of their production factors. On the average, a farm from Romania produced a FNVA of 11474 euro in the year 2018, which represented 31% of the EU average. The best remuneration of fixed factors was noticed in the region București-Ilfov, with a FNVA of 36647 euro/farm and in the region Sud-Est, with 17302 euro/farm; the latter increased by 337% compared to 2007. The lowest FNVA values were in the region Sud-Vest Oltenia: 6819 euro/farm.

By typology, the farms specialised in granivores and those specialised in cereals, oilseeds and protein crops, had a FNVA 3.3 and 3.2 times as high than the average of all farms. At the same time, on the wine farms FNVA/farm was 2.1 times higher than the sample average.

The net farm income (NFI) represents the amount available for the payment of own production factors (labour, land and capital). In Romania, the net farm income was 9051 euro, by

199% higher than in 2007, due to the increase of crop production. As compared to the EU average, this represented 39%.

By development regions, the net farm income had significant variations, from 30554 euro in the region Bucureşti-Ilfov, 13249 euro in Vest Region and 13004 euro in Sud-Est to 5485 euro in Sud-Vest Oltenia, which is the region with the lowest farm income.

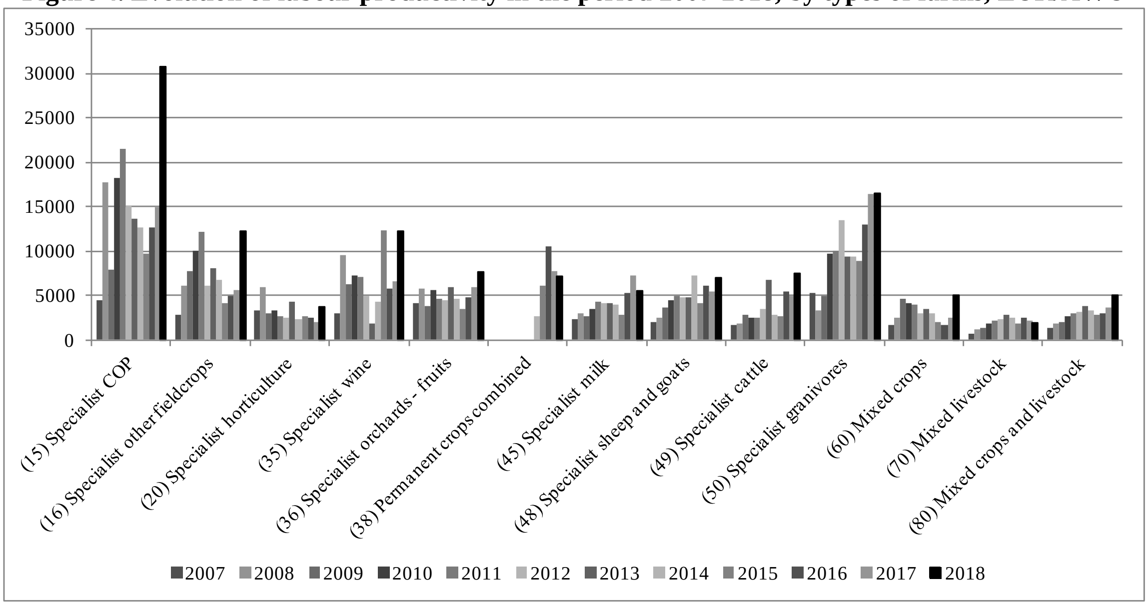
If we refer to the type of specialization, the three types of specialist farms (granivores, COP and wine) also stand out for this indicator. For instance, in the year 2018, the net farm income of farms specialised in cereals, oilseeds and protein crops was twice as high than the 2007-2018 average, and 3.5 times as high than in 2007.

The net farm income did not have a steady increase, depending on external factors, for instance the selling price and weather. For instance, under the background of the decrease of selling prices in 2009 as compared to 2008 (in common wheat from 179.5 EUR/ton to 158 EUR/ton, in maize from 263.8 EUR/ton to 158.0 EUR/ton, and in sunflower from 304.5 EUR/ton to 202.8 EUR/ton), net income decreased more than three times. In the years with higher yields, on the COP farms, even though prices were slightly lower, incomes were up. This was the case in 2018, when the yield in cereal grains was 5999 kg/ha, higher by 64% than the 2007-2018 average, and prices lower by 12% in common wheat, by 21% in maize and by 9% in sunflower.

On the Romanian farms, *labour productivity* represents almost 40% of the EU average. One annual work unit averagely produced 9248.08 euro NVA. In terms of the investigated indicator, the ranking of regions does not change. The highest labour productivity is found on the farms from the region Bucureşti-Ilfov, i.e. 51989.77 euro/AWU, followed at great distance by the regions Sud-Est (13398.53 euro/AWU), Vest (12576.88 euro/AWU) and Sud-Muntenia (12171.16 euro/AWU). The region Sud-Vest Oltenia has the lowest labour productivity, more than ten times lower than in Bucureşti-Ilfov. In dynamics, labour productivity increased by 56% compared to the base year. The most spectacular increase was in the region Sud-Muntenia, more than 6 times and in the regions Sud-Est and Nord-Est, more than 5 times, mainly due to the decline of labour force and UAA increase on the farms from sample.

By farm specialization, the highest labour productivity was noticed on the COP farms, with 30793.66 euro/AWU, 2.3 times higher than the average of all farms, in the year 2018.

Figure 4. Evolution of labour productivity in the period 2007-2018, by types of farms, EUR/AWU



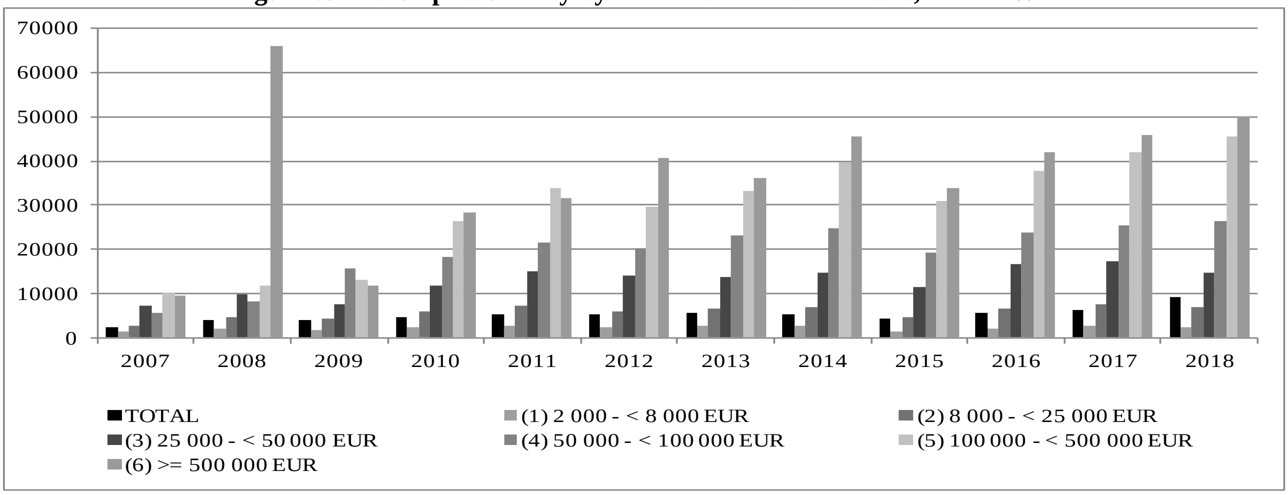
Source: FADN

However, in the investigated period, labour productivity did not increase constantly, depending on external factors, such as selling prices and weather conditions. In the years with good yields, labour productivity increased, even though prices slightly decreased. The farms specialised in granivores rank second in terms of this indicator, with NVA/AWU of 16506.5 euro in 2018, while the wine farms (12301.15 EUR/AWU) and those specialised in other field crops (12202.37 EUR/AWU) rank third and fourth.

The mixed livestock farms and the horticultural farms had the lowest productivity throughout the investigated period.

Starting with the year 2012, labour productivity was directly correlated with the economic farm size (Figure 5).

Figure 5. Labour productivity by farm economic size classes, EUR/AWU



Source: FADN

Total factor productivity means economic output per unit of input. The unit of input represents all production factors, including labour force, machinery and energy (total factor of productivity). Total factor productivity in 2018 was higher by 19% than the EU average on the Romanian farms, which can be explained by the total intermediary consumption per 1 ha UAA lower by 51% than the EU average and favourable pedological conditions; however, the yearly variations show that the external factors, such as prices and weather , had a significant influence. Depending on the specialization of farms, total factor productivity ranged from 1.12 on the granivore farms to 1.95 on the fruit farms in the year 2018.

CONCLUSIONS

In Romania, the value of agricultural output increased in the analysed period, mainly based on cereal crops and to a lesser extent on industrial crops, while livestock output decreased, indicating a non-sustainable development on the long run. In the EU, the percentage increase was lower and was based on the increases in wine, fruit and vegetables, products with high value added, while livestock output also increased.

The indicators in the FADN sample reveal a significant gap compared to the EU average: the economic farm size is five times lower, the net value added is less than one-third of the EU average, the net farm income represents 40% of the European average, and labour productivity is 2.5 times lower.

In dynamics, the increase of the economic farm size correlates with the increase in the physical farm size. This increase in size hid the significant differences between development regions and between farm types.

Labour force on the Romanian farms declined by more than 40% in the investigated period, with the greatest percentage diminution on the farms from the regions Sud-Muntenia, Nord-Est and Nord-Vest, and by farm types on the farms specialised in other field crops, horticulture and on the sheep and goat farms.

In the analysed period, the income indicators largely depended on external factors, such as the selling price of agricultural products and the weather conditions.

The best remuneration of fixed production factors was obtained on the granivore farms and on the farms specialised in cereals, oilseeds and protein crops (COP), with NVA/farm 3.3 and 3.2 times as high than the average of all farms, due to the increase in size and yields.

At the same time, NVA/farm on the wine farms was 2.1 times as high than the sample average, which can be associated with the effects of restructuring under the national support programme.

On the farms specialised in horticulture, the effects of organization into producer groups and organizations have not been noticeable yet.

In Romania, the net farm income increased mainly as a result of crop production growth. In the ranking of regions, the region București-Ilfov ranks first, while Sud-Vest Oltenia is on the last position. If we refer to the specialization type, the three types of farms (granivores, COP, wine) also stand out in the case of this indicator, too.

In dynamics, labour productivity increased by 56% compared to the base year. The most spectacular increase was in the region Sud-Muntenia, by more than 6 times and in the regions Sud-Est and Nord-Est, by more than 5 times, due to the decline in the labour force and to the increase of UAA on the farms in the sample and to farm specialization type. By farm specialization, the highest labour productivity was noticed on the farms specialised in COP. Over time, labour productivity increased in only four farm specializations: on COP farms, on those specialised in granivores, in other field crops and on the wine farms.

Based on lower intermediary consumptions compared to the EU average, total factor productivity was slightly higher on the Romanian farms, which can be also explained by the favourable pedological conditions.

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IMPACT OF COUPLED SUPPORT ON THE ROMANIAN DAIRY COW AND BUFFALO COW SECTOR – A REGIONAL PROFILE ANALYSIS

MARIANA GRODEA[1]

Abstract: *The coupled support is a production limiting system, which is granted under the form of an annual payment, to those sectors or regions in a Member State, where certain types of agriculture or certain agricultural sectors, which are very important from economic, social or environmental reasons, are affected by certain difficulties. In the year 2019, at EU 28 level, the largest amount of coupled support payments was allocated to the livestock farming sector (73.2%), out of which 20.1% to the dairy sector. In Romania, the dairy sector was allocated the amount of 88 million euros, i.e. 59.1% of total livestock sector. The obtained results highlight that the impact of the scheme application is not significant as regards the sector development, having in view that the share of cows and buffaloes authorised for payment in total herds ranged from 7.1% in 2015, 9.2% in 2016, 18.6% in 2017to 22.5% in 2018.*

Key words: *dairy cows, buffalo cows, coupled support, production*

JEL Classification: *Q10, Q13, Q19*

INTRODUCTION

Although the budget allocated to the Common Agricultural Policy accounted for 36.25% of total European Union Budget (2018), the EU citizens had a positive perception of the support provided to agriculture, as they consider agriculture particularly important, not only as regards production of safe and healthy foods, but also in terms of reaching the rural development and environmental objectives (Hayden,A. et al., 2019).

In the current Common Agricultural Policy (2014-2020), the value of direct payments is 291.3 billion euros, i.e. 71.3% of the total budget allocated to CAP (European Commission, 2017). In the proposal for the future CAP (2021-2027), they will remain the main part of farmers' support, yet they will be moderately reduced and better targeted (Chelmu, S., 2020).

For the financial exercise 2014-2020, the allocations for Romania are around 19.43 billion euros (current prices) for direct payments and market-related expenditure (Pillar 1) and for rural development (Pillar 2) (Drigă, D., M., 2018),

As a result of the 2003 CAP Reform, as a general rule, the link between receiving a direct payment and the production of a certain product was progressively eliminated ("decoupling") (European Commission, 2017). Nevertheless, the member states can condition (or continue to couple) a limited volume of direct payments on certain products (European Commission, 2017).

The coupled support is one of the main payments scheme from the category "optional direct payments" introduced in 2015, financed from the European Agricultural Guarantee Fund (EAGF). In 2019, the total budget allocated to coupled support at European Union level was 4.2 billion euros (around 10% of total direct payments), out of which 39.7 % beef, 20.9 % milk and dairy products, 12.6 % sheep and goats, 11.2 % protein crops, 4.3 % fruit and vegetables, 4.3 % sugar beet and 7.1 % other products (cereals, olive oil, rice, leguminous crops, potatoes, nuts, hops, hemp, oilseeds, silk worms) (European Commission, September, 2019).

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In the next period (2021-2027), the Common Agricultural Policy will also support those sector facing difficulties, which are considered as important out of economic, social or environmental reasons, so that these sectors can improve their competitiveness, sustainability or quality, through supplementary support, known as coupled income support (European Commission, June, 2018). The eligible member states can allocate maximum 10% of direct payments to the coupled income support, and a supplement of 2% can be reserved to support protein crops (European Commission, June 2018).

MATERIAL AND METHOD

The research work from the present paper was based on a comprehensive quantitative analysis, consisting of a descriptive part of the dairy cow and buffalo cow raising sector in Romania in the post-accession period and an explicit analysis of the impact of the payment scheme implementation –*the coupled support*– upon the sector, across regions, in the period 2015-2018.

The coupled support is granted to those sectors or regions in a member state in which certain types of agriculture or certain agricultural sectors that are extremely important out of economic, social or environmental reasons are affected by certain difficulties (Matthews, A., 2018). Except for the protein crop sector, the coupled support can only be granted to the extent necessary to create an incentive for maintaining current production levels in the sectors or regions concerned (Matthews, A., 2018).

The coupled zootechnical support (CZS) for raising Romanian dairy cows and buffalo cows is granted to active farmers owning a minimum number of 10 and maximum 250 dairy cow heads (for the mountain region, minimum 5 to maximum 250 heads); for buffalo cows, support is granted to active farmers with maximum 100 heads. The livestock herds must be identified and registered in the National Register of Holdings (NRH) and entered in the Genealogical Registry of Breeds (GRB) and the Official Control of Production (OCP). The applicants must have a contract concluded on minimum 6 months, valid at the moment of submitting the single payment request, with a first buyer and at least one fiscal document attesting milk delivery or, in case when the producer owns his own milk processing unit. Granting the coupled support for the milk sector does not have any connection to the breed, but only to a minimum milk yield per animal head alongside with the proof that this is sold with legal documents. Breeds are mentioned only for investment projects, making reference to the local breeds, those already acclimatised to the conditions in Romania.

The data necessary for this study have resulted following consultation of a large amount of specialty materials (workpapers and articles, scientific treatises and other scientific materials published in the country and abroad by specialised bodies). The statistical information was taken from national databases (Tempo Online, NIS, APIA, MARD), community databases (Eurostat database, the European Commission) or international databases (FAOSTAT), as well as from specialised websites. Some data of interest were taken from official announcements or from the economic media.

RESULTS AND DISCUSSIONS

Starting with the year 2015, in order to increase productivity, maintain yields and decrease the abandonment risk in the livestock sector activities, a new direct payment scheme was introduced at EU level, funded from the European Agricultural Guarantee Fund, namely: *Coupled Zootechnical Support (CZS)*.

In Romania, from the perspective of the sector to which the coupled support was provided, it can be mentioned that in the period 2015-2019, the livestock sector benefited from a total amount of 679.3 million euros, with an increasing share in total coupled support value (crops and livestock) from 52% in 2015, to 67% in 2019. In the same period, 416.4 million euros were allocated to the dairy cow and buffalo cow sector, i.e. 61.3% of the value of the coupled zootechnical support. In evolution, although the value of the coupled support to the sector increased from 69.9 million euros in 2015 to 96.6 million euros in 2019, the share in total livestock support diminished from 69.3% in 2015 to 55.7% in 2019 (Table 1)

Table 1. Evolution of total amount authorised for payment (Coupled Zootechnical Support) in the milk sector – thousand euros

Item	2015	2016	2017	2018	2019
Dairy cows (thousand euros)	68584	75592	83172	86165	94999
%	68.0	66.9	58.3	57.8	54.8
Dairy buffalo cows (thousand euros)	1312	1474	1627	1867	1610
%	1.3	1.3	1.1	1.3	0.9
Total livestock sector (thousand euros)	100919	113043	142783	149014	173509

Source: author's calculations based on data from the Agency for Payments and Intervention in Agriculture

By regions, in the milk sector (cows and buffalo cows), the largest amount authorised for payment was allocated to the region Centru, i.e. 41.0% in 2015 and 32.3% in 2018, and the lowest amount (except for Bucharest – Ilfov Region) was allocated in the region Sud-Vest Oltenia (2.0% in 2018). On the second and third place we have the regions Nord-Vest and Nortd-Est, with 24.9% and 16.0% respectively in the year 2018 (Table 2). We should also mention that the counties Harghita and Mureș from the region Centru requested coupled support representing 24.4% and 22.4% respectively of total livestock coupled support in the region for the milk sector in the year 2018.

Table 2. Evolution of the Coupled Zootechnical Support (CZS) by regions, for dairy cows and buffalo cows

	2015		2016		2017		2018	
	Thousand euros	**%**	**Thousand euros**	**%**	**Thousand euros**	**%**	**Thousand euros**	**%**
Nord-Est	9941	*14.2*	10980	*14.2*	12496	*14.7*	14109	*16.0*
Sud-Est	5054	*7.2*	6321	*8.2*	7021	*8.3*	7191	*8.2*
Sud Muntenia	5544	*7.9*	6790	*8.8*	7057	*8.3*	7424	*8.4*
Sud Vest Oltenia	1108	*1.6*	1109	*1.4*	1394	*1.6*	1777	*2.0*
Vest	5604	*8.0*	6222	*8.1*	6424	*7.6*	6817	*7.7*
Nord-Vest	13246	*19.0*	19162	*24.9*	21167	*25.0*	21953	*24.9*
Centru	28675	*41.0*	25812	*33.5*	28856	*34.0*	28440	*32.3*
București-Ilfov	724	*1.0*	672	*0.9*	385	*0.5*	320	*0.4*
TOTAL	69895	*100.0*	77067	*100.0*	84800	*100.0*	88032	*100.0*

Source: author's calculations based on data from the Agency for Payments and Intervention in Agriculture

In the case of dairy buffalo cows, we can see that 77% of the total amount was granted to the regions Nord -Vest (46%) and Centru (31%). The counties with the largest number of animals authorised for payment in the year 2018 were Brașov (22%), Cluj (17%), Sălaj and Sibiu with 15% each.

In the analysed period (2015-2018), as we can see in Table 3, the largest amount (euros/head) for dairy cows was received in the year 2015 (Table 3).

Table 3. Evolution of coupled support in dairy cows (euros/head)

	2015	2016	2017	2018
Nord-Est	869	768	391	335
Sud-Est	845	677	297	333
Sud Muntenia	739	722	395	333
Sud Vest Oltenia	823	712	324	329
Vest	852	716	351	370
Nord-Vest	855	728	392	335
Centru	868	734	453	355
București-Ilfov	847	723	397	326
	850	729	395	343

Source: author's calculations based on data from the Agency for Payments and Intervention in Agriculture

After 2015, the amounts granted per dairy cow head started to decrease, as in the next period more and more farmers were interested in this payment scheme and were ready to fulfil the conditions to be eligible for payments.

Although in the period 2015-2018 a new direct payment scheme was introduced (the coupled support) financed from the European Agricultural Guarantee Fund (EAGF), in the year 2015, only 84901 cow and buffalo cow heads (7.1% of total herds) were authorized for payment under this scheme, and in the year 2018, 259990 heads (22.5% of total herds). Even with the introduction of this payment scheme, the female breeding stock continued to decrease both at national and regional level (Table 4).

Table 4. Evolution of total cow and buffalo cow herds (thousand heads)

	2015	2016	2017	2018	2018/2015
Nord-Vest	219	222	217	214	-5
Centru	208	208	212	211	3
Nord-Est	285	280	275	270	-16
Sud-Est	124	125	125	127	4
Sud Muntenia	144	141	140	135	-9
București-Ilfov	3	5	4	3	0
Sud Vest Oltenia	115	116	109	105	-10
Vest	92	96	93	93	0
TOTAL	1191	1193	1175	1158	-33

Source: Tempo online, National Institute of Statistics

Thus, in the analysed period, the total livestock number decreased by 33 thousand heads; by regions, the decrease ranged from 5 thousand heads (Nord-Vest) to 16 thousand heads (Nord-Est). Nevertheless, the number of herds increased in the region Sud-Est (4 thousand heads) and Centru (3 thousand heads).

The total production of cow and buffalo cow milk decreased from 42.7 million hl, in 2015, to 40.6 million hl in 2018 (-4.7%), mainly due to the decrease in the number of cows in the mentioned period by 2.8%. By regions, as we can see in Table 5, milk production increased only in the region Centru (+365 thousand hl); in the remaining regions, production decreased by percentages ranging from 0.2% (Vest) to 9.2% (Sud-Est), except for the region București-Ilfov.

Table 5. Evolution of total cow and buffalo cow milk production by regions (thousand hl.)

Region	2015	2016	2017	2018	2018/2015
Nord-Vest	7976	7604	7653	7410	-566
Centru	7064	7074	7209	7429	365
Nord-Est	10638	10182	9752	9694	-944
Sud-Est	4386	4338	3954	3982	-404
Sud Muntenia	4965	5086	4792	4816	-149
București-Ilfov	182	202	187	133	-49
Sud Vest Oltenia	4185	4125	3745	3924	-261
Vest	3267	3409	3272	3259	-8
TOTAL	42663	42020	40564	40647	-2016

Source: Tempo online, National Institute of Statistics

The average milk yield per dairy cow, in the analysed period, had a slight decreasing trend, from 3583 litres/head (2015) to 3510 litres/head (2018); compared to other new EU member states (Czech Republic, Hungary, Slovakia, Slovenia, Poland, Bulgaria), Romania had the lowest evolution of yields, by only 3.8%, in the period 2007-2016, as compared to 60.1% (Poland) and 23.2% (Czech Republic).

Milk collection is the decisive factor for each processing unit profitability, and this is still an insufficiently solved problem in Romania. The main reason is represented by the high milk production fragmentation, which increases transport costs; experts consider that transport costs represent around 30% of the procurement price for raw milk (Adrian Stoica, 2018).

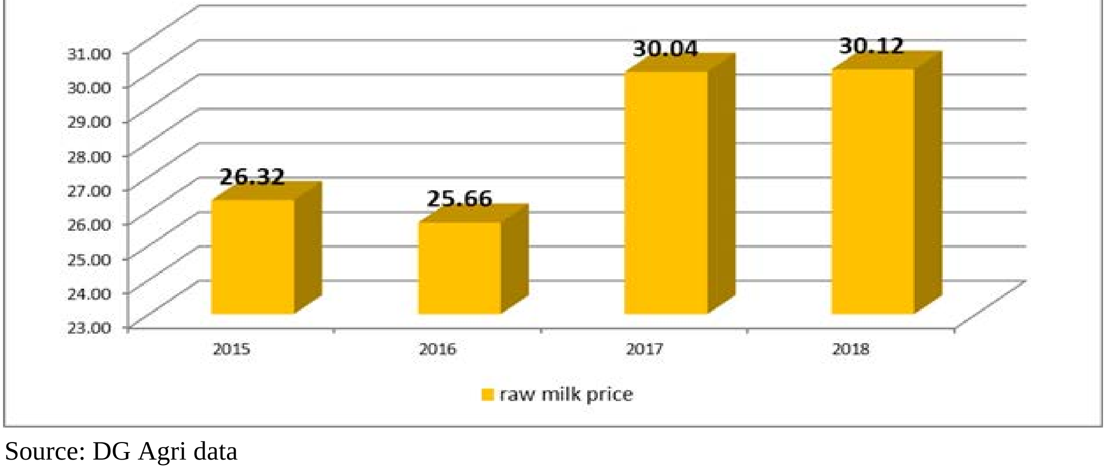
The medium size of a dairy cow farm did not evolve significantly, in the period 2015-2018, continuing to be low (2.74 heads / farm in 2018, as against 2.28 heads / farm in 2015). We can also mention the diminution of the total number of farms from 619864 in 2015, to 531851 in 2018

(-14.2%) and the increase of the number of commercial farms (with over 50 heads) from 1096 in 2015, to 1319 in 2018. Although these commercial farms have a low share in total farms (0.25%), they concentrate 12% of the female breeding stock.

In the period 2015-2018, the quantity of raw milk collected for processing increased from 1068 thousand tons (2015) to 1291 thousand tons (2016), based on the increase of milk quantities collected from the Romanian farms by 20.2% and on the increase of raw milk imports by 26.6%.

In Romania, compared to the EU 28 member states, prices has constantly been under the European average, the Romanian raw milk being one of the cheapest in the EU, only the Baltic countries ranking behind us (Figure 1). Prices recovered in 2017 and 2018, and their increase towards the levels of previous years was quite significant (14.4% in 2018 as against 2015).

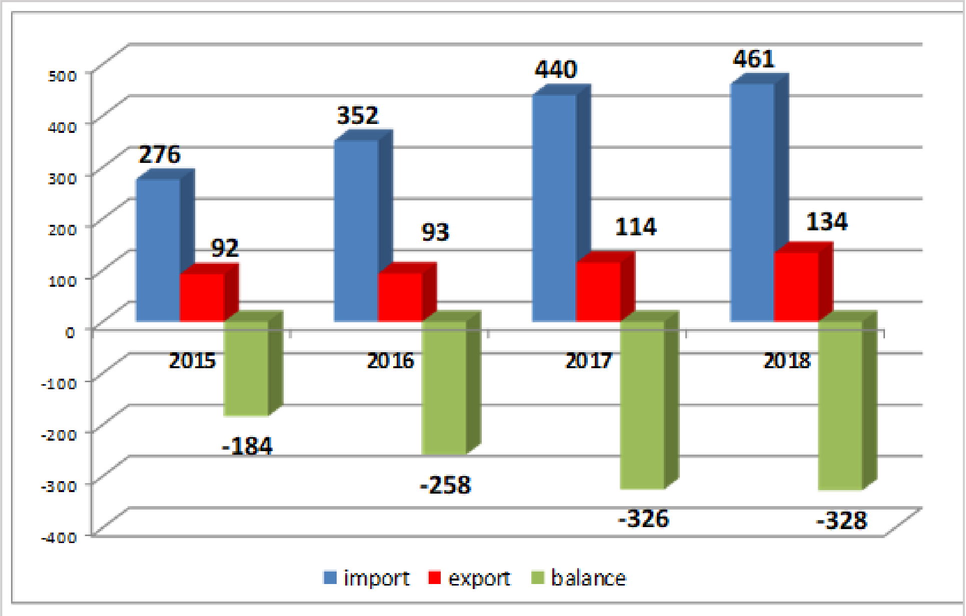
Figure 1. Annual average prices of raw cow milk in Romania (euros / 100 kg)



Source: DG Agri data

In the period 2015-2018, Romania constantly had a trade balance deficit in the milk and dairy trade. In the year 2018, the highest trade deficit was registered (-327.7 million euros), 1.8 times as high than the trade deficit in the year 2015.

Figure 2. Romania's trade balance in milk and dairy products (million euros)



Source: Export Helpdesk-Europa EU

The main cause was VAT reduction in June 2015, which led to the increase in the consumption of dairy products, but the additional demand was covered from imports mainly in butter, cheese and drinking milk. More important increases of the imported quantities of dairy products were mainly registered starting with the year 2014, the year of the removal of milk quotas in the European Union and milk market liberalization, but also in the next period: 2015-2018.

Measures for supporting the milk sector as a result of crisis induced by the Coronavirus pandemic

The Coronavirus pandemic started under the background of a large raw milk supply. School closing in Romania starting with March 14, 2020 has resulted in a significant quantity of milk from the domestic production not being delivered any more under the *'milk in schools'* scheme to the final consumer (pre-school children and pupils). At the same time, the closing down of an important part of the HORECA industry selling points has resulted in the decrease of consumers' demand for a certain classical category of dairy products. All these have negatively influenced the entire milk chain in Romania, but mainly the primary sector, milk producers in particular, who are mostly affected by their business vulnerability. In the situation in which processors cannot collect the entire raw milk supply from the farm gate, as they do not have not having sufficient processing and storage facilities, there is a clear situation that farmers must accept low prices or they may be forced to dispose of (throw away) the milk on the farm, which would have huge implications, both ecologically and financially. On the other hand, farmers claim that as long as the dairy products prices have not decreased on the shelves of supermarkets, processors have no reason to raise prices when buying raw milk at the farm gate.

On the other hand, this year's drought, as well as other logistical constraints related to transport and handling represent clear premises that dairy farmers will be mostly affected by the increase of costs both in concentrated feeds (cereals), and in bulk fodders (green fodder, fibre feeds, etc), which will have an impact on the milk price, as it is known that feeds represent around 60% of the cost of producing cow milk.

In order to optimize and manage some specific agricultural activities, in the period when the COVID-19 pandemic affects the EU member states, a series of normative acts adopted by the European Commission have been published in the Official Journal of the European Union (APIA, 2020). These regulations also refer to market intervention through granting an aid for the private storage of certain agri-food products, such as beef, goat and sheep meat, butter, skimmed milk powder and cheese. Thus, the Application Rules (EU) 2020/597/591 of the Commission from April 30, 2020 were issued, establishing the legal framework for granting aid for the private storage of butter, skimmed milk powder and cheese and establishing the aid value in advance (APIA, 2020).

Taking into account the difficulties facing the livestock sector farmers, namely decrease of procurement prices, restrictions to the livestock transport to processing/direct sales, decrease of livestock herds, of live animals export, as well as the many claims from the cattle farmers' representatives, and to compensate losses caused by the COVID 19 pandemic, Romania's Government issued the Emergency Ordinance no. 149/2020 establishing a state aid scheme to support the activity of cattle farmers in the context of the economic crisis generated by the COVID 19 pandemic**.** The state aid is granted to the beneficiaries owning minimum 91 adult female bovine heads registered in the National Register of Holdings (NRH) on July 1, 2020, and its value represents the equivalent in RON (national currency) of 100 euros/head of adult female cattle, the maximum value of this state aid scheme being 35700 thousand RON.

Farmers owning less than 91 bovine heads will receive financial support during the crisis through a new temporary measure from the National Rural Development Program (NRDP) 2020 **(**Measure 21, which will be opened until the end of the year 2020, after approval by the European Commission). The eligibility conditions are that the applicant must own minimum 5 LLU (Large Livestock Units) adult females from the bovine species, registered in the National Register of Holdings (NRH), aged minimum 24 months on July 1, 2020. The support for the cattle sector/farm will be: 1000 euros for 5 LLU - 10 LLU; 2500 euros for 11 LLU - 20 LLU; 3500 euros for 21 LLU-30 LLU; 4750 euros for 31 LLU-40 LLU; 5000 euros for 41 LLU-50 LLU; 6000 euros for 51 LLU-60 LLU; 7000 euros for 61 LLU-90 LLU.

CONCLUSIONS

In the period 2015-2018:

- The amount authorised for payment for total livestock sector increased by 47.7%, with the highest increase in the sheep and goat sector (133.4%), and lowest in beef cattle (13.3%); in the cow and buffalo cow sector, the increase was by 26%;
- The number of dairy cows and buffalo cows authorised for payment increased by 175 thousand heads;
- The share of cows and buffalo cows authorised for payment in total livestock number increased from 7.1% in 2015, to 9.2% in 2016, to 18.6% in 2017, to reach 22.5% in 2018;
- Both the raw milk quantity collected from the Romanian farms and the imported raw milk increased by 20.2% and 26.6% respectively;
- The average dairy cow farm size did not evolve significantly, in the period 2015-2018, continuing to be low (2.74 cow heads /farm in 2018, as against 2.28 cow heads /farm in 2015)
- The total number of farms diminished by 14.2%

- The number of commercial farms increased (farms with 50 heads) from 1096 in 2015, to 1319 in 2018
- A price recovery was noticed in 2017 and 2018, the increase towards the levels in previous years being quite important (14.4% in 2018 opposed to 2015).
- Imports of dairy products continued their upward trend, with the market dominated by imports from Hungary and Poland.

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TERRITORIAL DIMENSION OF WHEAT PRODUCTION IN ROMANIA

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Abstract: *Romania's significant agricultural productive potential can fully cover domestic demand and can ensure important export deliveries. However, the yield of cereal production is below the European Union average. Of these, an important place is occupied by wheat production. Taking into account these aspects, the paper investigates the potential of wheat production in Romanian counties starting from a set of indicators and using cluster analysis to identify similarities and disparities between counties from this point of view. Through this study we tried to provide answers to the questions: What is the configuration of wheat production yield at the regional level in Romania? What is its evolution over time? The results obtained during the research show that there are disparities in the counties of Romania in terms of the efficiency of wheat production in correlation with the resources used for its production.*

Keywords: *agricultural sector, wheat production, production yield, regional development, Romania*

JEL classification: *C10, C38, O13*

INTRODUCTION

Balanced territorial development, including the adoption of rural development measures, embodied in national and regional programs to address the needs and challenges facing rural areas, are major objectives pursued by the Common Agricultural Policy of the European Union (CAP, 2017). In promoting and supporting territorial cohesion, many experts believe that public policies must take into account primarily territorial needs (Sykes & Baing, 2017 and Popescu & al., 2016) even if there is currently no consensus on how this should be done.

The identification of these needs, of the mechanisms necessary for their satisfaction process, must be done by each country (Kruzslicika, 2018), depending on the scale of existing regional disparities, social preferences, division of power in that country, the nature of regional challenges, but also the available financial resources (Traşcă et.al., 2013).

Agricultural products are part of the regional identity due to several factors, among which the most important are the natural environment and climate. The soil and climatic conditions in Romania correspond, to a large extent, to the biological requirements for the cultivation of wheat and, as a result, rich crops of superior quality can be obtained.

Wheat cultivation is a tradition of Romanian agriculture (Soare, 2018), being a basic product in food consumption (bakery wheat) as well as in animal consumption (feed wheat). In Romania, the consumption of wheat and wheat products is higher than the European average, and in terms of wheat production, in 2018, Romania occupied the 4th position in the EU, with 10.27 million tons. The continuous development of agricultural production, and implicitly of wheat, accelerates the process of economic growth, by taking over a part of the value produced by agriculture by other economic branches. (Dospinescu, 2005)

The development of agriculture, implicitly the production of wheat, is determined not only by the natural environment, climate and its changes (Taylor et.al., 2018), but also by other factors, some with negative effect, including: water pollution (Stoica, 2006), soil erosion, air quality, pandemics (Zhang, 2020), and others with a positive effect on regional development, such as the development of rural economies driven by the development of rural tourism (Davidescu et.al., 2018).

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At the level of the European Union, 10.5 million farms, of which 32.7% located in Romania where registered in 2016 (Eurostat, ef_m_farmleg, 2019). At the same time, it should be specified that Romania is on the list of EU countries with the smallest average farm size, measured by standard production, and the Southwest Oltenia region has the lowest standard level of production per farm (EUR 2,710). As for farm managers, over 40.0% of them were over 65, which implies the encouragement of a new generation of farmers.

This article presents a statistic of wheat production at territorial level in Romania, provides information on the territorial dimension of wheat production yield and identifies suitable areas for wheat cultivation using the cluster method.

The article was structured in five sections containing the introduction, the research methodology used in validating the objectives proposed in the research, a section in which the results obtained and the related discussions are presented, and the last part contains the conclusions and references sections.

RESEARCH METHODOLOGY

The methodology of data collection and analysis was based on two main stages: territorial analysis of the evolution of the weights of cultivated areas with the main cereal crops, with emphasis on wheat production in order to identify areas with potential, and respectively, cluster analysis of similarities and dissimilarities between the 41 counties of Romania considering the wheat production in 2019. In the study, 8 indicators were used, the abbreviations, meanings and units of measurement can be found in Table 1.

Table 1 The main variables used in the analysis of similarities and disparities regarding wheat production at territorial level

Variable	Significations	UM
AWF	Area cultivated with wheat in farms, at county level	ha
AWIF	Area cultivated with wheat in individual farms, at county level	ha
WPF	Wheat production per hectare on farms, at county level	Kg/ha
WPIF	Wheat production per hectare on individual farms, at county level	Kg/ha
SWF	The share of the area cultivated with wheat in farms, in the total area cultivated with wheat, at county level	%
SWIF	The share of the area cultivated with wheat in individual farms, in the total area cultivated with wheat, at county level	%
SCAF	The share of the cultivated area with the main crops in farms, at county level	%
SCAIF	The share of the cultivated area with the main crops in individual farms, at county level	%

An image of the relationships between wheat production and its yield was highlighted by applying a quantitative descriptive method, which is based both on the comparative analysis of the absolute values of the eight indicators, recorded in the counties included in the study, and by highlighting the relationships between these.

The main characteristics of the variables included in the study are presented in Table 2. From their analysis, a first observation concerns the rather high values of standard deviation (Std.Dev) in relation to the average values of the variables AWF and AWIF; this fact is due to the significant differences between the relief forms specific to the counties of Romania. At the same time, for the WPF and WPIF variables that refer to yields per hectare, the coefficients of variation have the values of 14.8% and 16.4% emphasizing the significance of their values. With regard to the other four variables, there are differences between farms and individual farms in terms of the area of cereal-grown areas in total cultivated areas, and of wheat-cultivated areas in total.

Table 2 Descriptive statistics of data series

	AWF	AWIF	WPF	WPIF	SWF	SWIF	SCAF	SCAIF
Mean	27680.41	24948.78	4354.05	4295.15	43.37	56.08	31.30	68.10
Std.Error	4927.20	4365.93	100.78	110.19	3.71	3.72	3.23	3.23
Median	13413.00	15402.00	4211.00	4359.00	41.73	57.12	27.38	72.16
Std.Dev	31549.49	27955.60	645.28	705.54	23.73	23.81	20.67	20.69
Kurtosis	0.34	5.93	-0.61	-0.59	-1.10	-1.10	-0.66	-0.64
Skewness	1.25	2.33	0.23	0.05	-0.09	0.13	0.50	-0.48
Range	104159.00	132286.00	2608.00	2790.00	81.98	81.98	78.08	78.90
Minimum	99.00	3000.00	3196.00	2911.00	1.64	16.38	0.73	20.27
Maximum	104258.00	135286.00	5804.00	5701.00	83.62	98.36	78.81	99.16
Cnf.Lev (95%)	9958.25	8823.88	203.68	222.70	7.49	7.52	6.52	6.53

Source: Developed by authors using SPSS

To analyze the disparities and similarities between the counties of Romania regarding the efficiency and yields of wheat production, it was used the hierarchical clustering analysis. (Johnson, 1967 and D'Andrade, 1978). The cluster analysis was performed against four indicators: area cultivated with wheat in farms, at county level (AWF), area cultivated with wheat in individual farms, at county level (AWIF), wheat production per hectare on farms, at county level (WPF) and wheat production per hectare on individual farms , at county level (WPIF).

Cluster generation was performed using Euclidian distance (Proximity Martix) and Ward Linkage Method. To test the statistical significance of the membership of the variables in the clusters, as well as the average values obtained at the level of each cluster, we used the Levene's test (the variance homoscedasticity test) and the Welch robust tests of equality of means.

For testing the statistical hypotheses on homoscedasticity of variance and on the statistical significance of the average values of the indicators analyzed at the cluster level (tests of equality of means), the significance level used was 95% ($\alpha = 0.05$), and in exceptional cases being allowed and 90% ($\alpha = 0.10$).

RESULTS AND DISCUSSIONS

The evolution of the weights of the cultivated areas with the main crops by forms of ownership in the period 1990-2019 shows us significant differences between the three forms of ownership, but also their considerable variations during the 20 years. (Figure 1).

At the beginning of the analyzed period, 1990, the largest share of areas cultivated with the main crops was owned by the state (71.64% compared to 28.36% individual farms and 0% farms). This situation changes from the following year, with the start of the privatization process by the adoption of Law no. 15/1990, by which the former state enterprises during the communist regime were transformed into commercial companies or autonomous companies. Thus, at the end of the analyzed period the largest share of areas cultivated with the main crops is found in Individuals farms (59.30%), followed by farms (40.36%), while the state still owns only 0.53%.

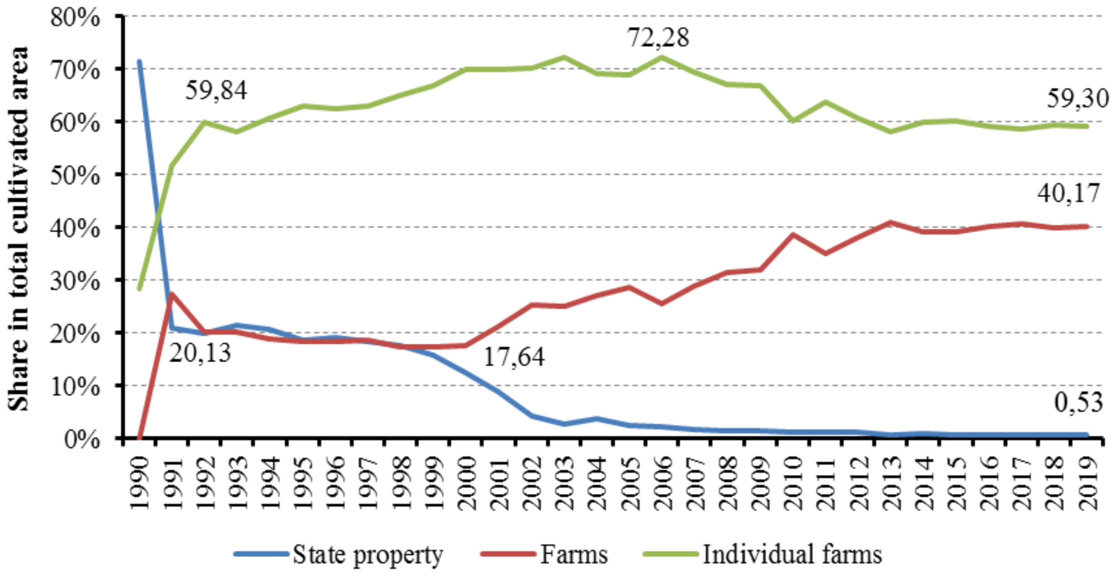

Figure 1 Evolutions of the weights of cultivated areas with the main crops by forms of ownership in the period 1990-2019

In 2019, from the point of view of the counties that have the largest shares of individual farms in the areas cultivated with the main crops, Vâlcea stands out with 99.16% on the first place, then on the second place Gorj county with 98.1% ha, and on the last place is Călărași with 20.27%. (Figure 2)

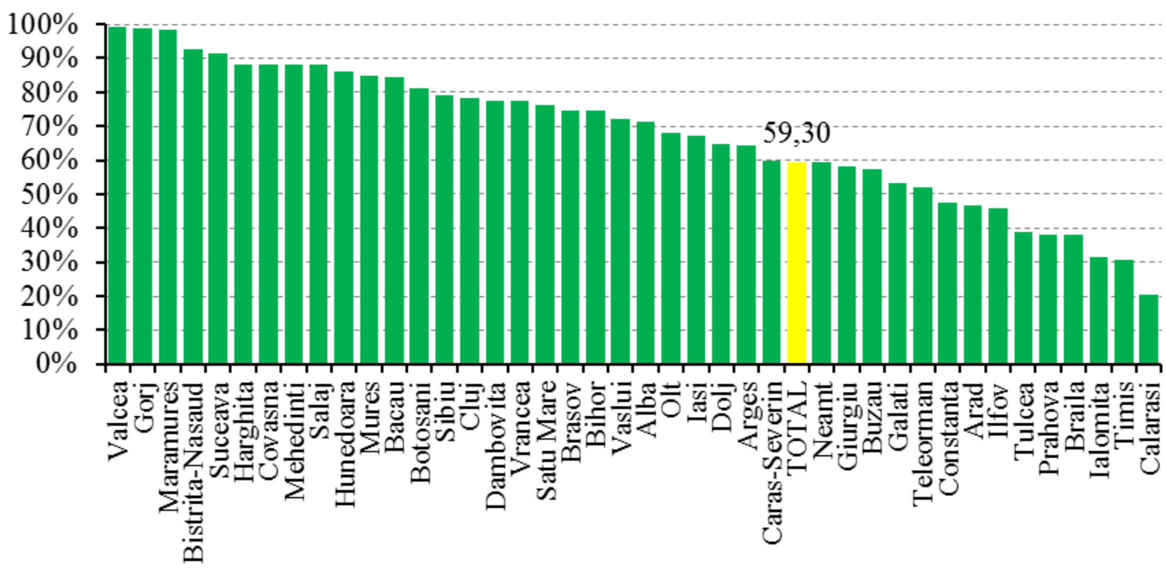

Figure 2 Distribution of individual farms shares in cultivated areas with the main crops at the county level compared to the average value in Romania in 2019

Regarding the average annual evolutions of wheat production per hectare in farms and individual farms in the period 1990-2019, major fluctuations can be observed over short time intervals (2-3 years), and starting with 2012, wheat production, in both forms of ownership, it is on an upward trend until 2018, when we notice a slight decrease. (Figure 3)

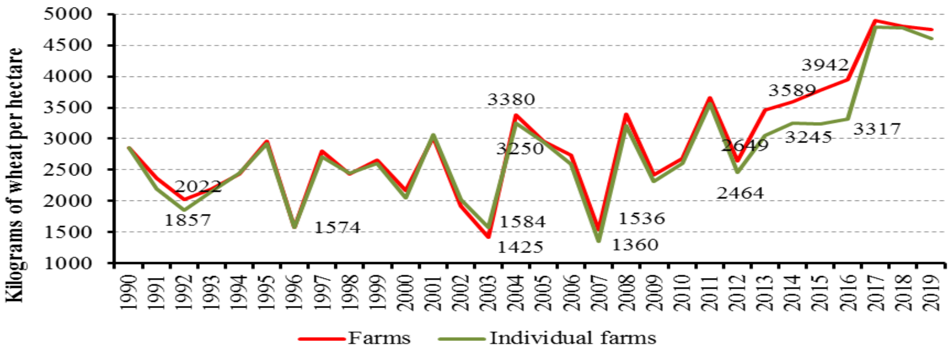

Figure 3 Average annual developments of wheat production per hectare in farms and individual farms in the period 1990-2019

If in 1990, the annual average of wheat production was 3235 kg / ha (by 2861 kg / ha for both types of farms), in 2019 it increased by 98.53%, reaching 4749 kg / ha.

Starting from the four indicators mentioned above (AWF, AWIF, WPF and WPIF), the similarities and disparities between Romania's counties, in terms of wheat production efficiency in farms and individual farms in 2019, were analyzed based on hierarchical cluster methodology, through a hierarchy in five clusters. The Levene test was used to analyze the statistical significance of the mean values at the level of the clusters and to assess the degree of homogeneity of the variance (Table 3).

Table 3 Results of Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
AWF	10.232	4	36	0.000
AWIF	2.241	4	36	0.084
WPF	.961	4	36	0.441
WPIF	1.737	4	36	0.163

The results obtained after the application of the Levene test show that, for three of the four indicators, at a significance threshold $\alpha = 0.05$, the null hypothesis H_0 can be accepted. For the indicator "Area cultivated with wheat in farms, at county level" with Sig. = 0.00 $<\alpha = 0.05$, the null hypothesis H_0 must be rejected and, consequently, the ANOVA methodology cannot be applied.

To test the equality of the averages, starting from the premise that there is no homogeneity of the variance of the four indicators in the clusters and the fact that the groups do not have equal dimensions, the Welch and Brown-Forsythe tests were used. According to them, the statistic is significant at the level of 0.05 and the null hypothesis that the groups have equal averages is rejected.

Table 4 Results of Robust Tests of Equality of Means

		Statistic[a]	df1	df2	Sig.
AWF	Welch	20.203	4	11.804	0.000
	Brown-Forsythe	27.532	4	10.680	0.000
AWIF	Welch	12.107	4	11.714	0.000
	Brown-Forsythe	22.878	4	7.635	0.000
WPF	Welch	47.405	4	12.397	0.000
	Brown-Forsythe	36.332	4	21.308	0.000
WPIF	Welch	45.208	4	12.139	0.000
	Brown-Forsythe	23.922	4	13.159	0.000

Asymptotically F distributed.

The results of the Welch and Brown-Forsythe tests show that, for all four indicators analyzed, all Sig.F values are less than $\alpha = 0.05$, so the null hypothesis H_0 is rejected and, consequently, the averages differ significantly. Thus, the test results show that the cluster membership of the 41 counties of Romania is statistically significant and is presented in Table 5.

Table 5 Clusters structure

Cluster	Counties
C_1	Bihor, Buzau, Galati, Dambovita, Prahova, Ilfov, Valcea, Caras-Severin
C_2	Bistrita-Nasaud, Maramures, Satu Mare, Brasov, Harghita, Sibiu, Botosani, Iasi, Neamt, Suceava, Vaslui, Vrancea, Arges, Gorj, Mehedinti, Hunedoara
C_3	Cluj, Salaj, Alba, Covasna, Mures, Bacau
C_4	Braila, Tulcea. Calarasi, Giurgiu, Ialomita, Arad, Timis
C_5	Constanta, Teleorman, Dolj, Olt

Most counties are included in the second cluster (C_2), respectively 16 counties which represent 39.02% of the total of 41 counties analyzed. Next, in the first cluster (C_1) are included 8 counties, then in the fourth cluster (C_4) there are 7 counties, the third cluster (C_3) is composed of six counties, so that in cluster five (C_5) there are only 4 counties.

The characteristics of the Romanian county clusters, from the point of view of wheat crops at the level of 2019, are highlighted mainly through their classification in relation to the determined average values. The descriptive statistical parameters and the characteristics associated to each cluster in terms of the analyzed indicators are presented in table 6.

Table 6 Characteristics of Romanian county clusters in terms of wheat crops in 2019

Cluster	Variable	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound
1	AWF	19834.00	12006.45	4244.92	9796.36	29871.64
	AWIF	17467.38	17753.67	6276.87	2624.94	32309.81
	WPF	5238.88	314.87	111.32	4975.64	5502.11
	WPIF	5252.50	340.13	120.26	4968.14	5536.86
2	AWF	8645.13	8526.51	2131.63	4101.67	13188.58
	AWIF	12971.50	9213.82	2303.45	8061.80	17881.20
	WPF	4141.50	281.72	70.43	3991.38	4291.62
	WPIF	4132.00	335.80	83.95	3953.07	4310.93
3	AWF	5083.83	2759.33	1126.49	2188.09	7979.58
	AWIF	11464.17	6974.85	2847.47	4144.52	18783.82
	WPF	3417.17	179.07	73.11	3229.24	3605.09
	WPIF	3210.33	202.37	82.62	2997.96	3422.70
4	AWF	72681.00	24634.97	9311.14	49897.45	95464.55
	AWIF	31376.86	9910.84	3745.95	22210.86	40542.86
	WPF	4325.86	391.60	148.01	3963.69	4688.02
	WPIF	4358.14	449.01	169.71	3942.88	4773.40
5	AWF	74658.25	23658.43	11829.21	37012.41	112304.09
	AWIF	96798.50	26928.47	13464.24	53949.29	139647.71
	WPF	4889.25	309.06	154.53	4397.47	5381.03
	WPIF	4550.00	544.43	272.21	3683.69	5416.31

Taking into account with priority both the average values of wheat areas and productions, as well as the confidence intervals (Lower and Upper Bound), it is important to highlight the oscillation of these indicators by counties, at the level of each cluster.

A cluster analysis of the area cultivated with wheat in farms (AWF) places on the first place Constanța county with 104258 ha from C_5, then Arad with 97380 ha component of C_4, followed by Buzău with 34870 ha from C_1, then Argeș with 25196 ha belonging C_2 and Mureș with 8195 ha in C_3. The smallest AWF areas are noticed in C_5 with Olt county through the 49,407 ha, then in C_4 with Giurgiu county (36009 ha), followed by C_3 through Sălaj county (1584 ha), by C_1 through Vâlcea county (184 ha) and C_2 at the level of Maramureș county through the 99 ha.

In relation to these distributions by counties and clusters of AWF and the production of wheat per hectare of farms (WPF) should have a similar evolution. However, the situation is different, the oscillations at the level of each cluster being: at C_1 between 4746 kg / ha obtained in Galati county and 5804 kg / ha in Dâmbovița, for C_2 between 3714 kg / ha (Vrancea) and 4661 kg / ha (Sibiu) , then at C_3 the minimum production belongs to Mureș county with 3196 kg / ha, and the maximum to Covasna county with 3695. For C_4 the WPF variation is between the minimum of 3879 kg / ha in Brăila and the maximum of 4947 kg / ha in Ialomița, while, at the level of cluster C_5, Dolj county has the lowest production of 4598 kg / ha, and Constanța county has the highest production of 5237 kg / ha.

Regarding the AWIF indicator, it can be specified that the largest areas are in the counties of Dolj from C_5 (135286 ha), Bihor from C_1 (58641 ha), Giurgiu from C_4 (48091 ha), Mehedinți from C_2 (36835 ha) and Covasna from C_3 (21528 ha). The smallest areas for wheat cultivation at the level of individual farms are 76816 ha and are found in Constanța from C_5, then 15278 ha in Brăila from C_4, followed by 5185 ha in Sălaj from C_3, 3088 ha from Caraş-Severin of C_1, respectively 3000 ha from Maramureș belonging to cluster C_2.

The production situation corresponding to these areas (WPIF) highlights Ilfov county with a maximum of 4857 kg / ha and Caras-Severin with a minimum of 5701 kg / ha for C_1, then Hunedoara with a production of 3677 kg / ha, respectively Argeș and Sibiu both with a minimum of 4601 kg / ha for C_2. In C_3 the production oscillates between 2911 kg / ha (Sălaj) and 3512 kg / ha (Alba), then in C_4 the counties of Călărași with 3580 kg / ha and Arad with 4820 kg / ha represent the extremes of production, while for C_5 the highest production belongs to Teleorman county (4991 kg / ha) and the smallest to Dolj county (3756 kg / ha).

CONCLUSIONS

Assessing the territorial dimension of wheat production is very important in order to adopt measures that meet the needs of society and correctly identify the actions that are required to increase its yield.

The research aimed at two complementary objectives, on the one hand highlighting an image of the evolution of wheat production in the last 20 years, and on the other hand, identifying the best performing counties in Romania in terms of wheat production. The results of the study highlight a series of disparities in wheat production at the territorial level in Romania.

In 2019, cluster 1 (C_1) recorded the highest average values for two of the four indicators, the component counties are located in eastern and southern Romania (except Bihor - west), presenting the highest wheat production per hectare in Romania. This cluster, compared to the other four, ranks third through the average areas of the component counties (AWF and AWIF). Cluster 5 (Constanta, Teleorman, Dolj, Olt) is in the top of the ranking in terms of average values of the other indicators (AWF and AWIF), because it includes mainly the counties in southern Romania that have the largest areas cultivated with wheat. At the same time, due to the large cultivated areas and the very favorable climate, this cluster ranks second with the respective counties in terms of production per hectare for both general and individual farms (WPF and WPIF), a fact noted by the average values obtained. Although the second cluster (C_2) includes most counties (Bistrita-Nasaud, Maramures, Satu Mare, Brasov, Harghita, Sibiu, Botosani, Iasi, Neamt, Suceava, Vaslui, Vrancea, Arges, Gorj, Mehedinti, Hunedoara), they are not representative for wheat cultivation. This statement is supported by the average values of both cultivated areas and production per hectare, which places C_2 only in fourth place, compared to other clusters that have fewer counties. A similar situation is registered for cluster three (C_3) which, although it is composed of only six counties (Cluj, Salaj, Alba, Covasna, Mures, Bacau), the average values of all four indicators are so low that it will occupy last place in the rankings. Regarding cluster four (C_4) we can highlight the second place in terms of average values of areas cultivated with wheat (AWF and AWIF) and the third place for the yields obtained (WPF and WPIF).

Wheat production per hectare of farms in general but also of individual ones (WPF and WPIF) is distributed differently by counties at the level of each cluster compared to that of AWF and AWIF areas. This aspect reflects the fact that, regardless of the cultivated area, attention must be paid to the level of each farm, of each county regarding the cultivation and treatment methods applied, having a significant impact on the production obtained.

In the context in which wheat production, as a priority component of agriculture, faces significant disparities at territorial level, it is possible to mention the need to develop policies to support socio-economic development. In this direction, the priorities are: ensuring irrigation, applying efficient methods and techniques of cultivation, treatment and harvesting, attracting investments.

The research topic is open for further exploration, extension, and refinement in a future project. Thus, the authors consider that an analysis correlated with wheat production with the climatic and natural conditions specific to each county and the applied agricultural policies can lead to the identification of the causes that generate regional disparities in wheat production.

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RESEARCHES REGARDING THE INFLUENCE OF THE UNCONVENTIONAL SOIL TILLAGE SYSTEMS UPON WEEDING AND SOYBEAN YIELD, IN PEDOCLIMATE CONDITIONS IN THE TRANSYLVANIAN PLAIN

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Abstract: *The importance of soybeans derives from the multiple uses in the human nutrition, animal feeding, industry, but also as a plant that improves the physical properties of the soil by improving the soil in nitrogen. Regardless of the use of practical cultures, for obtaining high yield in terms of quantity and quality, a particularly important role for all other technological links, can be to fight the weeds. Soybeans are sensitive to weeding the first stages of vegetation until the plants can reach the ground cover and at the maturation after the leaves start to fall. In this paper we present the weeding degree and the soybean yield realized, under the influence of unconventional tillage systems and climatic conditions from 2018-2019. In unconventional systems the number of annual monocotyledonous species decreases but the number of perennial weeds increases. As an alternative to the classical system, soybeans can be grown in a minimum tillage system (tillage with chisel), the difference in yield between the classical system is insignificant (only 16 kg/ha).*

Key words: *tillage system, clime, weeds, soybean, yield.*

JEL Classification: *Q 01, Q 15, Q 16*

INTRODUCTION

Soybeans are grown in several countries of the world, being one of the most valuable oil-protein plants due to seeds rich in protein, non-nitrogen extractive substances, fats, vitamins and mineral salts (Muntean et al., 1995; Scurtu, 2001). The judicious zonate of varieties, the efficient use of climate resources and the adaptation of all other technological elements specific to the cultivation area, is an important source in increasing soybean yield and does not require additional energy consumption.

Soybeans have high temperature requirements, the minimum germination temperature in the soil is 7-8^{o}C and the air temperature 14-15^{o}C. Immediately after rising and until the formation of simple leaves, soy temperatures of -2, -3^{o}C, but for a short period of time. The optimum temperature for the flowering period is around 24^{o}C, for seed formation a lower temperature of about 22^{o}C and when ripening the beans are required 19^{o}C (optimal). And compared to humidity has relatively high requirements, recording a specific consumption between 300-700 m^3 and the critical period for water is recorded in the phase of formation of reproductive organs, blooming and seeds formation (Muntean et al., 2008). The light requirements of the silk are like a short-day plant, by earlier sowing, the short days from the beginning of the vegetation play an important role in meeting the photoperiodic requirements of late and medium varieties (Muntean, 1995). Soybeans have high soil requirements, require medium-textured soils with neutral reaction (pH around 6.5), well drained, rich in humus phosphorus, potassium and calcium (Dencescu et al., 1982). The cultivation technology is differentiated according to the climatic characteristics, soil, the terrain of the area, the machine system and the impact of the technologies applied on the surrounding environment. The practice of the

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establishment of spring crops has shown that autumn ploughing is the work that ensures the best preparation of the germination bed, increasing the infiltration and conservation of water in the soil, combating weeds, diseases and pests, etc., especially for sugar beet, potato, maize, soybean crops, which are pretentious to the way soil is prepared (Gus et al., 2003). However, in dry autumns, when the soil is very dry and the ploughing is difficult or by ploughing would result in large lumps and difficult to shred but also for economic reasons, the preparation of the land through minimal works are preferred to the ploughing. Cultivation of soybeans in an unconventional system involves from the beginning the elimination of plowing and excessive tillage, aiming at preserving soil properties, reducing erosion, sequestration of carbon in the soil, accumulation and storage of water in the soil, reducing labor and fuel costs, reducing land traffic intended for culture, etc. In this system the basic work is carried out without the return of the furrow (chisel, disk, rotary harrow, cutters, etc.) with the preserve of plant residues in the proportion of 15-30% on the surface of the soil or superficially incorporated by the work performed, having the role of mulch (Chetan et al., 2019). It is accepted the ploughing a time every 3-5 years (Rusu et al., 2007). Regardless of the cultivation system practiced, in order to obtain superior yield in terms of quantity and quality, a particularly important role in all other technological links is the control of weeds, soybean being sensitive to weeding in the early stages of vegetation until the plants come to cover the land and towards maturity after the leaves begin to fall (Chetan et al., 2014). In its studies, Sarpe (1976) states that weeds cause significant damage to soybeans between 40-84% and significantly decrease yield. Kramer (quoted by Anghel et al.,1972) estimates that worldwide, weeds cause 95% damage (calculated by the difference between real and potential harvest) while Ciorlăus (1998) shows that in the countries with modern agricultural technologies losses can reach 27-42% of potential yield and in poorly developed countries losses can exceed 50-60%. The literature mentions 10% yield losses (Farmer's Digest, 1998) depending on the number of weed species present in the soybean crop: 0.3 pl/m.l. *Xanthium* sp; 1pl/m.l *Convolvulus arvensis*., 5 pl/m.l. *Agropyrum* sp. Slonovschi et al., 2001, specifies that weeds are much more resistant than crop plants to pedo-climate conditions due to a wide ecological plasticity, the large number of seeds they produce, germination in soil for several years. In reduce till and conservative systems, weed seeds usually remain at or near the surface of the soil, quickly germinating and infesting the next crop if not controlled by specific chemical treatments. Soil mulching is a means of keeping weeds under control due to the properties of weeds to remain inactive when light is absent. This practice uses: straw, vegetable scraps, leaves, sawdust, compost, to cover the soil. Without light weeds disappear, and at the same time water in the soil is better preserved and the activity of microorganisms (http://agroromania.manager.ro) is protected. In the relationship between the unconventional soil work system and weed control treatment, it is difficult to distinguish between cause and effect, since the degree of weeding can be influenced by the growth and defective development of soy plants which in turn can be influenced by other causes (strong infestation of the land in previous years with perennial weed species, quality of biological material used, unfavorable climatic conditions, etc.). In order to achieve successful results in agricultural yield and in the protection of the surrounding environment, it is necessary to choose the best combination of rotating crops, soil working method and chemical control of weeds (http://www.icpa.ro) in conservative agriculture. Treatments with herbicides applied pre-emerging and supplemented with treatments on vegetation can ensure a free crop of weeds (Berca, 2004), but the condition is the knowledge of the spectrum of weeds in order to take effective control measures as early as possible. When choosing herbicides, account should be taken of their selectivity, the spectrum of weeds specific to the respective soil, the recommended dose, the period of application as well as the correct and uniform administration (Rusu et al., 2014; Chetan et al., 2019). The ecological framework in Transylvania is given by the existence in interaction of a large number of factors, two of which seem to exhibit a dominant action for the agro-ecosystem: the first is the thermal background at its low temperature level and with large temporal variations, characteristics that impose significant restrictions on thermophile plants; the second is the hilly orography of the land with numerous soils degraded by erosion or temporary excess moisture, which impose restrictions on the structure of crops and the system of machines and tractors to ensure the mechanization of the work on the slope (ARDS Turda, 50th anniversary).

The purpose of the research carried out and presented in the paper is to establish the influence of the technology specific to the soil work system on the degree of weeding of the crop and yield obtained at soybeans.

MATERIAL AND METHODS

The research was carried out in 2018, 2019 at the Turda Agricultural Development Research Station, located in the Transylvanian Plain, on a vertical Phaeozem soil with a loamy-clay texture, with neutral pH, good and very good supply with mobile phosphorus and potassium, the soil content in humus being medium. The poly-factorial experience is organized according to the Method of the Latin Rectangle. The biological material used was the early variety Cristina TD, characterized by good resistance to fall and shaking, tolerance to drought, diseases and very good adaptability to mechanized harvesting (16-17 cm height of insertion of the first basal pods).

Experimental factors are: Factor **A-** Soil work system: a_1- (CS) conventional soil work system with plough (in autumn) + spring prepared germination bed with rotary harrow + sowing + fertilized; a_2- (MC) minimum soil work system with chisel (in autumn) + spring prepared germination bed with rotary harrow + sowing + fertilized; a_3- (MD) minimum soil work system with hard disc (in autumn) + in spring prepared germination bed with rotary harrow + sowing + fertilized; a_4- (NT) sowing system directly in the stubble of the pre-emergent crop (in the case of corn) + fertilized; factor **B** - year (climate conditions) b_1- 2018 and b_2- 2019.

Due to the fact that in the conservative system the technological works are reduced (without the frying), weed control carried out chemically in two stages: pre-emerging 0.35 l/ha (*metribuzin* 600 g/l) + 1.5 l/ha (8-*metolaclor* 960 g/l) and postemergent with 1.0 l/ha (*imazamox* 40 g/l) +1.5 l/ha (*propaquizafop*) in the phenophase 3-4 trifoliated leaves, the dicotyledonous weeds in the 2-4 leaf stage and the monocotyledonous weeds were not twinning. Sowing was carried out with the Gaspardo Directa-400 machine, the distance between the rows 18 cm, seed incorporation at 5 cm depth, the sowing density 65 g. g./m^2. At the same time as sowing, chemical fertilizer of $N_{40}P_{40}$ kg a.c./ha was applied. The degree of weeding of the soybean crop was achieved visually and numerically with the metric frame with sides of 50 cm. Harvesting was carried out in step: harvesting of protective bands around the experience; the harvesting of the front and lateral edges of the experimental variants (the frontal eliminations were 1 m and the lateral eliminations 0.60 cm), taking into account by the Wintersteiger combine harvested work width for the experimental plots harvester (1.4 m), the harvestable area of the experimental plot was 28 m^2.The experimental data were processed by analysis of the variant (Poly Fact, 2015) and setting the limit differences (LSD 5%, 1%, 0.1%).The evolution of the thermal and rainfall regime at ARDS Turda (Turda Meteorological Station, longitude: 23°47'; latitude 46°35'; altitude 427 m), for the period March-September from the 2018, 2019 experiment years, is shown in Figure 1 and 2.

RESULTS AND DISCUSSION

Atypical climatic conditions marked the 2018 agricultural year having a negative impact on the evolution of soybean culture. After the first three months of the year in which there was an excess of moisture, the drought occurred during the sowing period and in the period immediately following the sowing caused a soybean staggered rise which favored the weeding but also with an effect on the size of the plants, the blooming and the pods formation phenophases. The month of June brought quite a lot of rainfall that led to a lush growth of soy plants and an increase in the attack of diseases, especially mana (*Peronospora manshurica*). Also due to the high summer temperatures, there was also a slight change coloration on the soy leaves, in the form of discolored spots (sunburn). The autumn months (September and October) were warm and dry. The year 2019 had January rich in precipitation (rain and snow), followed by dry months (February and March), during which the water supply was reduced. The rains in the second half of April favored to the emergence and uniform development of the culture. After April there followed periods of high temperatures, in June there was a more pronounced lack of water, a period that coincides with soy plants that are in important phenophases and have a high water consumption. The last few months have been characterized by a significant lack of water correlated with high temperatures, close to the hot temperatures, with the phenomenon of burning occurring since the second decade of June. The March-September period of the two experimental years showed large variations in temperatures and precipitation, with long periods of time recorded without precipitation, the drought present in several months of the year, short-term torrential rains but also periods when the maximum daily temperatures were above 32°C, setting up the burn.

Figure 1. The thermal regime at ARDS Turda during March-September from the 2018, 2019

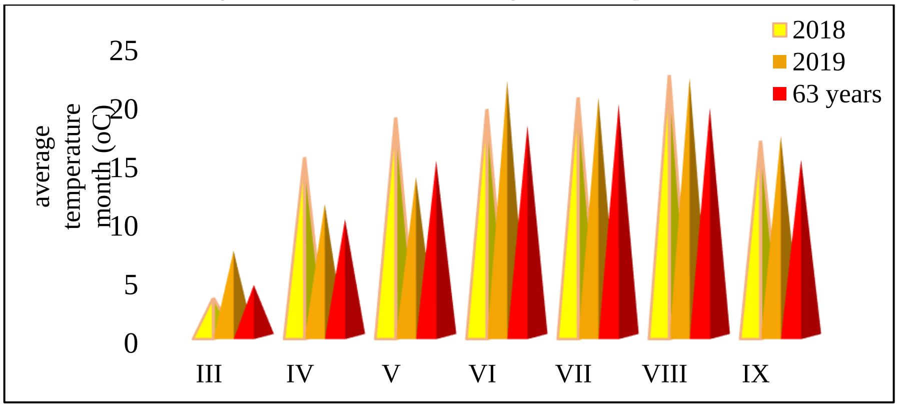
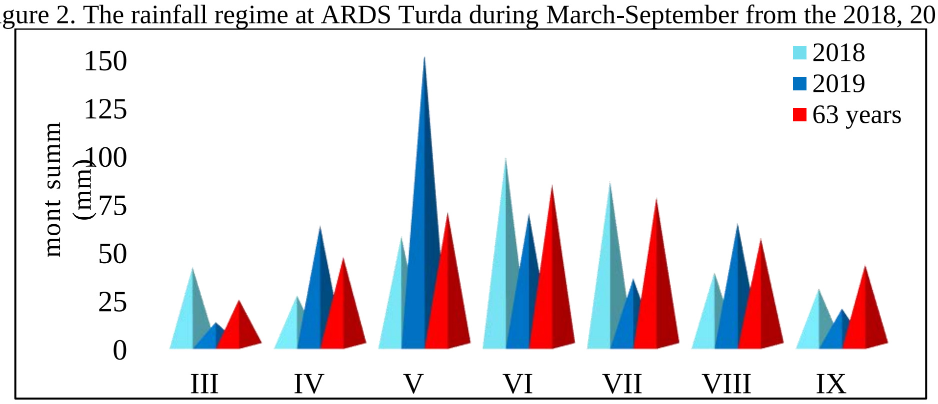


Figure 2. The rainfall regime at ARDS Turda during March-September from the 2018, 2019



The degree of improvement of the soybean crop according to the working variant of the soil, before the completion of the post-mergence herbicide is shown in Table 1. In 2018, with a dry spring, the degree of bottling of the soybean crop is higher with 130 weeds/m^2 compared to 2019 in which there were 104 weeds/m^2. This difference of 26 weeds/m^2 is due to a lack of water in the soil both before sowing and after sowing, soybean seeds have had poor germination and as a result of a defective emergence. The subsequent rains caused the soybean plants to rise in a staggered way, so that from sowing (24.04.2018) to sunrise the crop (17.05.2018) has passed almost a month, during which time the weeds have occupied the land. The effect of herbicides (*metribuzin* + *metolaclor*) applied in pre emergence has been diminished due to pedological drought and only by post-emergence treatment were weeds kept under control to some extent. The degree of weeding of soybean cultivation in 2018 was higher in the soil work system with disk (MD 41 weeds/m^2) and directly sown (NT 44 weeds/m^2). The beneficial effect of plowing and scarification with chisel was observed this year by the lower number of weeds (CS 21 weeds/m^2; MC 24 weeds/m^2). It was found that in all four variants of soil work predominates the annual dicotyledonous species followed by the perennial dicotyledonous species *Convolvulus arvensis*, *Rubus caesius* and *Lathyrus tuberosus.* The rains of April 2019 contributed to the solubility of the *metolaclor* in the surface layer of soil and the formation of the film of the *metribuzin* on the surface of the soil, with good effect in the control of weeds rise or rising (17.04.2019 weeding in pre-emergence), soil moisture has caused a uniform rises (17.04 sowing, rise on 30.04.2019) but also a good start in the development of soybean cultivation. The number of weeds recorded year was lower in all soil work systems, annual dicotyledonous weeds had the highest share and this year (CS 8 weeds/m^2; MC 11 weeds/m^2; MD 14 weeds/m^2; NT 17 weeds/m^2) and predominates species: *Xanthium strumarium, Chenopodium album, Hibiscus trionum* and *Polygonum convolvulus.*

Table 1. The weed species presented in culture before post-emergence herbicide applying, 2018, 2019

No.	Classification	Weeds species presented	Tillage system (A) no. weeds/m^2 -2018				Tillage system no.weeds/m^2 -2019			
			a_1-CS	a_2-MC	a_3-MD	a_4-NT	a_1-CS	a_2-MC	a_3-MD	a_4-NT
1	MA	*Bromus tectorum*	0	0	3	5	0	0	7	10
2		*Setaria glauca*	0	1	1	0	1	0	0	0
3		*Echinochloa crus- galli*	2	2	2	1	0	0	1	1
Total MA			**2**	**3**	**6**	**6**	**1**	**0**	**8**	**11**
1	MP	*Agropyron repens*	0	0	1	4	0	1	3	5
Total MP			**0**	**0**	**1**	**4**	**0**	**1**	**3**	**5**
1	DA	*Xanthium strumarium*	9	4	5	1	3	4	4	4
2		*Chenopodium album*	2	3	3	4	1	2	2	1
3		*Polygonum convolvulus*	2	3	4	3	0	0	1	1
4		*Tragopogon dubius*	0	0	2	4	0	0	1	2
5		*Sonchus asper*	0	0	2	2	0	0	1	1
6		*Hibiscus trionum*	1	3	2	4	1	1	2	3
7		*Anthemis cotula*	0	0	1	0	1	0	1	2
8		*Viola arvensis*	0	0	1	1	0	0	0	1
9		*Daucus carota*	0	0	1	0	0	0	0	1
10		*Silene noctiflora*	1	0	0	0	0	1	0	0
11		*Amaranthus hybridus*	0	1	0	0	1	1	0	0
12		*Datura stramonium*	0	1	0	0	0	0	1	0
13		*Galeopsis ladanum*	0	1	0	1	1	0	0	0
14		*Polygonum lapathifolium*	1	1	3	2	0	2	1	1
Total DA			**16**	**17**	**24**	**22**	**8**	**11**	**14**	**17**
1	DP	*Convolvulus arvensis*	1	2	3	4	1	1	2	3
2		*Rubus caesius*	2	2	2	3	1	1	2	2

3		*Cirsium arvense*	0	0	2	1	0	0	1	2
4		*Lathyrus tuberosus*	0	0	2	2	0	1	1	4
5		*Taraxacum officinale*	0	0	1	2	0	0	1	2
Total DP			**3**	**4**	**10**	**12**	**2**	**3**	**7**	**13**
Total weeds species			**130**				**104**			

To carry out post-mergence treatment, *imazamox* and *propaquizafop* herbicides had a good effect in combating weed species existing at the time, but the crop has re-infested with the annual dicotyledonous species mainly in the disk soil processing variant (MD 6 weeds/m^2 in 2018; 5 weeds/m^2 in 2019) and perennial dicotyledonous in the direct sowing variant (NT 7 weeds/m^2 in 2018; 5 weeds/m^2 in 2019). Variants CS and MC had the lowest number of weeds in both experimental years (1-2 weeds/m^2). Unconventional systems (MD and NT) have a different influence on the spectrum of weeds, so that in these systems the number of monocotyledonous species annually is reduced but the number of perennial weeds increases (Table 2). This may be influenced by the amounts of rainfall recorded in the spring but also by the staggered rise of weeds (the period of germination of weed seeds varies from species to species).

Table 2. The crop re-infested with weeds species after the soybean harvestig, 2018, 2019

No.	**Classification**	**Weeds species presented**	**Tillage system(A) no. weeds/m^2-2018**				**Tillage system (A) no. weeds/m^2 -2019**			
			a_1-CS	a_2-MC	a_3-MD	a_4-NT	a_1-CS	a_2-MC	a_3-MD	a_4-NT
1	MA	*Bromus tectorum*	0	0	1	3	0	0	1	1
2		*Setaria glauca*	0	0	0	0	0	1	1	0
3		*Echinochloa crus- galli*	1	1	1	0	1	0	0	0
Total MA			**1**	**1**	**2**	**3**	**1**	**1**	**2**	**1**
1	MP	*Agropyron repens*	0	1	1	1	0	1	2	2
Total MP			**0**	**1**	**1**	**1**	**0**	**1**	**2**	**2**
1	DA	*Xanthium strumarium*	2	1	2	1	1	2	1	1
2		*Polygonum convolvulus*	1	0	1	0	0	0	1	0
3		*Tragopogon dubius*	0	0	1	2	0	0	1	1
4		*Hibiscus trionum*	0	1	0	0	0	0	1	0
5		*Galeopsis ladanum*	0	0	1	0	0	1	0	0
6		*Polygonum lapathifolium*	0	0	1	0	1	0	1	1
Total DA			**3**	**2**	**6**	**3**	**2**	**3**	**5**	**3**
1	DP	*Convolvulus arvensis*	0	1	2	3	0	0	1	1
2		*Rubus caesius*	1	1	1	1	0	1	1	2
3		*Cirsium arvense*	0	0	1	2	1	2	1	1
4		*Taraxacum officinale*	0	0	0	1	0	0	0	1
Total DP			**1**	**2**	**4**	**7**	**1**	**3**	**3**	**5**
Total weeds species			**38**				**35**			

As can be seen in Table 3, in the classical soil work system considered as a control, the yields achieved were superior (2741 kg/ha) to the conservative systems (MD 2506 kg/ha and NT 2381 kg/ha), which had a significant and distinctly significantly negative influence in crop formation, the differences being 235 kg/ha (MD) 361 kg/ha (NT). The yield difference between the chisel work system (MC) and the control system (SC) is only 16 kg/ha which suggests that soy is a crop without high demands compared to the MC system applied in our area.

Table 3.The influence of the tillage system factor on the soybean yield, 2018-2019

Factor A-Tillage system	**Yield kg/ha**	**%**	**Differences**	**Signification**
a_1 CS	2741	100	0	Mt.
a_2 MC	2726	99	-16	-

a_3 MD	2506	91	-235	0
a_4 NT	2381	87	-361	00
LSD (p 5%) 181; LSD (p 1%) 333; LSD (p 0.1%) 738.				

The reaction of soybeans in the crop year is reflected in Table 4. In 2018 (considered a control) the drought during the sowing period (April with 26.2 mm precipitation) and especially in the summer months in which high temperatures persisted over a long period of time contributed to a yield of 2428 kg/ha. Although 2019, difficult in terms of temperatures and precipitation distribution, the rains in the period immediately after sowing (April 62.6 mm and May 152.4 mm) contributed to a good start in soybean cultivation, significantly influencing yield (2749 kg/ha), with the difference of 321 kg/ha compared to the previous year.

Table 4. The influence of year factors on the soybean yield, 2018-2019

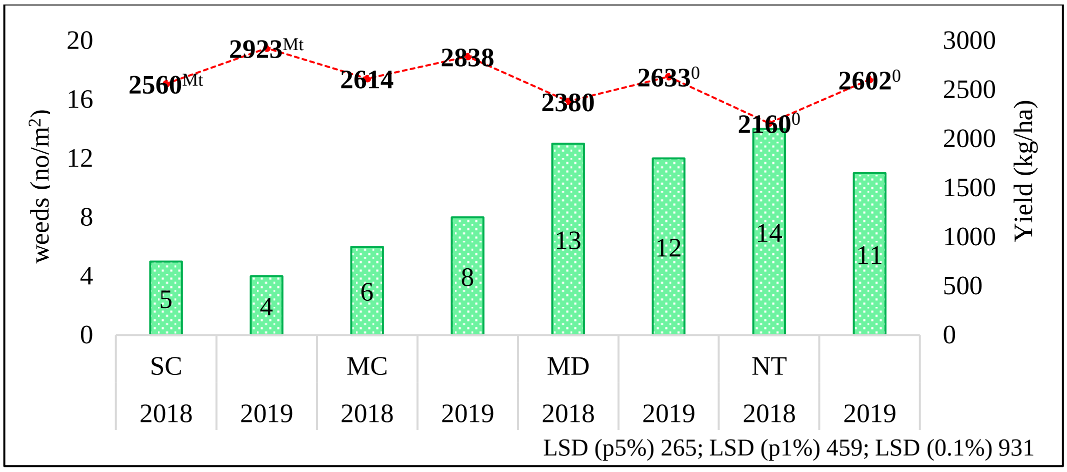
Factor B-year	**Yield kg/ha**	**%**	**Differences**	**Signification**
b_1 2018	2428	100	0	Mt.
b_2 2019	2749	113	321	**
LSD (p 5%) 137; LSD (p 1%) 226; LSD (p 0.1%) 424.				

The technology specific to the minimum system (MC), with the processing of the soil with chisel at 30 cm depth, seems to have a positive influence both in weed control and in the yield of near-control soybean yield (CS variant) during the two experimental years. Thus, in 2018 in the MC system there was a yield of 2614 kg/ha with 6 weeds/m^2 and in the control variant (CS) the yield was reduced by 54 kg/ha although there were only 5 weeds/m^2 (2560 kg/ha). In the second year of experimentation CS (2923 kg/ha) exceeded the MC system (2838 kg/ha) in terms of yield by 85 kg/ha and we believe that this difference is also due to the number of weeds higher in the MC system (8 weeds/m^2) compared to CS (4 weeds/m^2).

The specific technological variants MD and NT related to the degree of weeding of the crop negatively influenced the yield in the two experimental years, so that in 2018 MD with 13 weeds/m^2 there was a yield of 2380 kg/ha, 180 kg/ha lower than CS (witness) and 234 kg/ha compared to MC. In 2019 MD yield was 2633 kg/ha and 1230 kg/ha was recorded, the difference of 290 kg from the control has statistical assurance and has significantly negative influence. The NT system in 2018 significantly negatively influenced soybean yield, with the lowest yield and the highest number of weeds recorded in this variant (2160 kg/ha and 14 weeds/m^2), the difference from CS being 400 kg/ha and 9 weeds/m^2. Even though soybean yields in 2019 were higher in all soil tillage variants (compared to the previous year), the NT system has significantly negative influence (2602 kg/ha and 11 weeds/m^2) and resulted in yield with 321 kg/ha lower and 7 weeds/m^2 more than compared to the control variant.

The yield results obtained in the two experimental years are influenced by the climatic conditions, the technology applied, the weeding degree of the crop, but also by the type of soil in the experimental area (high clay content above 40%). As an alternative to the classical system, soybeans can be grown in the minimum tillage system (processing of the soil with chisel), the yield difference between the classical system (CS) is insignificant (only 16 kg/ha).

Figure 3. The influence of tillage system x weeding degree x year on soybean yield, 2018-2019



CONCLUSIONS

The soil work system, climate conditions and technology specific to each system influence the productive potential of the Cristina soybean variety created at SCDA Turda.

Soybeans respond less favorable to cultivation in the system minimum tillage-disk (MD) and no tillage-direct sowing (NT), recorded yields were lower by 235 and 361 kg/ha respectively compared to the classical system (CS) and 220-345 kg/ha compared to chisel variant (MC), and influenced yield of higher weeding in these systems.

In the system minimum tillage-disk (MD) and no tillage- direct sowing (NT), the number of monocotyledonous species is reduced annually but the number of perennial weeds is increased.

In addition to the genetic and technological factors, in the formation of yield a major role it is represented by climatic conditions, the low rainfall between May and August in conjunction with the high temperatures that persisted over a long period of time had a negative impact on the soybean crop in 2018 with an average yield of 2428 kg/ha.

Rains in the period immediately after sowing in 2019 contributed to a uniform emergence and good development of soybean culture, which led to a lower degree of weeding and thus a higher average yield (2749 kg/ha).

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THE PERCEPTION OF CONSUMERS FROM THE NORTH-EAST REGION OF DEVELOPMENT OF ROMANIA OF ORGANIC PRODUCE

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Abstract: *A significant amount of data and statistical information currently available indicates an ever-increasing appetite of European consumers for organic agri-food products. This particular phenomenon can be identified in Romania as well, albeit to a lower extent. In view of this, an analysis of Romanian consumers` perception of this particular category of produce, whether more succinct or extensive, is both necessary and useful in the shaping of a specific profile of this type of consumer. Consequently, in this study we discuss the interpretation of the data obtained by applying the 2016-2017 Ecological Agri-Food Products Questionnaire, which was developed within the Rural Development Research Platform Interdisciplinary Research Group and filled in by 1788 respondents, 723 of them residents of the North-East Development Region of Romania. The present research approach focuses on aspects of analysis based on demographic categories while aiming at observing the level of understanding of the term certified organic food-product, the main reason behind purchases, the criteria employed in recognizing organic agri-food products, the respondents' preference for certain purchase locations, customer familiarity with the logo specific to organic produce as well as the degree of confidence in organic food-products of the consumers in the North East Region of Development of Romania.*

Keywords: *organic food products; consumer profile*

JEL Classification: *Q57, P46*

INTRODUCTION

A review of the field literature shows that historically there were several determinants that contributed to the emergence of organic farming, and that its definition has involved significant variations based on relevant criteria, mainly the geographical area. It can be noted that, at European level, an important contribution to the advancement of the concept of organic farming has been made by the scientific community, which has been noted for its commitment to the issue of the damaging impact of intensive agriculture on the environment and on population health as a result of the consumption of conventional agri-food products with a high content of residues, a direct effect of the chemical treatments applied within the production chains. At the same time, besides the academic community, an important part, both in the initial emergence and in the subsequent evolution of the concept, has been played by the consumers themselves, through a steady and gradual change in their perception of food products and implicitly through an increased awareness of the need to choose a more balanced and beneficial diet for their general state of health and well-being. Moreover, consumers have also become aware of their role and impact on the environment, a major determining factor in the emergence and growth of organic farms. Currently, the concept of organic farming is seen by a large number of people as a feasible and sustainable medium – to – long - term solution that can be deployed with a view to countering the negative effects of the primary sector on ecosystems and the general health state of consumers.

Scholars seem to agree on at least three key goals of organic farming:

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- the supply of competitive agricultural and agri-food products, in terms of purchasing costs, fully in line with most of the standards in force, in particular the demands of consumers;

- to improve and preserve the many existing ecosystems by directly and indirectly reducing the impact of polluting sources;

- ensuring the economic and financial conditions supportive of the commercial activities of organic producers, including the provision of specific instruments for their development.

With organic products, it is of the essence give the necessary attention to packaging, certification and labeling. A comparison of conventional and organic products reveals quite a few differences that can be easily noticed at the various marketing and retail points. In this regard, it should be pointed out that the certification process does not represent the final stage in the production chain, contrary to the perceptions or beliefs of more than one consumer. Certification is a complex gradual process that starts during the very first stage of agricultural production and continues during the entire production chain, including the supply chain. The adherents and supporters of organic farming are particularly aware of the relevant principles and useful recommendations developed with a view to encouraging the activities of all those involved in the management of such agricultural holdings. Specifically, the principles and recommendations developed concern the recognition of the biological and ecological nature of the ecosystems comprising the many existing habitats as well as the importance of interactions between soil and subsoil organisms (Stockdale and Watson, 2008).

According to the latest available European statistics, the organic farming sector is experiencing both quantitative and qualitative expansion. The most recent official data clearly show that organic farming is marked by a steady expansion process, with a total area cultivated in the organic system of up to 58 million hectares at the level of 2016, belonging to some 2.7 million agricultural producers. As far as the consumption of organic products is concerned, the highest levels are registered in northern Europe and the lowest in southern Europe. At the level of the European Union, Germany had until recently the largest market share of organic products in terms of total volume of merchandised goods, with sales of almost EUR 2.5 billion. More exactly, in 2017 some 12.8 million hectares were managed in the organic system by a number of 305,000 certified producers.

In 2015, the worldwide market for organic products amounted to around USD 81.6 billion (~ EUR 73.5 billion), registering an increase of around 10% compared to the previous year, of which the European market generated sales of around EUR 29.8 billion (EUR 27.1 billion in EU countries). Compared to 2006, the organic food market in Europe and the European Union has doubled (Willer and Lernoud, 2017). At country level, it can be noted that Germany was the second largest market for organic products in the world (EUR 8.62 billion) after the United States of America. France ranked second in the European Union with 5.53 billion, the United Kingdom third (EUR 2.60 billion), followed by Italy (EUR 2.31 billion). The consumption of organic products per capita varies depending on purchasing power, consumer awareness and affordability of organic products. While European consumers spent an average of EUR 36.4 per person on organic food products in 2015, EU citizens spent EUR 53.7. In 2015, the highest per capita consumption of food produced under organic protocols was registered in Switzerland (262.2 EUR), Denmark (190.7 EUR), Sweden (177.1 EUR), Luxembourg (170 EUR), Liechtenstein (142.4 EUR) and Germany (105.9 EUR).

Although differences in dynamics and implementation are to be expected, it can be noted that Romania, as a European country, has gradually joined the trends in the development of an organic food culture. Consequently, the areas farmed under organic protocols have increased significantly in recent years: from 17,438 ha in 2000, to 170,000 ha in 2006, and to 301,148 ha in 2013.While in 2007 Romania ranked 35th globally in terms of organically cultivated areas, and 38th in terms of number of organic farms, in 2015 it ranked 26th as a result of its organically certified farmland areas.

However, this year, the total area certified as organic has decreased to 226,309 hectares (1.7 % of the total agricultural area).

The "**ae**" (**a**gricultură **e**cologică/ Organic Agriculture) logo is the national logo used to mark organic products, which alongside the EU logo can be effectively used to increase the level of awareness of consumers of the availability of produce obtained from organic farming (M.A.D.R., 2017). Pursuant to Council Regulation (E.E.C.) No. 2092/91, the application of the Community logo on the label of organic food products was optional prior to 2010, but became mandatory as of the July 10, 2010, in accordance with Regulation (E.C.) No. 967/2008.

THE BEHAVIOR OF THE ROMANIAN CONSUMER OF ORGANIC PRODUCTS

The American Marketing Association (A.M.A.) defines consumer behavior as "the dynamic interaction of affect and cognition, behavior and environmental events by which human beings conduct the exchange aspects of their lives" (A.M.A., 2017). Consumer behavior therefore involves a number of processes that characterize the selection, buying, use of products, services, ideas or experiences by individuals or groups to meet their needs and desires (Solomon et al., 2006) Such decisions are influenced by a multitude of factors such as: needs, motivations, perceptions, attitudes, beliefs, financial resources, knowledge, values, life experiences etc. An extensive 2012 study points out that consumers are satisfied with the purchase of organic food products for several reasons (Paul and Rana, 2012). First of all, for their beneficial impact on health and the protection of the environment, their different tastes compared to conventional products, the positive attitude of the customers and the keeping of a particular status in society. Quality was also a very important factor for consumers. The overall level of consumer satisfaction with organic food products was therefore much higher than with conventional products. Consumers believe that organic produce is more expensive, but at the same time think that the higher prices are often justified. As in many other areas, the Romanian market of organic food products is markedly different from the Western European markets, both in terms of quantity, diversity, accessibility of products and in terms of culture, level of information and confidence of consumers and producers.

A 2015 comprehensive study on consumer perception of organic foods conducted by Petrescu and Petrescu-Mag on a sample from the North-West Region of Development brought fresh insights on "the image" of organic food in Romania (Petrescu and Petrescu-Mag, 2015). The first refers to the fact that the decision to purchase organic products is fashionable, and the second suggests that organic products are beneficial to health and the environment. The results of this study suggest the existence of a specific environmental awareness among consumers of organic produce in the North-West Region of Romania: a high percentage of consumers consider organic food to be healthier than conventional food (87 %) and to contribute more to environmental protection than conventional food products (75 %). The notions of organic food products as a fashionable trend (33 %) a whim (18 %) and satisfying one's curiosity (45 %) rank significantly lower in the mindsets of consumers compared to the ideas of health and environmental benefits. On considering demographic variables (age, gender and education) the main differences that can be observed are the result of the level of education which influences the belief in fashionable organic food and its environmental benefits, yet there is no statistically significant difference in the idea that organic food consumption is a caprice and assurance of higher quality and nutritional value than conventional produce. Individuals over 60 share the strongest convictions that most people purchase and consume organic products because they are fashionable, while individuals aged between 36 and 45 have the strongest beliefs in the beneficial impact of organic food products on the general state of health and wellbeing and their contribution to environmental protection. Gender did not stand out as a relevant variable.

As regards the frequency of organic food consumption, according to a 2012 study approximately 45 % of respondents in the North East Region of Development of Romania consumed organic food at least once a week (Stoleru et al., 2012). The most popular categories consumed are also the staple foods, i.e. fruit and vegetables, beverages and dairy products. Approximately a quarter of the respondents said that they regularly checked and questioned whether the products purchased were environmentally friendly, and about 70 % said that they used the label for such checking. The main points of purchase of organic food products were the agri-food markets, supermarkets as well as organic shops.

A very recent study carried out in the North-West Development Region emphasizes that organic farming practices are becoming ever more popular among Romanian producers and are considered a viable alternative for small agricultural holders (Oroian et al., 2017). The same study also shows that consumer awareness of the impact that consumption of organic products has on sustainable development is on the increase. Most importantly, the results of the study indicate that consumers of organic products are educated individuals over 35 years of age who are well aware of the overall effects of diet on their state of health. Increased consumer interest in organic certified produce is attributed to the growing demand for pesticide-free non-G.M.O. goods with high mineral and vitamin content besides various natural ingredients. Once again, this trend indicates that consumers are giving an ever-increasing importance to their health and wellbeing. Undoubtedly, this might be a good starting point for developing market strategies to stimulate the consumption of organic products.

On the other hand, it should not be overlooked that the Romanian consumer often displays a critical attitude and behavior in their purchase decision. Such choice is strongly determined by purchasing power, but in particular by their life experience, which involves not only their individual cultural background and level of information, but also the “tribulations” to which recent history has subjected them. Manifesting considerable distrust of chemical and genetic modification, which is in fact difficult to detect, when choosing a product that qualifies as being organic the Romanian consumer relies to a great extent on their senses by individual decision making. Their individual experience is usually the most important factor in the purchase decision. The Romanian consumer is a rather critical actor, driven by personal beliefs, often considering himself/herself misinformed and preferring to rely on his own interpretation of the ecological character of the food product.

METHODOLOGY

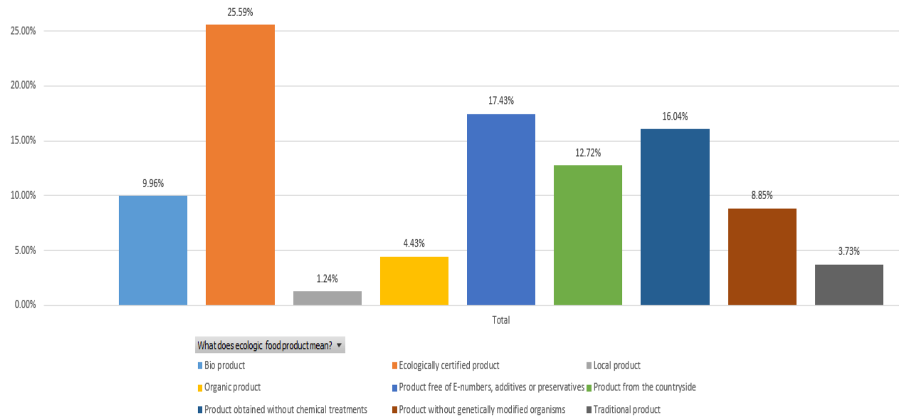
The main objective of this study was to capture consumer perceptions of organic food products in the North East Development Region of Romania. The research was carried out in three stages: the documentation on the state of knowledge in the field, the implementation of the *Organic Agri-Food Products Questionnaire* and the analysis, interpretation and dissemination of the results. The methodological system used in the present research paper to process the information collected, display the results and formulate the conclusions, involved methods and procedures involving bibliographical study and international and national statistics, besides a sociological survey based on the use of an online questionnaire.

The achievement of the proposed objective was made possible by the preparation of the appropriate questionnaire, its online application and survey, followed by the statistical processing of the data compiled. The Organic Agri-Food Products Questionnaire was drafted and developed by the Interdisciplinary Research Group R.D.R.P. *(Rural Development Research Platform)* and distributed online (especially via Facebook) in 2016 and 2017. The questionnaire comprised three sections and 20 “closed” questions with a single answer aimed at identifying the relevant socio-professional features, the behavior of respondents when buying organic food products and the means of advertising and the information respondents rely on concerning organic food products. The socio-professional aspects were addressed by means of 10 questions, focusing on key determinants such as age, gender, marital status, child support, income level, education level, environment and county of residence, field of activity and frequency of organic agri-food products purchase. The sample was nationally representative (1,788 respondents with 1,614 validated questionnaires), with the majority of respondents (723 questionnaires) coming from the Northeast Development Region (45 %).

INTERPRETATION OF RESEARCH RESULTS

The very first thing to be noted concerning the definition of organic certified products is that subjects in the North East Development Region share a distinct view of organic produce: it was found that about a quarter (26%) of the respondents believed that organic food products are only those that are *certified as such.* The next perceptions are of *produce free from E-class compounds, preservatives or additives,* followed closely by *produce obtained free from chemical treatment* (17 % and 16 % respectively). While approximately 13 % of the respondents identified organic products as those obtained or sourced in rural areas, 10 % termed them “bio” products and 9 % identified them with food products free from chemical treatments. Much smaller shares of respondents associated them with organic (4.5 %), local (1 %) and traditional (4 %) agri-food sector goods.

Figure 1– Perception of the concept of organically certified food product



Health concerns emerged as the North-East Region respondents’ major motivation in purchasing organic food produce (about 61%). The second motivation was the perceived higher quality (organoleptic characteristics) of organic produce (9%), followed closely by personal beliefs and values (8%) and the support of small-scale producers (7%). Only 4% of the subjects identified environmental protection as the main reason for their purchase decision. Curiosity (3%), ethics (1%) and protection of animals (0.3%) ranked as second-tier motivations. Last but not least, about 5% of the individuals surveyed did not buy any organic food items.

Figure 2 - The main motivation for purchasing organic agri-food sector products

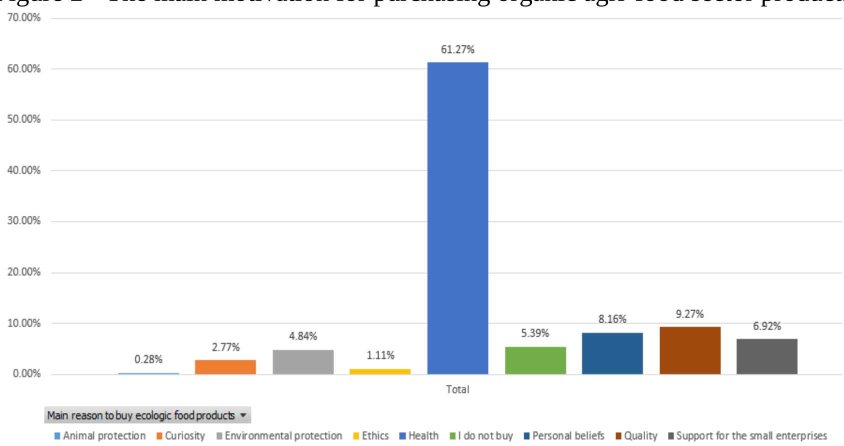
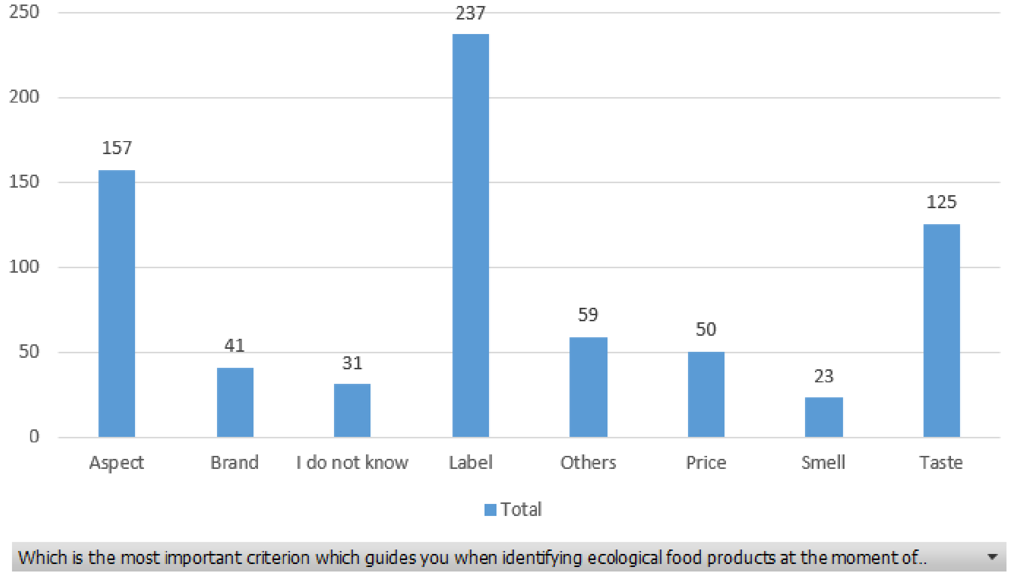
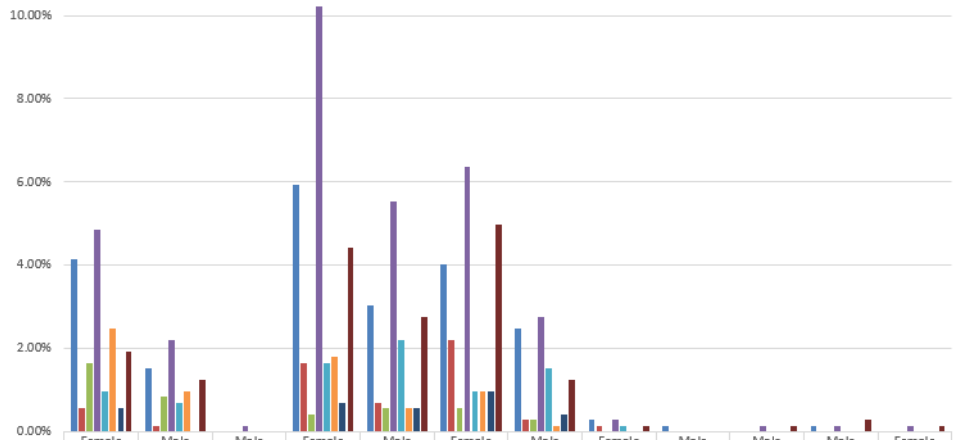


Figure 3 - The main criterion underlying the identification of organic food products



According to the sample examined, the key factor underlying the identification of organic products was the product label (33 %) at the time of purchase. Organoleptic characteristics - appearance (22 %), taste (17 %) and smell (3 %) were also important criteria. Somewhat surprisingly, only 7% of the respondents considered *price* to be the most important criterion, given that the North East Development Region ranked the third poorest region of the European Union. The brand (6%) was not considered to be a primary factor underlying purchase. While more than 8 % of the subjects surveyed found other criteria to be more relevant, 4 % were not able to answer this question.

Figure 4 - The main criteria underlying the decision to purchase organic foodstuffs by gender and age



	Female	Male	Male	Female	Male	Female	Male	Female	Male	Male	Male	Female
	18 - 25		18 - 25	26 - 40		41 - 65		over 65		over 65	under 18	under 18
Aspect	4.15%	1.52%	0.00%	5.95%	3.04%	4.01%	2.49%	0.28%	0.14%	0.00%	0.14%	0.00%
Brand	0.55%	0.14%	0.00%	1.66%	0.69%	2.21%	0.28%	0.14%	0.00%	0.00%	0.00%	0.00%
I do not know	1.66%	0.83%	0.00%	0.41%	0.55%	0.55%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%
Label	4.84%	2.21%	0.14%	10.24%	5.53%	6.36%	2.77%	0.28%	0.00%	0.14%	0.14%	0.14%
Others	0.97%	0.69%	0.00%	1.66%	2.21%	0.97%	1.52%	0.14%	0.00%	0.00%	0.00%	0.00%
Price	2.49%	0.97%	0.00%	1.80%	0.55%	0.97%	0.14%	0.00%	0.00%	0.00%	0.00%	0.00%
Smell	0.55%	0.00%	0.00%	0.69%	0.55%	0.97%	0.41%	0.00%	0.00%	0.00%	0.00%	0.00%
Taste	1.94%	1.24%	0.00%	4.43%	2.77%	4.98%	1.24%	0.14%	0.00%	0.14%	0.28%	0.14%

On evaluating the key factors underpinning the decision to purchase organically certified goods by age group and gender, it emerged that there was no significant disparity between males and females. The following characteristics can be noted:

- Roughly 16 % of respondents in the 26-40 age group (10 % female and 6 % male) considered the label as the key factor underlying the buying decision, the largest share of the sample surveyed.

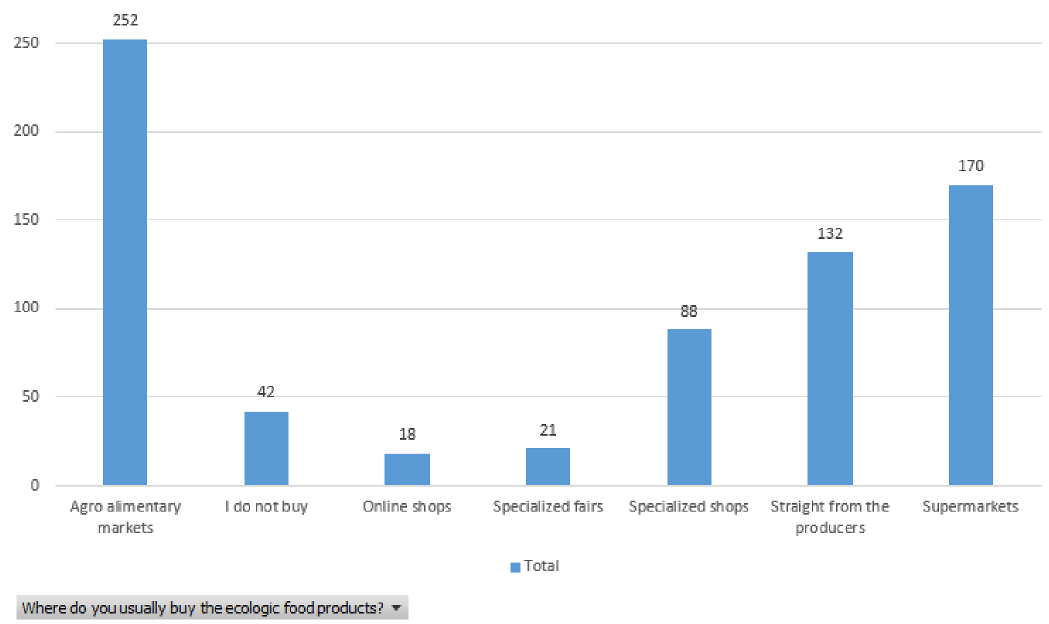
Appearance ranked next (6 % female and 3 % male), followed closely by taste (6 % female and 3 % male). The first three main criteria were thus identical for both men and women. The price criterion ranked fourth with female respondents (2 %) but was of secondary importance for male respondents (2 %).

- The same preferences were expressed by the 41-65 age group: 9 percent identified the label (6 percent female, 3 percent male), 7 percent indicated appearance (4 percent female, 3 percent male) and 6 percent taste (5 percent female, 1 percent male). With male subjects (1.5 %) the third largest percentage was defined by criteria other than taste. The trademark emerged as an important criterion in the purchase decision with female respondents (2 %) and taste with male respondents (1.5 %).

- In the 18-25 age group, the label (6.5 %) and appearance (6 %) constitute the first two key determinants in the buying decision (with a marked contribution from the female gender). Price (3.5 %) ranked third in the buying decision for this age group.

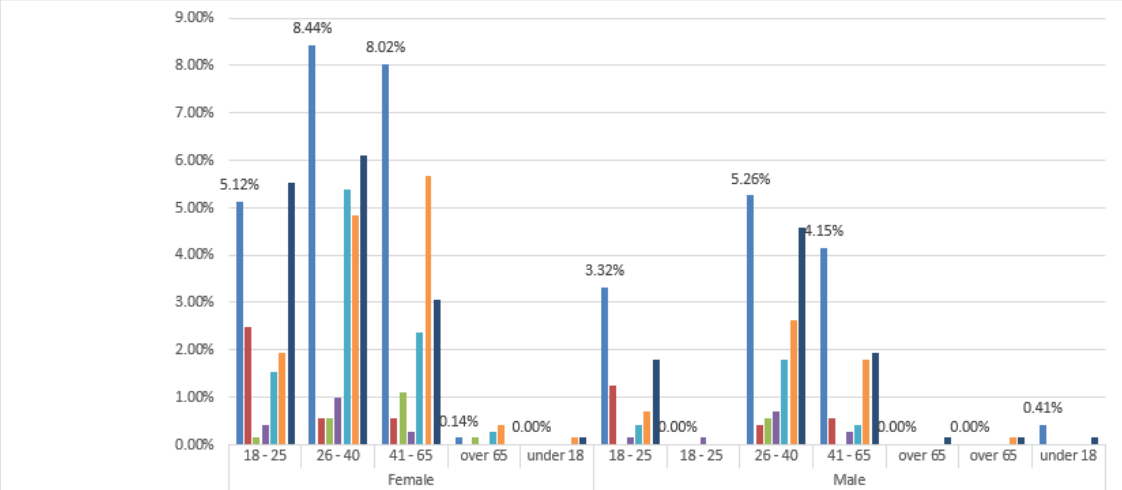
- While for young individuals under 18 years of age, taste was singled out as the key criteria in the choice of organically certified products, for subjects over 65 years of age, appearance and label were the most important criteria.

Figure 5 - Consumer ranking of the sources for the purchase of organic food items



On turning to the survey of the preferred source for the purchasing of organic food products in the North East Region, we noted that the agri-food markets (approximately 35 %) are the main source of purchasing for ordinary consumers. *Supermarkets* (24 %) were identified as the second choice by respondents (especially middle-aged people). More than 18 % of respondents chose to source their food items *directly from farmers*, while *specialist stores* (grocers, butchers, delis, etc.) have a market share of over 12 %. Interestingly, food fairs had a much lower share compared to other choices available (3 %), besides online shops (2 %), which registered the lowest market share among respondents (mainly young respondents).

Figure 6 - The preferred source for the purchase of organic food products by gender and age



	Female					Male						
	18 - 25	26 - 40	41 - 65	over 65	under 18	18 - 25	18 - 25	26 - 40	41 - 65	over 65	over 65	under 18
Agro alimentary markets	5.12%	8.44%	8.02%	0.14%	0.00%	3.32%	0.00%	5.26%	4.15%	0.00%	0.00%	0.41%
I do not buy	2.49%	0.55%	0.55%	0.00%	0.00%	1.24%	0.00%	0.41%	0.55%	0.00%	0.00%	0.00%
Online shops	0.14%	0.55%	1.11%	0.14%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%	0.00%
Specialized fairs	0.41%	0.97%	0.28%	0.00%	0.00%	0.14%	0.14%	0.69%	0.28%	0.00%	0.00%	0.00%
Specialized shops	1.52%	5.39%	2.35%	0.28%	0.00%	0.41%	0.00%	1.80%	0.41%	0.00%	0.00%	0.00%
Straight from the producers	1.94%	4.84%	5.67%	0.41%	0.14%	0.69%	0.00%	2.63%	1.80%	0.00%	0.14%	0.00%
Supermarkets	5.53%	6.09%	3.04%	0.00%	0.14%	1.80%	0.00%	4.56%	1.94%	0.14%	0.14%	0.14%

Overall, there are no significant differences regarding the place of purchase between male and female customers. On assessing the place of purchase by gender and age, the following conclusions emerged:

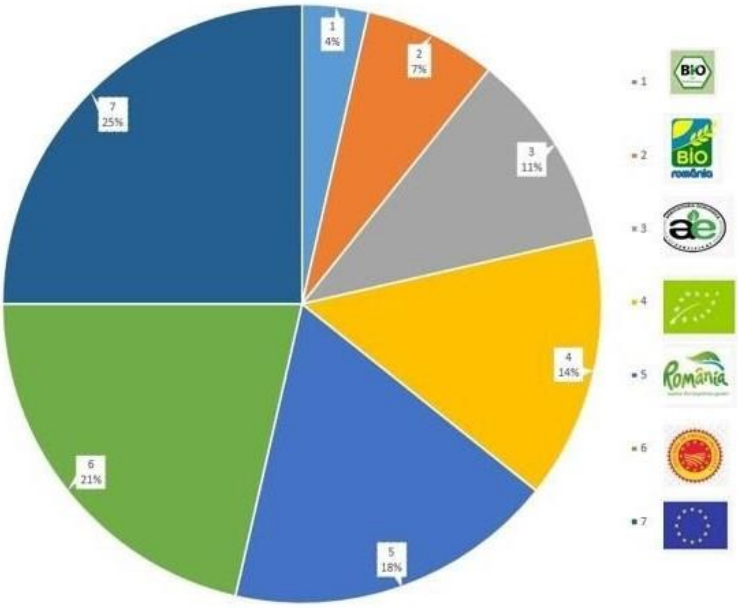
- In the 26-40 age group, which represents the largest share of the survey sample, about 14 % of the respondents (9 % female and 5 % male) indentified agri-food markets as their regular place of purchase of organic produce. Interestingly enough, supermarkets ranked second with approximately 11 % (6 % female, 5 % male). Approximately 7 % of respondents reported buying from specialist shops, with a marked disparity between females and males (more than 5 % for females and less than 2 % for males).

- Much as expected, in the 41-65 age group, which comprises the second largest age category of the total sample, agri-food markets were the main source of supply of organic products with approximately 12 % (8 % female, 4 % male), followed by producers, with (8 %), a slightly lower share (6 % female, 2 % male). Supermarkets (5 %) were the third option (3 % female and 2 % male). Less than 3% of the respondents in this age group bought from specialist stores.

- It is interesting to note that the 18-25 age group failed to indicate supermarkets as their favourite place of purchase of organic certified items (7 %, with an important contribution from females – 5 %). The first option of this age group was food markets (8.5 %) (5 % femaless and 3.5 % males). For young people, the third alternative (3 %) was directly from producers, followed closely by specialized stores.

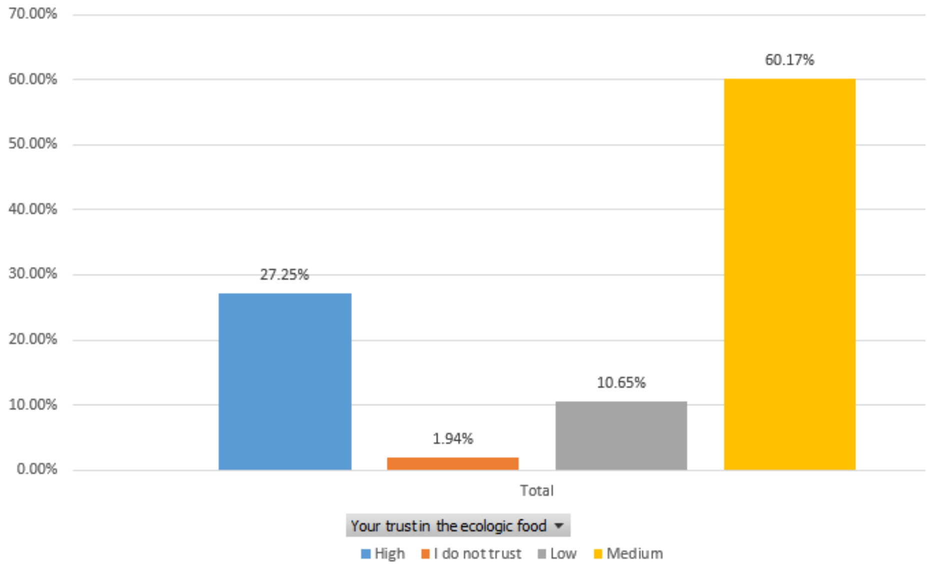
- While the total number of online purchases in Romania has increased significantly in recent years, the preference of respondents for online purchases of organic certified agri-food items is still rather small, mainly traceable to female customers.

Figure 7 - Ability to identify the specific logo of organic farming at European Union level



According to the collected data, only 14 % of the total number of individuals surveyed in the North-East region were able to recognize the organic food logo of the European Union. Most of the respondents mistook it for the E.U. logo (25 %), the logo of certified products D.O.P. (*Protected Designation of Origin*) (21 %) and even with Romania`s tourism promotion logo (14 %). A smaller percentage (11 %) represented the individuals who associated it with the *Ecological Agriculture* logo at the level of Romania (owned by the Ministry of Agriculture and Rural Development) as well as the logos of the organizations that certify organic producers.

Figure 8 - Consumer confidence in organic food products



The respondents clearly appreciated the reliability and value of organic food items: around 2⁄3 manifested an average level of confidence and over 27 % a high level of trust. Those who showed little to no confidence totaled around 13 %.

CONCLUSIONS

This paper provides detailed information on the behavior of consumers of organic food items in the North East Development Region of Romania on the basis of a demographic survey.

As in many other areas and in terms of organic agri-food products, the Romanian market differs to a large extent from Western European markets, both in terms of quantity, variety and accessibility of goods and in terms of culture and level of information and confidence of both consumers and producers.

The level of confidence of people in organic food in the North-East Development Region is strong. In addition, organic foods are deemed to be of higher quality than conventional goods.

Health is by far the biggest incentive of respondents (approximately 2⁄3) to purchase organic food. The second incentive is high quality, accompanied closely by personal values and support for small producers.

The key criteria on which the decision to buy eco certified products is based is the product label. At the same time, organoleptic characteristics - appearance, taste and smell - are essential criteria. Interestingly, only 7% of respondents identify the price to be the most important criterion, given the fact that the Northeast Development Region third poorest region in the European Union.

Agri-food markets, supermarkets, suppliers and specialized stores are the key outlets for the purchase of organic food items in the North-East region.

Most respondents confuse the “ae” (Organic Farming) logo with other logos. In this regard, we think it advisable to begin a campaign in support of this logo.

Overall, there are no major differences between females and males with respect to the preferred place of purchase, the main factor, the main criteria underlying the purchasing decision and the identification of the “ae” logo.

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TECHNICAL-ECONOMIC ANALYSIS OF SHEEP AND GOAT HERDS IN ROMANIA

IRINA-ADRIANA CHIURCIU[1], ELENA COFAS[2]

Summary: *The paper aims to identify the number of sheep and goats existing in Romania, spread over Macroregions, Development Regions and counties and to present its evolution in the period 2014-2019. At the same time, a comparison will be made with the situation registered in 1990. The favorable conditions for raising sheep and goats have placed Romania on the 3rd place in the European Union in terms of their number. In 2019, the number of sheep meant 10,358,699 heads, and those of goats 1,594,862 heads. These values increased compared to 2014 by 8.83% for sheep and 12.54% for goats. At the level of Macroregions, most sheep were found in Macroregion One - 4,095,872 heads, representing 40% of the total, and in Macroregion Two, most heads of goats - 664,473 heads, representing 42% of the total, valid values for the year 2019. The development regions where most animals were registered were N-W Region - 2,285,787 for sheep and S-E Region 425,834 for goats. It should also be mentioned that Timiș County - 612,638 sheep heads and Constanța County - 140,559 goat heads, were on the first places at NUTS 3 level, in the breeders' ranking. All these results conclude that in Romania the high growth potential of sheep and goats is not exploited, an occupation that could represent an advantage for the relaunch of the livestock sector.*

Keywords: *goats, herds, livestock, sheep, Romania*

JEL Classification: *Q10*

INTRODUCTION

Due to the advantageous geographical position of our country, the varied relief and the large areas of pastures (3.3 million ha) and meadows (1.5 million ha), which represent 14% and respectively 7% of the total of 14.6 million ha of land, raising sheep and goats is an activity practiced in Romania since ancient times. These animals are well adapted to the climatic conditions in Romania and are raised on small subsistence and semi-subsistence farms, requiring low maintenance costs [7]. The average size of a farm is small (29 heads of sheep / farm and 11 heads of goat / farm) which makes it more difficult to adapt to high-performance technologies due to lack of own funds and reduced access to other sources of funding [3].

Although it is not the most productive domestic animal, the sheep is the animal with the most goods produced (wool, meat, milk, skin, etc.). The purpose for which it is raised in Romania is usually milk production and to a lesser extent meat production [4]. In European Union countries, the most important product is meat [9]. The development of the livestock sector and mainly of the sheep sector would give breeders the opportunity to export sheep meat, which could lead to high incomes.

Starting from the values recorded in 1990, the paper analyzes the existing situation in the sheep and goat sector in Romania, thus identifying the Macroregions, Development Regions and counties where the most specimens of the mentioned species are found.

MATERIAL AND METHODS

For the elaboration of this paper were used the information available online on the website of the National Institute of Statistics, more precisely the Tempo-Online database and on the EUROSTAT website (European Statistical Office), the online database of the European Union. This information was processed using a quantitative analysis method and presented in the form of tables or graphs. In parallel, the specialty literature was studied, in order to know the current state of the information on the approached topic. The analyzed period is 2014-2019, and the purpose of this

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study was the analysis of sheep and goats, in the context of support provided to this sector by the Ministry of Agriculture and Rural Development, through various programs and campaigns.

RESULTS AND DISCUSSIONS

As Soare E., 2016 notes, the sector of activity dealing with sheep and goat farming can be approached from 3 different positions: economic, social and ecological [10].

The benefits of raising sheep and goats in rural areas can be seen not only in the market, bringing income, but also in local households, where products obtained from these animals are used. We can complement the socio-economic role that these species have in terms of employment in rural areas and the contribution to improving environmental conditions and preserving biodiversity [3]. Thus, sheep and goats can graze on land unsuitable for other crops, land in marginal areas or in areas with natural or specific constraints, and the manure of these animals is a possibility to enrich soil fertility [8].

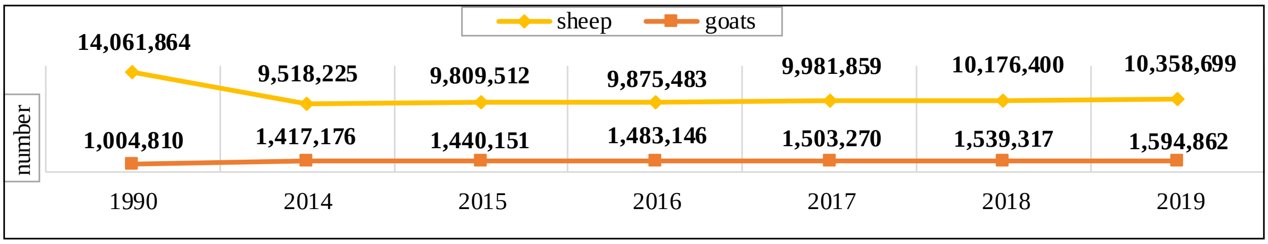
At the same time, by supporting the continuity of their growth in the areas where this activity has been practiced in the past, biodiversity is maintained and traditional customs are passed on.

Figure 1 shows the evolution of the number of sheep and goat heads in Romania in 1990 and in the period 2014-2019.

For sheep it is observed a numerical decrease in 2014 compared to 1990. The decrease is of 32.31%. By contrast, for the period 2014-2019 there is an increase in sheep flocks of 8.83% more in 2019 than in 2014.

Goats registered increases, both in 2014, compared to 1990, of 41.04%, and in 2019 compared to 2014, of 12.54%.

Figure 1. Total number of sheep and goats in Romania



Source: own interpretation, according to [5]

An explanation for the increase in livestock of the two categories of animals is also the non-refundable funds granted by the 2014-2020 NRDP [1], such as and the interest in exporting to Arab countries. Also, "The campaign to inform and promote the consumption of sheep meat - Choose the Sheep/ Alege oaia!" contributed to the orientation of farmers towards this zootechnical sector [6].

Table 1 shows the evolution of sheep heads on Macroregions and Development Regions in the period 2014-2019, as well as the values that were recorded in 1990. It can be observed that if in 1990 in Macroregion Two the most sheep were encountered - 5,139,700, in 2019 the first place was occupied by Macroregion One, with 4,095,872 sheep heads. Macroregion Three held the last place both in 1990 and 2019, with 2,065,400 sheep heads and 1,030,837 respectively.

Compared to 1990, in 2019 only Macroregion One had an additional 226,072 sheep, but for the other three macroregions there were observed decreases in the number of heads. For Macroregion Two we recorded the largest decrease, with 2,138,907 sheep.

Reporting to 2014, for all macroregions we have seen increases, in 2019, for the analyzed indicator. The largest increase was in Macroregion Three, of 12.68%, followed by Macroregion One, 10.52%, and on the last place Macroregion Two - 6.83%. For the Development Regions, it is obvious the decrease of the number of sheep by 11.77% in the Bucharest-Ilfov Region and the most significant increases, found in the South-Muntenia Region - 13.53% and the North-West Region - 12.40%. The North-East region had the smallest growth, of 2.80%.

Table 1. Total sheep on Macroregions and Development Regions

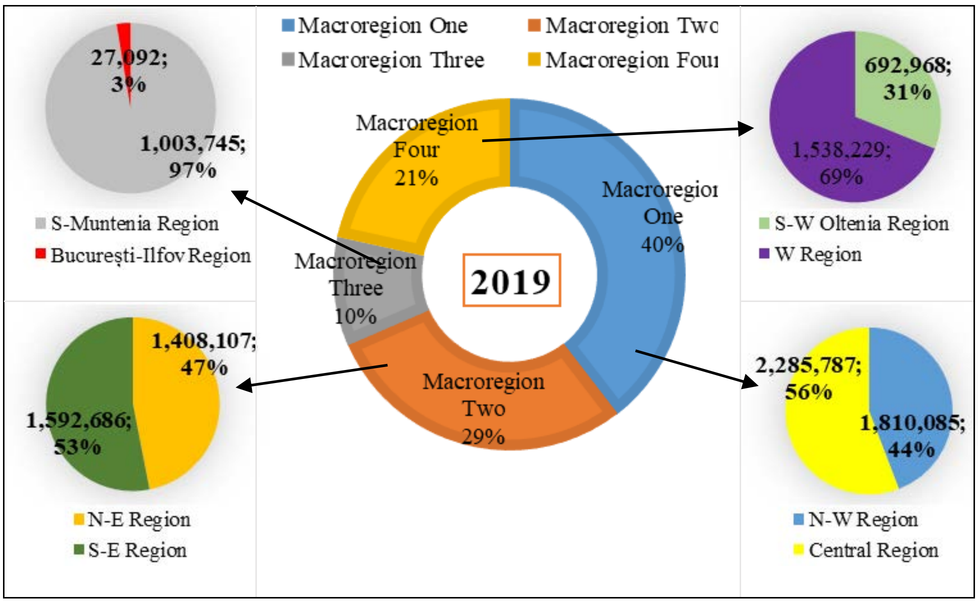
Specification	**1990**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2019/2014 %**
MACROREGION ONE	**3,869,800**	**3,706,046**	3,767,239	3,820,778	3,971,515	4,025,941	**4,095,872**	**110.52**
NORTH-WEST Region	1,985,500	1,610,376	1,649,303	1,668,922	1,679,514	1,709,860	1,810,085	*112.40*
CENTER Region	1,884,300	2,095,670	2,117,936	2,151,856	2,292,001	2,316,081	2,285,787	109.07
MACROREGION TWO	**5,139,700**	**2,808,989**	2,904,482	2,888,275	2,889,994	2,968,482	**3,000,793**	**106.83**
NORTH-EAST Region	2,691,000	1,369,698	1,395,954	1,403,177	1,395,832	1,431,147	1,408,107	102.80
SOUTH-EAST Region	2,448,700	1,439,291	1,508,528	1,485,098	1,494,162	1,537,335	1,592,686	110.66
MACROREGION THREE	**2,065,400**	**914,819**	965,906	965,201	990,169	998,320	**1,030,837**	**112.68**
Region SOUTH-MUNTENIA	1,990,800	884,112	935,565	933,987	959,886	974,041	1,003,745	*113.53*
Region BUCHAREST- ILFOV	74,600	30,707	30,341	31,214	30,283	24,279	27,092	*88.23*
MACROREGION FOUR	**2,987,000**	**2,088,371**	2,171,885	2,201,229	2,130,181	2,183,657	**2,231,197**	**106.84**
SOUTH-WEST OLTENIA Region	1,417,100	657,169	679,271	685,812	668,522	686,596	692,968	105.45
WEST Region	1,569,900	1,431,202	1,492,614	1,515,417	1,461,659	1,497,061	1,538,229	107.48

Source: own calculations, according to [5]

Analyzing the spread of sheep on Macroregions and Development Regions for 2019 (Figure 2), it is found that most heads were found in Macroregion One 40% - 4,095,872 and in Macroregion Two 29% - 3,000,793. Other values obtained were: Macroregion Four - 21% and Macroregion Three - 10% of the total sheep raised in 2019.

The top for large sheep breeders at the level of Development Regions was as follows: N-W Region 2,285,787 sheep, representing 56% of the total of Macroregion One; Central Region 1,810,085 sheep, representing 44% of the total of Macroregion One; S-E Region 1,592,686 sheep, representing 53% of the total of Macroregion Two and W Region 1,538,229 sheep, representing 69% of the total of Macroregion Four. On the last place was Bucharest-Ilfov Region - 27,092 sheep (3% of the total of Macroregion Three).

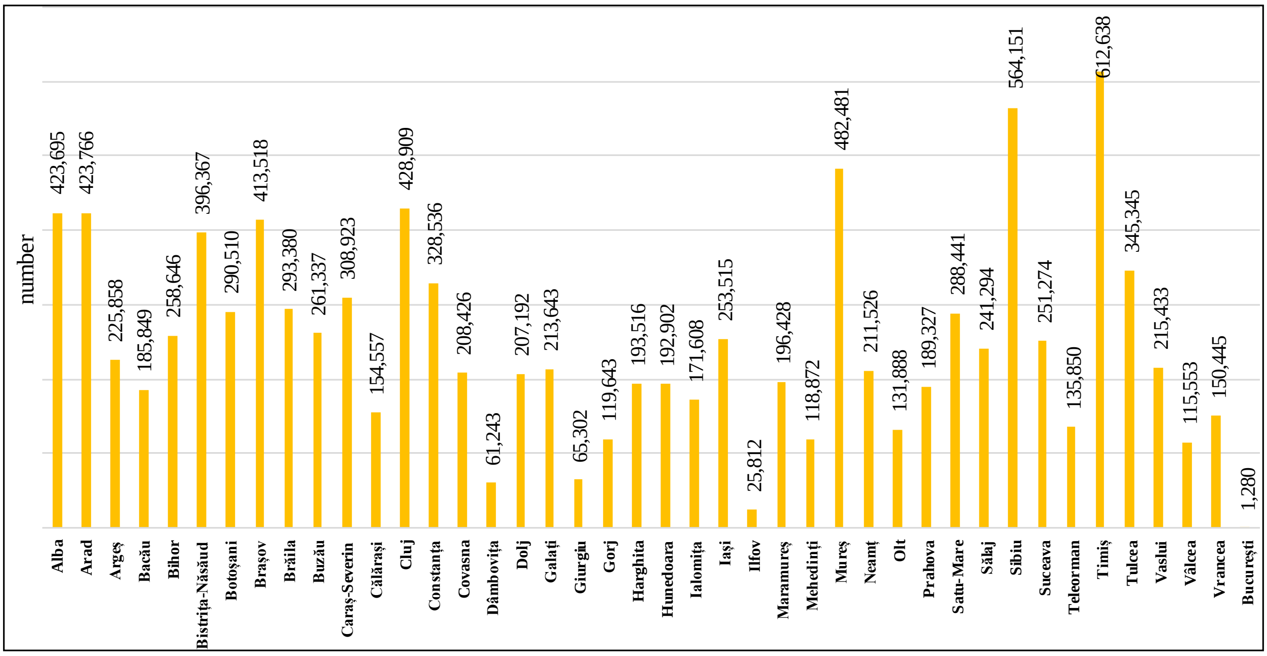
Figure 2. Sheep herds by Macroregions and Development Regions, 2019 (%)



Source: own interpretation, according to [5]

At the level of NUTS III (Figure 3), the situation was as follows, compared to 2019: most sheep were raised in Timiș County - 612,638 heads, followed by Sibiu County - 564,151 heads, Mureș County - 482,481 heads. Other counties that registered over 400,000 sheep were Cluj - 428,909 heads, Arad - 423,766 heads, Alba - 423,695 heads and Brașov - 413,518 heads. Apart from the area of Bucharest, which owned 1,280 sheep, other counties that had less than 100,000 animals of the mentioned species were: Ilfov - 25,812 heads, Dâmbovița - 61,243 heads and Giurgiu - 65,302 heads. From the data presented by NIS [5] we noticed that the area occupied by pastures and perennial fodder in the counties with the lowest number of sheep is much smaller compared to the areas occupied with the same crops, in the counties that had the highest number of sheep. It should also be specified that Dâmbovița, Ilfov and Giurgiu counties are located in the southern part of the country, where the effects of water scarcity are more pronounced, and the proximity to the Bucharest metropolitan area limits the existence of grazing places for animals.

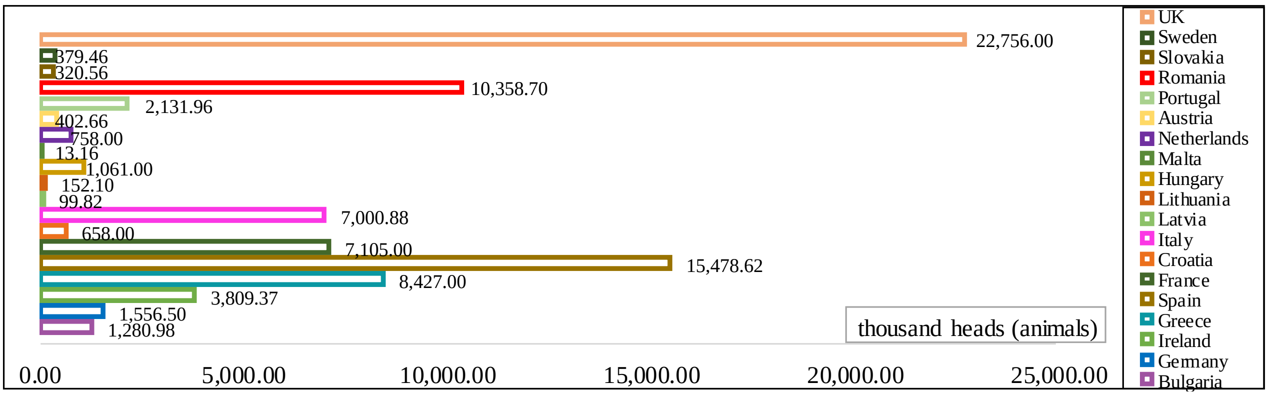
Figure 3. Sheep herds by counties, 2019



Source: own interpretation, according to [5]

According to Eurostat, in 2019, sheep were raised only in 19 states out of the 28 EU members. The main sheep breeders in the European Union were UK - 22,756 thousand heads, Spain - 15,478.62 thousand heads and Romania - 10,358.70 thousand heads (Figure 4). Lithuania (152.10 thousand heads), Latvia (99.82 thousand heads) and Malta (13.16 thousand heads) were on the last places in this ranking.

Figure 4. The main sheep breeders in the EU, 2019



Source: own interpretation, according to [2]

Table 2 mentions data regarding the evolution of goat herds on Macroregions and Development Regions, in the period 2014-2019 and at the same time indicates the values that were recorded in 1990. It can be observed that if in 1990 in Macroregion Four the most goats were encountered - 346,758, in 2019 the first place was occupied by Macroregion Two, with 664,473 goat heads. Macroregion One held both in 1990 as well as in 2019 the last place, with 178,566 goat heads and 248,392 respectively.

Compared to 1990, in 2019 all four macro-regions recorded increases in the number of heads. The largest increase was in Macroregion Two, with 390,465 goats.

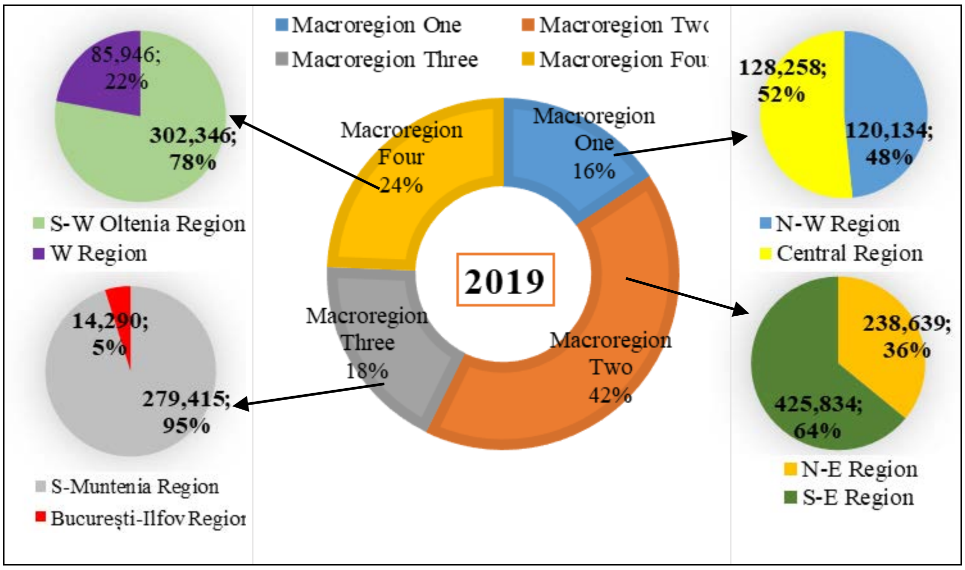
Reporting to 2014, for all macroregions we have seen increases, in 2019, for the analyzed indicator. The highest value was registered by Macroregion Four, of 14.88%, followed by Macroregion Two, 13.71%, and on the last place was Macroregion One - 7.95%. The growth of the number of goats was also found in the Development Regions, so we noted the most important increases for the West Region - 27.76%, the South-East Region - 17.74% and the North-East Region - 14.37%. The Center Region had the lowest increase, of 2.55%.

Table 2. Total goats on Macroregions and Development Regions

Specification	**1990**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2019/2014 %**
MACROREGION ONE	**178,566**	**230,109**	237,966	247,484	254,468	259,690	**248,392**	**107.95**
NORTH-WEST Region	92,270	105,040	107,415	112,777	115,258	118,005	120,134	*114.37*
CENTER Region	86,296	125,069	130,551	134,707	139,210	141,685	128,258	102.55
MACROREGION TWO	**274,008**	**584,387**	592,053	601,628	608,639	626,100	**664,473**	**113.71**
NORTH-EAST Region	94,607	222,704	224,245	229,838	230,848	235,687	238,639	107.16
SOUTH-EAST Region	179,401	361,683	367,808	371,790	377,791	390,413	425,834	*117.74*
MACROREGION THREE	**205,478**	**264,693**	268,965	274,188	274,814	282,334	**293,705**	**110.96**
Region SOUTH-MUNTENIA	200,547	251,816	256,864	260,633	261,276	270,021	279,415	110.96
Region BUCHAREST- ILFOV	4,931	12,877	12,101	13,555	13,538	12,313	14,290	110.97
MACROREGION FOUR	**346,758**	**337,987**	341,167	359,846	365,349	371,193	**388,292**	**114.88**
SOUTH-WEST OLTENIA Region	261,187	270,713	270,292	283,558	286,353	289,235	302,346	111.69
WEST Region	85,571	67,274	70,875	76,288	78,996	81,958	85,946	*127.76*

Source: own calculations, according to [5]

Figure 5. Goat herds by Macroregions and Development Regions, 2019 (%)



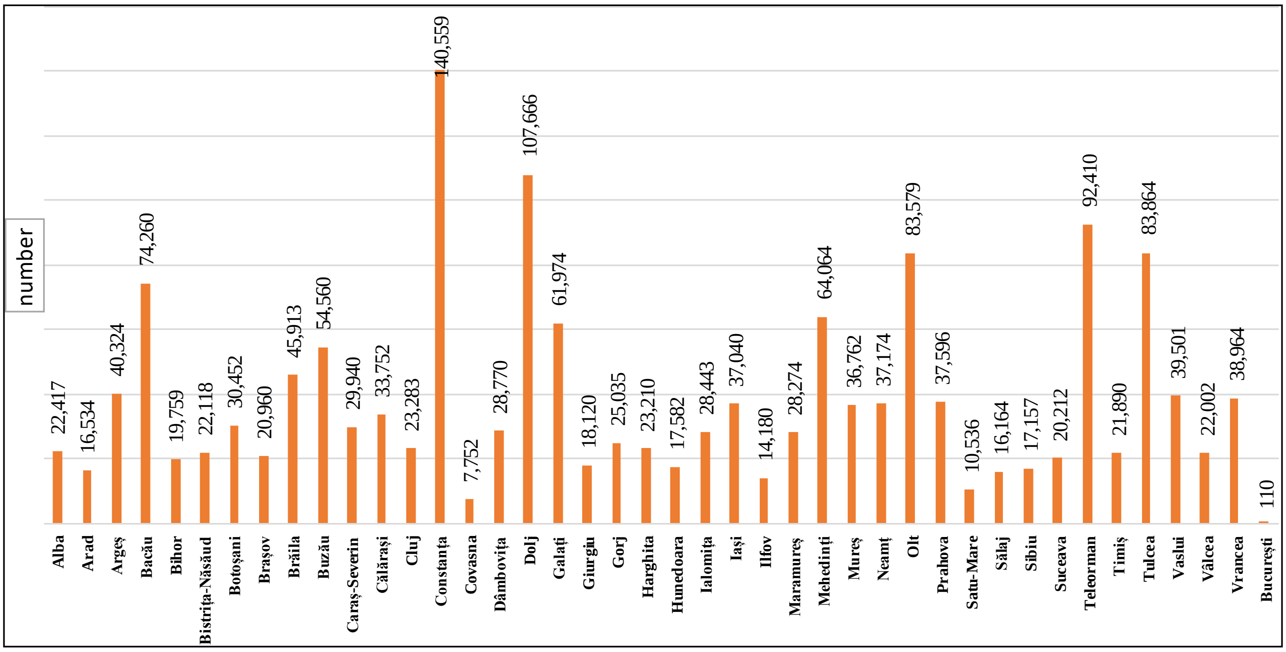
Source: *own interpretation, according [5]*

Analyzing the distribution of goats by Macroregions and Development Regions for 2019 (Figure 5), it is found that most heads were found in Macroregion Two 42% - 664,473 and in Macroregion Four 24% - 388,292. Other values obtained were: Macroregion Three - 18% and Macroregion One - 16% of the total goats raised in 2019.

The top for the large goat breeders at the level of Development Regions was the following: S-E Region 425,834, representing 64% of the total of Macroregion Two; S-W Oltenia Region 302,346, representing 78% of the total of the Four Macroregion; S-Muntenia Region 279,415, representing 95% of the total of Macroregion Three and N-E Region 238,639, representing 36% of the total of Macroregion Two. On the last place was Bucharest-Ilfov Region - 14,290 (5% of the total of Macroregion Three).

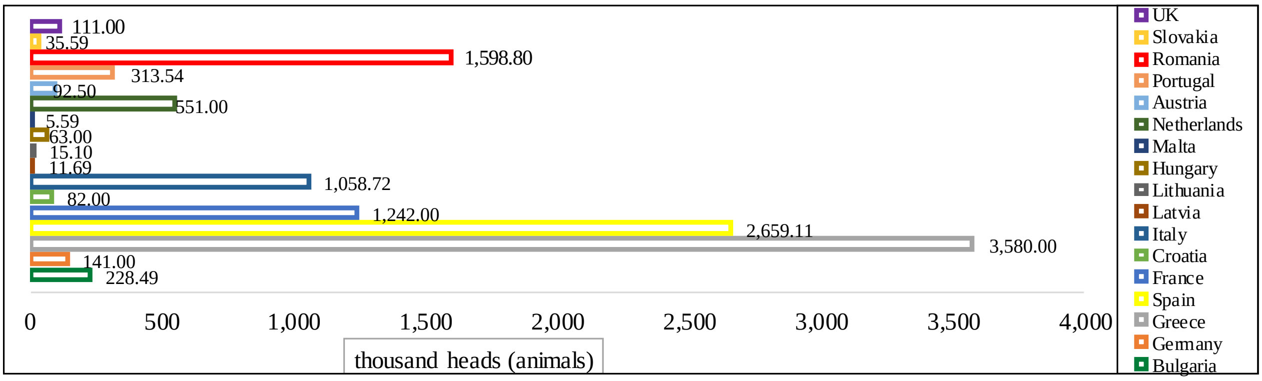
At the level of NUTS III (Figure 6), the situation was as follows, compared to 2019: most goats were raised in Constanța County - 140,559 heads, followed by Dolj County - 107,666 heads. The other counties registered values below 100,000 goats, of which we mention: Teleorman - 92,410 heads, Tulcea - 83,864 heads, Olt - 83,579 heads and Bacău - 74,260 heads. Apart from the area of Bucharest, which owned 110 goats, other counties that had less than 20,000 animals of the mentioned species were: Ilfov - 14,180 heads, Satu-Mare - 10,536 heads and Covasna - 7,752 heads.

Figure 6. Goat herds by counties, 2019



Source: *own interpretation, according to [5]*

Figure 7. The main goat breeders in the EU, 2019



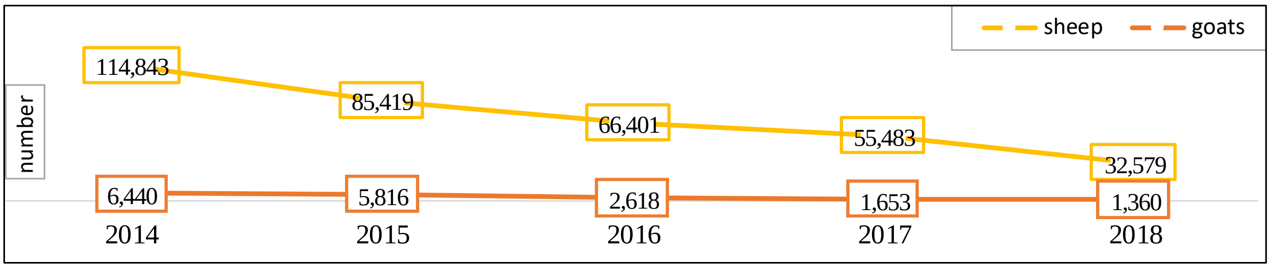
Source: *own interpretation, according to [2]*

According to Eurostat [2], in 2019, goats were raised only in 17 states out of the 28 EU members. The main goat breeders in the European Union were Greece - 3,580 thousand heads, Spain - 2,659.11 thousand heads and Romania - 1,598 thousand heads (Figure 7). As in the case of sheep, Lithuania (15.10 thousand heads), Latvia (11.69 thousand heads) and Malta (5.59 thousand heads) were on the last places in the ranking of goat breeders.

The raising of sheep and goats in an ecological regime has been successfully practiced recently, in the member countries of the European Union. For sheep, the main breeders that followed this breeding technology in 2018 were Greece - 1,299,677 heads, France - 1,132,809 heads and UK - 826,598. For Romania, out of the total number of sheep (10,176,400 heads in 2018), those raised in ecological regime represented 0.32%.

Greece - 494,031 heads, Italy - 110,055 and France - 109,938 were the main organic goat breeders. Although Romania was on the third place in terms of the total number of goats, organically raised animals totaled 1,360 heads in 2018, which placed our country on the last places in the Union. Out of the total number of goats (1,539,317 heads in 2018), those raised in ecological regime represented 0.09%.

Figure 8. The number of sheep and goats raised in ecological regime in Romania, 2018



Source: own interpretation, according to [2]

Analyzing Figure 8, it is found that the number of sheep and goats that were raised in the ecological regime, in the period 2014-2018, in Romania, decreased for both categories of animals, by 71.63% for sheep and by 78.88% for goats.

What recommends the consumption of mutton? The fact that it is a healthy food, containing proteins that can be easily absorbed by the body and very important, in spring this meat is the lowest in fat and the most tender. Also, the risk of antibiotic residue poisoning is lower in these animals [4].

Following this analysis and taking into account the fact that the European Union-28 provided from its own production only 88% of the demand for sheep and goat meat [11], supporting this livestock sector in Romania, a country with a tradition in raising these animals, would create new opportunities for farmers.

CONCLUSIONS

Romania has a natural environment conducive to the development of the livestock sector, but in our country the consumption of sheep and goat meat is seasonal, especially in spring, on the occasion of the Easter holidays and in autumn, on the "Harvest Days". As a result, Romania exports more than it consumes. The intensification of exports to non-EU countries, recently notified, can bring benefits to Romanian farmers. That is why this sector has been included in MADR's priority list since 2017, and the results of these efforts have started to be noted in the livestock growth.

The quality, benefits and diversity of products obtained from sheep and goats, the lower production costs resulting on these farms compared to other livestock farms, and the secular traditions related to their growth are advantages that can influence the preferences of livestock farmers. The increase in sheep and goat farms would cover domestic demand and bring important benefits for Romanian farmers through exports.

ACKNOWLEDGEMENTS

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ECONOMIC IMPACT ON THE TOMATO PRODUCTION SECTOR OF DE MINIMIS AID SCHEME IN 2020, OF SANITARY CRISIS AND PEDOLOGICAL DROUGHT

MARIN ANCUȚA[1], RODINO STELIANA[2], BEREVOIANU ROZI LILIANA [3]

Abstract: *The paper presents the assessment of the economic impact in the vegetable production sector through the support scheme for the Program to support tomatoes in protected areas for 2020, focusing on production results, market effects, impact on producers, trade balance. In this context, the study is based on extensive documentation on the impact of funding from the National Budget and support schemes established under European CAP regulations. The outbreak of the COVID-19 health crisis in March 2020 led to restrictions on the movement of people, which led to behavioral changes in tomato producers. The aim of this paper is to highlight the dinamics of the areas cultivated with tomatoes and, as well as to change the behavior of producers in terms of marketing and payment methods accepted.*

Keywords: *support scheme for tomatoes, economic impact, tomato cultivation*

JEL Classification: Q13, Q18, Q28

INTRODUCTION

In the last two decades, globalization has been reflected in the technological and organizational revolution that has disrupted production and marketing systems in the agricultural sector. Increasing product differentiation, logistical progress, economies of scale and new strategies intensify national and international competition. At the same time, the opening of borders and the liberalization of trade affect small local producers.

In Romania, the vegetable sector has benefited from financial aid, both by granting direct payments and by the possibility of accessing European funds in order to make investments at sector level. The payments granted to the sectors and productions provided in art. 52 paragraph (2) of Regulation (EU) no. 1307/2013, applies to those who are considered economically, socially and environmentally important, and who are affected by certain difficulties.

Romania is a key player on the European market of fresh tomatoes, either in terms of production or imports, Romania ranking among the top 10 tomato producers in Europe, after Italy, Spain, Portugal, the Netherlands, Greece, France, Poland), although, from the point of view of the cultivated area, Romania is on the third place in Europe (after Italy and Spain).

The scheme "De minimis aid for the implementation of the program to support the tomato product in protected areas" is a multi-annual government program that is applied according to the provisions of Regulation (EU) no. 1408/2013. Tomato growers in protected spaces have benefited from the de minimis aid scheme provided for this sector since 2017 by GD no. 39/2017, program that continued in 2018 by Decision no. 943 of December 20, 2017, in 2019 by Decision no. 107/2019, and in 2020 by the Decision of 248/26 March 2020. De minimis scheme for 2020 is similar to the previous ones and is implemented by the County Directorates for Agriculture (DAJ). The financial resources necessary for the application of the de minimis aid scheme are provided from the budget for 2020 and are in the amount of 33,190 thousand lei, representing the equivalent in lei of the amount of 50,000 thousand euros. The changes in the implementation of the program for 2020 took into account the mandatory amount to be marketed and the amount of subsidy per farmer enrolled in the program.

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MATERIALS AND METHODS

The scientific research aims to develop concrete, original solutions and recommendations on the impact of the program to support the tomato product in protected areas, the health crisis and the pedological drought on tomato production in Romania.

The paper involves the use of methodologies, techniques and equipment specific to an analytical study and data processing. The quantitative survey was used as a method of collecting information. The opinion poll applied is a questionnaire-based survey that provided information on the situation of tomato growers, the problems they had to face throughout the year.

RESULTS AND DISCUSSIONS

In June-July 2020, an opinion poll was conducted among tomato growers on identifying the problems they face and highlighting their views in order to develop solutions and recommendations for efficient use of vegetable production, in this case, tomatoes. The questionnaire was applied to a number of 246 respondents from all over the country. We received answers from farmers in 28 counties and grouped them by region. The counties with the most respondents were: Teleorman, Prahova, Dâmbovița, Olt, Dolj, Galați and Bihor. The respondents were are all of Romanian nationality. Among the interviewed people, more than half were men, respectively 59%, the difference of 41% being women.

By age groups, the highest percentage of respondents is the highest weights are held by people between 30-50 years old (over 75% of the respondents). Making a correlation between the occupations of the respondents with their level of training, it resulted that most of the respondents have high school and higher education.

In order to summarize the results obtained, we will present in the following the most significant answers received from the interviewees. All the interviewees started their activity (tomato cultivation) after 1985. Among them:

- 18 people started their activity between 1985-1990,
- 24 people started their activity between 1990-1995,
- 42 people started their activity between 1995-2000,
- 33 people started their activity between 2000-2005,
- 48 people started their activity between 2005-2010,
- 48 people started their activity between 2010-2015,
- 33 people started their activity between 2015-2020.

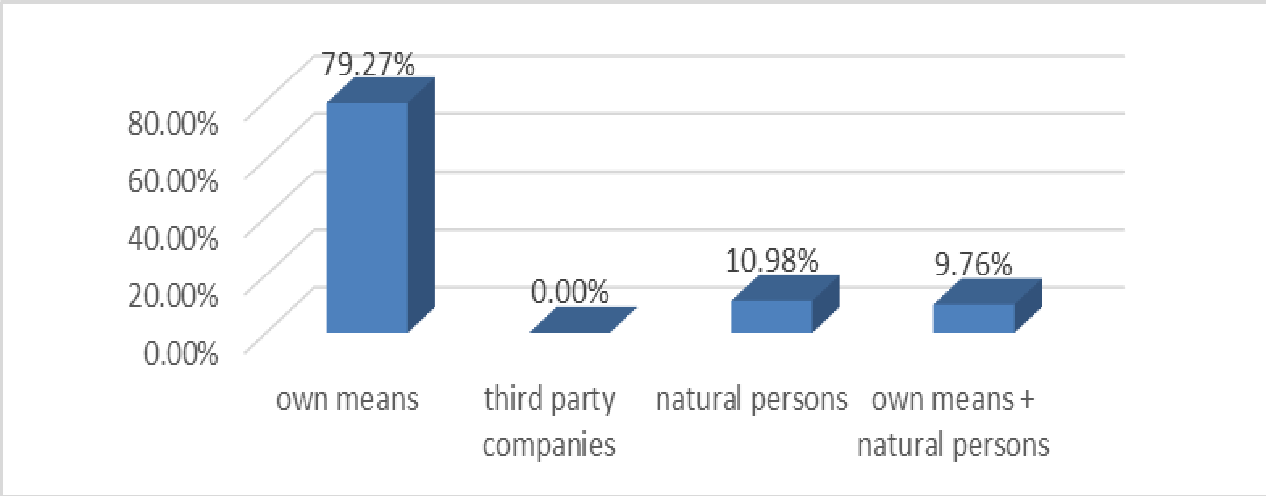
A number of 162 people (65%) of those interviewed started their activity after 2000, more than half of those surveyed work as natural persons, 17% family businesses, 12% individual businesses, etc. Most of the farmers participating in survey, more precisely 219 people (representing 89%) own a farm with an area of less than 5 ha. Of these, 167 people own areas under 1 ha. Of the 246 people surveyed, 39 people (15.85%) have greenhouses and / or solariums with small areas below 500 sqm, 126 people (51.22%) have greenhouses and / or solariums with medium areas between 500-1500 sqm, while 81 people (32.93%) have large greenhouses and / or solariums, with areas over 2,000 sqm.

A number of 105 persons representing 42.68%, additionally to greenhouses and solariums, own areas that they cultivate with field vegetables, but less than 1 ha. Only 6 people (2.44%) are cultivating areas over 5 ha, with field vegetables. 90 people (36.59%) deal exclusively with vegetable growing in protected areas, their number being approximately equal to those which have greenhouses and large solariums, over 2,000 sqm.

According to the questionnaire, vegetable growers use varieties / hybrids of local origin in proportion of 10%, imported in proportion of 56% and both variants 34%, and the propagating material is produced in proportion of 92% on their own, 8% being purchased from third parties.

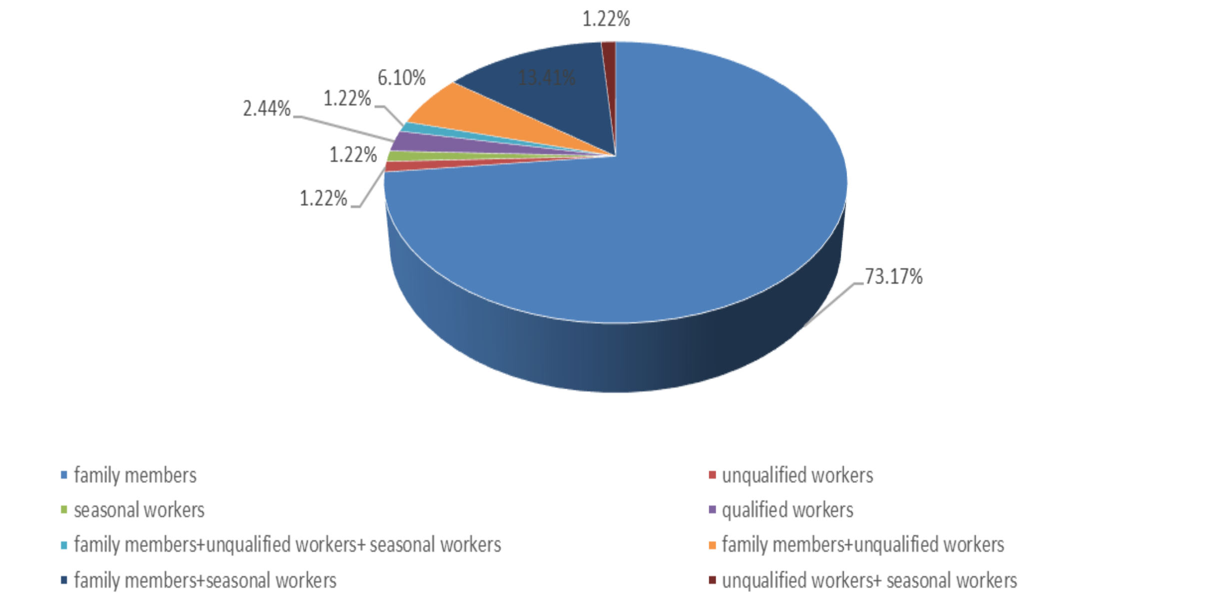
Regarding the works, most of them (80%) are done with their own means, the rest using the help of private individuals. No interviewee uses the services of specialized companies (Figure 1).

Figure 1 – Agricultural operations



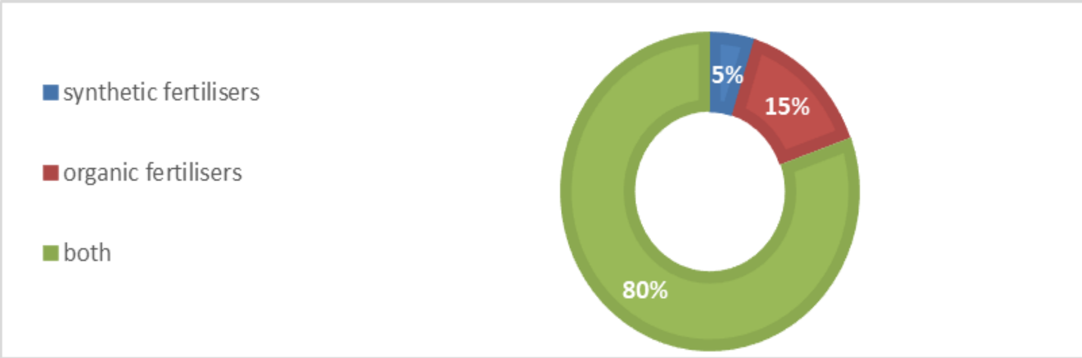
The structure of human resources used reflects the fact that, in general, in the Romanian vegetable farms the labor force is provided by family members in proportion of 73% (180), 1.22% of unskilled workers, 1.22% seasonal and the remaining 24% of variations composed of family members and / or skilled / unskilled workers, seasonal (Figure 2).

Figure 2 – The structure of human resources used in agriculture



Fertilizers used in current agricultural practices are included in both the category of synthetic chemicals and organic fertilizers. The surveyed vegetable growers use to a small extent chemical fertilizers 4.88%, they apply organic fertilizers in proportion of 14.63%, the remaining 80.49% going on a mixed variant (chemical + organic) - Figure 3.

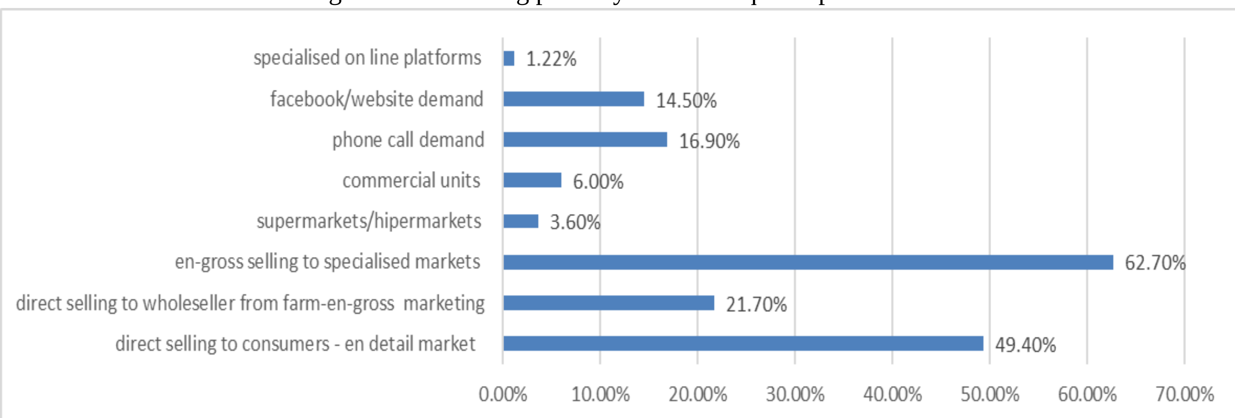
Figure 3 – Fertilizers used



A number of 225 producers out of the 246 interviewees answered that the main irrigation method used is "by drip", 6 use the "sprinkler" method and 3 "by watering furrows".

The market structure is another aspect taken into account in conducting this study. Both pre-harvest activities were taken into account, such as concluding pre-contracts for the capitalization of production, as well as the actual sales activity, in terms of sales channels, and revenues. Thus, it is observed that over 91% of respondents do NOT plan their production structure based on contracts concluded in advance, not having a well-structured, predictable management plan, without seeking to achieve well-established indicators. Therefore, sales are chaotic and losses are considerable, in some cases up to 50% of the value of production achieved. In the case of tomatoes, most of the production obtained goes to sale, even if a percentage is usually kept for self-consumption. Few, only 13% manage to capitalize on the full production, these being those who turn to intermediaries even if the price obtained is much lower than the market. The production is capitalized either in local markets / at the farm gate, in county or national markets. None of the farmers surveyed exports the production obtained. Most farmers (over 87%) sell their products in local markets, probably to wholesale buyers. The health crisis that started in March 2020, led to the emergence of new ways to sell production. Thus, 42 of the respondents deliver the products based on telephone orders, 36 of the respondents have created a page on social media accounts, and 3 have registered on the platform specialized in selling vegetables and fruits. Of those surveyed, only 11 deliver directly to consumers, 5 at the farm gate and 28 sell in markets. The others prefer mixed variants of capitalizing on production (Figure 4).

Figure 4 - Marketing pathways for the acquired production

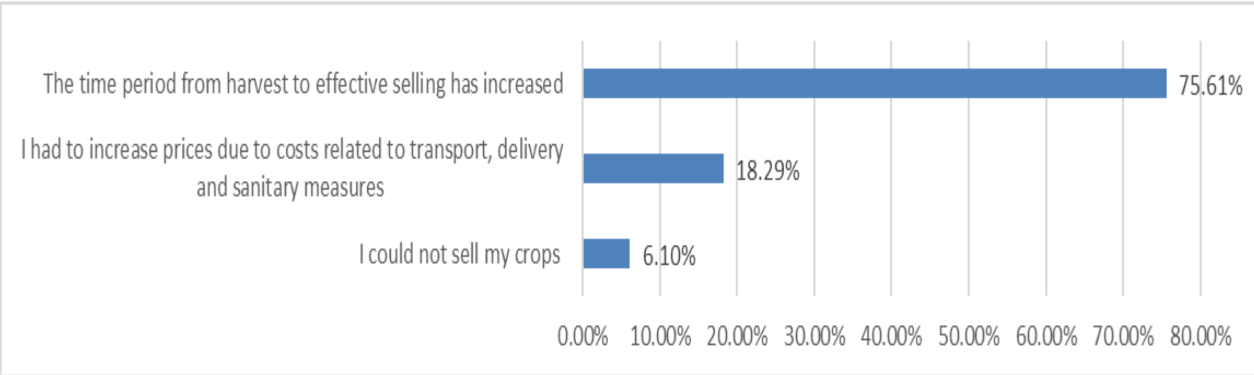


The revenues obtained from the sale of tomato production are mostly over 10,000 lei per year, the extremes can be explained by the existence of a large number of farms with small and very small areas, and high revenues can be attributed to the support given to tomatoes cultivation.

The issue of funding for agricultural activity was also addressed, in terms of using own resources or accessing funds available through national programs or EU funds. For the most part, the activities are supported by own funds. A share of 70% of those surveyed finance their activity from their own funds, 9.76% of those interviewed used bank loans, 14.63% going on a mixed version of loans + own sources.

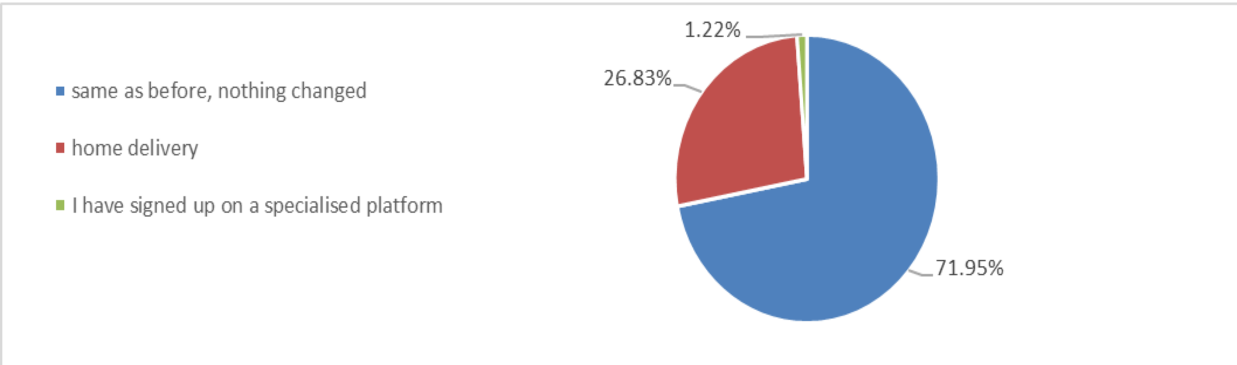
An important part of the survey was based on questions about the problems that vegetable farmers encountered and which were due to the COVID-19 health crisis, pedological drought and heavy rains in May-June 2020. When asked how the activity was affected by COVID-19 crisis, three quarters of them said that the time from harvest to the sale of the production increased, 18% increased delivery prices and 6% pointed that they did not sell anything from all the production obtained (Figure 5).

Figure 5 – The degree that your activity was influenced by COVID-19 crisis



When asked how the sale was affected, the vast majority of respondents said that they were not affected, because the sale of vegetables is done as before (Figure 6).

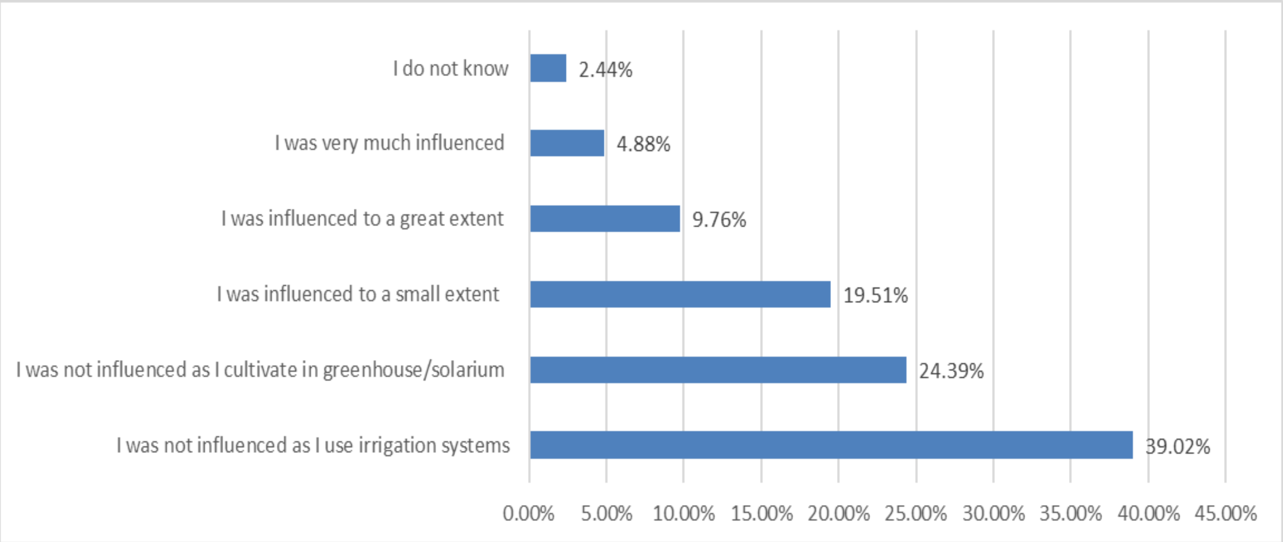
Figure 6 – Marketing of tomatoes during COVID-19 crisis



A share of 40% of the farmers who deliver the tomatoes by telephone order / site / facebook / specialized platform, will do so after the end of the COVID-19 crisis, considering that it is a beneficial way of marketing their harvest, eliminating intermediaries. A share of 11% categorically replied that they will not continue this practice because they find it cumbersome and do not master computer practice well enough, while 49% are undecided.

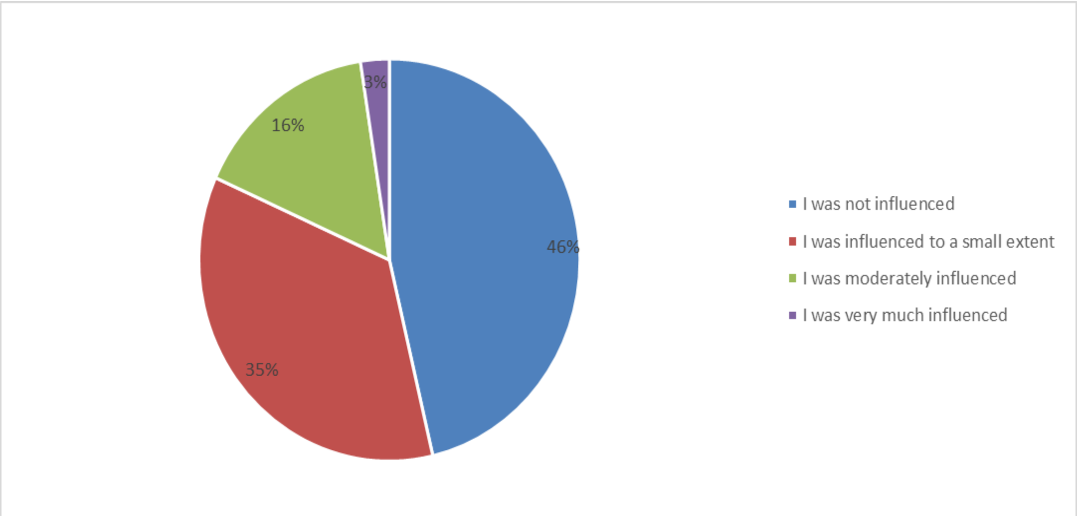
Another issue considered is the one related to the pedological drought from 2019-2020, the question being targeted towards the degree of impairment of the activity carried out by the interviewees. Thus, 96 people answered that they were not affected by drought because they irrigate, 60 people answered that they were not affected by drought because they cultivate only in greenhouses / solariums, 48 people answered that they were affected, but to a small extent, while 36 people responded that they were affected to a large and very large extent (Figure 7).

Figure 7 – Influence of the activity by the pedological drought



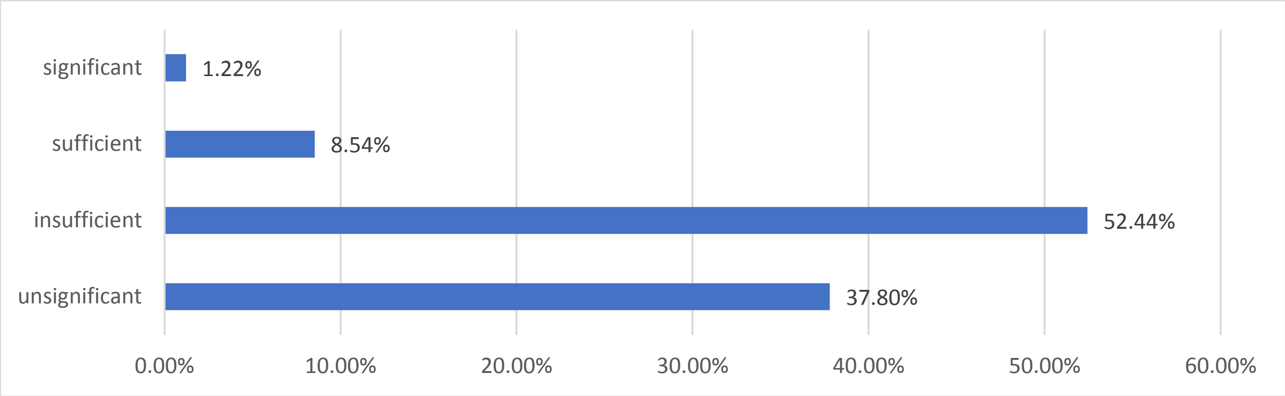
In the context of this severe drought, the heavy rains from May to June 2020, slightly affected the surveyed farmers (less than 20%). Large amounts of water were, only 6.90% of those surveyed considering that they were seriously affected by the floods (Figure 8).

Figure 8 – Influence of the activity by the May-June 2020 floods



As can be seen from Figure 9, a number of 222 of the interviewed farmers (representing over 90%) appreciate insufficiently / insignificantly the support provided by the state to combat the sanitary crisis, and pedological draught issues.

Figure 9 - The governmental support for overcoming the sanitary, economic and pedological issues



CONCLUSIONS

The farmers surveyed consider that the authorities need to be more involved by increasing the amount of support provided for different vegetables, possibly increasing the number of vegetables whose cultivation needs to be supported.

Also, the interviewees appreciate that the intense promotion of Romanian products would lead to an increase in the respective demand for the consumption of local products. Last, but not least, the adoption of more flexible legislation, more in line with their concrete needs, would be beneficial for all farmers in Romania.

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COORDINATES OF EFFICIENCY / INEFFICIENCY IN RAISING SHEEP

CHETROIU RODICA[1], IURCHEVICI LIDIA[2]

Abstract: *The paper highlights coordinates and aspects of the sheep breeding sector, which can lead to the creation of the framework of efficiency or inefficiency of production activities. The sheep sector is very diverse in terms of farm size, breeds and scale of production. Low average incomes, which limit investment in the sector and are not attractive to potential younger entrants, low modernization thresholds, infrastructure weaknesses, lack of training or a product marketing strategy are challenges for the sector. On the other hand, local market opportunities may arise from rural tourism, such as direct sale of products to those who value traditional quality products. Positive aspects can also arise from the sector's capacity to provide environment advantages: as the animals from this sector are grown mainly in extensive systems, they play a key role in landscapes and biodiversity conservation. The positive annual average rates of the last 10 years in Romania regarding the increase of sheep (+ 2.4%) and the increase of sheep meat production (+ 1.91%) indicate an upward trend of activities towards the production of sheep meat, in parallel with a slightly downward slope (-0.43% average annual rate) in the direction of milk production.*

Keywords: *efficiency, sheep, meat, milk*

JEL Classification: *O12, O13, Q12*

INTRODUCTION

The paper is part of the research conducted under the *ADER Project 24.1.2, Phase 2 - ”Economic efficiency of sheep and goat farms of different sizes, located in different geographical regions and landforms”*, funded by the Ministry of Agriculture and Rural Development.

Sheep are part of the landscape and cultural heritage of many countries. They are a source of employment in disadvantaged agricultural areas, and the high quality traditional products they produce are generally recognized as a result of a sustainable and multifunctional form of agriculture, which contributes to maintaining the environment and social cohesion in rural areas. Analyzes have shown that many production systems are below the profitability threshold. For this reason, measures are needed both from farmers, in order to increase average production, improve technologies, apply proper management, and support measures from the state, in various forms, to ensure the sustainability of future small ruminant farms.

MATERIAL AND METHODS

The present study uses as research methods both the analysis of statistical data, their processing and the calculation of statistical indicators, to highlight in terms of dimensional and structural dynamics of the sheep sector, and the results of 47 case studies conducted on sheep farms for milk, located in different regions of the country, in different relief forms and of different sizes. For these, different indicators of economic efficiency were analyzed, as well as the correlations between them.

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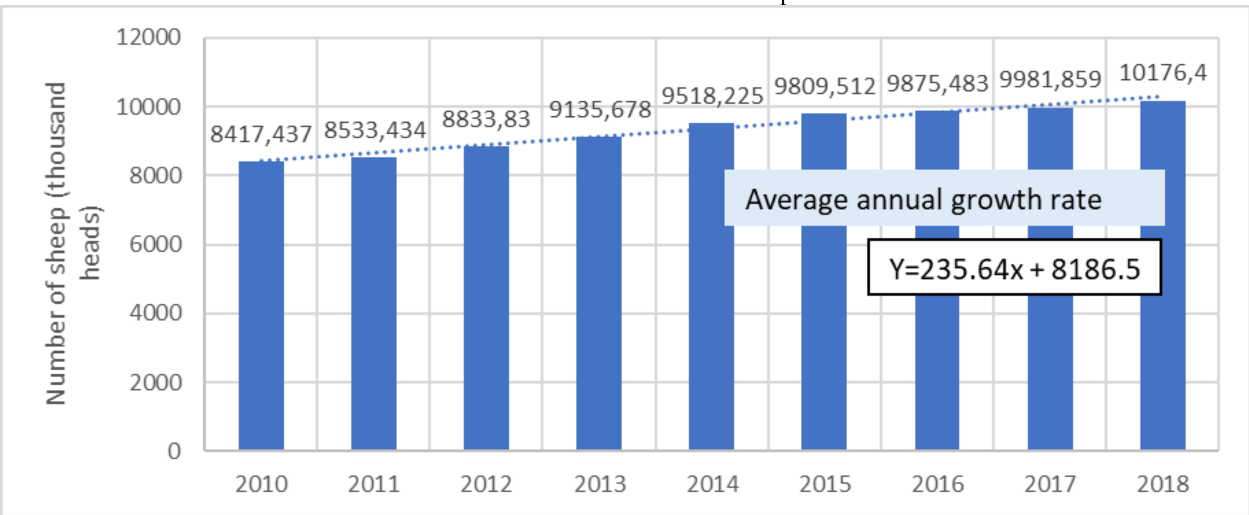
RESULT AND DISCUSSIONS

At national level, sheep herds registered an increasing trend, in 2018 reaching the maximum number of the period, of 10176.4 thousand heads, by 20.89% more than in 2010. The average of the period studied is 9364.65 thousand heads, with a standard deviation of 618.66 thousand heads, which determined a coefficient of variation of 6.6%, indicating that the string taken into analysis is homogeneous. The average annual growth rate of sheep during the period 2010-2018 was 2.40%. Calculating the equation of the evolution trend of the herds, it can be seen that the value of the coefficient of x is positive, which indicates that, on average, annually, the number of sheep increases by 235.64 thousand heads (Chart 1).

Chart 1. The evolution trend of sheep herds

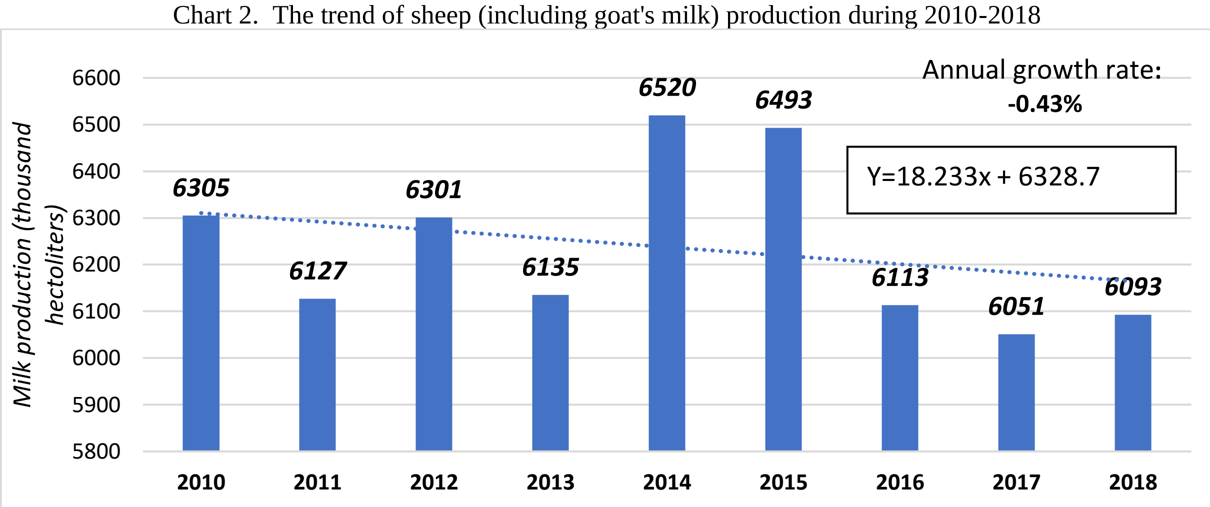


Source: Own calculations following NIS data

Analyzing the evolution of sheep (including goat) milk production over the period 2010-2018, as can be seen in Chart 2, it followed an oscillating trend, recording the maximum value of the period of 6520 thousand hectoliters in 2014.

After 2015, milk production decreased to 6051 thousand hectoliters (in 2017). The average value of milk production recorded during the studied period is 6238 thousand hectoliters, with a standard deviation of 165.85 thousand hectoliters, which led to a low coefficient of variation of 2.66%. The average annual registered rate is a negative one, of -0.43%.

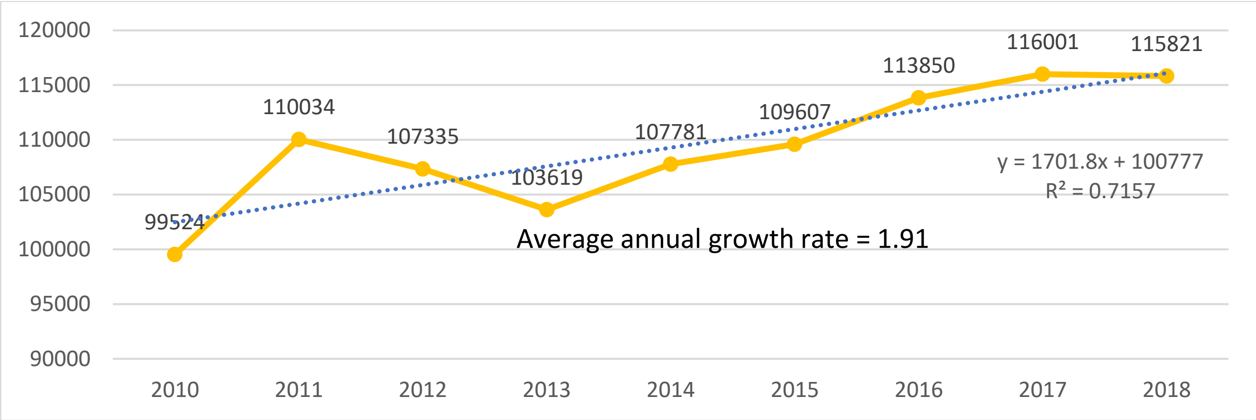
Chart 2. The trend of sheep (including goat's milk) production during 2010-2018



Source: Own calculations following NIS data

Regarding the dynamics of sheep meat production, as indicated by the data in Chart 3, the trend followed was an increasing one, so that in 2018, there was a higher amount than in 2010 by 16.4%, the average annual growth rate being 1.91% during this time. The minimum of the period was at the beginning of the interval (99524 tons), and the maximum was reached in 2017 (116001 tons), the coefficient of variation being 0.05.

Chart 3. Dynamics of sheep meat (including goat meat) production (tones live weight)



Source: Own calculations following NIS data

In order to identify the most vulnerable sheep farms for milk, the indicators of economic efficiency within the sheep farms that are the subject of the case studies were calculated and analyzed. In this sense, the farms were grouped on the 3 relief forms (plain, hill, mountain), in the order of their size (subsistence, semi-subsistence, small, medium farms, up to the lower limit of the large ones), specifying, also the geographical region of origin.

The analysis of the various synthesis indicators highlighted the fact that there is a complexity of factors that contribute to obtaining favorable economic results on a farm and these refer to the size of the farm, the average and total milk production, the costs incurred, the market context for the sale of production, the degree of production processing (primary processing, or the creation of added value by delivering assortments of cheese such as bellows cheese, etc.), the general management of the farm, etc.

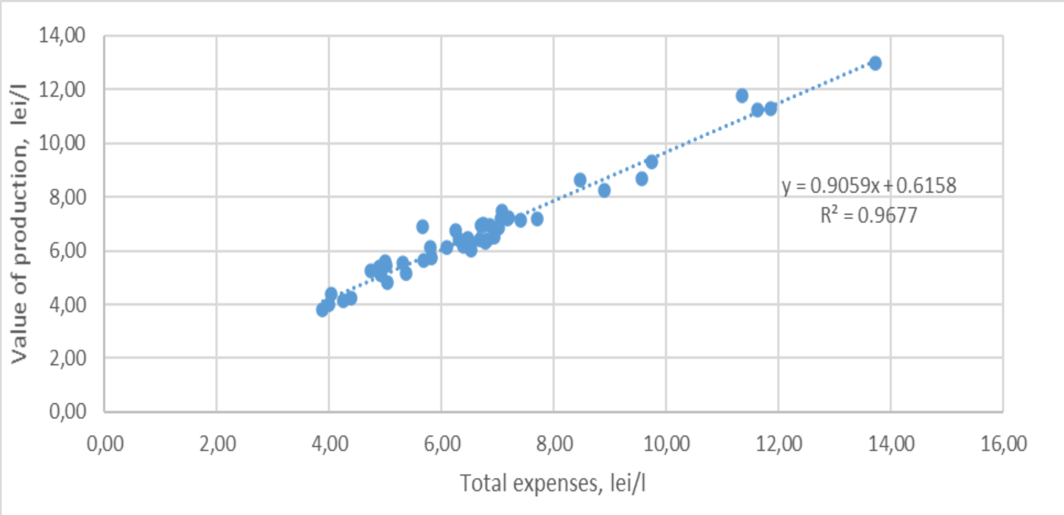
The average size of the farms taken into study was 516.75 heads, with an average production of 74.18 liters / head. The average value of production was 6.72 lei / liter, respectively 498.49 lei / head, total expenses being 6.74 lei / l, meaning 499.9 lei / head. The average value of the unit cost was 3.39 lei / l, being between 2.51-5.44 lei / l. The average deliver price for milk was 3.38 lei / l, between 2.47-5.01 lei / l. The average labor productivity in physical expression was 0.28 hours-man / l, while the average labor productivity in value expression was 16.13 lei / hour-man. Average profit / average loss per product unit: -0.02 lei / l, with a minimum of -0.86 lei / l and a maximum of 1.22 lei / l.

The average taxable income rate was 0.3%, with a minimum of -17.55% and a maximum of 32.07%. The average net income rate without subsidies was -0.18%, with a minimum of -17.55% and a maximum of 28.87%. The average profitability threshold in physical units was 153.35 l / head, and the value threshold was 490.24 lei / head. The average rate of exploitation risk was 222.95%, and the security index was negative: -1.22. On average, the total income / head of animal in the case studies is 1.6% above the break-even point, which indicates that the farms are in an unstable situation from an economic point of view.

Correlations between different indicators

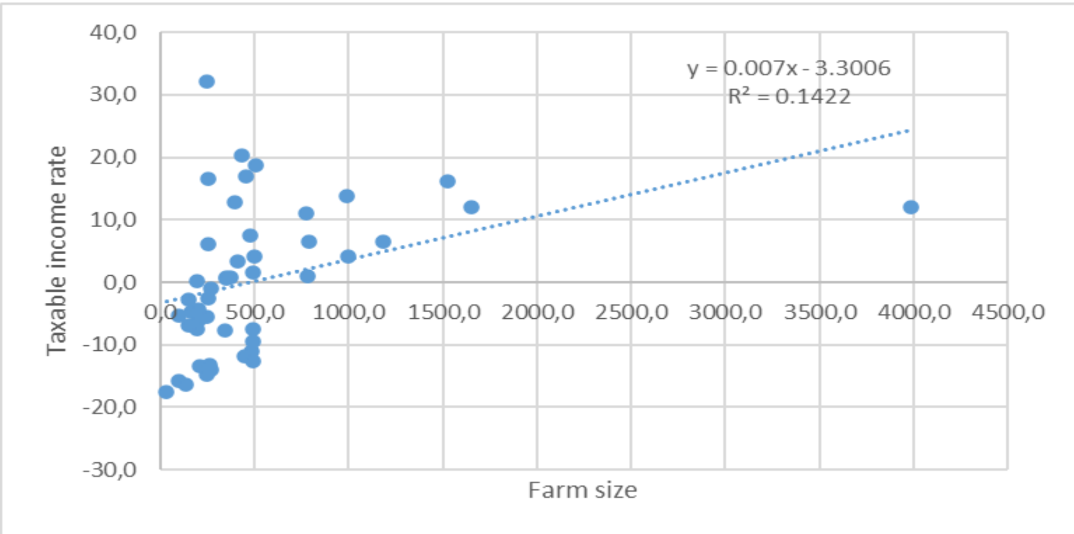
The Pearson correlation coefficient of 0.98 calculated between total expenditure and production value indicates a very good association between the two variables, and the determination coefficient R^2 shows that 96.77% of production value can be explained by the linear relationship with total expenditure (Chart 4).

Chart 4. Correlation between total expenses and production value



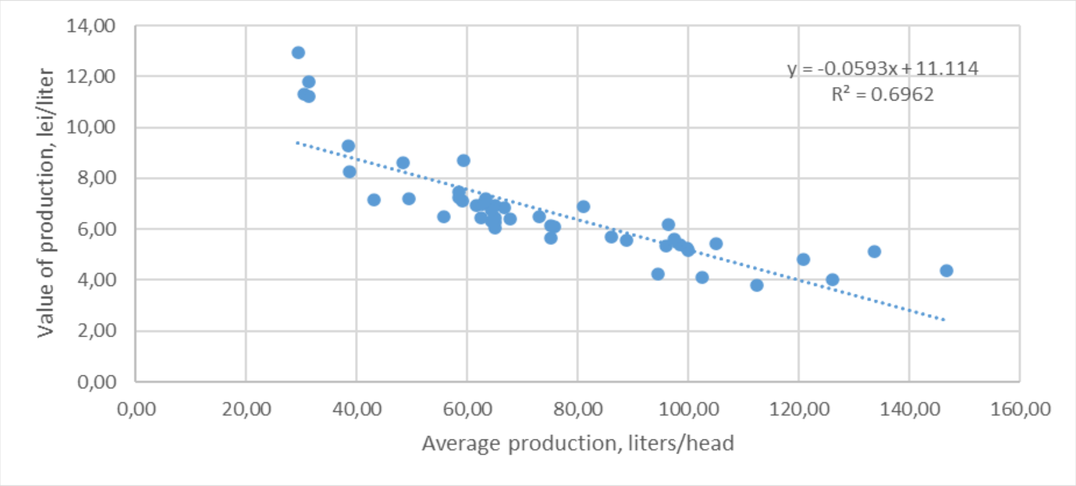
The correlation coefficient of 0.38 calculated between the size of the farm and the taxable income rate indicates an acceptable degree of association between the two variables, and the determination coefficient R^2 of 0.1422 shows that 14.22% of the taxable income rate can be explained by the linear relationship with farm size (Chart 5).

Chart 5. Correlation between farm size and taxable income rate



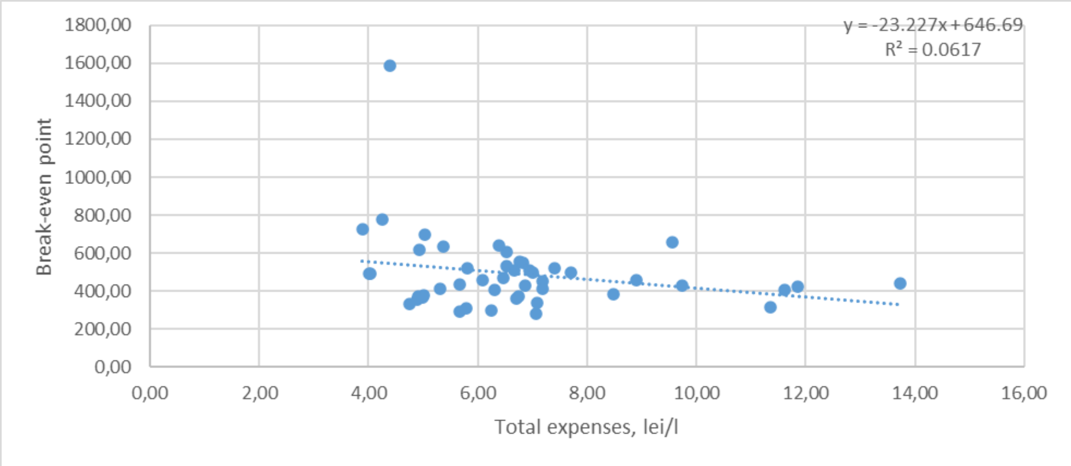
The correlation coefficient of -0.83 calculated between the average production and the production value indicates a very good association between the two variables, and the determination coefficient R^2 of 0.6962 shows that 69.62% of the production value can be explained by linear relationship with average milk production (Chart 6).

Chart 6. Correlation between average production and production value



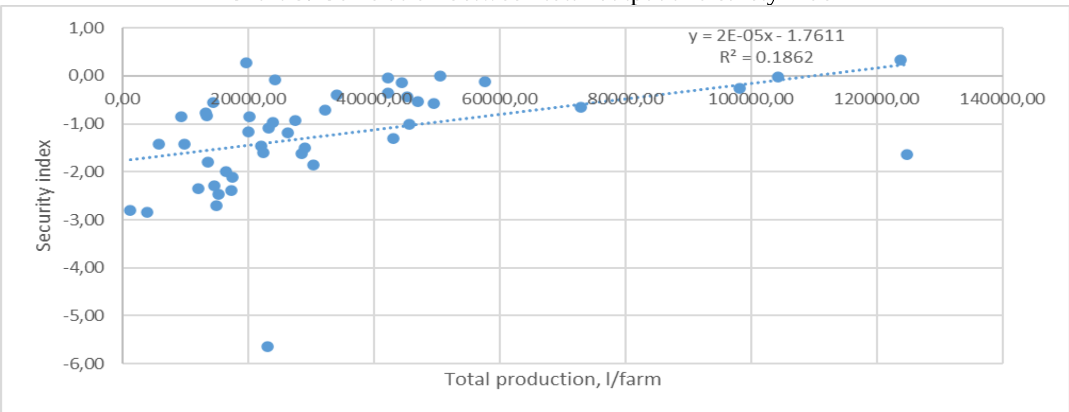
The correlation coefficient of -0.25 calculated between the total expenses and the break-even point indicates an acceptable degree of association between the two variables, and the determination coefficient R^2 of 0.0617 shows that only 6.17% of the break-even point can be explained by the linear relationship with total expenditures (Chart 7).

Chart 7. Correlation between total expenditure and break-even point



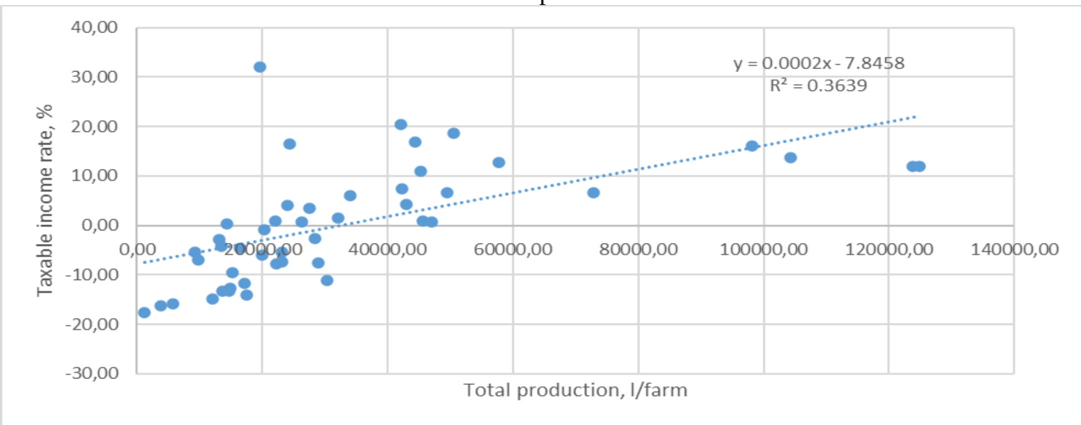
The correlation coefficient of 0.43 calculated between the total output and the safety index indicates an acceptable degree of association between the two variables, and the determination coefficient R^2 of 0.1682 shows that 18.62% of the safety index can be explain by the linear relationship with total milk production (Chart 8).

Chart 8. Correlation between total output and safety index



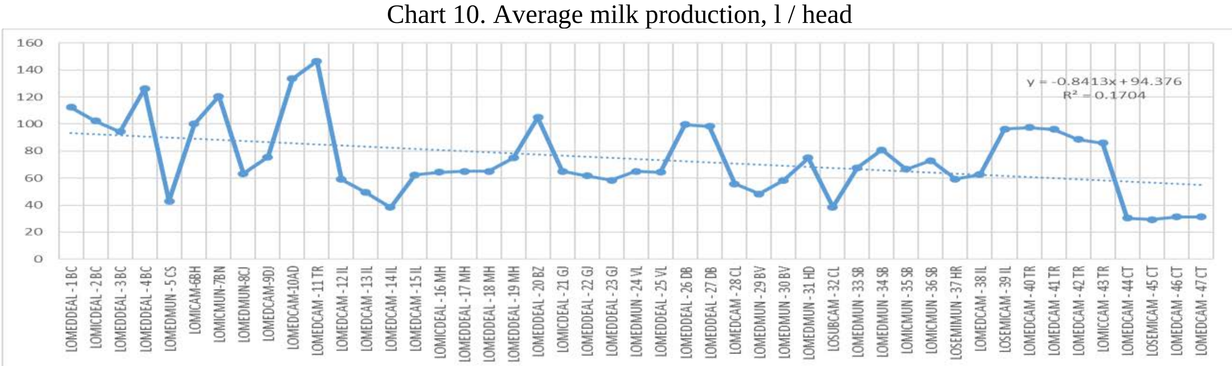
The correlation coefficient of 0.60 calculated between total production and taxable income rate indicates a good correlation between the two variables, and the determination coefficient R^2 shows that 36.39% of the taxable income rate can be explained by the linear relationship with total milk production (Chart 9).

Chart 9. Correlation between total production and taxable income rate



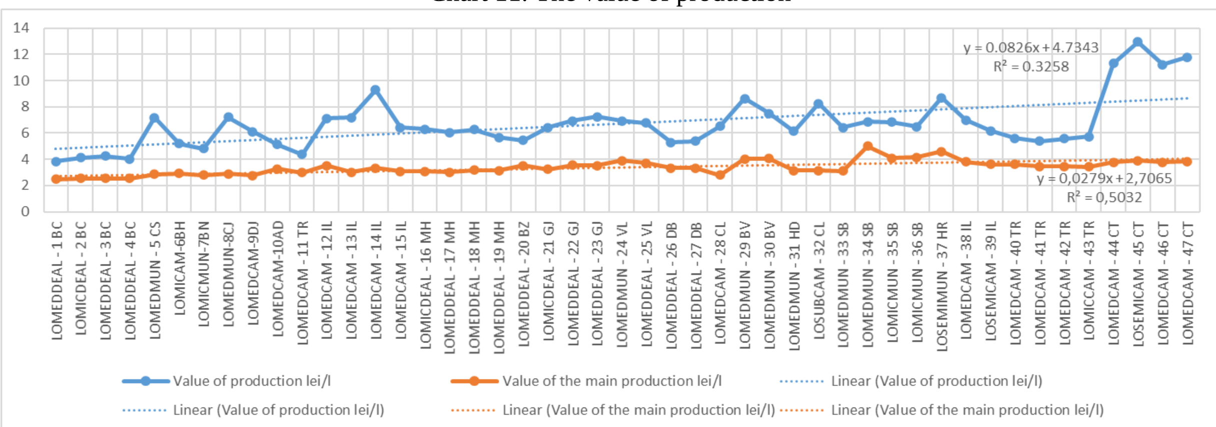
In the following graphs, the main synthesis indicators of the farms in the case studies are shown. The average milk production was between 29.33 l / head in Dobrogea area, for Merino sheep and 146.67 l / head in the southern part of Muntenia, in the plain area, for Carabașă sheep (Chart 10).

Chart 10. Average milk production, l / head



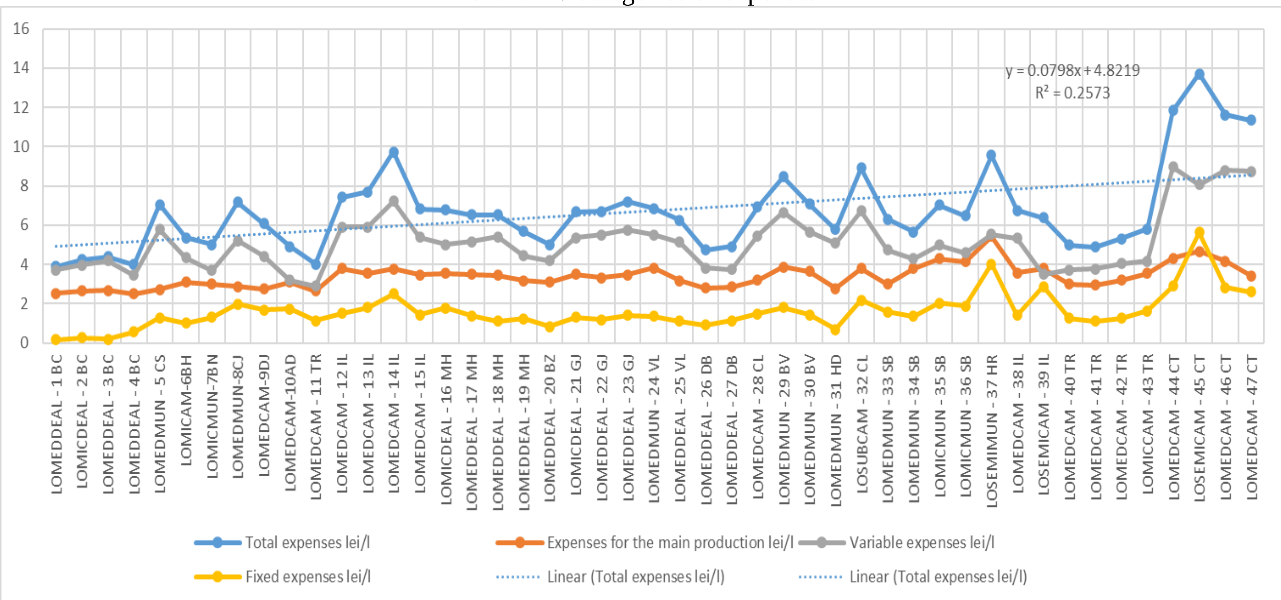
The value of production was between 3.82 lei / l and 12.96 lei / l, at the upper pole being farms that process milk, transforming it into specialties, such as bellows cheese, thus creating added value (Chart 11).

Chart 11. The value of production



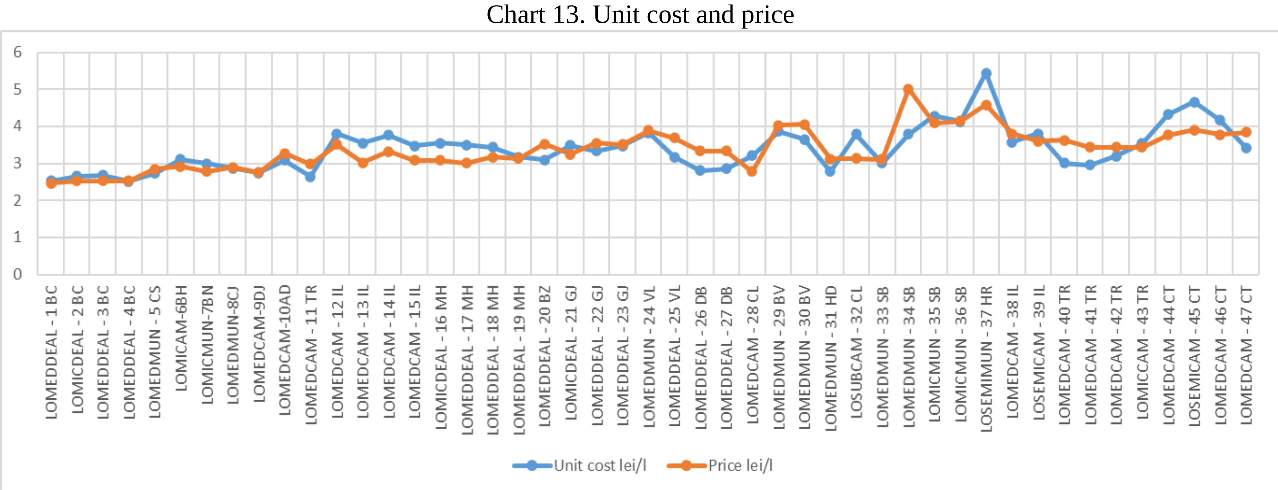
The total expenses were between 3.88 lei / l and 13.72 lei / l, the higher values being in the case of farms with low milk production (30 liters / head or less than 30 liters / head). The expenses for the main production (milk) were between 2.51 lei / l and 5.44 lei / l, the increased values being found especially in the case of farms with small milk productions or of the farms in the mountain area. The variable expenses were between 2.90 lei / l and 8.96 lei / l, and the fixed ones between 0.16 lei / l and 5.64 lei / l (Chart 12).

Chart 12. Categories of expenses



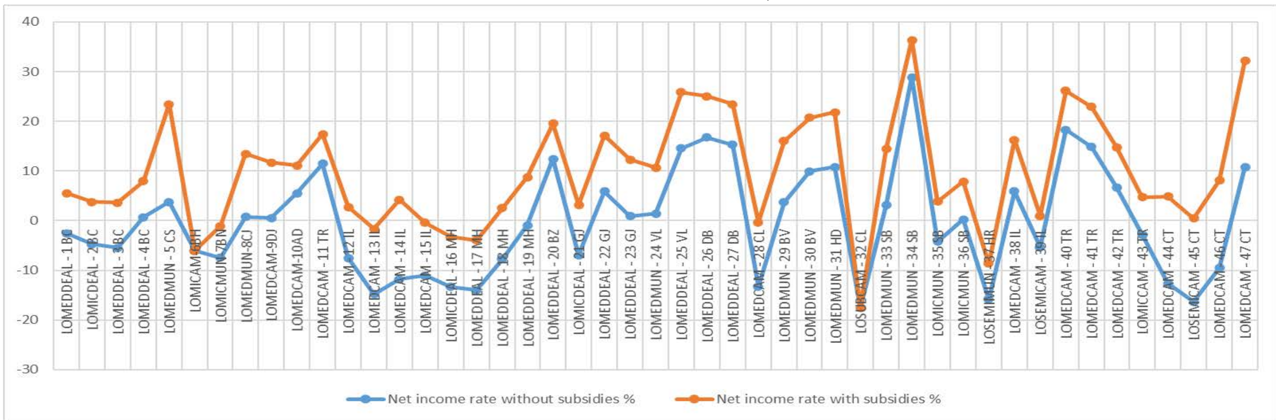
The unit cost was between 2.51 lei / l and 5.44 lei / l, the higher values being generally found in farms with low average milk production, or with low production and low number of animals. The calculated price of milk delivered was between 2.47 lei / l and 5.01 lei / l, the highest being found, in general, in mountain farms, where milk is transformed in different categories of cheese (Chart 13.).

Chart 13. Unit cost and price



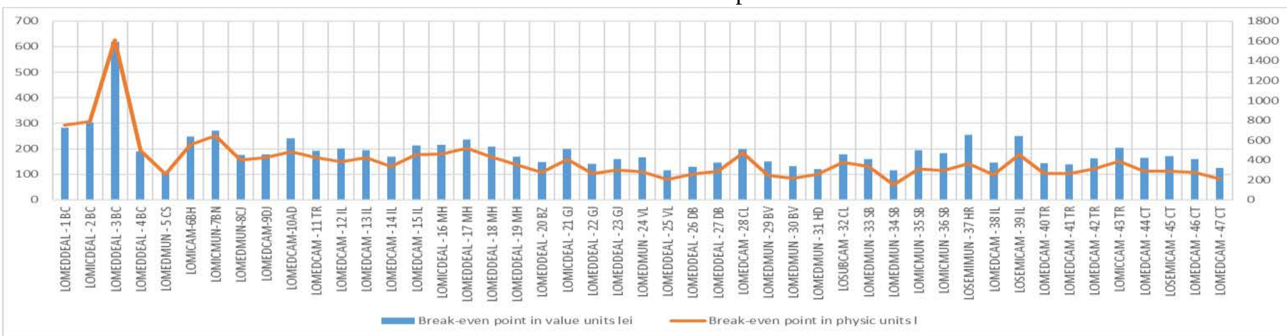
The economic results of the farms studied were different, some registering losses of different degrees, others a certain profit. Losses have occurred in different categories of farms in different regions or landforms, in farms with small herds and small productions, or even in farms with high productions but small herds. The net income rate without subsidies was between -17.55% and 28.87%, and the net income rate with subsidies (NTA) was between -17.55% and 36.36% (Chart 14).

Chart 14. Net income rate, %



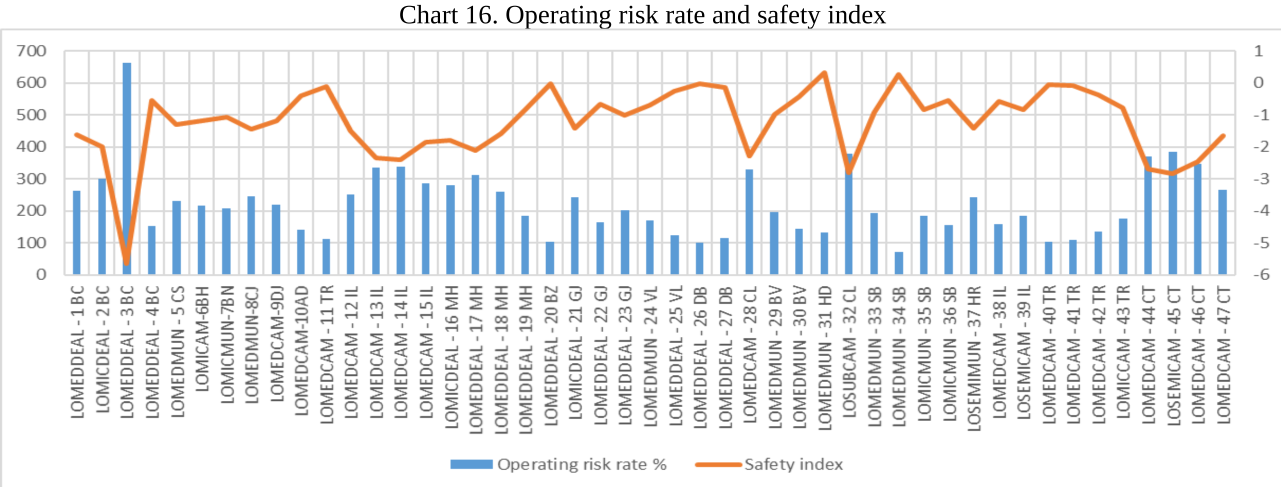
The break-even point in physical units was between 58.82 l / head and 626.37 l / head, and the value threshold between 283.07 lei / head and 1586.81 lei / head (Chart 15).

Chart 15. Break-even point



The exploitation risk rate (Chart 16) was between 72.62% and 664%, being higher in holdings with small number of animals and small productions, or even in holdings with high productions but small number of animals. There are also high-risk situations in which farms with large numbers and high yields obtain low capitalization prices and then production costs are not covered, resulting in losses. The safety index was between -5.64 and 0.33, and the positive values were in only 4.2% of the farms (in the mountain area, at over 240 heads and over 75 l / head, with added value of products).

Chart 16. Operating risk rate and safety index



CONCLUSIONS

Analyzing the averages of synthetic indicators by relief forms, it is found that the highest value of production is found in the plain area (7.41 lei / l), but the highest value of the main production - milk is found in the mountain area (3.71 lei / l). The highest total expenses are in the plain area (7.53 lei / l), but the highest expenses with the main production - milk are in the mountain area (3.62 lei / l). The unit cost of milk has the highest value in the mountain area (on average 3.62 lei / l), but also the highest capitalization price in the mountain area (average of 3.71 lei / l, with maximum of 5 lei / l). The profitability threshold in physical units is the highest in the hill area (192.38 l / head) and the lowest in the mountain area (on average 121.98 l / head). The lowest rate of exploitation risk is in the mountain area, where we meet the highest safety index. Comparing the farms that had a profit with those that registered losses, on average, those with a negative result produced milk with 3.61 lei / l and sold it with 3.26 lei / l, and those with a positive result produced with 3.19 lei / l and they sold with 3.49 lei / l.

The comparative analysis of the synthetic indicators on farm size segments highlights the fact that the smallest size segments, below 100 heads and 101-200 heads, generally have the lowest values of profitability indicators, high profitability thresholds, high operating risk rates and low security indices. They also have among the highest unit costs and the lowest labor productivity.

We consider that farms in these categories are the most economically vulnerable and fail to adapt quickly to changes in the economic environment, unless the lower number of heads is compensated by a high average production per head. In the case of larger farms, even if the average production is not high, it is compensated by the number of heads, which will ensure positive results. The sale of value-added products at higher prices is an important factor in obtaining favorable economic results.

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STUDY ON CONSUMER PREFERENCES TOWARDS VEGETABLES

ILIE (NECULA) DIANA MARIA[1], BĂDAN DANIELA NICOLETA[2]

Abstract: *Vegetables play an important role in human nutrition, as they have a high content of nutrients. In the last five years, there has been a tendency to increase the consumption of vegetables among Romanians, this being attributed to the increase of the living standard, but also to the reorientation of the population towards a healthier diet. The present study aims to determine the profile of vegetable consumers by highlighting their attitude and preferences. The research method used in the research paper was the questionnaire administered to a representative sample of 403 respondents. The study identified aspects related to the frequency of buying vegetables, but also the factors that can influence the decision to buy vegetables, such as their condition (frozen, fresh, processed vegetables) and their origin. The identified aspects were related to several socio-professional indicators (sex, age, place of residence, level of education, income) that can define the consumer profile.*

Keywords: *profile, consumption, preferences*

JEL classification: *D11, E21, Q11, Q13*

INTRODUCTION

In order to procure the necessary nutrients for a healthy and active life, man must consume various foods, including vegetables. In recent years, there has been an increase in the share of vegetables in consumer spending, which indicates that people are more attentive to what they consume, but more informed about the effects of food on health. Other factors that have led to an increase in the consumption of vegetable products are the increase in income and the availability of the variety of vegetables [2].

Consumer behavior is influenced by a number of factors that can be both endogenous / internal (need, motives, personality and attitude) or exogenous / external (culture, reference group, family and socio-economic situation) [1,6].

The consumer's decision to buy vegetables is usually based on the analysis of cognitive and emotional elements that may be influenced by advertising or food promotion campaigns, the most appreciated features being: freshness, appearance and price [3,4].

The behavioral and preferential study of the consumer towards agri-food products, fruits and vegetables alike, has been studied in numerous scientific papers, the main purpose being to identify the factors influencing the decision to buy these products but also to create a consumer profile, all undergoing changes. over time due to the constantly changing socio-economic environment [5].

MATERIALS AND METHOD

The present study aimed to determine the profile of vegetable consumers by highlighting their attitude and preferences. By evaluating the consumers' preferences in connection with the purchase of vegetables, the factors that influence the purchasing decision are also identified.

The research method used in this research paper was the questionnaire, with a number of 403 respondents. In this study were identified aspects related to the frequency of buying vegetables, the places where they were purchased, the amount allocated. These identified aspects were related to a

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series of indicators such as sex, age, income, place of residence, indicators that can build the profile of the vegetable consumer.

In order to determine the link between socio-economic factors and the frequency of consumption of vegetables, the Chi-square test was applied.

The Chi square test (X^2) indicates whether there is a link between two variables, by checking the hypothesis of an association between them. This test is used to interpret the incidence tables that were generated by cross-applying the pairs of factors studied in the study.

To determine Chi-square we start from the following hypotheses:

a. H0 - null hypothesis - when the two variables are independent;

b. Ha - alternative hypothesis - when there is an association between the two variables.

The calculation formula of X^2 is as follows [7]:

$$\chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i},$$

Where,

O -represents the observed frequency;

E- represents the theoretical frequency;

n and i - represent the number of rows and columns of the incidence table, respectively.

If at least 80% of the probable frequencies exceed the value 5 and all probable frequencies exceed the value 1, the Chi square test is valid. [8.9]

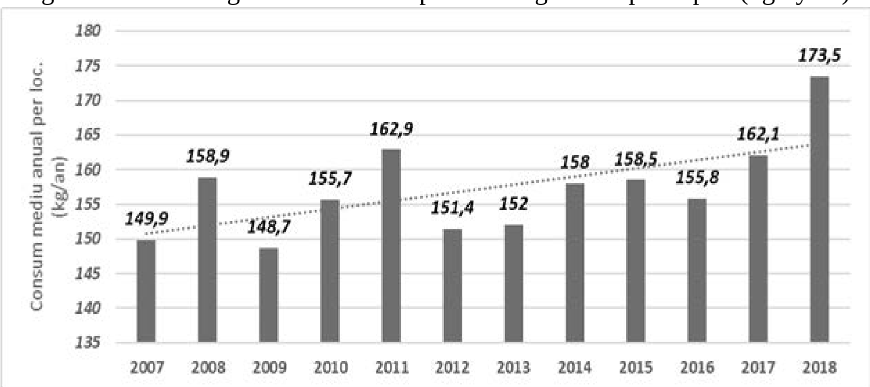
Using the method of ordering the ranks, it was possible to establish a hierarchy of decision-makers that can influence the consumption of vegetables. This method is a comparative scaling method by which the appreciation of a sample can be established according to an evaluated criterion for a given product. In order to be able to process the information, they will be classified by ranks with the help of scores from 1 - the least important to 5 very important (in this case). By processing the data, the average scores of each criterion subject to evaluation will be determined, so they will be ranked according to the value obtained. [9]

RESULTS AND DISCUSSIONS

1. Average annual consumption of vegetables in Romania and the EU

Analyzing the average annual consumption of vegetables per person at national level, it can be seen in figure no.1 that during 2007-2018, it registered a growth trend of 15.74%, from 149.9 kg / person in year 2007, at 173.5 kg / pers. in 2018. The average annual rate recorded is 1.34%, this increase being attributed to the increase in living standards.

Figure no. 1. Average annual consumption of vegetables per capita (kg / year)



Source: INSSE data [10].

Taking into account the average consumption of vegetable varieties, it was observed that:
- the average annual consumption of onions shows an oscillating evolution. In 2018 it registered an increase of 26.11% compared to the consumption registered in 2007 located at the value of 18 kg / capita;
- in the case of tomato consumption, a downward trend is observed, so that if in 2007 it was consumed per year 46.4 kg / inhabitant, in 2018 it was 41.4 kg / capita, a decrease of 10.78 %;
- consumption of edible roots shows an oscillating trend. In 2018 it registered a consumption of 15.5 kg / capita, increasing compared to the consumption registered in 2007 when it was 9.5 kg / capita, which could be attributed to the decrease of the sale price;
- the evolution of cucumber consumption shows an upward trend, so that in 2007 it was 5.9 kg / capita, while in 2018 it registered an increase of 84.75% reaching a consumption of 10.9 kg / capita, the annual registered rate being of 5.74%.

Table no. 1. Average annual consumption per capita (kg / year)

Specification	**2007**	**2018**	**Annual rithm (%)**	**2018/2007 (%)**
Tomato	46,4	41,4	-1,03	-10,78
Dried onions	18	22,7	2,13	26,11
Cabbage	40,8	44,5	0,79	9,07
Edible roots	11,6	15,5	2,67	33,62
Pepper	9,2	13,4	3,48	45,65
Green pea	1,2	1,5	2,05	25,00
Green beans	2,3	3,3	3,34	43,48
Cucumbers	5,9	10,9	5,74	84,75
Other vegetables	14,5	20,3	3,11	40,00

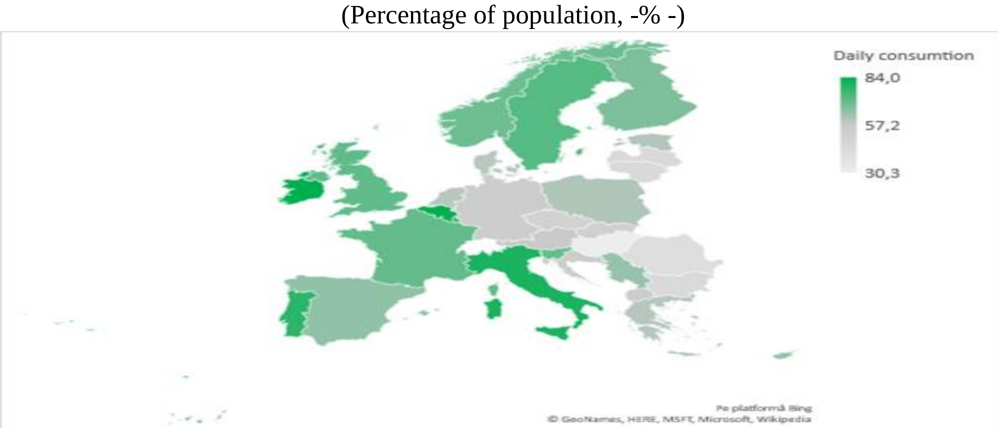
Source: INSSE processed data [10].

According to Eurostat statistics, in 2017, 28.6% of the population consumed vegetables once a day and more than one portion, 12.6%.

At the level of 2017, a percentage of 63.5% of the U.S. population. consume vegetables daily, 27.3% of the population consume at least twice a day, and 5.4% consume vegetables at least once a week.

According to Eurostat statistics, Romania, Bulgaria, Lithuania, Latvia and Hungary are the only five EU member states in which less than half of the population consumes vegetables daily. Thus, in Romania 41.2% of the population consumes vegetables daily, compared to 30.3% in Hungary, 44.4% in Latvia and 44.8% in Lithuania and Bulgaria.

Figure no. 2. The share of the EU population consuming vegetables daily in 2017
(Percentage of population, -% -)



Source: Eurostat data processed [12].

Among the European Union countries, the largest vegetable lovers are in Ireland, Belgium, Italy and Portugal population shares of 84%, 83.8%, 80.4% and 78% respectively, most countries ranging from 50% to 80% regarding the percentage of people who eat vegetables at least once a day.

2. Analysis of vegetable consumer preferences in Romania

In order to obtain information on consumer preferences for vegetables, a questionnaire survey was conducted in 2020. The sample size was 403 respondents, of which 68.98% were female and 31.02% were male, 34.74% from the rural area and 65.26% from the urban area. It was also observed that about 42.7% are in the age category under 25 years, and over 75.9% have higher education (table no. 2).

Table no.2 The structure of the respondents according to gender, age, environment of residence and level of education

Gender of respondents n = 403	nr.	%	Residence environment n = 403	nr.	%
female	278	68,98	Rural	140	34,74
male	125	31,02	Urban	263	65,26
Total = 403 respondents					
Age of respondents n=403	nr.	%	Education level n = 403	nr.	%
> 25ani	172	42,68	Primary education	4	0,99
25-34	50	12,41	Gymnasium studies	9	2,23
35-44	79	19,60	High-school studies	69	17,12
45-54	91	22,58	Post-secondary education	15	3,72
>54	11	2,73	Higher education	306	75,93
Total = 403 respondents					

Source: own calculations

It is important to note that female consumers consume vegetables more frequently than male consumers, so that 79.5% of women consume a lot and a lot of vegetables and men 67.2% (Table no. 3). One woman said she did not eat vegetables and 4 men.

In order to determine whether there is a link between the consumer's gender and the frequency of consumption, the calculation of test X2 cancels the null hypothesis that there is no link between the two variables. Thus, it can be stated with a 99% probability that the gender of the respondents has a significant influence on the frequency of consumption of vegetables.

Table no.3 The connection between the respondents' gender and the frequency of consumption of vegetables

Gender	UM	The frequency of consumption of vegetables					Total	
		not at all	Very little	little bit	a lot	very much	No	%
Female	No	1	8	48	158	63	278	68,98
Male	No	4	6	31	68	16	125	31,02
Total	No	5	14	79	226	79	403	100,00
	%	1,24	3,47	19,60	56,08	19,60	100,00	*
Indicator	X^2 calculate		Degrees of freedom	X^2 table value		Threshold of significance		
	13,39		4	13,28		0,01		

Source: own calculations

In the case of the analysis of the influence of the residence environment on the frequency of consumption of vegetables (table no. 4), by calculating the X2 test, it was observed that there is no significant connection between the two variables. Thus, there are no significant differences between the answers given by rural and urban respondents, over half of them in both areas of residence (56.4% and 56% respectively) consuming "many" vegetables..

Table no.4. The connection between the respondents' environment of residence and the frequency of consumption of vegetables

Gender	UM	The frequency of consumption of vegetables					Total	
		not at all	Very little	little bit	a lot	very much	No	%
rural	No	3	5	28	79	25	140	34,74
urban	No	2	9	51	147	54	263	65,26
Total	No	5	14	79	226	79	403	100,00
	%	1,24	3,47	19,60	56,08	19,60	100,00	*
Indicators	X^2 calculate		Degrees of freedom		X^2 table value		Threshold of significance	
	1,77		4		1,65		0,8	

Source: own calculations

Taking into account the influence of income on the frequency of vegetable consumption, it was found that of those who answered the questionnaire, most (a share of 38.7%) are in the income category between 2000-3001 lei (table no. 5). A percentage of 8.44% have an income below 1000 lei per month and a percentage of 9.18% exceed 6000 lei per month. Calculating the influence of income on the frequency of consumption of vegetables, it is found that there are no significant differences between their answers by income category, so that the X2 test does not indicate a link between the two variables..

Table no.5. The link between respondents' income and the frequency of consumption of vegetables

Income	UM	The frequency of consumption of vegetables					Total	
		not at all	Very little	putin	not at all	Very little	nr	not at all
sub 1000 lei	nr	0	1	5	21	7	34	8,44
1001-2000 lei	nr	0	2	10	37	10	59	14,64
2001-3000 lei	nr	3	6	25	90	32	156	38,71
3001-4000 lei	nr	0	2	17	37	13	69	17,12
4001-5000 lei	nr	1	1	10	15	2	29	7,20
5001-6000 lei	nr	1	1	2	10	5	19	4,71
peste 6000 lei	nr	0	1	10	16	10	37	9,18
Total	nr	5	14	79	226	79	403	100
	%	1,24	3,47	19,60	56,08	19,60	100	*
Indicatori	X^2 calculate		Degrees of freedom		X^2 table value		Threshold of significance	
	20,93		24		21,65		0,6	

Source: own calculations

In table no. 6 centralized the results of the X2 test for the consumption preferences of fresh vegetables, frozen or preserved depending on the income of the respondents. It is observed that, in the case of consumption preferences of canned and frozen vegetables, the calculated values of X2 of 31.56 and 31.65, respectively, exceed the value of tabular X2 (30.84) for a significance threshold of 0.03. Thus, it can be concluded that for the consumption of frozen and canned vegetables, the income of the respondents has a very significant influence, with a probability of 97%.

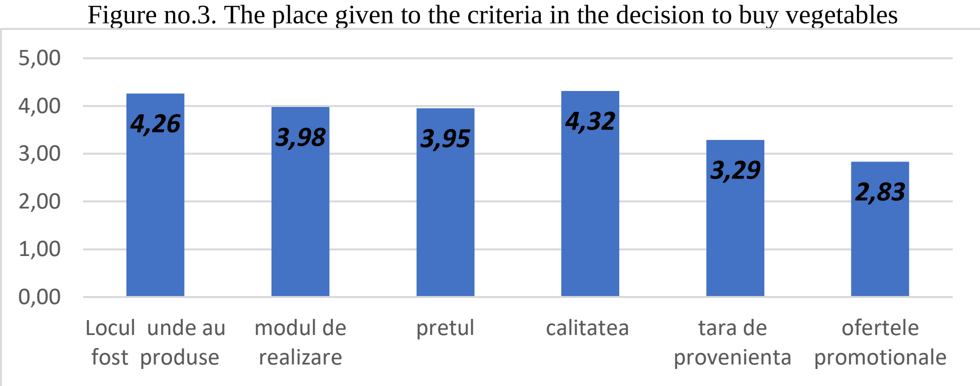
Table no.6. Link between vegetable consumption preferences: fresh, frozen or preserved, depending on respondents' income

		X^2 calculate	Degrees of freedom	X^2 table value	Threshold of significance
Income	consumption preferences of vegetables: fresh	13,89	18	12,86	0,8
	consumption preferences of vegetables: canned (compote, jam, etc.)	31,56	18	30,84	0,03
	vegetable consumption preferences: frozen / dehydrated	31,65	18	30,84	0,03

Source: own calculations

Using the Method of ordering the ranks for processing the results, a hierarchy of criteria was made according to which the decisions to buy vegetables are made. In the first place, the respondents chose the quality, followed by the place where the vegetables were produced (solar / greenhouse), the production method (conventional / ecological), the price, the country of origin and the promotional offers, according to the following figure:

Figure no.3. The place given to the criteria in the decision to buy vegetables

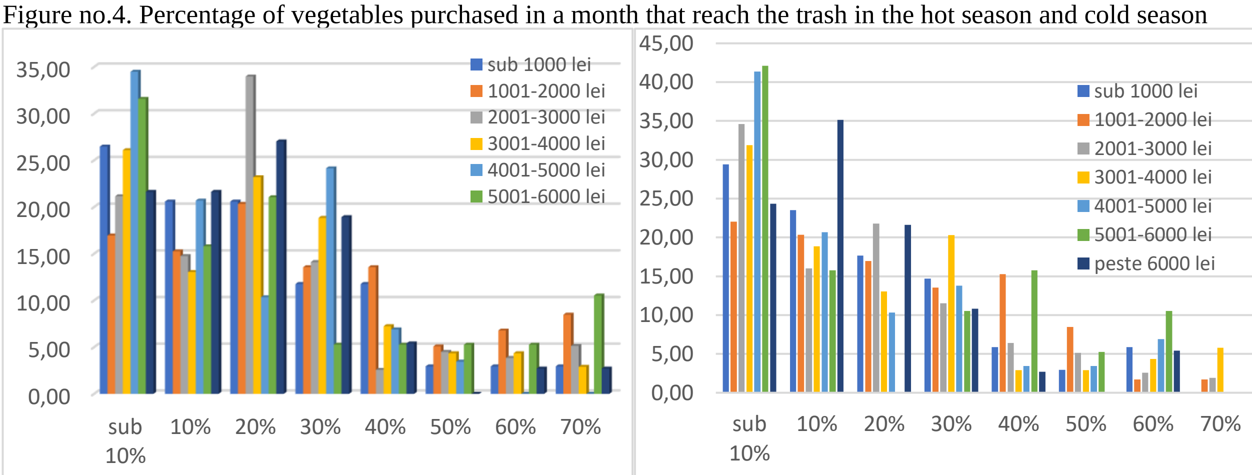


Source: own calculations

The study also highlighted the fact that a significant amount of vegetables is thrown away in both the hot and cold seasons, which involves a large waste of food and a source of pollution. The survey showed that over 26% of respondents throw about 20% of the quantity of vegetables bought in the hot season and in the cold season 31.8% of respondents throw less than 10%.

If we refer to the percentage of vegetables thrown in the trash depending on the income of the respondents, figure no. 4, those from the income categories between 4001-5000 lei and 5001-6000 lei stand out, which in a large share throw more less than 10% in both the hot and cold seasons.

Figure no.4. Percentage of vegetables purchased in a month that reach the trash in the hot season and cold season



Source: own calculations

Respondents with incomes between 2001-3000 lei throw in the hot season 20% of the vegetables bought, and those in the category of over 6000 lei most throw in the cold season 10% of the vegetables bought. What is worrying is the fact that there are consumers who throw away up to 70% of the purchased vegetables from the purchased quantity, so that in the hot season both those with low incomes and those exceeding 6000 lei are in this category, and in most of the cold season are in the income category of 3001-4000 lei; these things indicate poor shopping management, buying more than necessary regardless of income.

CONCLUSIONS

The elaborated study contributes to the determination of the profile of the Romanian vegetable consumer, thus constructing a current overall image of him. The respondents of this study fall into the age category of over 25 years. They appreciate the consumption of vegetables as a very important one in the diet so that, making a distinction according to gender, it was found that female consumers consume more vegetables than male consumers. Analyzing the economic factor, namely income, which can influence vegetable consumption, it was observed that although respondents fall into different income categories, vegetable consumption is not influenced by this factor, ie no more vegetables are consumed if income is higher. large, but can influence the category of vegetables purchased (frozen, fresh or canned).

Recently, it has been observed that Romanian consumers are more attentive to the characteristics of purchased agri-food products. This fact can be seen in the present study, so that a first important factor in the decision to buy vegetables is the quality of vegetables, being followed by the place where the vegetables were produced (solar / greenhouse) and how to make (conventional / ecological system).

Considering the fact that over a percentage of 57% of the purchased foods are vegetables, it was considered necessary to analyze the quantities of vegetables that reach the trash in the cold / hot season, being considered a food waste. Thus, it was concluded that a share of over 26% of the interviewed consumers throw about 20% of the quantity of vegetables bought in the hot season and in the cold season 31.8% of the respondents throw less than 10%.

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POTENTIAL OF RENEWABLE RESOURCES IN ROMANIA AND THE EU

TUREK-RAHOVEANU PETRUTA[1]

Summary: *In most European countries in the energy sector, a reconsideration of renewable energy priorities is taking place, increasing consumer safety and protecting the environment through the use of renewable energy sources that provide an affordable and guaranteed solution in the medium and long term. In Romania renewable energy constitutes 30% of the total percentage of energy used, although we have a high potential of renewable energy sources such as biomass, hydro or wind energy. In order for renewable energy sources to become an important factor in mitigating climate change and improving the overall energy security of the European Union, it is necessary to change the way renewable energies are promoted within EU Member States.*

Keywords: *biomass, green energy, wind energy*

JEL classification: *Q4,Q40, Q42, Q43, Q47, Q49*

INTRODUCTION

Renewable energy is produced using the earth's natural resources, such as sunlight, wind, water resources (rivers, tides and waves), heat from the earth's surface or biomass. The process by which these renewable resources are converted into energy does not emit greenhouse gases, so renewable energy is also referred to as 'clean energy'.

It can be used for biogas in the production of heat or electricity, as well as for biofuels in the transport sector.

Renewable energy plays a fundamental role in achieving the EU's energy and climate targets. Not only is it available in abundance within the EU, but it is also cost-effective with fossil fuels. As such, it can help to make our energy systems more efficient and reduce the EU's dependence on imported fossil fuels.

It also has the potential to provide a range of new jobs, create new industrial opportunities and contribute to economic growth.

In 1991, Denmark installed the world's first offshore wind farm "Sellby", which included 11 wind turbines. Germany introduced the first 'power tariff' for renewable energy sources in the same year; a policy mechanism to accelerate investment in renewable energy technologies.

Europe has also become the largest market for solar photovoltaics by covering more than 70% of the market by 2008. In the same year, Spain's Olmedilla photovoltaic park – a 60 megawatt power plant, making it the largest in the world – generated enough solar energy to power 40,000 homes a year.

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As the rest of the world increasingly uses and produces renewable energy sources, Europe has continued to be a leader. In July 2019, Portugal achieved the lowest cost of a global solar photovoltaic park – a record that still stands today.

MATERIAL AND METHOD

The analysis in this paper is based on statistical data from the publications provided by Eurostat and INS on the share of renewable energy in the EU in the period 2012-2018.

Indicators highlighting the evolution of the data studied are used in the paper, by analysing the average of the period and the increases over each year.

The calculation formulas to calculate the indicators are as follows[2]:

Fixed-base indices: ISC = (SCn/SC0)*100

- the arithmetic mean, in which:

X = arithmetic mean;

Xi = average values over a number of years (i);

n = number of years taken into account.

For standard deviation $\partial = \sqrt{\frac{\Sigma(\bar{x}-xi)^{\wedge}2}{n-1}}$; in which:

∂ = standard deviation; xi = average production values over a number of years; n = number of years taken into account.

For the mean square deviation $\partial x = \sqrt{\frac{\Sigma(\bar{x}-xi)^{\wedge}2}{n(n-1)}}$; in which:

∂x = mean square deviation;

For the coefficient of variation = , in which:

C = coefficient of variation (expressed as a percentage).

where: C-coefficient of variation- expressed as a percentage and which may be small (0-10.0%, average(10.1-20%) (greater than 20.1%).

RESULTS AND DISCUTIONS

Most European countries in the energy sector are reconsidering priorities for increasing safety in consumer food supply and environmental protection, and in this process, renewable energy sources provide an affordable and guaranteed solution in the medium and long term.

Advances in renewable energy show that the share of this type of energy in total consumption in the EU shows that it had reached only 14.6% in 2014. This is explained by the fact that more than half of the energy consumed in the EU came from net imports (gas and crude oil). In 2018 the share is increasing to 18% with a coefficient of variation of 7%, the difference having a small significance.

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Table 1. Share of renewable energy in 2012-2018
(% of gross final energy consumption)

Specificare	2012	2013	2014	2015	2016	2017	2018	Media	STDEV	Coefficient of variation %
European Union - 27 countries (from 2020)	16.063	16.711	17.482	17.849	18.048	18.471	18.884	17.64	0.99	5.58
European Union - 28 countries (2013-2020)	14.69	15.378	16.219	16.732	16.995	17.474	17.98	16.50	1.16	7.02
Belgium	7.181	7.515	8.032	8.003	8.712	9.064	9.424	8.28	0.82	9.92
Denmark	25.466	27.174	29.31	30.835	31.837	34.72	35.708	30.72	3.75	12.20
Germany	13.555	13.766	14.386	14.901	14.885	15.472	16.481	14.78	1.01	6.81
Estonia	25.524	25.324	26.145	28.228	28.684	29.127	29.996	27.58	1.88	6.82
Ireland	7.054	7.618	8.598	9.108	9.258	10.588	11.061	9.04	1.45	16.09
Greece	13.741	15.326	15.683	15.69	15.39	16.951	18.002	15.83	1.34	8.49
Spain	14.287	15.319	16.125	16.228	17.427	17.563	17.453	16.34	1.24	7.59
France	13.437	14.043	14.581	15.012	15.68	16.012	16.593	15.05	1.12	7.45
Croatia	26.757	28.04	27.817	28.97	28.267	27.28	28.024	27.88	0.71	2.54
Italy	15.441	16.741	17.082	17.526	17.415	18.267	17.775	17.18	0.91	5.28
Cyprus	7.137	8.456	9.173	9.929	9.859	10.491	13.882	9.85	2.10	21.32
Latvia	35.709	37.037	38.629	37.538	37.138	39.019	40.292	37.91	1.51	4.00
Lithuania	21.437	22.689	23.593	25.751	25.615	26.039	24.448	24.22	1.74	7.18
Luxembourg	3.14	3.531	4.512	5.05	5.44	6.286	9.059	5.29	1.98	37.50
Hungary	15.53	16.205	14.618	14.495	14.315	13.517	12.489	14.45	1.23	8.48
Malta	2.862	3.76	4.744	5.119	6.208	7.27	7.978	5.42	1.85	34.05
Netherlands	4.659	4.691	5.415	5.657	5.827	6.461	7.385	5.73	0.97	16.89
Austria	32.678	32.77	33.653	33.542	33.365	33.144	33.426	33.23	0.38	1.14
Poland	10.897	11.368	11.495	11.743	11.267	10.964	11.284	11.29	0.29	2.59
Portugal	24.579	25.7	29.508	30.514	30.865	30.611	30.322	28.87	2.60	9.02
Romania	22.825	23.886	24.845	24.785	25.032	24.454	23.875	24.24	0.77	3.19
Slovenia	20.818	22.407	21.539	21.894	21.293	21.056	21.149	21.45	0.55	2.55
Slovakia	10.453	10.133	11.713	12.883	12.029	11.465	11.896	11.51	0.95	8.21
Finland	34.434	36.73	38.78	39.32	39.011	40.917	41.162	38.62	2.36	6.12
Sweden	50.23	50.8	51.874	53.009	53.371	54.201	54.645	52.59	1.68	3.19
Iceland	72.394	71.66	70.484	70.261	70.175	70.691	72.182	71.12	0.94	1.32
Norway	65.55	66.746	69.19	69.193	70.163	71.647	72.752	69.32	2.54	3.67
Montenegro	41.531	43.735	44.111	43.089	41.558	39.708	38.807	41.79	2.01	4.81
North Macedonia	18.128	18.509	19.559	19.527	18.044	19.636	18.118	18.79	0.75	3.99
Albania	35.152	33.167	31.476	34.387	35.487	34.465	34.865	34.14	1.39	4.07
Serbia	20.79	21.095	22.864	21.989	21.147	20.287	20.32	21.21	0.93	4.38
Turkey	13.208	13.91	13.596	13.603	13.741	12.767	13.659	13.50	0.39	2.86

Source: data processed by Eurostat

In 2018, Sweden recorded the highest share of renewable energy, from gross final energy consumption (54.6 %) and a coefficient of variation of 3,19 %.

Sweden is followed by Finland with 41.2%, Latvia with 40.3%, Denmark 36.1% and Austria 33.4%.

On the other hand, the lowest shares of renewable energy were recorded in the Netherlands 7,4 %, Malta 8,0 %, Luxembourg 9,1 % and Belgium 9,4 % (Table 1).

The EU is trying to reach 20% of its final gross consumption of renewable energy by 2020. Thus, in order to achieve this objective in the development of renewable energies, France and the Netherlands must increase their share of renewable energy in final energy consumption by at least 6,4 % and 6,6 % respectively.

For 2020, twelve Member States have already exceeded their target, including Croatia, Sweden, Denmark and Estonia in the range of 5% to 8%.

In Romania, the share of renewable energy in gross final energy consumption was from 25% in 2016 to 24.5% in 2017, so that in 2018 it reached 23.9%.

Thus, in 2018, Romania was only 0.1 percentage points from the target set under the Europe 2020 strategy, according to which the share of renewable energy in gross final energy consumption must reach 24%. The average period 2012-2018 is 24.2%, with a coefficient of variation of 3.19% and a small meaning.

Romania has a diversified but quantitatively reduced range of primary energy resources: crude oil, natural gas, coal, uranium ore, as well as a potentially recoverable renewable resources.

CONCLUSIONS

In view of the responsibility the whole world has towards future generations and the environment, the European Union has set clear targets for renewable energy production.

The European Union's energy policies are focused on ensuring safe, sustainable and affordable access to energy. In order to achieve these objectives, the European Union has set out to adopt a long-term energy strategy with clear directions on energy security and efficiency, reducing carbon emissions, including through the growing use of renewable energy.

Most Member States will meet or exceed their 2020 targets. However, the forecasts also anticipate that Ireland, Luxembourg, the Netherlands and the United Kingdom will not meet their national targets.

In order for renewable energy sources to become an important factor in mitigating climate change and improving the overall energy security of the European Union, it is necessary to change the way renewable energies are promoted within EU Member States[3]

The priority objective of Romania's energy policy has also been to promote the exploitation of renewable energy resources (RES). Thus: by HG 443/2003 (repealed by OUG 88/2011), the provisions of Directive 2001/77/EC on the promotion of electricity production from renewable energy sources were transposed. The following objectives have been set: the legal framework necessary to promote E-SRE, the indicative targets for the share of SRE in Romania's gross energy consumption, and the share of E-SRE in the country's gross electricity consumption[4].

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[3] Thomas D. Foust, Doug Arent, Isaias de Carvalho Macedo, José Goldembergc, Chanakya Hoysalad, Rubens Maciel Filhob, Francisco E. B. Nigroc, Tom L. Richarde, Jack Saddlerf, Jon Samsethg, Chris R.

[4] Ministry of Economy, Energy and Business Environment – European and National Legislation

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ANALYSIS OF THE PROFITABILITY THRESHOLD FOR CABBAGE CULTURE IN CONVENTIONAL AND ECOLOGICAL AGRICULTURE SYSTEM -estimates 2019 / 2020-

BEREVOIANU ROZI LILIANA[1]

Summary: *The prices of horticultural products fluctuate depending on a number of factors, such as perishability, storage possibilities, insufficient supply for a certain assortment, quality, etc., which can stimulate or reduce the incomes of agricultural producers. The paper aims to substantiate from a technical-economic point of view a system for elaborating production costs and estimating capitalization prices, the degree of profitability of the cabbage crop in the field, so that in the conditions of optimizing production structures, technologies applied and the financial support provided, to achieve high economic efficiency, in line with the performance of the European Union. The results of scientific research can have a positive influence on agricultural producers who can adapt their existing resources and capacities at the farm level to obtain high yields.*

Keywords: *economic efficiency, profitability threshold, cabbage culture*

JEL classification: *Q12, Q14, Q57*

INTRODUCTION

Cabbage, with the scientific name *Brassica oleracea*, the Crucifere family, also known as *curechi*, is one of the oldest vegetables grown by man. Originally from the Mediterranean area, it was cultivated by the Greeks and Romans, then spread to Europe in the ninth and twelfth centuries. It is a biennial plant with green, red (purple) or white (pale green) leaves grown as an annual vegetable crop for its densely leafy heads. It is eaten as a raw salad, assorted or simple, as a culinary preparation in combination with or without meat, as well as pickled or canned.Cabbage juice, with a high content of sulfur, chlorine, calcium, iodine and iron, consumed raw and without salt has therapeutic effects in combating duodenal ulcer, cleansing the stomach lining and intestines, being indicated in the treatment of anemia and osteoporosis.

In Romania, the most favorable regions for cabbage cultivation are represented by the river meadows in the hilly area of Transylvania, Moldova, in the plain area in the south and west of the country (especially for extra-early solarium and early field crops).The cultivation of this plant is an advantageous activity from an economic point of view due to the large crops that can be obtained per hectare. Because there are several varieties of cabbage, each with different growing seasons (early, summer and autumn crops), cabbage cultivation can ensure a high yield per hectare, which can lead to a rapid income for growers of this plant in spring to autumn. This is due to the fact that the expenses per unit area are relatively low, some works, from establishment to harvest, can be completely mechanized and the cabbage is harvested over a long period of time of the year. Cabbage is a perishable product during transport, temporary storage and recovery.

MATERIALS AND WORKING METHODS

In order to make the estimates regarding the analysis of the profitability threshold for the cabbage crop, we started from the production framework technology that includes all the measures and agrofytotechnical, agrochemical and phytosanitary works applied. The analysis of the revenue and expenditure budget is based on the production technologies used and is an element of economic appreciation of the activity through the final indicators: cost, profit, profitability. The structure of the revenue and expenditure budget refers to the detailed presentation of the elements related to the value of production, intermediate consumption, production cost, net income, as well as the gross product and subsidies granted.

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RESULTS AND DISCUSSIONS

Cabbage cultivation technology in the field - conventional system and ecological system

A. Precursor crops

	Conventional system	Ecological system
Very good	- perennial legumes (alfalfa and clover in the first year after weeding); - annual legumes (peas, beans); - solano-fruity vegetables (tomatoes, peppers, eggplants, etc.).	
Good	- root vegetables (carrot, parsley, celery, beetroot, etc.); - pumpkin vegetables (cucumbers, squash, melons, etc.);	
Media	- bulbous vegetables (onions, garlic, leeks)	
Against	- cabbage vegetables (cabbage, cauliflower, etc.)	

B. Fertilizer application

<table>
<tr><th></th><th>Conventional system</th><th>Ecological system</th></tr>
<tr><td>Organic fertilizers</td><td colspan="2">
<table>
<tr><th>Soil fertility status</th><th>T / ha</th></tr>
<tr><td>Low</td><td>35-40</td></tr>
<tr><td>Average</td><td>25-30</td></tr>
<tr><td>Hi</td><td>20-25</td></tr>
<tr><td>high</td><td>0-20</td></tr>
</table>
</td></tr>
<tr><td>Chemical fertilizers</td><td>- It is administered depending on the varieties used (summer cabbage or early cabbage)
<table>
<tr><th>Soil fertility status</th><th>Phosphorus P2O5 kg / ha</th><th>Potassium K2O kg / ha</th><th>Nitrogen N kg / ha</th></tr>
<tr><td>Low</td><td>100-170</td><td>100-125</td><td>135-75</td></tr>
<tr><td>Average</td><td>75-150</td><td>75-100</td><td>50-100</td></tr>
<tr><td>Hi</td><td>50-100</td><td>50-75</td><td>25-70</td></tr>
<tr><td>high</td><td>0-75</td><td>0-35</td><td>35-0</td></tr>
</table>
</td><td>Synthetic chemical fertilizers are not applied in organic technologies. Instead, organically produced fertilizers are used, applied in the periods and doses recommended by the relevant scientific research.</td></tr>
<tr><td colspan="3">The basic fertilization with organic / chemical fertilizers is performed with the tractor of 55-75 HP in the unit with the machine for administering organic / chemical fertilizers.</td></tr>
</table>

C. Soil works

	Conventional system	Ecological system
Work done in the fall		
Soil mobilization (Rolling on)	- for the abolition of the previous crop, the crushing of plant residues and the loosening of the soil for leveling. - it is executed with the tractor of 55-75 HP in the unit with the disc harrow and the adjustable harrow. - epoch: immediately after the liberation of the land from the previous culture. - working depth: 7-12 cm.	
Maintenance leveling	- to ensure the optimal conditions for irrigating the crop. - is performed with the unit consisting of a tractor of 55-75 hp and leveler.	
Basic fertilization	- with organic / chemical fertilizers - it is executed with the tractor of 55-75 HP in the unit with the machine for administering organic / chemical fertilizers.	- with organic fertilizers. - it is executed with the tractor of 55-75 HP in the aggregate with the machine for administering organic fertilizers.
Deep plowing (28-30 cm)	- for loosening the soil and incorporating fertilizers - is executed with the aggregate consisting of a tractor of 55-75 HP, plow and star harrow	

<table>
<tr><td>subsoiling (deep loosening)</td><td colspan="2">- it is recommended to run once every 3-4 years, especially on heavy soils.
- it is executed with the tractor of 55-75 HP in the unit with the soil loosening machine.</td></tr>
<tr><td colspan="3">Work done in the spring</td></tr>
<tr><td>Preparation of the germination bed</td><td colspan="2">- to ensure a soil suitable for planting seedlings
- is performed with the unit consisting of a tractor of 55-75 hp and combine</td></tr>
<tr><td>Soil herbicide</td><td>- It is made with authorized substances and according to the recommendations of specialists in the field</td><td></td></tr>
<tr><td>Open gutters</td><td colspan="2">- for modeling the soil
- it is executed with the unit consisting of a tractor of 55-75 HP and the machine for opening gutters
- working depth: 18-20 cm.</td></tr>
<tr><td>Soil modeling</td><td colspan="2">- to ensure the conditions for planting seedlings.
- it is executed with the aggregate consisting of a 55-75 hp tractor and the soil modeling machine.</td></tr>
</table>

D. The establishment of culture

<table>
<tr><th></th><th>Conventional system</th><th>Ecological system</th></tr>
<tr><td>Planting season</td><td colspan="2">- for early cultivation it is established that the plants are not affected by late spring frosts (a temperature of 8 degrees Celsius is recorded in the soil). Thus, planting is carried out between the last decade of March and the first decade of April.
-for summer cultivation, planting is carried out between the second decade of April and the first half of May.
- for autumn cultivation the planting is carried out between the second decade of June and the first decade of July</td></tr>
<tr><td>Plant density</td><td colspan="2">- for early cultivation: 50-60 thousand plants / ha
- for summer cultivation: 45-50 thousand plants / ha
- for autumn cultivation: 30- 45 thousand plants / ha</td></tr>
<tr><td>Planting technique</td><td colspan="2">- manual for early cultivation, manual or mechanical for summer and autumn crops</td></tr>
<tr><td>Depth to plant</td><td colspan="2">- it is up to the first normal leaf</td></tr>
</table>

E. Culture maintenance

<table>
<tr><th></th><th>Conventional system</th><th>Ecological system</th></tr>
<tr><td colspan="3">General works</td></tr>
<tr><td>watering</td><td colspan="2">- immediately after planting with a watering rate of 200 m3 water / ha</td></tr>
<tr><td>Filling in the blanks</td><td colspan="2">- it is made with seedlings of the same age and variety.
- 4-7 days after planting (performed manually)</td></tr>
<tr><td rowspan="2">Facial fertilization</td><td colspan="2">- can be associated with phytosanitary treatments.
- is carried out with the 40-45 HP tractor in the unit with the phytosanitary treatment machine</td></tr>
<tr><td>During the vegetation, it is recommended to apply complex fertilizers, in the first stages of growth, until the beginning of fruiting and during fruiting.</td><td>Specific products made in an ecological regime are used, in doses recommended by the specialized technical research.</td></tr>
<tr><td>Weeding in the vegetation</td><td colspan="2">- it is recommended to perform it as many times as necessary, manually or mechanized.
- it is executed with the tractor of 40-45 HP in the unit with the vegetable cultivator.</td></tr>
<tr><td>Crop irrigation</td><td colspan="2">- is carried out whenever it is mainly needed during the fruit-growing period.
- drip watering is recommended, constantly ensuring the water needs of the plant.</td></tr>
</table>

	- is carried out from the establishment of the culture until the end of the vegetation period, once or twice a week, depending on the nebulosity and the weather / atmospheric humidity conditions. - 1.5-2 liters of water / plant are administered at a pressure of 1-1.2 atmospheres and during the formation and intensive growth of fruits the doses can be increased.	
herbicides	- it is recommended before opening the gutters, with herbicides specific to the crop. - it is executed with the tractor of 55-75 HP in the unit with the herbicide machine.	
Fighting diseases and pests	- the most common diseases in cabbage cultivation in the field are: hand, seedling fall, cabbage hernia, black rot on cabbage leaves, fusarium wilt, bacterial leaf spot, wet rot. - pests of vase culture: crucifer fleas, cabbage bedbugs, cabbage fly, gray cabbage lice and cabbage stalks. - it is executed with the tractor of 40-45 HP in the unit with the machine for phytosanitary treatments	
	Chemical control can be achieved with the help of approved fungicides and insecticides and in the dose recommended by specialists	Specific products made in an ecological regime are used, applied in the periods and doses recommended by the specialized technical research.

F. Production evaluation

Conventional system	Ecological system
• It is done after the formation of the head, collecting samples from areas of 8 square meters for each sample. It is determined: - no. of existing plants (Ntp); - no. of heads formed (Nc) on total samples; - average weight of a head (Gc) - in kg - total area of the samples (Sp) **Calculation formula:**	

$$Qkg / ha = \frac{Nc \times Gc}{Sp} \times 10{,}000$$

G. harvesting

Conventional system	Ecological system
- harvesting is done manually, requiring staggered harvests, as the heads reach maturity for consumption - production varies depending on the variety and technology applied: 20-30 t / ha for early cultivation, 35-40 t / ha for summer cultivation and 50-70 t / ha for autumn cultivation.	- harvesting is done only manually - the estimated productions are about 20-25% lower than in the conventional system

1. Structure of production costs - estimates for the production year 2019/2020

Table 1: Structure of production costs for field crop of seed potatoes - estimates for the crop year 2017/2018

Culture	**Culture system**	**Production (kg / ha)**	**Total agrotechnical expenses**		**Mechanized works**		**Manual works**		**Materials and materials**	
			lei / ha	**%**	**lei / ha**	**%**	**lei / ha**	**%**	**lei / ha**	**%**
Cabbage	conventional	30000	48.474	100	1490	3.1	9650	19.9	37.334	77.0
	ecological	24000	53.052	100	1425	2.7	8780	16.5	42.847	80.8

Source: Own calculations

From the data presented in table 1 it is observed that for the cabbage cultivation in the field was estimated a production of 30t / ha in conventional system and for the ecological system by 20% lower. The total agro-technical expenses had a value of 48,474 lei / ha in the conventional system, while for the ecological system they were approximately 8% higher. Also, the expenses with the materials and materials used had the highest share of the total expenses of 77.0% in the case of cabbage grown in the field in conventional system and of 80.8% in the case of cabbage grown in the field in organic system. Expenditures on manual works have a share of only 19.9% in the conventional system and 16.5% in the ecological system (Table 1).

2. Comparative analysis (conventional and ecological) of revenue and expenditure budgets for cabbage in the field - estimates for the production year 2019/2020

The analysis of revenue and expenditure budgets is based on production framework technologies, input prices for unfinished production and the production of the plan year.

Table 2: Revenue and expenditure budget for cabbage cultivation in the field, conventional and organic system - estimates for the production year 2019/2020

indicators	UM	Conventional 30,000 kg / ha	Ecological 24,000 kg / ha
A. Value of production	lei	66751.0	73482.2
B (+). subsidies	lei	580.3	2649.1
C (=) Gross product	lei	67331.3	76131.2
D (-) Total expenses	lei	55625.8	61235.1
I. Variable expenses	lei	43326.5	49506.1
II. Fixed expenses	lei	12299.3	11729.1
E (=) Taxable income	lei	11125.2	12247.0
F (=) Net income + subsidies	lei	10592.9	13671.4
G. Taxable income rate	%	20.0	20.0
H. Net income rate + subsidies	%	19.0	22.3
Production cost	lei / kg	1.85	2.55
Domestic market price predictable	lei / kg	2.2	3.0

Source: Own calculations

- Cabbage in the field - conventional system

At an estimated average production of 30000 kg/ha, a production value of 66751 lei/ha is achieved, and by adding to it the subsidy of 580.3 lei/ha, a gross product of 67331.3 lei/ha is obtained.

Variable expenditures represent 77.9% of the total agro-phytotechnical expenditures. Of these, the value consumption of raw materials and materials has a share of 79.9%. With a proportion of 22.1% of total expenditures, fixed expenditures are represented by 78.4% of value consumption with permanent labor.

By deducting the total expenses from the value of the production, a taxable income of 11125.2 lei/ha results, finally obtaining a net income of 10012.6 lei/ha and a net income rate of 18%.

As a suggestive synthetic indicator for the degree of economic efficiency with which the cabbage crop is obtained in the field - conventional system, the production cost of 1.8 lei/kg is calculated by dividing the total costs by the estimated average production.

Obtaining the profitability of the cabbage crop in the field, becomes profitable by establishing a predictable domestic market price of 2.2 lei / kg, calculated by multiplying the production cost by a coefficient of 1.2.

- Cabbage in the field - ecological system

For an estimated average production of 24000 kg/ha, a production value of 73482.2 lei/ha corresponds, and by adding to it the subsidy of 2649.1 lei/ha, a gross product of 76131.2 lei/ha is achieved.

Variable expenditures, occupying a share of 80.8% of total expenditures, are represented in proportion of 82.6% of value consumption of materials and materials. Constituting 19.2% of the total expenses, the fixed expenses are formed in a percentage of 74.8% of the value consumptions with permanent labor force.

By subtracting the total expenses from the value of production, a taxable income of 12247 lei/ha is obtained, finally resulting in a net income and a net income rate of 11022.3 lei/ha and 18% respectively.

Being a synthetic indicator representative of the level of economic efficiency with which the cabbage is grown in the field in an ecological system, the production cost of 2.5 lei/kg results from the reporting of total costs to the production expected to be obtained.

The profitability of the crop is achievable by establishing the foreseeable internal market price of 3 lei/kg, calculated by applying a coefficient of 1.2.

CONCLUSIONS

- From the data presented in table 3 it is highlighted that the value of the production obtained in the two cropping systems exceeds the value of the expenses made by 20%. Variable expenditures occupy a share of 77.9% in the conventional system and 80.8% in the ecological system of the total expenditures, the difference being represented by the fixed expenditures.
- Materials and materials hold a proportion of 62.2% and 66.8% of the total resources consumed, respectively, and the permanent labor expenses make up 78.4% and 74.8% of the fixed expenses, respectively. Representative synthetic indicator for the level of economic efficiency of expenditures per product, the production cost is 1.9 lei / kg in conventional system and 2.6 lei/kg in ecological system, mainly due to a lower average production by 16.4%.
- The average capitalization price per unit of product is 2.2 lei/kg in conventional system, and in ecological system of 3 lei/kg.
- The rate of return achieved was 20% in both conventional and organic systems, the production of cabbage in the field being economically efficient. The break-even point refers to the physical or value level of the production at which the expenses incurred are fully covered by the income achieved by capitalizing on the production, respectively the level from which the crop starts to be profitable. Thus, the field cabbage crop is considered profitable in conventional system starting from the average production of 15800 kg/ha corresponding in value with the amount of 35048.4 lei, and in ecological system this threshold is 11700 kg/ha in physical units and expressed in value with 35947.4 lei.

Table 3: Synthesis economic indicators for field crop of seeds for seeds, conventional and ecological system - estimates for the crop year 2017/2018

Nr. crt.	Synthetic economic indicators	UM	Conventional system	Ecological system
1	Average production per hectare	t / ha	30.0	24.0
2	The value of production per ha	lei / ha	66751.0	73482.2
3	Production costs per ha	lei / ha	55625.8	61235.1
4	Variable expenses	lei	43326.5	49506.1
5	Raw materials and materials	lei	34633.6	40912.1
6	Permanent labor costs	lei	9649.6	8779.9
7	Fixed expenses	lei	12299.3	11729.1
8	Production cost	lei / kg	1.9	2.6
9	Capitalization price	lei / kg	2225.0	3061.8
10	Profit or loss per unit of production	lei / ha	11125.2	12247.0
11	Profit or loss per unit of product	lei / kg	370.8	510.3
12	Profitability rate	%	20.0	20.0
13	Profitability threshold in value units	lei	35048.4	35947.4
14	Profitability threshold in physical units	to	15.8	11.7
15	Exploitation risk rate	%	52.5	48.9
16	Security index (Is)		0.5	0.5

Source: Own calculations

- The exploitation risk rate is a synthetic indicator that estimates the existing risk in case of not realizing the expected production. In the field of cabbage cultivation, this indicator is 52.5% in the conventional system, respectively 48.9% in the ecological system.
- The security index expresses the existing security margin by achieving that culture, which increases in line with the value of the security index. This synthetic indicator for cabbage cultivation in the field 0.5 for the two cultivation systems, conventional and organic.

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CONSIDERATIONS REGARDING DIMENSIONAL STRUCTURE OF SHEEP AND GOATS FARMS AT REGIONAL LEVEL

CREȚU DIANA[1], CHETROIU RODICA[2]

Abstract: *The paper presents dimensional structure of sheep and goats farms at national level, as well as a comparative analysis of it, conducted at the level of development regions. As of April 30, 2019, there were 338,371 sheep farms, of which 65% were in the category "below 10 heads", belonging to households. At regional level, dimensional structure indicates that, in all areas of the country, most sheep farms are in the category "below 10 heads", between 47% in the West Region and 72% in the South-East. In fact, in the west part of the country, the shares of larger farms are higher than in other areas. Most farms are located in the south-east part of the country, where most of them are in the category under 10 heads. At the same time, there were 134,069 goats farms, of which 83% were in "under 10 heads" category. At regional level, most goats farms are in this category, between 67% in Bucharest-Ilfov region and 91% in the southwest of the country. Also, the largest share of holdings over 50 heads are in Ilfov (11%). It seems that the proximity of the capital has stimulated the development of larger goat farms, whose products are easier to find in the market in Bucharest.*

Keywords: *dimensional structure, farms, sheep, goats, regions.*

JEL Classification: *Q12; Q19*

INTRODUCTION

The paper is part of the research results of the *ADER Project 24.1.2, Phase 2 - ”Economic efficiency of sheep and goat farms of different sizes, located in different geographical regions and landforms”*, funded by the Ministry of Agriculture and Rural Development. Research has shown that most sheep and goat farms are found in small size categories, respectively in households, where the resulting productions are used mainly for family consumption. This is the situation at both national and regional level.

In order to enter the economic circuit, it is necessary to increase the size of these holdings and their market orientation. Of course, the supply of dairy products and sheep meat is made by commercial farms of different sizes.

MATERIAL AND METHODS

The studies were based on available statistical data, from official sources – Ministry of Agriculture and Rural Development and National Institute of Statistics, on the basis of which structural comparative analyzes of sheep and goat breeding sectors were performed, both nationally and regionally.

RESULTS AND DISCUSSIONS

At national level, on April 30, 2019, there were 338,371 sheep farms, and in terms of their size, 65% (respectively 219,328 farms) were part of the category under 10 heads, meaning in households.

In the category 11-20 heads, there were 14% of holdings, and holdings with over 500 heads accounted for only 1% of the total (Chart 1).

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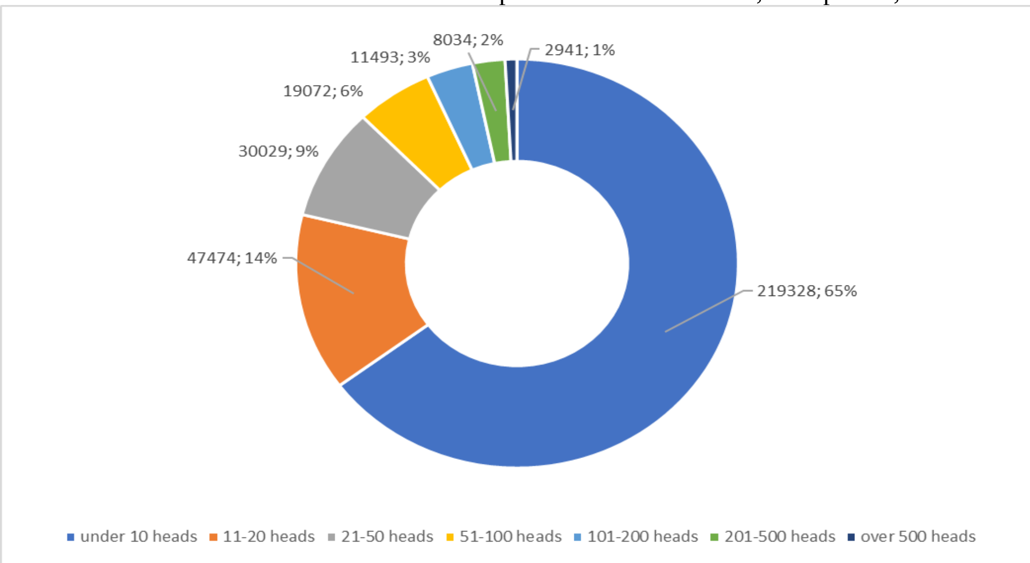
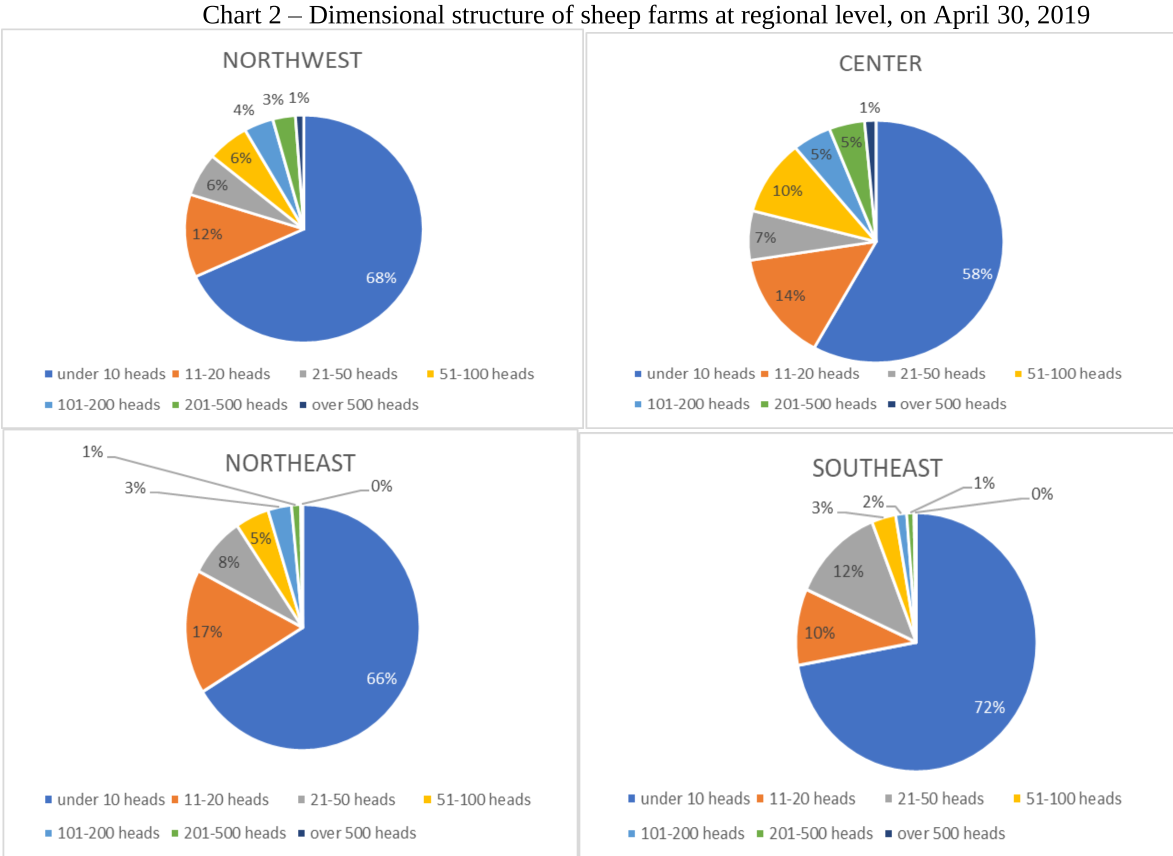
Chart 1 – Dimensional structure of sheep farms at national level, on April 30, 2019

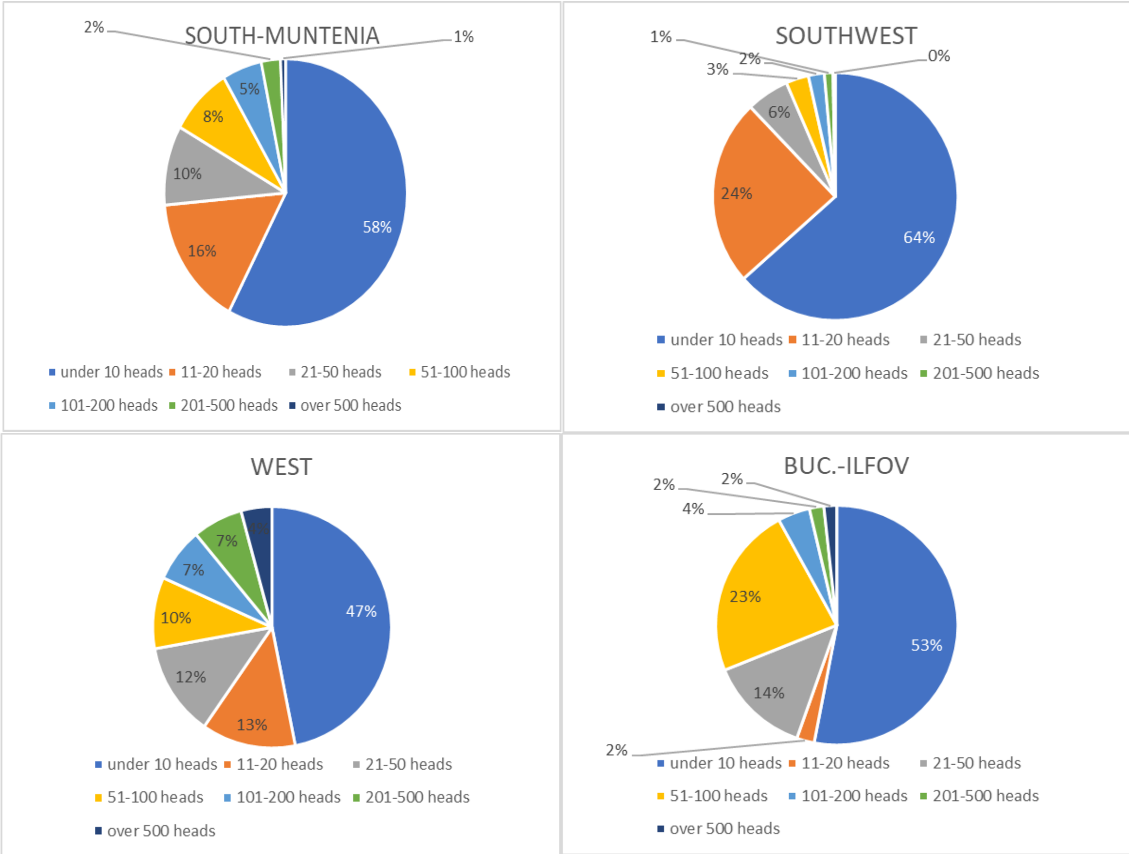


Source: Own calculations following operative data from MARD

According to Law no. 285/2015 for the amendment of Law no. 37/2015 regarding classification of farms and agricultural holdings, holdings that have below 1999 SO fall into the category of subsistence farms, and those that have between 2000-7999 SO are semi-subsistence farms. Corroborating these values with the standard production coefficients specific to sheep (54.91 sheep + ewes breeded; 26.72 other sheep, lambs, rams, and reformed sheep), it can be seen that 94% of sheep farms fall into subsistence categories. and semi-subsistence (all holdings with less than 100 heads): 65% + 14% + 9% + 6% = 94%. At regional level, the dimensional structure illustrated in Chart 2 indicates that, in all areas of the country, most farms are in the category below 10 heads, between 47% in the western region and 72% in the south-east of the country. In fact, in the western part of the country, the shares of larger farms are higher than in other areas.

Chart 2 – Dimensional structure of sheep farms at regional level, on April 30, 2019

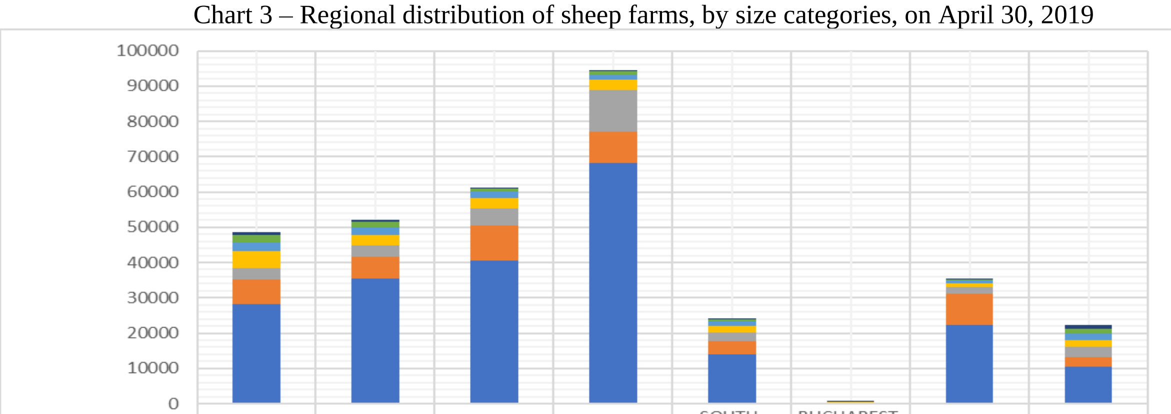




Source: Own calculations following operative data from MARD

The data in Chart 3 indicate that most farms are located in the southeastern part of the country, where there are most of the category under 10 heads (68125). In the 11-20 head category, most are in the northeast of the country (9993), followed by the southeast area, which also has the most holdings in the 21-50 head category. In the central region of the country, there are most holdings in the 51-100 head category, this area also having the most holdings in the 101-200 head and 201-500 head categories. In the western part of the country, there are the most holdings in the largest category, with over 500 heads (932 holdings).

Chart 3 – Regional distribution of sheep farms, by size categories, on April 30, 2019

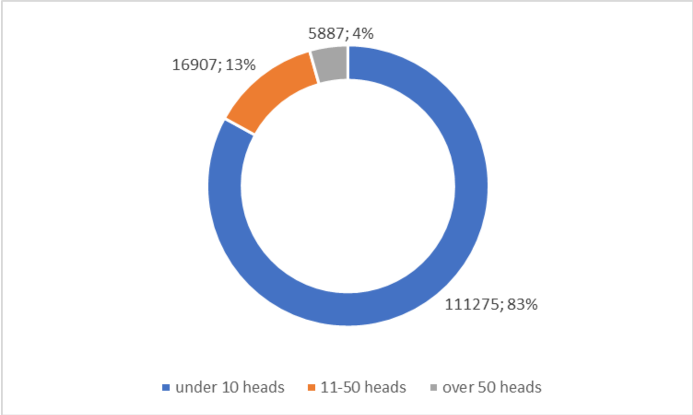


	CENTER	NORTHWEST	NORTHEAST	SOUTHEAST	SOUTH-MUNTENIA	BUCHAREST-ILFOV	SOUTHWEST	WEST
over 500 heads	704	590	157	286	165	8	99	932
201-500 heads	2186	1600	776	932	616	9	407	1508
101-200 heads	2392	2084	1984	1389	1268	20	742	1614
51-100 heads	4866	3001	2858	3058	2004	108	1055	2122
21-50 heads	3195	3198	4871	11625	2316	63	1987	2774
11-20 heads	7033	6153	9993	9025	3808	11	8622	2829
under 10 heads	28187	35528	40525	68125	13902	247	22417	10397

Source: Own calculations following operative data from MARD

At national level, on April 30, 2019, there were 134,069 goat farms, and in terms of their size, 83% (respectively 111,275 farms) were part of the category under 10 heads, meaning in households. In the 11-50 head category, there were 13% of the holdings, and the holdings with over 50 heads represented only 4% of the total (Chart 4).

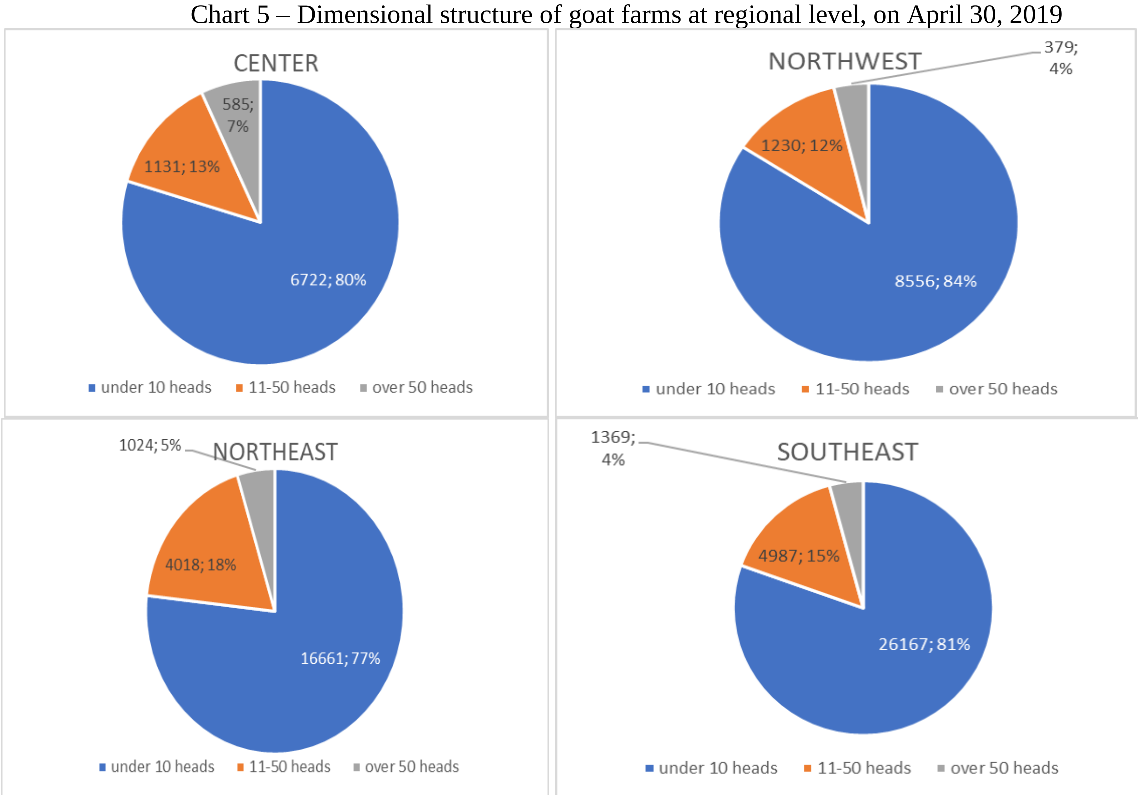
Chart 4 – Dimensional structure of goat holdings at national level, on April 30, 2019

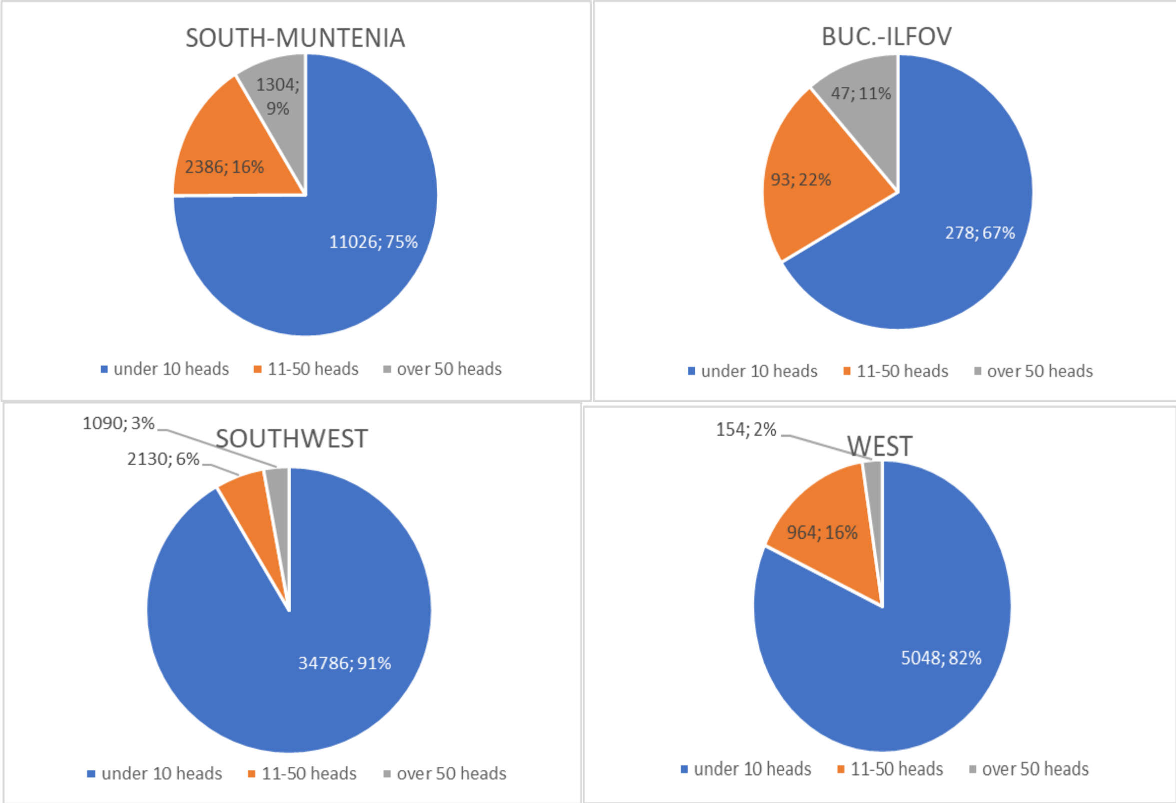


Source: Own calculations following operative data from MARD

At regional level, dimensional structure illustrated in Chart 5 indicates that, in all areas of the country, most farms are in the category below 10 heads, between 67% in the Bucharest-Ilfov region and 91% in the southwest of the country. Holdings in the 10-50 head category are between 6% in the southwest and 22% in Ilfov. Also, the largest share of farms with more than 50 heads are in Ilfov (11%). It seems that the proximity of the capital has stimulated the development of larger goat farms, whose products are easier to find in the market in Bucharest.

Chart 5 – Dimensional structure of goat farms at regional level, on April 30, 2019

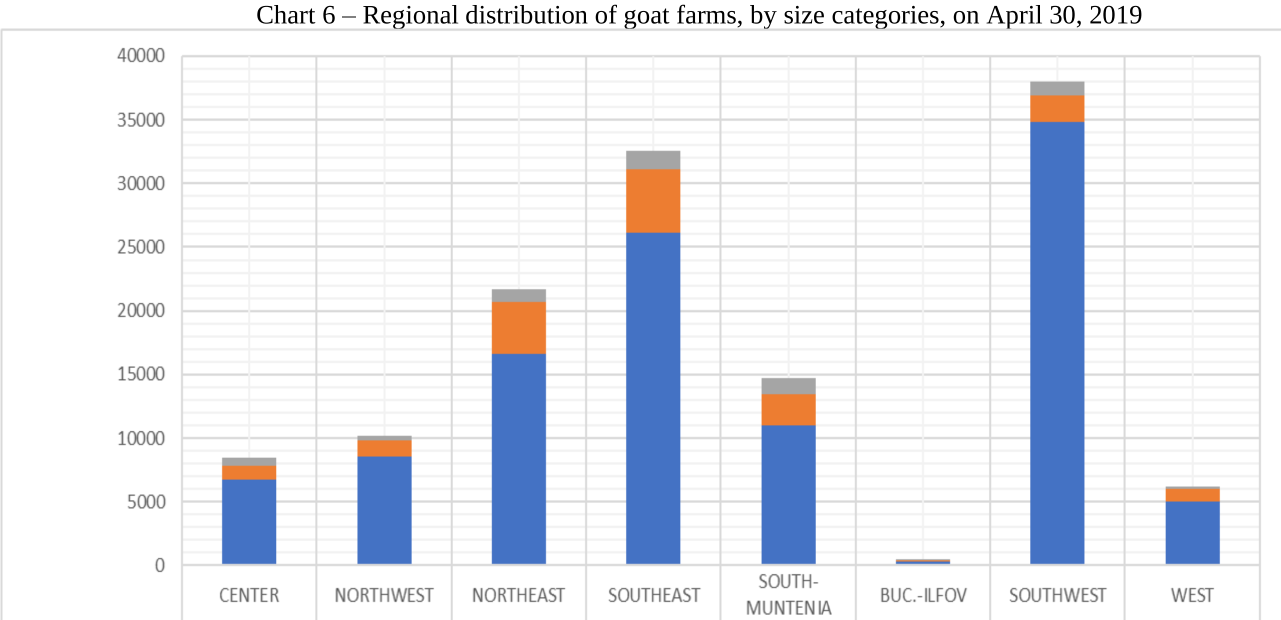




Source: Own calculations following operative data from MARD

The preponderance of farms in the category under 10 heads, illustrated in Chart 6, is evident in all areas of the country, as they are not commercial farms, but provide products especially to the family. However, as can be seen from the calculated indicators, a certain uninterrupted rhythm of growth in activities in this sector has been observed in the last decade.

Chart 6 – Regional distribution of goat farms, by size categories, on April 30, 2019



	CENTER	NORTHWEST	NORTHEAST	SOUTHEAST	SOUTH-MUNTENIA	BUC.-ILFOV	SOUTHWEST	WEST
over 50 heads	585	379	1024	1369	1304	47	1090	154
11-50 heads	1131	1230	4018	4987	2386	93	2130	964
under 10 heads	6722	8556	16661	26167	11026	278	34786	5048

Source: Own calculations following operative data from MARD

CONCLUSIONS

The sheep and goat farming sector is characterized by great diversity in terms of dimensional structure and scale of production. Most of the holdings are represented by those in the category under 10 heads, a situation encountered in all regions of the country, their share being between 47-72% for sheep and 67-91% for goats. Farms in the category over 500 heads are in the proportion of 1-4% for sheep and 4-11% for goats.

The general feature is that, as the size class of farms increases, their share in the overall dimensional structure decreases. Whereas the sheep and goat sectors have significant potential for many fragile rural areas and for many peri-urban areas in terms of development and employment, in particular through the sale of sheep meat and goatmeat, as well as high-quality dairy products, which can be distributed through short supply chains locally, it is necessary to increase the size of farms that ensure the penetration of products into the economic circuit.

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STUDY REGARDING THE VEGETABLE MARKET IN ROMANIA IN THE PERIOD 2015-2019

CREȚU DIANA[1]

Abstract: *The paper presents the vegetable market in the period 2015-2019 in Romania, highlighting aspects such as: cultivated area of vegetables, vegetable production, price dynamics, average annual consumption, domestic and foreign trade. The fruit and vegetable market is one of the most important sectors of the world economy, so in this paper I proposed a five-year analysis to see the evolution of this sector in Romania. The research method used in the study is statistical processing and economic analysis of existing data for the period 2015-2019 on specialized sites such as the National Institute of Statistics (NIS), Eurostat, FAO, Ministry of Agriculture and Rural Development (MADR) but and other specialty materials.*

Keywords: *vegetable market, consumption, price dynamics*

JEL Classification: *Q11;Q13;L11.*

INTRODUCTION

In this article I will analyze some of the most important vegetables available to any Romanian, namely tomatoes, peppers, cucumbers, onions, cabbage and potatoes.

In Romanian agriculture there are many vegetable species, due to the high natural fertility of the soils and the diversity of the climate. Apart from the favorable pedoclimatic conditions for the production of fruits and vegetables, Romania still does not have in agriculture, for the most part, the requirements and technical facilities characteristic of the market economy.

Vegetables can be considered the basis of a healthy diet as they are rich in vitamins, fiber and phytonutrients and therefore it is mandatory to eat as many fresh colored vegetables and less heat. Vegetables are without a doubt a source of health, longevity and beauty.

The price level is influenced by a multitude of factors, of which the ones related to consumer demand are predominant. Trends and delimitations can be mentioned for the prices of these products such as: the price level must cover production costs, due to the seasonal nature of production prices fluctuate from one month to another, the different level of prices which is influenced by the quality of vegetables, the degree prices may differ depending on the destination (fresh or processed consumption, etc.) or the potential market for the products (domestic or export).

Vegetable growers and fruit growers are threatened by large hypermarkets but also by massive imports. On the one hand, large chain stores refuse to buy goods at a fair price, and on the other hand, imports compete with domestic production.

Approximately 50 - 60% of the Romanian production of fruits and vegetables is sold in peasant markets organized in urban centers and at the farm gate. Although prices are on the rise, even when farmers have entered into commercial contracts, the beneficiaries do not come to pick up the goods until prices have fallen.

The emergence of large chain stores, the change of consumer preferences towards sorted, packaged and labeled products that respect the principles of quality and food safety continue to reduce the percentage of production sold at the farm gate in favor of organized markets. However, this percentage is also decreasing as a result of the intensification of trade through intermediaries.

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Romanian fruits and vegetables, even if in all cases they do not have a commercial aspect that satisfies the consumer's requirements, have special nutritional qualities

A decisive role is played in this respect by the producer organizations, whose main objective is the supply concentration bag, in order to be able to ensure a qualitative and quantitative capitalization of the obtained production, at an advantageous price.

MATERIAL AND METHOD

The research method used in the study is statistical processing and economic analysis of data. This paper analyzed the vegetable market in 2015-2019 highlighting aspects such as: total cultivated areas, total vegetable production, price dynamics, consumption, import and export by consulting agricultural materials (books, magazines, scientific papers) and specialized sites (INS, MADR , EUROSTAT, FAOSTAT, etc.).

RESULTS AND DISCUSSIONS

As I said in the summary in this article I set out to analyze the vegetable market focusing on issues such as: total cultivated area of vegetables, vegetable production, price evolution, average annual consumption, domestic and foreign trade at national level.

In Romania, according to the statistical data registered by NIS (table 1) regarding the cultivated area of vegetables (thousand ha) in the period 2015-2019, we observe a decrease in 2019 compared to 2015, namely in 2015 we had an area of 239.5 thousand ha and in 2019, an area of 227.7 thousand ha was registered.

The main causes that led to this decrease are the large number of small farms, high technological costs (irrigation water, energy) especially for protected areas here and the decrease in national vegetable production (Table 2).

Analyzing the total production of vegetables at national level, we notice that in 2015 the value of vegetable production was 3674 thousand tons and in 2019 there was a value of 3530 (thousand tons) a decrease of 144 thousand tons.

Table no.1 Total vegetable area registered in Romania 201-2019 (thousand ha)

PERIOD	**2015**	**2016**	**2017**	**2018**	**2019**
Total area of vegetables (thousand ha)	239,5	228,1	224,5	226,3	227,7

Source:NIS

Graph no.1 Total area of vegetables in the period 2015-2019 (thousand ha)

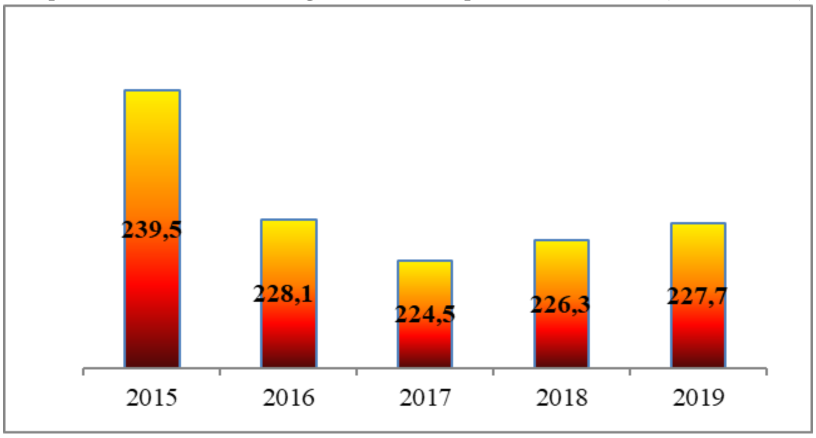
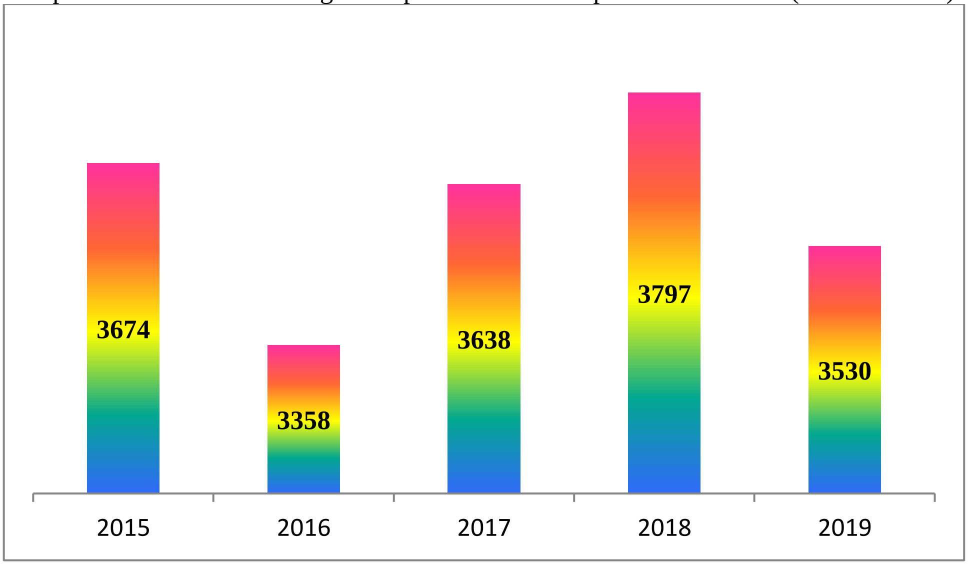


Table no.2 Total vegetable production registered in Romania 2015-2019 (thousand tone)

PERIOD	2015	2016	2017	2018	2019
Total vegetable production (thousand tone)	3674	3358	3638	3797	3530

Source:NIS

Graph no.2 Total national vegetable production in the period 2015-2019 (thousand tons)



Regarding the evolution of prices (table no. 3) for vegetables, I chose to analyze six of the most important vegetables, namely tomatoes, bell peppers, cucumbers, onions, cabbage and potatoes that are not missing from any romanian's house.

Analyzing the data provided by the National Institute of Statistics (NIS) we observe the following:

The highest price for tomatoes was recorded in 2019 with a value of 2.50 lei / kg and the lowest value was in 2015 with a value of 1.12 lei / kg resulting in an increase of 1.38 lei / kg in 2019.

For bell peppers we have a maximum of 2.46 in 2019 and a minimum of 1.15 lei / kg in 2015 resulting in an increase in 2019 compared to 2015 of 1.31 lei / kg.

Regarding the price of cucumbers, the highest value was registered in 2019 with a price of 2.13 lei / kg and the lowest price is in 2015 with a value of 1.13 lei / kg resulting in an increase in year 2019 of 1 leu / kg.

The maximum value for onions was reached in 2019 with a value of 3.78 lei / kg and the lowest value was reached in 2017 with a value of 2.15 lei / kg being a considerable increase of 1.63 lei / kg.

Regarding the price of early and summer white cabbage in 2016, the lowest value of the analyzed period was registered, namely 1.38 lei / kg and in 2018 the cabbage reached the price of 2.93 lei / kg an increase of 1.55 lei / kg.

The lowest value recorded for autumn potatoes was in 2015 with a value of 0.70 lei / kg and the highest value was recorded in 2019 with a value of 1.38 an increase of 0.68 lei / kg.

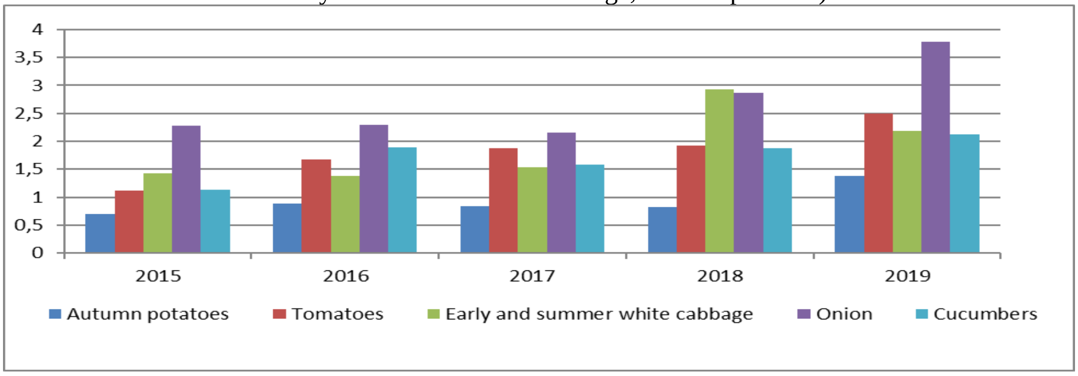
Possible causes that led to higher prices for most vegetables in 2019 could be unfavorable weather conditions that led to lower production, higher production costs (from arranging the land for sowing / cultivating seedlings, to obtaining own production -said, of the finished product), labor shortage, etc.

Table no.3 The evolution of prices registered in Romania during 2015-2019

Nomenclature of agricultural products purchased from agricultural producers	**Unit**	**PERIOD**				
		2015	**2016**	**2017**	**2018**	**2019**
Tomatoes	lei/kg	1,12	1,68	1,88	1,92	2,5
Bell peppers	lei/kg	1,15	1,52	1,81	2,26	2,46
Cucumbers	lei/kg	1,13	1,89	1,58	1,87	2,13
Onion	lei/kg	2,28	2,29	2,15	2,86	3,78
Early and summer white cabbage	lei/kg	1,42	1,38	1,53	2,93	2,19
Autumn potatoes	lei/kg	0,7	0,88	0,84	0,82	1,38

Source:NIS

Chart no.3 Price dynamics in the period 2015-2019 (tomatoes, bell peppers, cucumbers, dried onions, early and summer white cabbage, autumn potatoes)



Source:NIS

Regarding the consumption of vegetables in the period 2014-2018 we notice from the statistical data provided by NIS(National Institute of Statistics) that in 2018 compared to 2014 the consumption of fruits increased considerably, namely in 2014 we have a consumption of 158 kg / consumer and in 2018 it was recorded a consumption of 173.5 kg / consumer which we can deduce the fact that the Romanian started consuming more vegetables which is a good thing.

Table no.4 Vegetable consumption in Romania in the period 2014-2018 (kg / consumer)

Main food and beverages	**Unit**	**PERIOD**				
		2014	2015	2016	2017	2018
Vegetables and vegetable products equivalent to fresh vegetables	kg/consumer	158	158,5	155,8	162,1	173,5

Source:NIS

Graph no.4 Vegetable consumption in the period 2014-2018 (kg / consumer)

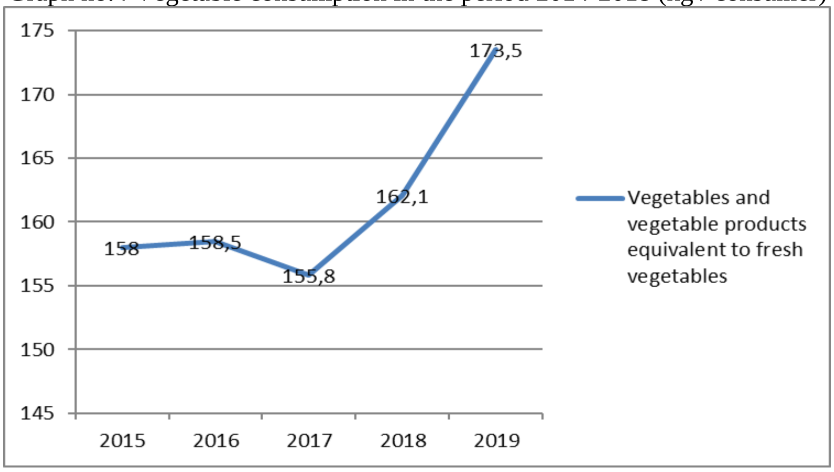


Table no.5 The value of import in the period 2015-2019 (thousand euro)

GROUPS ACCORDING TO THE COMBINED NOMENCLATURE	MONETARY UNIT	PERIOD				
		2015	2016	2017	2018	2019
Potatoes, fresh or chilled	thousand of euro	19783	37174	35533	28829	65852
Tomatoes, fresh or chilled	thousand of euro	54385	73049	86118	90937	94973
Cabbage, cauliflower, kale, goulash and similar edible products of the genus Brassica, fresh or chilled	thousand of euro	12048	14555	14451	17042	22846
Carrots, turnips, beetroot for salads, goat beard, celery root, radishes and similar edible roots, fresh or chilled	thousand of euro	18244	19488	18456	27987	34170
Cucumbers and cornis, fresh or chilled	thousand of euro	11207	16950	19252	18503	18512

Source:INS

Graph no.5 The value of vegetables imports in the period 2015-2019 (thousand euros)

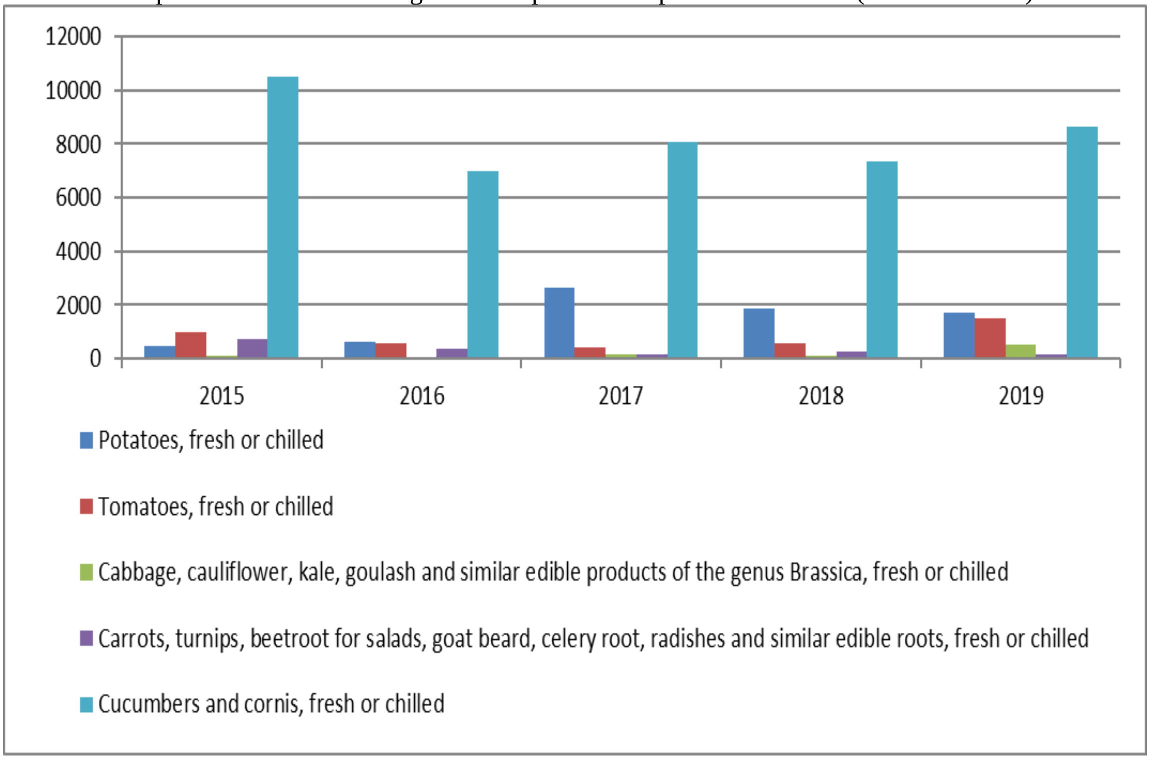
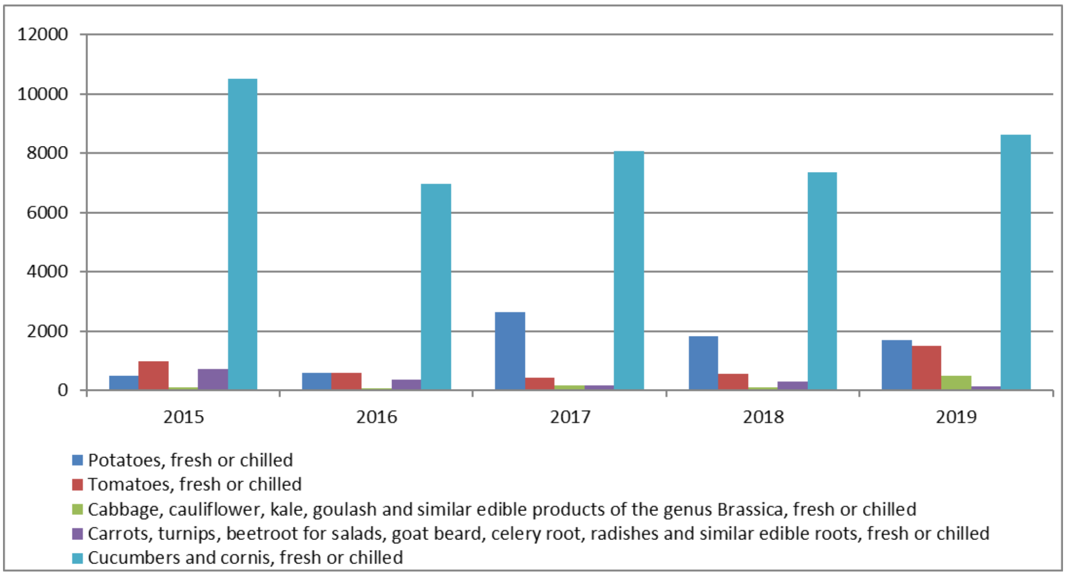


Table no.6 The value of vegetable exports in the period 2015-2019 (thousand euro)

GROUPS ACCORDING TO THE COMBINED NOMENCLATURE	MONETARY UNIT	PERIOD				
		2015	2016	2017	2018	2019
Potatoes, fresh or chilled	thousand of euro	487	607	2630	1844	1687
Tomatoes, fresh or chilled	thousand of euro	972	581	428	553	1511
Cabbage, cauliflower, kale, goulash and similar edible products of the genus Brassica, fresh or chilled	thousand of euro	115	76	183	111	500
Carrots, turnips, beetroot for salads, goat beard, celery root, radishes and similar edible roots, fresh or chilled	thousand of euro	714	358	173	286	145
Cucumbers and cornis, fresh or chilled	thousand of euro	10496	6971	8085	7361	8634

Source:INS

Graph no. 6 Export value in the period 2015-2019 (thousand euro)



Source:INS

If we analyze the value of imports regarding the statistical data recorded by INS in the period 2015-2019 we notice (chart no.5) that in 2019 compared to 2015 the import increased considerably for potatoes, tomatoes and cabbage and for carrots and cucumbers the import decreased in the same mentioned period.

From the statistical data registered by INS (graph 5) it is observed that the highest import was registered in 2015 for cucumbers with a value of 10496 thousand euro and the lowest value was in 2016 for cabbage with a value of 76 thousand euro.

In chart no.7 the highest value of imports was registered in 2017 with a value of 49443 thousand euro and the lowest value was in 2014 with 20482 thousand euro.

Regarding the value of exports (table no. 6) in 2019 the highest values were recorded for cucumbers with a total of 8634 thousand euro, followed by potatoes with 1687 thousand euro and tomatoes with 1511 thousand euro.

The lowest values recorded in 2019 regarding exports were for cabbage with 500 thousand euro in 2019 were for cabbage with 500 thousand euro and carrots with 145 thousand euro for the same year.

CONCLUSIONS

The vegetable market is one of the most important sectors of the world economy and has always been an area of interest for public health.

According to the INS, the total area of vegetables (thousand ha) was decreasing in 2019 compared to 2015, registering a total value of 227.7 thousand ha in 2019 and in 2015 239.5 thousand ha.

Regarding the total vegetable production in 2019, a total of 3530 thousand tons was registered and in 2015 the total production was 3674 thousand tons, which results in a significant decrease.

From the data provided by INS on the price of vegetables we see an increase in all vegetables analyzed (tomatoes, bell peppers, cucumbers, onions, cabbage, potatoes). Possible causes, being determined by unfavorable climatic conditions (drought), resulting in lower production, disease / pest infestation as well as production costs.

Vegetable consumption has an increasing trend in 2018 compared to 2015, namely in 2018 we have a consumption of 173.5 kg / consumer, and in 2014 the consumption was 158 kg / consumer.

The value of imports has an increasing trend for all analyzed vegetables (potatoes, tomatoes, cabbage, carrots, cucumbers) which is a cause for concern. The main suppliers of vegetables are the Netherlands. Poland, Germany, Turkey, Spain, Greece etc.

According to the INS, the value of exports in the period 2015-2019 in Romania was increasing in 2019 for cucumbers, cabbage and tomatoes and the value of exports for potatoes and carrots was decreasing in 2019 compared to 2015.

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STUDY ON THE EVOLUTION OF FRUIT PRICES AT NATIONAL LEVEL IN THE PERIOD 2015-2019

CREȚU DIANA[1]

Abstract: *The scientific paper presents the evolution of national fruit prices in the period 2015-2019. Over time, fruit and vegetable prices have an increasing trend, and in this study I aimed to identify the factors that lead to this increase prices from one year to another. Regular consumption of fruits and vegetables has an important role in maintaining long-term health. Romanian fruits and vegetables even if they do not have a commercial appearance that meets consumer requirements have special nutritional qualities even if the price is higher than that of fruits imported from Greece, Italy, etc. The research method used in the study is statistical processing and economic analysis of existing data for the period 2015-2019 on specialized sites such as the National Institute of Statistics (INS), Eurostat , FAO, Ministry of Agriculture and Rural Development (MADR) but also other specialized materials.*

Keywords: *evolution, prices, grapes, plums, cherries*

JEL Classification: *Q11;Q13;L11.*

INTRODUCTION

In this article I will analyze the evolution of fruit prices nationwide over a period of five years, namely 2015-2019 for melons and greens, apples, pears, peaches, apricots, cherries, sour cherries, plums, strawberries and grapes.

Depending on the income of consumers, the price can have a decisive influence on the price of the horticultural product. In this study I will talk about the two categories of consumers, namely consumers with a modest financial situation and consumers with a substantial income. In the first category of consumers with income modest, accept lower quality if they pay a lower price.This category of consumers are very sensitive to rising prices in the off-season and do not accept the purchase of fruit, even if they know the nutritional value, which is mainly due to the intake of vitamins and minerals.

Consumers with a higher budget who fall into the second category will never accept damaged fruit in exchange for a lower price but will focus on product quality regardless of the purchase price

Consuming fruits has many benefits for human health, reducing the risk of chronic diseases. Fruits provide vital nutrients to the body, helping us stay fit.

The price level is influenced by a multitude of factors, of which the ones related to consumer demand are predominant. Trends and delimitations can be mentioned for the prices of these products such as: the price level must cover production costs, due to the seasonal nature of production prices fluctuate from one month to another, the different price level which is influenced by the quality of vegetables, the degree of freshness , prices may differ depending on the destination (fresh or processed consumption, etc.) or the potential market for the products (domestic or export).

Vegetable growers and fruit growers are threatened by large hypermarkets but also by massive imports. On the one hand, large chain stores refuse to buy goods at a fair price, and on the other hand, imports compete with domestic production.

Approximately 50 - 60% of the Romanian production of fruits and vegetables is sold in peasant markets organized in urban centers and at the farm gate. Although prices are on the rise, even when farmers have entered into commercial contracts, the beneficiaries do not come to pick up the goods until the prices have fallen.

The emergence of large chain stores, the change of consumer preferences towards sorted, packaged and labeled products that respect the principles of quality and food safety continue to

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reduce the percentage of production sold at the farm gate in favor of organized markets. However, this percentage is also decreasing as a result of the intensification of trade through intermediaries.

Romanian fruits and vegetables, even if in all cases they do not have a commercial aspect that satisfies the consumer's requirements, have special nutritional qualities.

MATERIAL AND METHOD

The research method used in the study is statistical processing and economic analysis of data. In this paper I will analyze the evolution of prices for melons and greens, apples, pears, peaches, apricots, cherries, sour cherries, plums, strawberries and table grapes in period 2015-2019 consulting materials in the agricultural field (books, magazines, scientific papers) as well as specialized sites (INS, MADR, EUROSTAT, FAOSTAT etc.)

RESULTS AND DISCUSSIONS

As I said in the summary in this article, I set out to analyze the dynamics of fruit prices nationwide for the most consumed fruits, namely melons and greens, apples, pears, peaches, apricots, cherries, sour cherries, plums, strawberries and grapes.

In Romania according to the statistical data registered by INS (table 1) regarding the national price of melons and greens in the period 2015-2019.

For watermelon, we have an increase in 2019 compared to 2015 of approximately 0.50 lei / kg. In 2015, a price of 1.09 was registered and in 2019 the price reached 1.5 lei / kg.

For melons in 2015 a price of 2.15 lei was registered / and in 2019 a price of 2.53 was registered, an increase of 0.38 lei / kg.

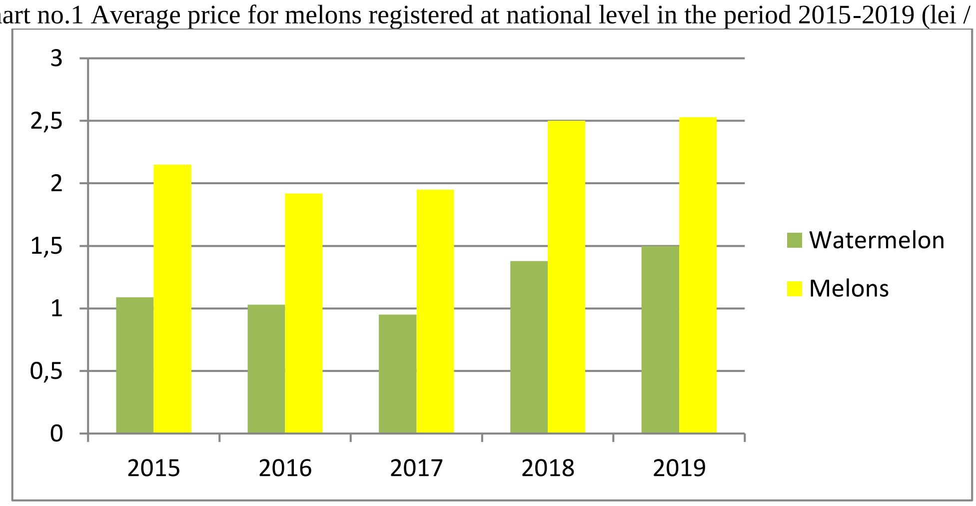
Regarding the evolution of apple prices (table 2) in 2015, a price of 2.75 lei / kg was registered, the price increasing in 2019 to 2.95 lei / kg, an increase of 0.20 lei / kg. Maximum value was reached in 2018, the price being 3.21 lei / kg.

Table no.1 The average price registered in Romania in the period 2015-2019 (lei / kg)

PERIOD	2015	2016	2017	2018	2019
Watermelon	1,09	1,03	0,95	1,38	1,5
Melons	2,15	1,92	1,95	2,5	2,53

Source:INS

Chart no.1 Average price for melons registered at national level in the period 2015-2019 (lei / kg)



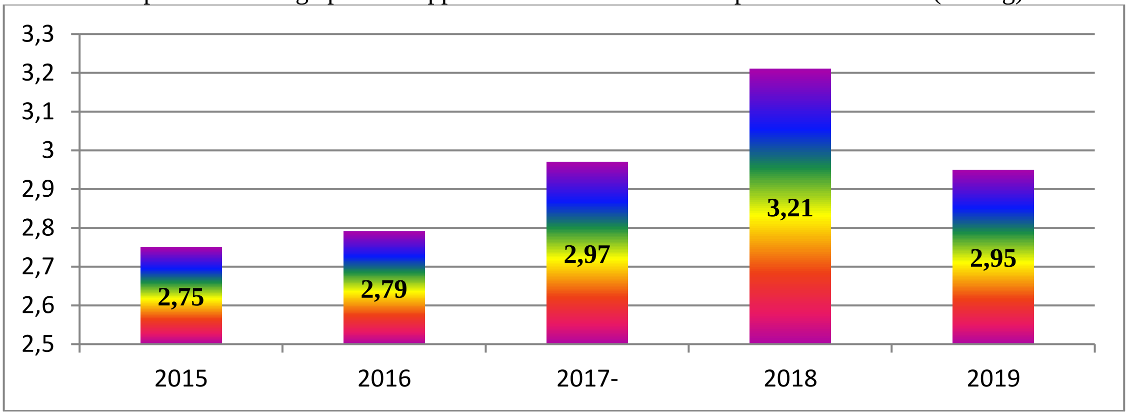
Source:INS

Table no. 2 The average price always at national level in the period 2015-2019

PERIOD	2015	2016	2017	2018	2019
Apples	2,75	2,79	2,97	3,21	2,95

Source:INS

Graph no.2 Average price of apples at national level in the period 2015-2019 (lei / kg)



Source:INS

Analyzing the data provided by the National Institute of Statistics (INS) we observe the following:

The highest price for pears was recorded in 2019 with a value of 5.76 lei / kg and the lowest value was in 2015 with a value of 4.55 lei / kg resulting in an increase of 1.21 lei / kg in 2019.

For peaches the maximum value was reached in 2019 with a price of 4.87 lei / kg and the lowest price was recorded in 2015 3.77 lei / kg resulting in a significant increase of 1.10 lei / kg.

The highest value recorded in the period 2015-2019 for houses was 5.58 lei / kg in 2018 and the lowest value was recorded in 2017 of 4.27 lei / kg.

The fruits with the highest growth in 2019 were cherries. If in 2015 a price of 6.65 was registered in 2019, the price increased by 4.54 lei / kg reaching a price of 11.19 lei / kg .

In 2019, the cherries registered a price of 8.33 lei / kg, an increase of 3.27 lei kg compared to 2015, where a price of 5.06 lei / kg was registered.

For plums, the price registered in 2015 was 2.54 lei / kg and in 2019 the price increased reaching 3.55 lei / kg, an increase of 1.01 lei / kg.

A significant increase was also for strawberries, the value registered in 2015 was 5.29 lei / kg and in 2019 the strawberries reached a value of 7.51 lei / kg.

The maximum value registered for grapes is found in 2019 with a price of 5.35 lei / kg and the minimum value was in 2015 registering a price of 4.44 lei / kg resulting in an increase of 0.91 lei / kg .

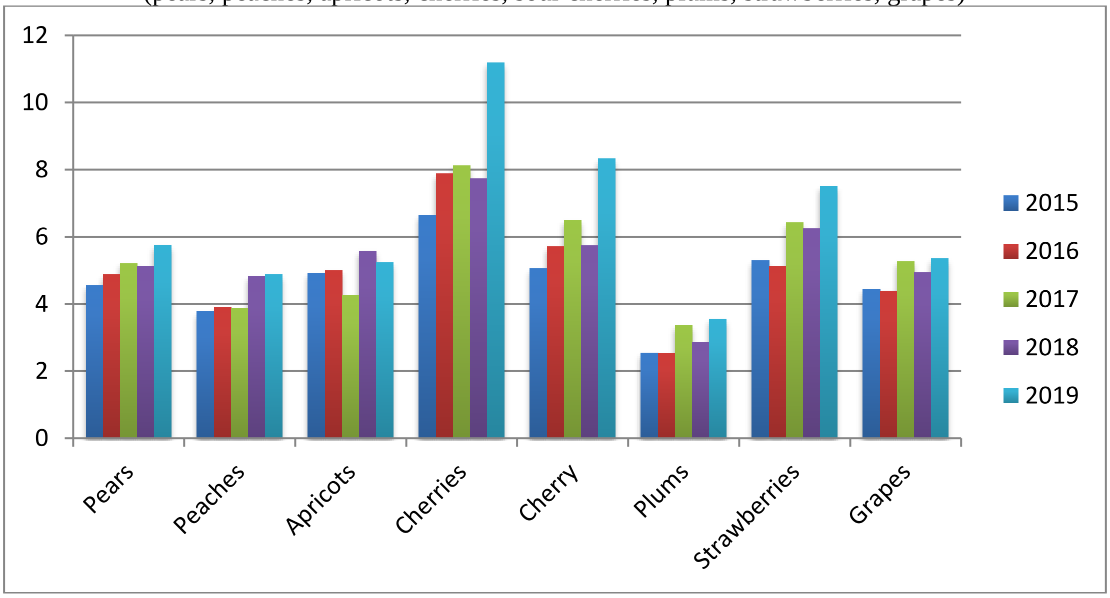
Possible causes that led to higher prices for most fruits in 2019 could be unfavorable weather conditions that led to low yields, production costs, the emergence of diseases and pests that affected crops, labor shortages, etc.

Table no.3 The evolution of prices registered in Romania during 2015-2019

Nomenclature of agricultural products purchased from agricultural producers	**Unit**	**PERIOD**				
		2015	**2016**	**2017**	**2018**	**2019**
Pears	lei/kg	4,55	4,88	5,21	5,13	5,76
Peaches	lei/kg	3,77	3,9	3,86	4,83	4,87
Apricots	lei/kg	4,92	5	4,27	5,58	5,24
Cherries	lei/kg	6,65	7,88	8,12	7,74	11,19
Cherry	lei/kg	5,06	5,71	6,5	5,74	8,33
Plums	lei/kg	2,54	2,52	3,36	2,85	3,55
Strawberries	lei/kg	5,29	5,13	6,42	6,25	7,51
Grapes	lei/kg	4,44	4,39	5,27	4,94	5,35

Source:INS

Chart no.3 Price dynamics in the period 2015-2019
(pears, peaches, apricots, cherries, sour cherries, plums, strawberries, grapes)



Source:INS

CONCLUSIONS

Romania's climate and soil offer favorable conditions for the cultivation of fruit trees and shrubs, species widespread, depending on their biological requirements, throughout the country, from the plains to altitudes of over 800-1000 m.

Fruits are an old staple food consumed by humans both as a daily food and as a medicine for curing many diseases. Both fruits and vegetables are of major importance for the health of the population so consumers are interested in the quality, origin , the price but also their nutritional value.

As I said in the article, price is a decisive factor in purchasing fruit, which is why we chose a wide range of fruits to observe the evolution of prices at national level but also the causes that led to significant increases in 2019.

According to the data registered by the National Institute of Statistics regarding the evolution of fruit prices over a period of 5 years, we notice that all the analyzed fruits were affected by increases in 2018 and 2019, respectively.

The most significant increase registered by the INS was in cherries an increase of 4.54 in 2019 compared to 2015 followed by cherries where an increase of 3.27 lei / kg was registered.

Possible causes that led to higher prices for most fruits in 2019 could be unfavorable weather conditions that led to low yields, production costs, the emergence of diseases and pests that affected crops, the large number of small farms, yields low per hectare, large areas of abandoned and / or built protected areas based on outdated techniques, labor shortage, etc.

At the same time, the production potential exists in Romania, being highlighted by a large assortment of species and varieties of fruits and vegetables, favorable pedo-climatic conditions for the cultivation of vegetables, fruit trees and shrubs but also the modernization of processing units and the increase of cultivated areas. with competitive varieties of vegetables and fruit trees.

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REQUIREMENTS CONCERNING THE EVOLUTION OF THE UTILAJE PARK IN ROMANIA IN PERIOD 2012-2018

STERIE MARIA CRISTINA[1]

Summary: *The machinery fleet is of particular importance for Romania's agriculture because it helps to preserve comfort, sustainability of agricultural production and the replacement of human energy. In Romania the machines illustrate a positive growth rate, the mechanization being favoured by non-refundable funding. Submeasure 4.1. Investments in agricultural holdings stimulate the purchase of agricultural machinery, the results can be observed in the long term, based on the environmental benefits, yields and quality of agricultural products.*

Keywords: *agriculture, machinery park, non-refundable financing*

JEL classification: Q10

INTRODUCTION

Agriculture is the art, science, industry of producing food, raising animals and other human needs.

In recent years agriculture has evolved considerably, resulting in the need to improve agricultural methods and equipment in order to obtain high quality products.

Mechanisation presents as factors of the occurrence of climate change, economic problems, the growth and efficiency of production, but also the lack of access to the workforce.

The mechanisation of agriculture is important because it boosts productivity and work efficiency, speed and speed of work. Mechanisation also helps to improve the agricultural technique by improving the irrigation system, preventing soil erosion, expanding agricultural land and costs can be adjusted accordingly.

In addition to the many benefits to agriculture, mechanisation improves the sustainability of the agricultural system, having an impact on the supply and demand of labour, agricultural profitability.

As regards the innovation and modernisation of agriculture in Romania, the financing methods are of particular importance. Thus, the Agency for Rural Investment Financing manages the European funds for agricultural innovation and modernisation.

By sub-measure 4.1 - Investments in agricultural holdings contribute to the areas of intervention, providing private beneficiaries with non-refundable funding for the modernisation of the agricultural machinery fleet through the purchase of efficient and efficient machinery and equipment.

The non-refundable support of this sub-measure for vegetable farms and livestock farms will be 50 % of the total ineligible expenditure. For projects providing for simple purchases, the maximum eligible expenditure will be EUR 500,000 and for vegetable farms the non-refundable public support will be 30% of eligible expenditure and public procurement will not exceed EUR 500,000.

MATERIAL AND METHOD

The research is based on statistical data provided by the National Statistical Institute and Eurostat. Statistical indicators were calculated in the work, namely:

- standard deviation $\sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{(n-1)}}$, where:

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x = sample average;
n = sample size;

- coefficient of variation v = $\frac{\sigma}{x}100$, where:
  σ = average deviation;
  x = the average level of a variable;
- the pace of growth $\bar{R} = (\bar{I}\,x\,100) - 100$, where:
  $\bar{I}$ = average general growth index.

RESULTS AND DISCUSSIONS

The number of agricultural tractors shows variations between 184,446 in 2012 and 215,980 in 2018, showing an upward trend with an annual growth rate of 2.67% and an average of 200,682 tractors in the period considered (Table No. 1., Table No. 2.).

With regard to tractor ploughs, an upward trend is observed, with the number oscillating between 147,471 in 2012 and 169,964 in 2018 and an average period of 160,575 ploughs with a growth rate of 2.39% (Table No. 1., Table No. 2.).

Table 1 - The evolution of the fleet of tractors and agricultural machines in Romania during 2012-2018

Categories of tractors and agricultural machinery	Years						
	2012	2013	2014	2015	2016	2017	2018
Physical farm tractors	184446	191301	193120	199284	207901	212730	215980
Tractor plows	147471	152031	156964	159334	168617	169647	169964
Mechanical cultivators	29173	29565	29562	30355	30632	29648	29337
Mechanical seed drills	73519	74805	76301	77560	81255	80038	78612
Mechanical traction spraying and dusting machines	5459	5293	5315	5607	5327	5494	5709
Self-propelled grain harvesters	25626	26454	25694	27485	26923	26690	27464
Self-propelled forage harvesters	752	826	868	891	985	1069	1104
Combine harvesters and potato harvesters	5165	5348	5122	5403	5629	5924	6108
Straw and hay balers	9087	10225	10871	11966	13840	14166	14697
Feed vindrovers	1817	1221	1217	1254	1327	1375	1399

Source: www.insse.ro (accessed on 08.01.2020), own calculations

The number of mechanical growers ranged from 29,173 in 2012 to 30,632 in 2016. The average period is 29,753 mechanical growers, and in the period under review oscillates, increasing until 2016, with a positive growth rate of 0.09% (Table No. 1., Table No. 2.).

In the period 2012 to 2016, in terms of the number of sowers, the average was 77,441, where the lowest number was recorded in 2012 (73,519 sowers), and the highest number was recorded in 2016 (81,255 sowers). Also the growth rate was 1.12 (Table No. 1., Table No. 2.).

Sprinklers and dusting machines with mechanical traction show variations during the period under review. The most sprinklers were registered in 2018, i.e. 5,709, and the fewest in number, 5,293 in 2013, with an average of 5,457 sprinklers and dusting machines with traction, showing a growth rate of 0.75% (Table No. 1., Table No. 2.).

Self-propelled grain harvesters also have small oscillations. They were between 25,625 and 27,485, resulting in an average period of 26,619 self-propelled grain harvesters and a growth rate of 1,16% (Table No. 1., Table No. 2.).

Self-propelled feed harvesters have the lowest average in the categories of tractors and agricultural machinery, i.e. 927 combinations with oscillations between 752 and 1,104, with the growth rate being the highest 6.61%.

As regards combinations and potato harvesters, it oscillates between 5,122 and 6,108, the average period is 5,528 and was characterized by a growth rate of 2,83%.

Table 2- The main indicators on the number of tractors and agricultural machines in the period 2012-2018

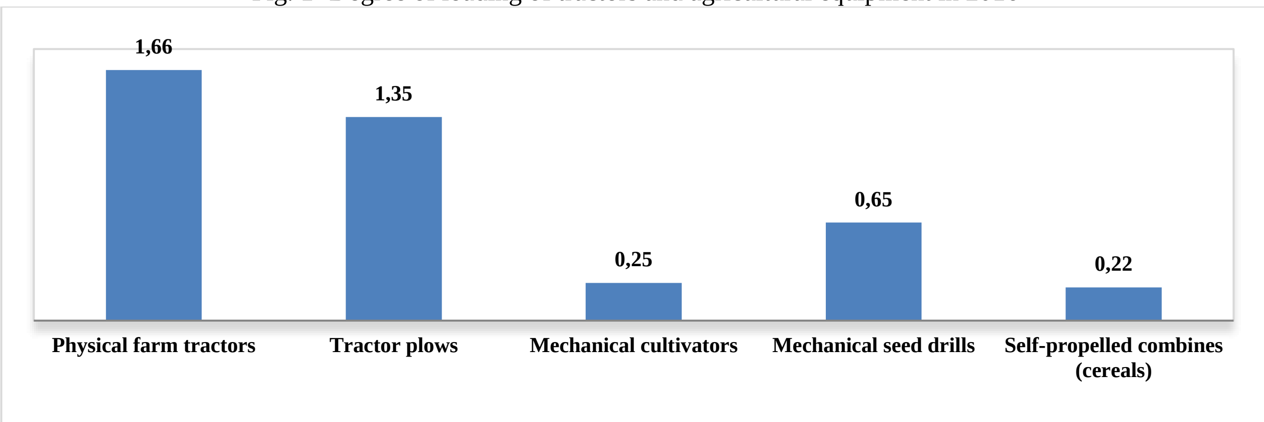
Categories of tractors and agricultural machinery	Min (no)	Max (no)	Aver. (no)	Stand. Dev. (no)	*Coef. of var. %	Growth rate %
Physical farm tractors	184446	215980	200680,29	11846,56	0,06	2,67
Tractor plows	147471	169964	160575,43	9077,65	0,06	2,39
Mechanical cultivators	29173	30632	29753,14	536,56	0,02	0,09
Mechanical seed drills	73519	81255	77441,43	2778,09	0,04	1,12
Mechanical traction spraying and dusting machines	5293	5709	5457,71	158,82	0,03	0,75
Self-propelled grain harvesters	25626	27485	26619,43	756,12	0,03	1,16
Self-propelled forage harvesters	752	1104	927,86	129,39	0,14	6,61
Combine harvesters and potato harvesters	5122	6108	5528,43	375,95	0,07	2,83
Straw and hay balers	9087	14697	12121,71	2166,38	0,18	8,34
Feed vindrovers	1217	1817	1372,86	208,78	0,15	-4,26

Source: www.insse.ro (accessed on 08.01.2020), coefficient of variation (<10 - small ;10-20- medium; >20-high).

Straw and hay balers have limits between 9,087 in 2012 and 14,697 in 2017. It has a positive growth rate of 3.84% with a period average of 1,810 (Table No. 1., Table No. 2.).

As regards the number of vindrovere for feedingstuffs, it was between 1,217 in 2014 and 1,817 in 2012, resulting in an average period of 1,372 and a negative growth rate is highlighted, i.e. -4,26% (Table No. 1., Table No. 2.).

Fig. 1- Degree of loading of tractors and agricultural equipment in 2016



Source: processed data EUROSTAT

As regards the load level, 1.66 tractors return to 100 ha, followed by tractor ploughs returning 1.35 to 100 ha and mechanical sowers by 0.65 to 100 ha.

The lowest numbers in the Romanian machinery fleet are shown by straw and fan balers, vindrovere for feed and self-propelled feed harvesters returning to 100 ha maximum 0.1.

Table 3- Evolution of the number of projects financed through sub-measure 4.1. – Investments in agricultural holdings (vegetable sector)

Specification	2015	2016	2017	2018
Number of projects funded	35	149	43	36
Number of projects excluding equipment purchases from total funded projects	33	144	26	1
Share of projects financed exclusively for equipment purchases from total financed projects (%)	94,3	96,6	60,5	2,8

Source:R.S_Final_sM4.1_selected_vegetal_2015,R.S.FINAL_sM4.1_vegetal_selected_S01_2016,R.S_sM4.1_ selected _vegetal_stage2_S01_2017,R.S_sM4.1_ selected _vegetal_stage1_S01_2017,R.S._sM4.1_vegetal_et1_2018_ selected.

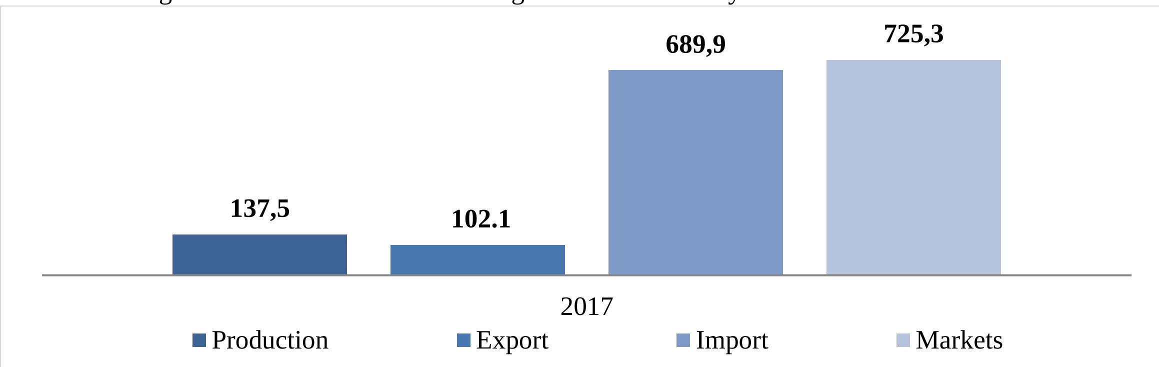
The main financing measure for farmers who contributed to the acquisition and renewal of the farm machinery fleet was submeasure 4.1. – Investments in agricultural holdings. During the period under review, it is noted that the most numerous projects financed were registered in 2016, with 149 projects of which 96.6% were projects financed exclusively for the purchase of agricultural machinery (Table No. 3.).

By the fact that most projects were submitted in 2016 on this sub-measure, it was due to the fact that farmers became aware of the opportunity to finance their holdings as a result of the possibility of an eligible investment of up to EUR 500,000, with non-refundable support of 50% of the total investment.

In 2016, most projects were contracted through sub-measure 4.1. – Investments in agricultural holdings accounting for 96.6% projects financed exclusively for machinery procurement from total funded projects.

Lately, farmers have started to be increasingly concerned about the brand, the manufacturers of the machinery, but also the technical characteristics having a special importance in the choice of model.

Figure 2- Production and trade of agricultural machinery in 2017 in Romania



Source: processed data CEMA

According to THE CEMA data, at the level of 2017 in Romania, the market for tractors and agricultural machinery amounted to more than 725 million euros, determined also against the background of the possibility of access to European funds by Romanian farmers. Also the import of agricultural machinery accounted for about 95% of the market for agricultural machinery in Romania.

It should be noted that Romania produced agricultural machinery worth more than 137 million euros through the two Romanian-owned producers Irum and Mechanica Ceahlau.

As regards the production of agricultural machinery at European Union level in 2017, Germany is ranked 12.7 billion euros, followed by Italy 7.1 billion euros and France with 4.6 billion euros.

CONCLUSIONS AND RECOMMENDATIONS

Agricultural machinery is an indispensable good on the farm. Their high prices make it difficult for the Romanian farmer to purchase them, so financing through European funds was a solution for them. By means of measure 4.1. - Investments in agricultural holdings, simple purchases, represented by the purchase of machinery with a financing of up to EUR 500,000 of the eligible value of the project, as well as a non-refundable support of 50% of the total investment.

The purchase of machinery in recent years has been carried out by large farms, small farms relying on the purchase of second-hand machinery and being less aware of the advantages brought by the modernisation of the tractor fleet and agricultural machinery. Also an influential factor in machine purchases is the climatic conditions of recent years that have led to good productions.

In 2016 most projects were contracted under submeasure 4.1. - Investments in agricultural holdings i.e. 144 projects exclusively for the purchase of machinery from total projects. This is due to the mechanisation of agriculture and the awareness of the benefits to both the environment and the production of high-quality agricultural products. Projects financed in 2016 stand out for mechanical growers and mechanical sowers with the most in number in the period considered 2012-2018, but in terms of load to 100 ha of agricultural land in 2016, are insufficient.

We note that in 2017 and 2018 the number of single procurement projects decreased considerably, due to the fact that construction/assembly projects received a higher selection score, as the applicant's guide favoured investments in greenhouses/ solars (vegetables) taking the face of projects aimed at simple purchases.

Romania shows a positive growth rate in terms of the number of agricultural equipment in the period 2012-2018, effectively illustrating in agricultural activities and guidance for sustainable agriculture and quality.

The future National Strategic Program will have to continue pursuing the financing of the renewal of the fleet of tractors and agricultural equipment, in a context in which the labor force is insufficient in agriculture, and the new models of use make the labor productivity to be high.

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ANALYSIS OF THE PLANT SECTOR IN GIURGIU COUNTY IN THE PERIOD 2015-2019 - GAPS TOWARDS THE SUD-MUNTEMIA REGION

GIUCĂ ANDREEA-DANIELA[1]

Abstract: *The geographical location of the Sud-Muntenia region and its relief ensure favorable natural conditions for vegetable crops, especially those in the cereals category, determining the predominantly agrarian character of the region, over 70% of the total area of the region is agricultural area. Agriculture is the basic economic sector for the counties in the southern part of the region - Argeș, Prahova, Dâmbovița, Călărași, Ialomița, Teleorman and Giurgiu. As a result of this situation, the plant sector has experienced a continuous development in the recent years, becoming one of the important branches of agricultural production in the region.*

The objectives of the paper aim to provide an overview of the agricultural plant sector of Giurgiu county, compared to the Sud-Muntenia region. The paper analyzes the evolution of cultivated areas with the main vegetable crops representative of the South-Muntenia region and especially of Giurgiu county (wheat and rye, barley and barley, corn, sunflower and rapeseed) and productions, in the period 2015-2019. Thus, based on the data provided and processed by the National Institute of Statistics and the Agricultural Directorate of Giurgiu County and their interpretation through the methods of statistical analysis, the oscillations that occurred during this period were highlighted.

Key words: *vegetable agricultural sector, surface, output, Giurgiu county, Sud-Muntenia region*

JEL classification: *Q10, R14*

INTRODUCTION

The South-Muntenia region is one of the development regions of Romania, with an area of 34,453 km², which includes the following counties: Argeș, Prahova, Dâmbovița, Teleorman, Giurgiu, Ialomița and Călărași, all located in the historical region of Muntenia.

From an economic point of view, the South – Muntenia Region has a predominantly agricultural character, therefore, the type of crops, but also the level of production are significant, from this point of view. South Muntenia is the most productive region in terms of cereals, recording record yields for wheat and corn.

Located in the Danube Meadow, on the left bank of the Danube River, Giurgiu County has an area of 3,526 km, representing 1.5% of the total area of the country. Giurgiu County has an identity of agricultural county, a status that must be revitalized by invigorating agriculture and food industry, key areas for the development of the county. The predominant activities in agriculture are the cultivation of cereals (wheat and rye, barley and barley, corn) and technical plants (sunflower and rapeseed), viticulture, fruit growing and animal husbandry.

MATERIALS AND METHODS

The paper studies the evolution, in the period 2015-2019, of the areas cultivated with: wheat and rye, barley and barley, corn, sunflower and rapeseed, as well as the dynamics of productions, using the data series of the National Institute of Statistics and the Agricultural Directorate of Giurgiu County. Statistical indicators were calculated to highlight the evolutionary trends of the technical indicators analyzed for each crop. In order to notice the differences registered at the level of the analyzed years, the comparison method was used. The statistical research process cost the following stages: data collection and recording, data processing, analysis and interpretation of results.

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RESULTS AND DISCUSSION

The main natural wealth of the South-Muntenia region is agricultural land. The soils are mostly composed of different types of chernozems and alluvial soils, they have a high fertility, which allows large-scale farming, predominantly the cereal sector.

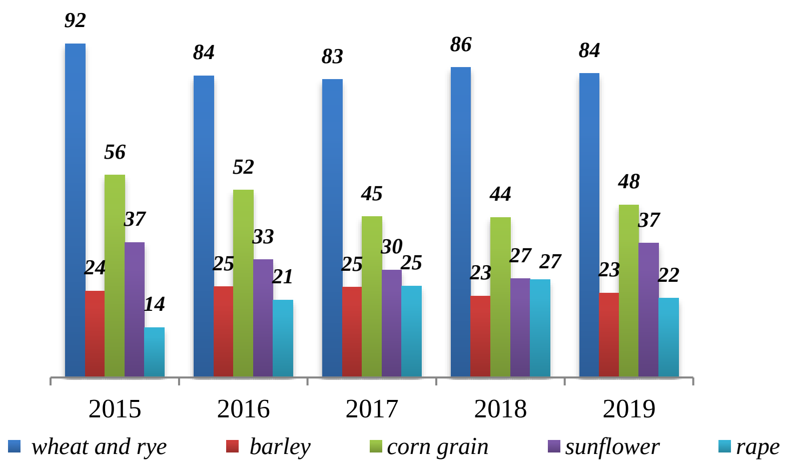
Vegetable production in Giurgiu County in the last five years has had a fluctuating trend in close connection with cultivated areas, agricultural policies and climate change.

Table no. 1: Area cultivated with the main crops in the South-Muntenia region and in Giurgiu county, in the period 2015-2019 (thousand hectares)

Nr. crt.	Category	Region/county	Years				
			2015	**2016**	**2017**	**2018**	**2019**
1.	**Cereal grains**	**South-Muntenia**	**1257**	**1231**	**1192**	**1189**	**1278**
		Giurgiu	**177**	**165**	**156**	**158**	**159**
2.	Wheat and rye	South-Muntenia	586	588	583	589	591
		Giurgiu	92	84	83	86	84
3.	Barley	South-Muntenia	130	133	115	98	116
		Giurgiu	24	25	25	23	23
4.	Corn grain	South-Muntenia	500	471	455	464	534
		Giurgiu	56	52	45	44	48
5.	**Oilseeds**	**South-Muntenia**	**433**	**427**	**487**	**501**	**431**
		Giurgiu	**56**	**58**	**62**	**60**	**63**
6.	Sunflower	South-Muntenia	243	209	213	216	268
		Giurgiu	37	33	30	27	37
7.	Rape	South-Muntenia	157	188	240	247	126
		Giurgiu	14	21	25	27	22

Source: National Institute of Statistics, www.insse.ro

Figure no. 1: Evolution of cultivated areas with the main vegetable crops in the period 2015-2020 at the level of Giurgiu county (thousand hectares)



Source: National Institute of Statistics, www.insse.ro

In Giurgiu county, the area cultivated with cereals in the period 2015-2019 had a downward trend, with small oscillations, it registered limits between 156 thousand hectares in 2017 and 177 thousand hectares in 2015, the average of the period being 163 thousand hectares. In 2019, of the total area cultivated with grain cereals (159 thousand hectares), the area cultivated with wheat and rye accounted for about 53%, followed by areas cultivated with corn grains and barley and barley, 30% and 15%, respectively.

The area cultivated with oil plants in Giurgiu County in the analyzed period ranged between 56 thousand hectares in 2015 and 63 thousand hectares in 2019 with an average of 60 thousand hectares. In 2019, out of the total area cultivated with oil plants (63 thousand ha), the area cultivated with sunflower represented 59%, and the one cultivated with rapeseed 35%.

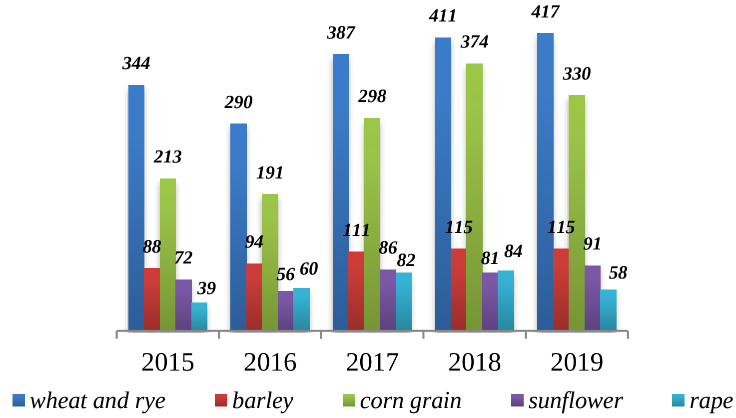
At the level of 2019, out of the total area with cereals for grains from the South-Muntenia region, the cultivated area in Giurgiu county represented 12%. Regarding the area cultivated with oil plants in the region, 15% of it was cultivated in Giurgiu County.

Table no. 2: Vegetable agricultural production, by main crops in the South-Muntenia region and in Giurgiu county, in the period 2015-2019 (thousand tons)

Nr. crt.	Category	Region/county	Years				
			2015	2016	2017	2018	2019
1.	**Cereal grains**	**South-Muntenia**	**5035**	**5029**	**6681**	**7199**	**7288**
		Giurgiu	**662**	**589**	**810**	**918**	**876**
2.	Wheat and rye	South-Muntenia	2366	2417	2986	2889	3025
		Giurgiu	344	290	387	411	417
3.	Barley	South-Muntenia	524	547	549	516	565
		Giurgiu	88	94	111	115	115
4.	Corn grain	South-Muntenia	2033	1959	3020	3674	3579
		Giurgiu	213	191	298	374	330
5.	**Oilseeds**	**South-Muntenia**	**968**	**1101**	**1459**	**1469**	**1111**
		Giurgiu	**125**	**120**	**191**	**190**	**165**
6.	Sunflower	South-Muntenia	481	455	620	672	700
		Giurgiu	72	56	86	81	91
7.	Rape	South-Muntenia	415	576	733	682	299
		Giurgiu	39	60	82	84	58

Source: National Institute of Statistics, www.insse.ro

Figure 2: Evolution of total productions for the main vegetable crops in the period 2015-2020 at the level of Giurgiu county (thousand tons)



Source: National Institute of Statistics, www.insse.ro

In the period 2015-2019, the total production of grain cereals in Giurgiu County had an upward trend, registering values between 589 thousand tons in 2016 and 918 thousand tons in 2018 and an average period equal to 771 thousand tons. At the level of 2019, out of the total production of cereals for grains (7,288 thousand tons), the production of wheat and rye represented 48%, followed by the production of corn grains with 38% and barley and barley with 13%.

The total production of oil plants in Giurgiu County showed an upward trend, with limits between 120 thousand tons in 2016 and 191 thousand tons in 2017 and an average period of 158 thousand tons. Of the total production of oil plants registered in 2019 in Giurgiu County (165 thousand tons), sunflower production accounted for 55% and rape 15%.

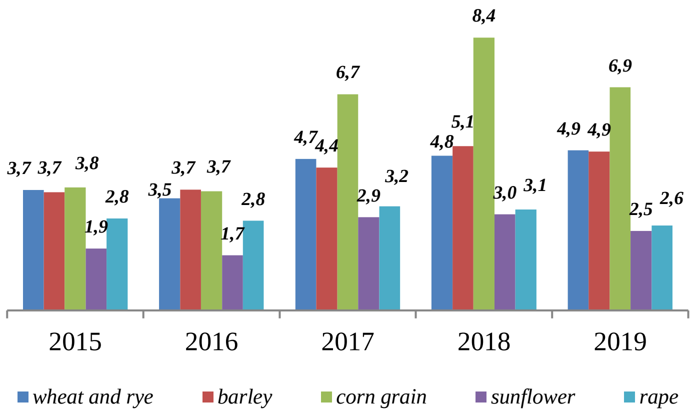
In 2019, from the total production of grain cereals at the level of the South-Muntenia region (7,288 thousand tons), the total production obtained in Giurgiu county (876 thousand tons) represented 12%. The total production obtained from oil plants in Giurgiu County (165 thousand tons) represented 15% of the total production registered in the region (1,111 thousand tons).

Table no. 3: Average production per hectare for the main crops in the South-Muntenia region and in Giurgiu county, in the period 2015-2019 (tons / ha)

Nr. crt.	Category	Region/county	Years				
			2015	2016	2017	2018	2019
1.	Wheat and rye	South-Muntenia	4,04	4,11	5,13	4,90	5,12
		Giurgiu	3,72	3,47	4,68	4,78	4,94
2.	Barley	South-Muntenia	4,03	4,12	4,76	5,24	4,87
		Giurgiu	3,65	3,74	4,41	5,08	4,91
3.	Corn grain	South-Muntenia	4,07	4,16	6,64	7,92	6,70
		Giurgiu	3,80	3,68	6,68	8,43	6,89
4.	Sunflower	South-Muntenia	1,97	2,18	2,91	3,10	2,61
		Giurgiu	1,92	1,71	2,88	2,97	2,45
5.	Rape	South-Muntenia	2,64	3,07	3,05	2,76	2,36
		Giurgiu	2,85	2,77	3,22	3,12	2,63

Source: National Institute of Statistics, www.insse.ro

Figure 3: Evolution of average yields per hectare for the main vegetable crops, in the period 2015-2020 in Giurgiu county (tons / ha)



Source: National Institute of Statistics, www.insse.ro

The average production per hectare for the main representative crops of Giurgiu County in the period 2015-2019, had an upward trend with small oscillations.

In the analyzed time interval, the average production recorded for wheat and rye ranged between 3.5 tons / ha in 2016 and 4.9 tons / ha in 2019. In 2019, the average production obtained for wheat and rye increased by 33% compared to 2015.

According to the article presented on the Gazeta de Agricultura website, in 2018 Giurgiu county was in the top of the counties with the highest wheat yield, with an average production per hectare of 5.8 tons / ha.[2]

[2] https://www.gazetadeagricultura.info/plante/cereale/21181-recolte-record-in-vara-anului-2018-in-ciuda-culturilor-afectate-de-calamitati.html

For barley and barley, the average production increased in 2019 by 34% compared to that obtained in 2015. In the analyzed period, the average production varied between 3.7 tons / ha in 2015 and 5.1 tons / ha in 2018.

For large farmers, in 2018 the production exceeded 7 tons for wheat and barley, as is the case of Agro Total in Adunații Copăceni, where wheat and barley production was very good, although rainfall caused damage, but the advantages they brought were greater. Barley yields of 8 tons / ha were obtained, and wheat 7 tons / ha. Agro Total manages about 3,000 hectares of agricultural land, being one of the most profitable agricultural holdings in Giurgiu County.

The average production of corn in Giurgiu County registered limits between 3.68 tons / ha in 2016 and 8.43 tons / ha in 2018. In 2019, the average production of corn increased by 81% compared to that obtained in 2015 Giurgiu was the county that obtained in 2017 the highest average production per hectare for corn crop 6.68 tons / ha, with over 500 kilograms compared to the national average (5.95 tons / ha), according to data communicated by the Ministry of Agriculture and Rural Development (MADR).

In sunflower and rapeseed, the average productions increased with small variations. For sunflower, the average production ranged between 1.71 tons / ha in 2016 and 2.97 tons / ha in 2018, and for rapeseed it varied between 2.63 tons / ha in 2019 and 3.22 tons / ha in 2017 In 2019, there was an increase in average production by 28% for sunflower and a decrease of 8% in rapeseed compared to production obtained in 2015.

CONCLUSIONS

According to the study based on data processed and provided by the National Institute of Statistics, in 2015-2019, there is a growing trend of areas cultivated with the main crops analyzed, as well as total and average production in Giurgiu County and also South Muntenia region.

Within the South-Muntenia region, at the level of 2019, the largest cultivated area with grain cereals was owned by Călărași County, followed by Teleorman and Ialomița, Giurgiu County ranking fourth with an area of 159 thousand hectares. Regarding the area cultivated with wheat and rye, Giurgiu county ranked fourth with 84 thousand hectares, after Teleorman, Călărași and Ialomița. For barley and barley, Giurgiu county ranked third in terms of cultivated area of 23 thousand hectares, after Călărași and Teleorman. For corn, the largest area was cultivated in Călărași County, Giurgiu ranking on the last place of the region with an area of 48 thousand hectares. The areas cultivated with oil slicks increased in the region during the analyzed period. In 2019, Teleorman County occupied the largest area cultivated with oil plants, followed by Călărași, Ialomița and Giurgiu. Regarding the area cultivated with sunflower and rapeseed, Giurgiu County ranked fourth in the top of the region with an area of 37 and 22 thousand hectares, respectively.

At the level of grain cereal productions, in 2019 the highest production was obtained in Călărași County, followed by Teleorman, Ialomița and Giurgiu, the lowest being registered in Dâmbovița. In the production of wheat and rye, Giurgiu County obtained a production of 417 thousand tons, occupying the fourth place in the top of the county after Ialomița, Călărași and Teleorman. Barley and barley production recorded the highest values in Călărași, Teleorman and Giurgiu counties. In the production of corn grains, Giurgiu county ranked fourth in the top of the region with a production of 330 thousand tons. Regarding the production of oil plants, the highest production was obtained in Teleorman County, and the lowest in Dâmbovița County. At sunflower, Giurgiu County obtained a production of 91 thousand tons, thus occupying the fourth place in the top of the region. The rapeseed production registered in Giurgiu County was of 58 thousand tons, ranking the county on the third place, after Teleorman and Călărași.

From those presented, the high potential of Giurgiu County in terms of capitalization of areas with soils in the category of chernozems, favorable to the cultivation of the main crops in the vegetable agricultural sector compared to the South-Muntenia region. Giurgiu is one of the counties with the highest average yields per hectare for cereals, especially wheat and barley.

In the economy of Giurgiu county, a very important share has agriculture, especially crops in the category of cereals, wheat and rye occupying the leading place in the share of agricultural areas and productions.

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ANALYSIS OF THE MAIN INDICATORS REGARDING THE PRODUCTION AND SURFACE AREA OF THE MAIN CROPS IN THE SOUTH-EAST DEVELOPMENT REGION, IN THE PERIOD 2010-2018

STOICA GABRIELA-DALILA[1]

Summary: *Cereals are grown for grain and are used both to provide food and feed. In Romania, cereals occupy an important place in the structure of use of agricultural areas, observing a tendency to increase the areas where cereals are grown due to their importance, but also due to the fact that Romania has favorable soil and climatic conditions for their growth and development. The research aims to analyze the evolution regarding the areas, total productions and average productions obtained within the South-East region, in the period 2010-2018.*

Keywords: *crop production, cultivated area, South-East region*

JEL classification: *Q10, R14*

INTORDUCTION

Wheat is important in ensuring food safety and security, due to its high content of minerals, proteins, carbohydrates, fats and vitamins. It is considered a good precursor plant for many crops, as it is harvested early, which gives the soil the opportunity to recover in terms of fertility. Wheat consumption in our country is linked to the tradition of food consumption of the Romanian people.

Corn is considered the best known precursor plant, it is also rich in protein and carbohydrates, which makes it a good source of energy.

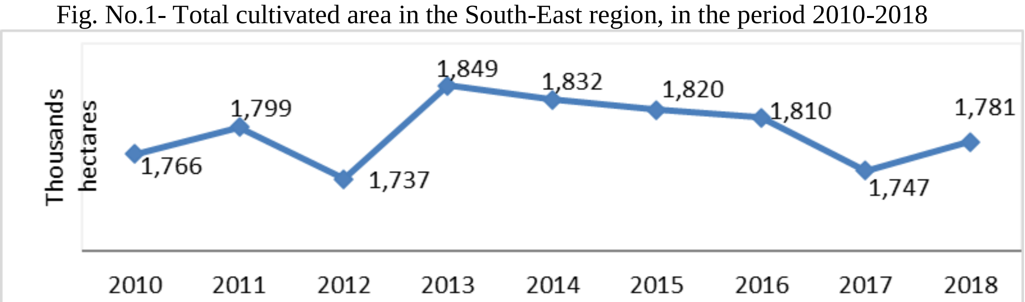
From ancient times, cereals are considered to be the basis of human nutrition, their cultivation contributing to the economic growth of the country. The problem that arises is the proportion in which cereals are consumed daily and the ratio between them and other products of both plant and animal origin. Romania occupies an important place in Europe, ranking on the leading places in the area cultivated with corn and on the 2nd place in the realized production.[2]

Regarding oil plants, Romania focuses on cultivating areas with sunflower, rapeseed, soybean and less flax for oil.

MATERIAL AND METHOD

Data provided by the National Institute of Statistics, time series 2010-2018 were used for this paper. The comparison method was used to highlight the annual differences in areas and production obtained in the cereals sector in the South-East Development Region.

Fig. No.1- Total cultivated area in the South-East region, in the period 2010-2018



Source: www.inss.ro (Accessed on 20.02.2020)

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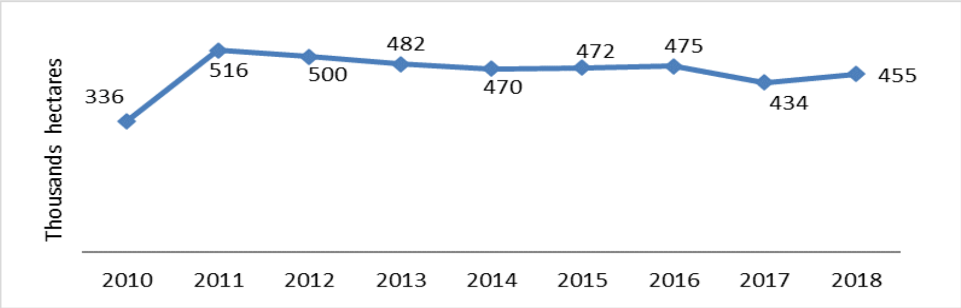
[2] https://agroromania.manager.ro/articole/vegetal/romania-a-inregistrat-cea-mai-mare-productie-de-porumb-din-europa-26343.html

The area cultivated with wheat and rye has a downward trend in the South-East development region. This area oscillated in the analyzed period, between 422 thousand ha and 529 thousand ha, which determined a period average of about 482 thousand ha.

Fig. No. 2- The area cultivated with wheat and rye in the South-East region, in the period 2010-2018

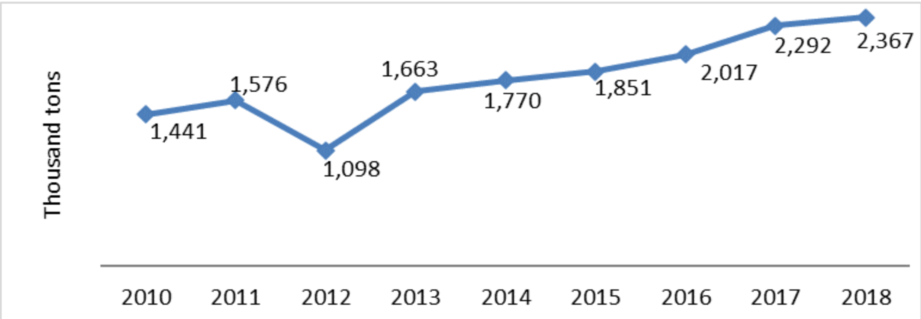


Source: www.inss.ro (Accessed on 20.02.2020)

In 2018, the area cultivated with wheat and rye in the region, represented 42.39% of the total area cultivated with grain cereals.

In 2018, Romania ranked 5^{th} in Europe in the area cultivated with wheat.[3]

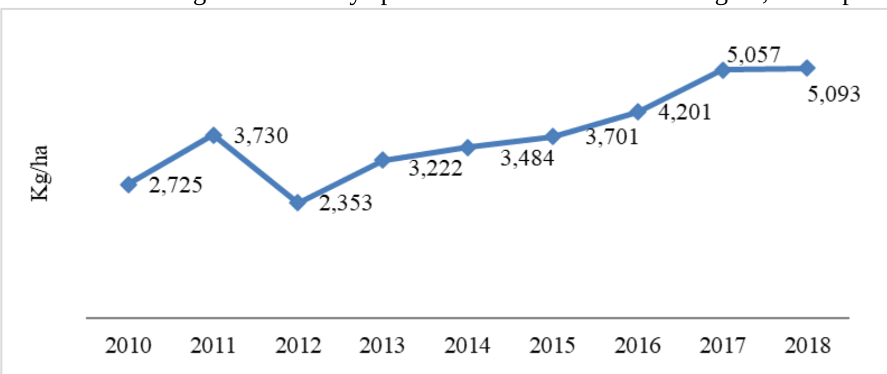
Fig. No .3-Total wheat and rye production in the South-East region, in the period 2010-2018



Source: www.inss.ro (Accessed on 20.02.2020)

The total production of wheat and rye varies from one year to another, registering significant increases in the analyzed period, reaching a maximum of approximately 2.4 million tons, which means that it increased by 46.39% tons compared to 2012 , when the lowest production was obtained. There are also substantial increases in yield per hectare. Thus, in 2018 a record yield of 5093 kg/ha was obtained by 86.89% more compared to the first year analyzed.

Fig. No.4 - Evolution of average wheat and rye production in the South-East region, in the period 2010-2018



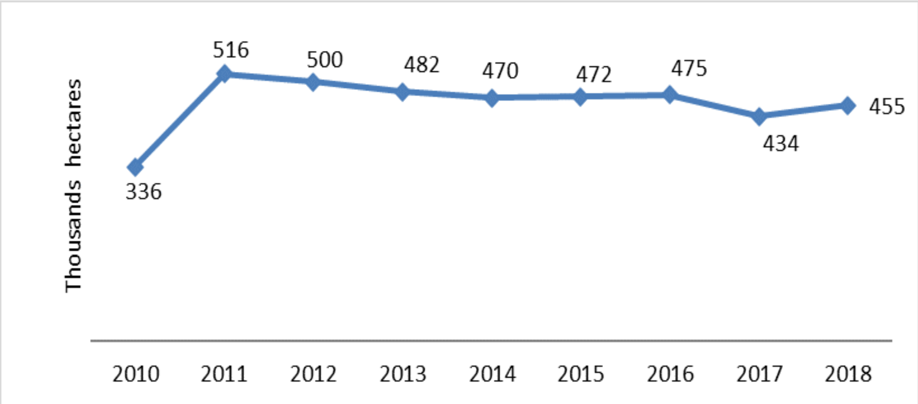
Source: www.inss.ro (Accessed on 20.02.2020)

[3] https://agroromania.manager.ro/articole/vegetal/romania-a-inregistrat-cea-mai-mare-productie-de-porumb-din-europa-26343.html

This evolution regarding the average production of wheat and rye is influenced by the level of technical endowment with tractors and the main groups of agricultural machines. It was found that the highest average yields were obtained in the years when there was a better technical endowment, which contributed to the optimal timing of the work of preparing the germination and sowing bed, the work of fertilization, herbicide, control of diseases and pests, as well as harvesting.

Another important cause that led to the achievement of high levels of production was the annual amount of rainfall and their distribution during the growing season. For wheat, the water requirement is 3,500 - 4,500 m^3/ha, the critical phases being: emergence-flowering, sprouting-flowering-grain formation (May-June).

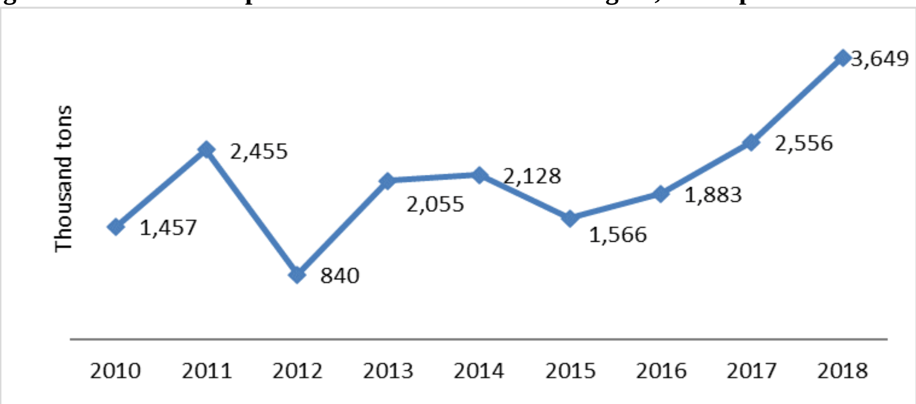
Fig. No. 5- Area cultivated with corn grains in the South-East region, in the period 2010-2018



Source: www.inss.ro (Accessed on 20.02.2020)

At the level of the South-East development region, the surface cultivated with grain corn was between approximately 336 and 516 thousand ha, resulting in an annual average of the period of 460 thousand ha. The area cultivated with corn grains in 2018, represented 41.51% of the total area cultivated with grain cereals. Thus, in 2018 Romania was the leader in the cultivated area and on the 2nd place in the corn production achieved.[4]

Fig. No.6 - Total maize production in the South-East region, in the period 2010-2018



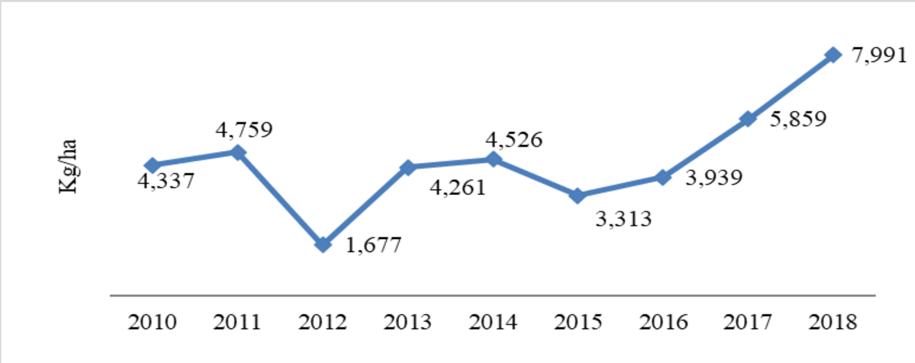
Source: www.inss.ro (Accessed on 20.02.2020)

Regarding the total production of corn, in the region there is a variation, registering values between 840 thousand tons and 3.6 million tons, resulting in an average period of 207 thousand tons and an average yield of 4,518 kg/ha .

The average production registers an accelerated growth, reaching a value of 7,991 kg/ha, with 84.25% more than the first year analyzed, when a yield of 4,337 kg/ha was obtained.

[4] https://agroromania.manager.ro/articole/vegetal/romania-a-inregistrat-cea-mai-mare-productie-de-porumb-din-europa-26343.html

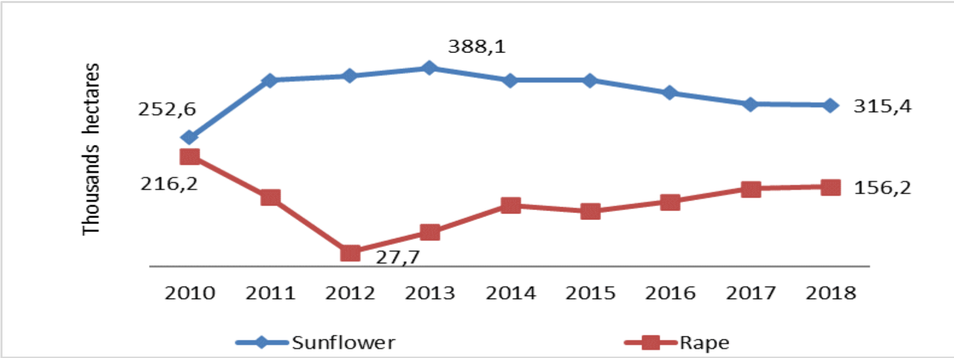
Fig. No7- Evolution of average maize production in the South-East region, in the period 2010-2018



Source: www.inss.ro (Accessed on 20.02.2020)

Thus, for the corn harvest in 2018, the average yield in Romania was 7.79 t/ hectare, based on data provided by the Romanian authorities. The European average was 8.35 t/hectare.[5]

Fig. No. 8 - Area cultivated with rapeseed and sunflower in the South-East region, in the period 2010-2018

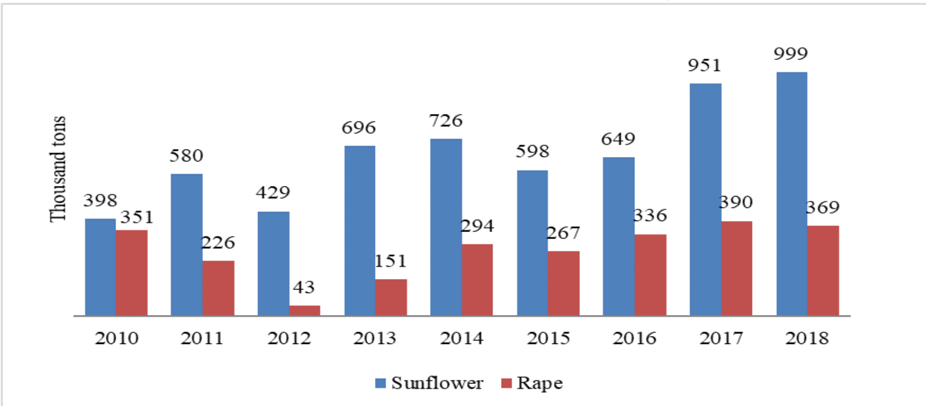


Source: www.inss.ro (Accessed on 20.02.2020)

Sunflower cultivation occupies an important place in the country, in terms of cultivated area and production obtained. Therefore, in 2018 Romania ranks 1st in Europe in terms of area and production obtained from sunflower.

There was a variation of the area cultivated with sunflower, observing a minimum value recorded in 2010 increasing by 20% until 2018. The increase of areas cultivated with sunflower took place due to the loss of areas sown with rapeseed.[6]

Fig. No. 9- Total production of sunflower and rapeseed in the South-East region, in the period 2010-2018



Source: www.inss.ro (Accessed on 20.02.2020)

[5] https://fermierinromania.ro/randamentele-medii-ale-productiei-romanesti-de-cereale-comparativ-cu-tarile-membre-ue/

[6] Profitul Agricol 1/2020

Rapid crop rotation is essential for the success of rapeseed farming, with better results when farmers coordinate their rapeseed cultivation plans.[7]

CONCLUSION

In conclusion, during the analyzed period, there is a general tendency to increase the cultivated areas, the total production and the average production obtained.

The area cultivated with wheat and rye has the largest share in the total area cultivated with grain cereals, namely 42.43%. The second crop, as cultivated area, among those analyzed above is corn, representing on average 40.47% of the total area cultivated with grain cereals.

Regarding the total yields obtained, for all five crops analyzed there are substantial increases. Wheat and rye account for about 35% of total cereal production, and maize accounts for 53% of total cereal production.

Compared to the first year analyzed, currently the average yields per ha have an upward trend, reaching a record production of about 8 t/ha for corn, 5 t/ha for wheat and rye, 3 t/ ha for sunflower 2,3 t/ha for rapeseed.

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SECTION 2

Rural Development and Agricultural Policies

DEVELOPMENT OF SOFT COMMODITY DERIVATIVE MARKET IN FUNCTION OF THE RISK MANAGEMENT IN CEE

VLADO KOVACEVIC[1], JONEL SUBIC[2], IRENA JANKOVIC[3]

The summary: *This aim of this paper is to analyse possibilities and potential effects of soft commodity derivative market on the development of risk management practice within the CEE. Agricultural producers and other participants in the soft commodity market in CEE are lacking local commodity market. As a consequence, they are relying on hedging strategies on remote derivative markets that results in basis risk. The local soft commodity derivative market with delivery in CEE ports could significantly improve the risk management practice. One of the most important barriers in developing commodity derivatives market is market liquidity. Joint commodity market between different commodity exchanges in the CEE could lead to increase of necessary liquidity. Attempts to develop commodity derivative markets in individual countries within the region were proven to be inefficient lacking the volume of trade. Methodology used in this paper is based on relevant literature review, consultation with experts in commodity trade and market participants and descriptive statistics applied in order to determine grain price volatility. Results of the research indicate that grain price volatility is high causing the need for application of hedging strategies at the commodity exchanges markets. Second, new EU common regulative is providing improved framework for joint commodity exchange clearing by single clearinghouse. Established market with delivery on Black See ports is of special importance for regional stakeholders.*

Keywords: *derivative commodity exchanges, hedging strategies, commodity market, futures contract, basis risk*

Classification JEL: *Q02, Q14, G23*

INTRODUCTION

Derivative instruments represent financial innovations originally started in 70s of XX century and since then we are witnessing constant increase in trading volume. As the name of the derivative suggests, these securities are based on certain underlaying assets, i.e. are created relying on characteristics of some other type of assets. As an underlying asset in derivative contracts the following real and financial asset classes may occur: commodities, foreign exchange, interest rates, other securities, weather indicators, market indices, etc. Change in the price of the underlying assets will affect the price of derivative securities. Derivative securities are divided into financial and commodity ones. Financial derivatives are created on: currencies, interest rates, other securities, market indices, etc, while commodity derivatives are created on precisions metals, agricultural commodities, etc. (Kovačević at al., 2018).

Derivative securities are financial innovations that have emerged in recent decades primarily as a result of the increased agricultural commodity price volatility. Grain price volatility in the world and in Central and Eastern Europe creates necessity for the introduction of price risk management tools. One of the basic vehicles for the implementation of hedging strategies is derivative commodity exchange. Despite to the expressed need of agricultural producers in Central and Eastern Europe, this kind of market is not established in this region. Paper is analysing potential, optimal model and advantages of regional wheat and corn futures market for delivery on Black Sea ports.

Based on the organisation structure there are two commodity derivative markets – OTC and Commodity exchange.

OTC market is regulated to a lesser extent. Name of the OTC market derives from the abbreviation of words Over-The-Counter. This market is regulated to some extent by the rules of

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International Swaps and Derivative association (ISDA). The OTC market provides greater flexibility but also a higher counterparty risk.

Commodity exchange is organised derivative market with clearinghouse and trading in highly standardized derivative contracts.

All derivatives securities are in EU classified as financial instruments and regulated by common EU regulation mandatory to all member states. Main EU regulation concerning derivative markets are EMIR and MIFID II regulations.

The derivative markets have been affected by the 2008 financial crisis. Following the G-20 guidance, both US and EU policymakers issued specific harmonised legal framework with Dood Frank act and other world vide legal frameworks (Grossule, 2019).

It is characteristic of the commodity derivative market that trading of goods takes place in some period in the future, while physical delivery of goods usually does not happen, but derivative contracts are settled in cash between buyer and seller depending on the level of market price of underlying goods.

Futures contracts are highly standardised related to the purchase/sale of certain types of goods.

Given that futures contract delivery/settlement takes place in the future, there is a need to provide guarantees to trading participants that in the event of unfavourable price movements and potential losses on futures position will not give up the execution of the contract obligations. Therefore, for the functioning of futures market clearinghouse has essential role. Clearinghouse is managing monetary guarantees – margins deposited by the both the buyer and the seller. In order for the cash deposit to always be above the potential loss resulting from daily movement of the futures settlement price, the daily marking to market is provided based on which the cash is transferred from the accounts of the losing party to the counterparty in the contract. If funds on the margin account fall below the maintenance margin the trader must pay additional money to the level of initial margin (Karali et al., 2020).

The main function of commodity derivative market is in providing price risk management tools - hedging strategies (Belozertsov et al., 2011).

Hedging strategies are most often based on the trade in the futures contracts. Only 2% of agricultural commodity futures contracts are closed by the delivery of the goods. Most of the future contracts are closed by the financial settlements, resulting in two cash flows for hedgers, first actual sale of agricultural commodity at the local market and second profit/loss at the future markets. Essence of the hedging strategies is if the price fell at the delivery time at the spot market where the agricultural commodity is physically sold, the loss from planned hedged price will be compensate by the same amount of the profit at the future contracts, and vice versa if the spot price is above the hedged future price additional gain will be subtracted by the loss at the future market. End result will be that hedger will secure futures price, regardless of the price direction up to the future maturity date (Zakić, Kovačević, 2012).

Gains and losses on futures and spot position usually do not perfectly cancel out. Future basis represents the difference between the price on the spot market and the futures price in each particular moment until the maturity of the contract. Since these two prices are not perfectly positively correlated over time the basis risk emerges. It reflects the uncertainty of the movement of basis over time until the maturity of the contract.

Additional risk emerges from the fact that absence of local derivative market leads to CEE producers implements hedging strategies via more developed commodity exchanges in the world i.e MATIF exchange-Paris, CME-Chicago etc. Besides additional transactional costs that these international transactions may bring to local traders the main risk lies in the imperfect correlation between local and international grain prices but also local grain and foreign futures prices.

Thus, one of the main advantages of the regional derivative market for grain would be the reduction of the basis risk given that the prices at which farmers sell grain are highly positively correlated in the region and most of the regional export is contracted at the Black Sea ports.

Farmers in Central and Eastern Europe are without regional soft commodity derivative market. Individual efforts to establish soft commodity derivative exchanges within the Central and Eastern countries failed due to insufficient volume of trade. Due to the absence of the regional derivative soft commodity exchange, regional farmers are mostly using CME for hedging strategies. Grain price between BLACK See region and CME futures are not highly correlated having effect on potential deviation of planned hedging strategies results (Heigermoser et al., 2019).

As the sufficient trade volume is main precondition for sustainable and successful derivative commodity exchange, production of corn and wheat in the region is analysed. Second precondition is price volatility and this factor is analysed for potential participants in the Regional derivative commodity exchange – Romania, Hungary, Bulgaria and Serbia. Third precondition for development of the regional commodity derivative exchange is price correlation among participating countries (Kovačević at al., 2017).

MATERIALS AND METHODS

Scientific methodology used for this Paper is desk research, literature review, consultations with potential participants in the Regional grain derivative market, consultations with the experts in the field of the marketing of agricultural products and risk management in the agricultural sector.

Data on production and prices are obtained from FAOSTAT database.

Applied statistical techniques include descriptive statistical analysis.

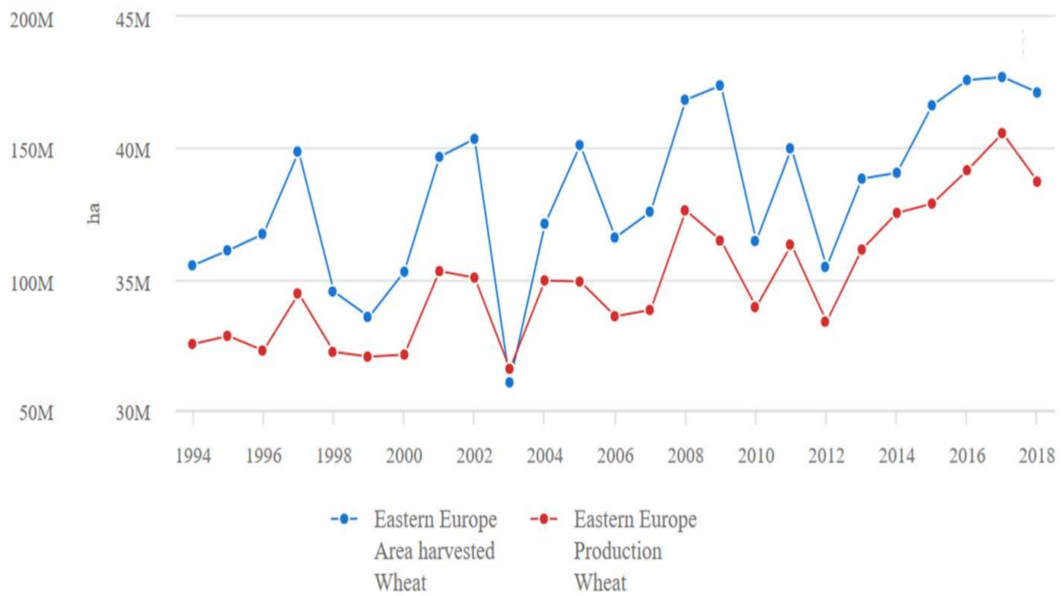
RESULTS AND DISCUSSION

Research hypothesis are threefold.

First assumption is that there is sufficient grain quantity on the market for establishment of the sustainable derivative market. Second hypothesis is that grain price volatility is high affecting the high need for hedging strategies and trade at the derivative commodity exchange. Third assumption is that grain price correlation is high within the CEE region, causing that producers have common interest in joint regional derivative exchange and low basis risk environment.

The wheat production volume is high with constant increasement (Figure 1)

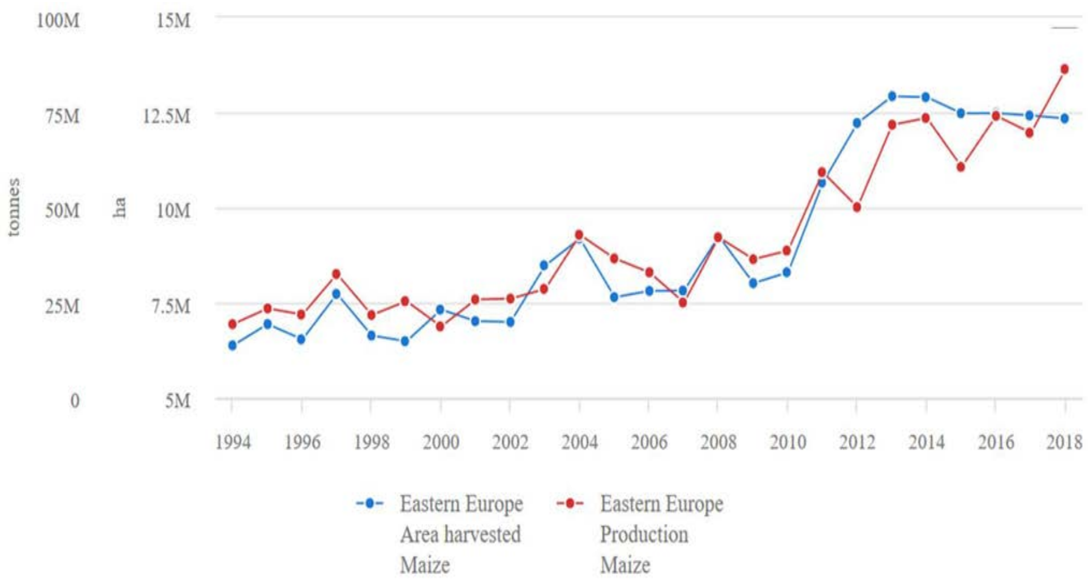
Figure 1. Production of Wheat in the Eastern Europe, 1994-2018



Source: FAOSTAT database

The corn production volume is high in CEE region with constant increasement (Figure 2)

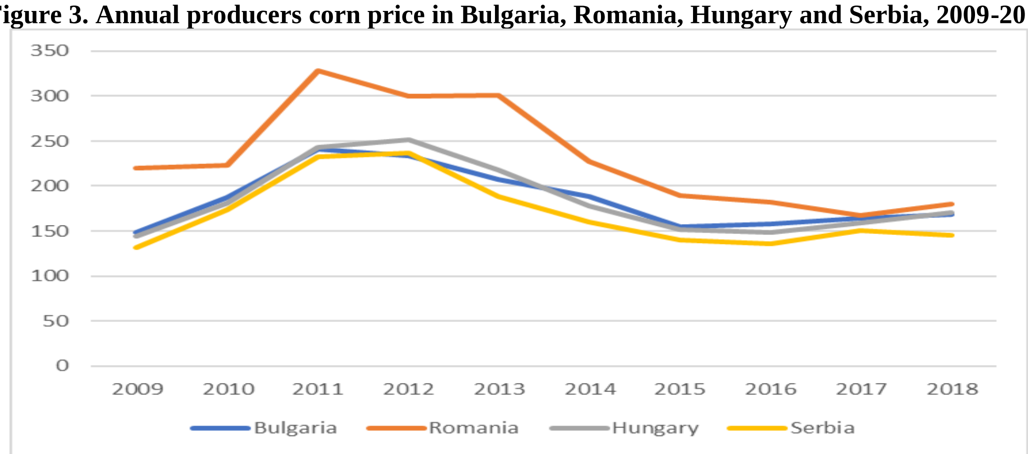
Figure 2. Production of Corn in the Eastern Europe, 1994-2018



Source: FAOSTAT database

As the grain price volatility is main driving force for development of soft commodity derivative exchanges, price volatility is analysed for Romania, Bulgaria, Hungary and Serbia (Figure 3 and Figure 4).

Figure 3. Annual producers corn price in Bulgaria, Romania, Hungary and Serbia, 2009-2018



Source: FAOSTAT database

In Table 1 descriptive statistics are provided for corn prices for four countries involved in the survey.

Table 1. Corn price descriptive statistics - Bulgaria, Romania, Hungary and Serbia, 2009-2018

	Bulgaria	Romania	Hungary	Serbia
Mean	185.21	231.83	184.67	169.38
Var	1074.181	3316.029	1560.867	1480.793
Stdev	32.7747	57.58497	39.50781	38.48107
Coefficient of variation	17.70%	24.84%	21.39%	22.72%

Source: Authors calculation based on FAOSTAT data

In Table 2. is presented correlation matrix for four countries involved in the survey.

Table 2. Corn price correlation matrix - Bulgaria, Romania, Hungary and Serbia, 2009-2018

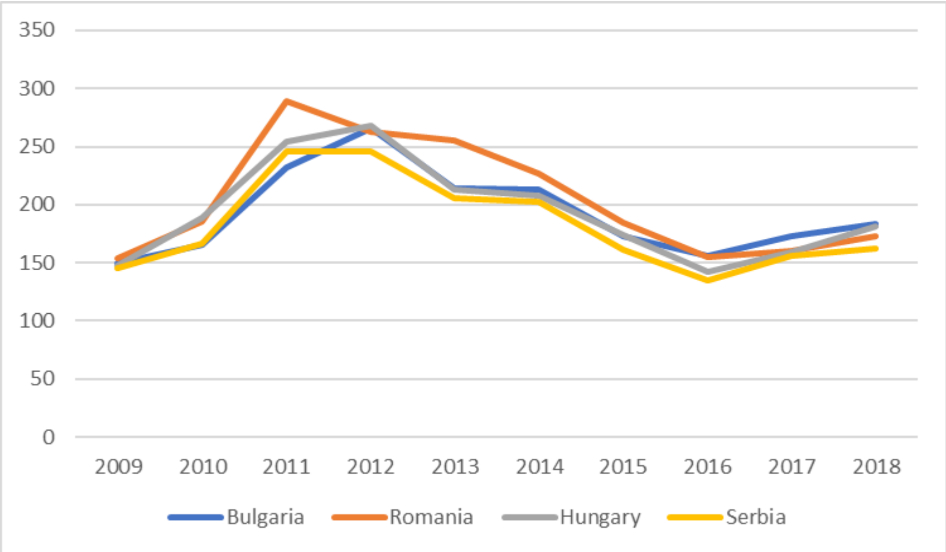
	Bulgaria	Romania	Hungary	Serbia
Bulgaria	1			
Romania	0.906552	1		
Hungary	0.984292	0.91024	1	
Serbia	0.981907	0.891854	0.982832	1

Source: Authors calculation based on FAOSTAT data

According to Table 2. price correlation is positive and very high, which is expected as corn is traded significantly in the region, and main export is organised through Black Sea ports in Romania.

Same analyses are performed for wheat with similar results as for corn. From Figure 4 can be concluded that wheat price is highly volatile in CEE.

Figure 4. Annual wheat prices in Bulgaria, Romania, Hungary and Serbia, 2009-2018



Source: FAOSTAT database

In Table 3. descriptive statistics is provided on corn prices for four countries involved in the survey.

Table 3. Wheat price descriptive statistic - Bulgaria, Romania, Hungary and Serbia, 2009-2018

	Bulgaria	Romania	Hungary	Serbia
Mean	192.47	204.6	193.71	182.61
Var	1399.951	2468.829	1826.708	1598.632
Stdev	37.41592	49.68731	42.74	39.9829
Coefficient of variation	19.44%	24.29%	22.06%	21.90%

Source: Authors calculation based on FAOSTAT data

Correlation of wheat prices is very high confirming that common CEE wheat derivative market may provide excellent opportunity for application of the hedging strategies for all stakeholders in the region. As in the corn case, this correlation is expected due to high volume of trade in the region and common exports ports at the Black Sea.

Table 4. Corn price correlation matrix - Bulgaria, Romania, Hungary and Serbia, 2009-2018

	Bulgaria	Romania	Hungary	Serbia
Bulgaria	1			
Romania	0.90599	1		
Hungary	0.95836	0.944699	1	
Serbia	0.961093	0.972549	0.985241	1

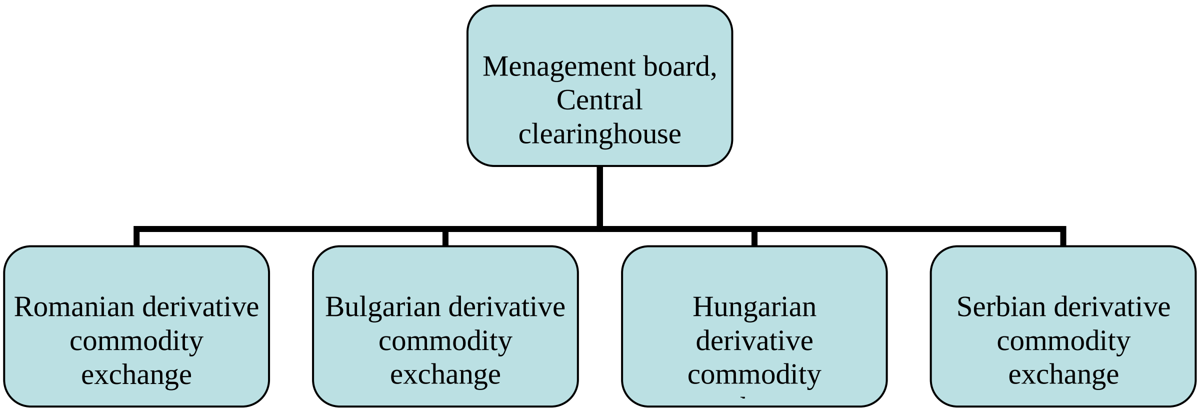
Source: Authors calculation based on FAOSTAT data

The analyses are shoving high production level and great need for the grain futures market in CEE. Port of delivery should be Constanta port in Romania as the significant quantity of grain are contracted for delivery at this port.

Most important issue in function of joint commodity exchange is clearing function. Theecent EU regulation is providing possibility for clearinghouse established in one EU member state to operate in whole EU. Most suitable solution would beto have one clearinghouse for all exchanges.

At the Scheme 1. is presented organisational model for joint soft commodity derivative exchange.

Scheme 1. Organization of the CEE Regional derivative soft commodity exchange



Source: Authors

Conclusions

Volume of wheat and corn production in CEE is high with constant increase. According to the production volume it can be concluded that CEE has sufficient quantity of grain for establishment of derivative commodity market.

Second important precondition for development of sustainable commodity derivative market with high trading volume is existence of grain price volatility, which is confirmed in conducted analyses.

Third, there is very high correlation between the corn and wheat prices within the countries included in the survey. High price correlation is one of the milestones for joint derivative commodity exchange leading to low basis risk in the implemented hedging strategies.

Despite to evident need and potential for establishment of commodity derivative exchange for grain delivery at the Black Sea ports, all so far efforts from individual CEE countries to establish derivative commodity exchange failed. The reason is in insufficient trade volume. All derivative exchanges (financial and commodity) are requiring high volume of trade.

Initiative and motive for this survey was in the possibility to increase derivative exchange trading volume through establishment of joint CEE regional commodity derivative exchange with one clearinghouse operating on all markets.

In favour of joint regional ECC goes new a single common EU regulation, which significantly facilitates the establishment of a regional market for EU member states by providing on provision for operation of the clearinghouses.

It can be concluded that join Regional CEE soft derivative exchange will have all preconditions for sustainable and efficient operations, providing the agricultural sector stakeholders with important price risk management instruments.

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RELATION BETWEEN EMITTED CO_2, ASSET EXPENDITURES, PRODUCED ENERGY FROM RENEWABLES AND ENERGY CONSUMPTION. EVIDENCE FROM BULGARIA

TSVETANA HARIZANOVA – METODIEVA[1], HRISTINA HARIZANOVA – BARTOS[2]

Abstract: *The paper explores the relation between emitted CO_2 in the atmosphere, asset expenditure, produced energy from renewables and energy consumption. ARDL model was developed on the basis of data for Bulgaria (2000 – 2018). As a whole the increase in asset expenditures leads to increase in emitted carbon dioxide in the short-run and in the long-run. The increase in the produced energy from renewables leads to decrease in the emitted carbon dioxide in a long-run, while in the short-run the relation is insignificant. In a short-run the energy consumption and emitted carbon dioxide are in a positive relation: the increase in energy consumption leads to increase in the emitted pollutant.*

Keywords: *ARDL model, emitted CO_2, asset expenditures, produced energy from renewables, energy consumption*

JEL Classification: *C32, Q50*

INTRODUCTION

In this study, an autoregressive distributed lag model ([11]; [12]) was developed in order to explore the relationship between the emitted carbon dioxide in the atmosphere, asset expenditures, produced energy from renewables and energy consumption.

It was found a strong relation between energy consumption, economic growth and greenhouse gases emissions in European countries [17]. A similar research was held for Asian countries [16].

A study reveals that a positive shock on the consumption of renewable energy source decreases CO_2 emissions and a positive shock on GDP increases the emitted CO_2 [15].

The relationship between emitted carbon dioxide, GDP and energy consumption was also explored [2].

Many researchers search the relationship between real gross domestic product per capita and carbon dioxide emissions per capita in different countries [13]. Their study showed that gross domestic product per capita and the relationship of the emitted CO_2 depends on the economic development of the country.

Other authors find the relationship between climate change and urban development and they focus on the impact of urbanization on CO_2 emissions for developing countries [8].

According to a research, GDP, fossil fuel energy consumption, trade openness and urbanization, increase air pollution. And on the contrary - renewable energy consumption soften air pollution [1].

Reasons for climate change

Climate change should be stabilized by reducing the emitted global emissions which is one of the most challenging problems of our times, and is of a great concern among policy makers.

Climate change is one of the biggest environmental, social and economic threats to the planet, which has an impact on a global and regional level, creating problems of public importance. Every factor that changes the amount of input or output energy over a long period of time can cause climate change. Some of these factors are natural or internal to the climate system - volcanic

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activity, solar energy or the Earth's orbit around the sun. Other causes are external to the climate system and are called climatic factors. The scientific evidence that substantiates the relationship between the current rise in global temperatures and human activity is indisputable. The world's leading experts in the field of climate believe that human activities are the main cause of the warming observed since the mid-20th century.

Policies related to climate change

Climate change action is an area in which the EU has been very active in recent years. Various initiatives are approved and developed, which can be categorized according to the period of their validity (Table 1).

Table 1. Climate initiatives

2008-2012 Kyoto Protocol	15 countries that were members of the EU before 2004 are committed to reducing their emissions to 8% below 1990 levels for the period 2008-2012. Those that join the EU after 2004 are also making progress towards meeting the Kyoto Protocol's targets for reducing emissions by 6% or 8%.
2020	EU is committed to reducing its emissions to 20% below 1990 levels. This commitment is one of the headline targets of the Europe 2020 growth strategy and is being implemented through a package of binding legislation. The EU proposes to reduce its emissions by up to 30% by 2020, if other developed and developing countries commit to taking measures to reduce emissions.
2050	EU leaders endorsed the goal of reducing Europe's greenhouse gas emissions to 80-95% from 1990 levels as part of the efforts of developed countries. The European Commission has published a roadmap for building a European low-carbon economy

Source: adaptation by Miteva et al., 2017 [9].

Climate change mitigation measures are related to reducing greenhouse gas emissions, adapting to climate change and financing the problem of tackling climate change in developing countries, as well as the development of low-carbon technologies, the development of a low-carbon transport system emissions, forest protection.

In December 2008, the EU approved the climate and energy package, which consists of six proposals to reach the so-called 20-20-20 target by 2020 [4].

The Commission's Roadmap 2050 initiative on resource efficiency in Europe provides a long-term framework for action in various policy areas (energy, climate change, transport, industry, raw materials, agriculture, fisheries, biodiversity and regional development) [5], [6]. The Roadmap 2050 for a low-carbon economy was created in connection with the achievement of the target by 2020 to reduce emissions to 80-95%. The European Commission is setting out a plan that shows how the sectors are responsible for emissions in Europe - energy, industry, transport buildings and construction, as well as agriculture [5]. The idea behind it is the sectors to shift to a low-carbon economy in the coming decades [7]. The low-carbon economy will have a much greater need for renewable energy, energy-efficient building materials, hybrid and electric vehicles, smart grid equipment, low-carbon energy production and carbon capture, storage technologies and more. The European Energy Efficiency Directive [3] provides for mandatory energy saving measures for public buildings, including their renovation, energy saving schemes by energy companies and energy audits for all large enterprises. It lays down rules aimed at removing energy barriers in the market and overcoming market failures that hamper energy supply and use efficiency, and provides for the establishment of national indicative energy efficiency targets for 2020.

The aim of this paper is to explore the relation between emitted CO_2 in the atmosphere, asset expenditures, produced energy from renewables and energy consumption in Bulgaria.

MATERIALS AND METHODS

ARDL model was developed on the basis of data for Bulgaria (2000 – 2018).

The variables, under this research are:

- Emitted CO_2 in the atmosphere (in thousand tones): ***CO2*** (abreviation in the model). The data were derived from the National Statistical Institute, Bulgaria [10] and The World Bank [14].
- Total expenditures on acquisition of tangible fixed assets (in thousand BGN) in real numbers. The nominal values of this variable were deflated with Consumer Price Index (***Exp***). The data were derived from the National Statistical Institute, Bulgaria [10].
- Primary production of energy from renewables (in thousand toe): ***En_r***. The information is from the national statistics [10].
- Final energy consumption (in thousand toe): ***En_c***. This variable was calculated by summing final energy consumption in industry, transport, households, agriculture and forestry, and services. The source is the national statistic [10].

Stationarity of the time series was checked by Augmented Dickey-Fuller test.

The basic model from which we started is represented as follow:

(1) $$CO2_t = a_0 + a_1 Exp_t + a_2 En\_r_t + a_3 En\_c_t + e_t$$

, where e_t is the error of the regression.

We accept this model after calculating correlation coefficients between the variables.

Then the ARDL models were developed and after checking their reliability with diagnostic tests, the one with lowest Akaike information criterion was chosen for further analysis:

(2) $$d(CO2_t) = \beta_0 + d\beta_1(CO2_{t-1}) + \sum_{i=0}^{i=1}\beta_2 d(Exp_{t-i}) + \beta_3 d(En\_r_t) + \sum_{i=0}^{i=1}\beta_4 d(En\_c_{t-i}) + \beta_5 CO2_{t-1} + \\ + \beta_6 Exp_{t-1} + \beta_7 En\_r_{t-1} + \beta_8 En\_c_{t-1} + \varepsilon_t$$

, where:

d - is the first difference; β_0 - intercept; from β_1 to β_4 are the short-run coefficients; β_5 to β_8 are the long-run coefficients; ε_t - white noise;

The next equation shows the long-run model:

(3) $$CO2_t = a_1 Exp_t + a_2 En\_r_t + a_3 En\_c_t + e_t$$

The coefficients of the long-run variables were tested for co-integration with Wald test, which F-statistics was compared with the critical bounds (unrestricted intercept and no trend) [12], at 5% significance level. H_0 of Wald test was formulated as follows: $\boldsymbol{\beta_5 = \beta_6 = \beta_7 = \beta_8 = 0}$, meaning that coefficients are equal to zero, or no co-integration exists.

The next step was to develop ARDL model with error correction in order to include the residuals of the long-run model as a regressor (**Ect_CO2**):

(4) $$d(CO2_t) = \beta_0 + d\beta_1(CO2_{t-1}) + \sum_{i=0}^{i=1}\beta_2 d(Exp_{t-i}) + \beta_3 d(En\_r_t) + \sum_{i=0}^{i=1}\beta_4 d(En\_c_{t-i}) + \\ + \beta_5 Ect\_CO2_{t-1} + \varepsilon_t$$

Then the two ARDL-models ((**2**) and (**4**)) were compared according to their Akaike information criterions and that with lowest value was analyzed. Diagnostics were used to check the reliability of the model. Short-run causality was assessed with Wald test.

RESULTS AND DISCUSSIONS

The emitted carbon dioxide in the atmosphere from Bulgaria for the period 2000 – 2018 reaches its highest value in 2011 (53854 thousand tones [10]) and its lower – in 2000 (43531 thousand tones [14**]**. Two sub periods could be identified: from 2000 to 2011, where the trend is growing and after that – with downward tendency.

The real value of asset expenditures has realized growth with 87.5% for 2000 – 2018.

Energy consumption realized its lowest value in 2009 (8472 thousand toe) and reached its maximum in 2006 (9953 thousand toe). Till 2009 the tendency in energy consumption in Bulgaria is upward. The production of energy from renewables in the country constantly increases during the period of 2000 – 2018: from 776.5 to 2562.9 thousand toe, or 230% increase. The biggest share of the production is taken from primary solid biofuels during the whole period, followed by hydro, wind and solar photovoltaic (Table 2).

Table 2. Produced energy from renewables

Year	**Total (Thousand toe)**	**Percentage from the total**										
		Hydro	**Wind**	**Solar photovoltaic**	**Solar thermal**	**Geothermal**	**Primary solid biofuels**	**Charcoal**	**Biogases**	**Renewable waste**	**Liquid biofuels**	**Ambient heat (heat pumps)**
2000	776.5	29.1					70.9					
2001	688.8	20.6					79.4					
2002	825.4	22.0					78.0					
2003	948.8	27.1					72.9					
2004	1019.4	26.5	0.0				72.3					1.3
2005	1137.1	32.5	0.0			2.9	63.1					1.5
2006	1193.3	30.4	0.1			2.7	64.4				0.5	1.9
2007	1015.7	24.0	0.4			3.2	69.8				0.2	2.4
2008	1113.4	21.6	0.9			2.9	71.1				1.0	2.5
2009	1179.4	25.0	1.7	0.0		2.8	66.8		0.0		0.9	2.7
2010	1533.5	28.2	3.8	0.1	0.7	2.1	61.7		0.2		0.7	2.5
2011	1471.0	16.8	5.0	0.6	0.9	2.2	70.3		0.2	0.0	1.0	2.9
2012	1664.9	16.4	6.3	4.2	0.9	2.0	66.8		0.0	0.1	0.4	2.8
2013	1890.1	18.4	6.2	6.2	1.0	1.8	59.5		0.1	0.9	2.5	3.4
2014	1913.8	20.7	6.0	5.6	1.0	1.7	56.9		0.5	0.6	3.5	3.4
2015	2117.2	23.0	5.9	5.6	1.0	1.6	54.9		0.9	0.7	2.8	3.5
2016	1996.2	16.7	6.1	6.0	1.1	1.7	56.3		3.0	1.3	3.7	4.1
2017	1938.2	12.5	6.7	6.2	1.2	1.8	58.1		2.4	1.5	5.0	4.5
2018	2562.9	17.3	4.4	4.5	1.0	1.4	59.5		2.1	1.4	4.9	3.6

Source: National Statistical Institute (Bulgaria) [10] and own analysis

Table 3 represents correlation matrix between the emitted carbon dioxide in the atmosphere, asset expenditures, produced energy from renewables and energy consumption, comprising the period 2000-2018. The correlation coefficients suggest that the variables are proper for regression analysis.

Table 3. Correlation coefficients

Variable	**CO_2**	**Exp**	**En_r**	**En_c**
CO2	1	0.432	-0.481	0.322
Exp	0.432	1	0.123	0.550
En_r	-0.481	0.123	1	0.318
En_c	0.322	0.550	0.318	1

Source: Own analysis

According to the conducted Augmented Dickey-Fuller test for unit root, it was found that the variables: emitted carbon dioxide in the atmosphere, asset expenditures, produced energy from renewables and energy consumption, were stationary at first difference. None of them was stationary at level.

Table 4 shows the estimates of the ARDL model **(2)** for emitted CO_2. This regression is highly significant with Adjusted R^2 of 0.882, which means that 88% of the variation of the emitted carbon dioxide could be explained by this model.

Wald test for co-integration of the long-run variables indicated that they are in equilibrium (the calculated F-statistics is 5.65, or higher than the upper bound [12]).

The estimates of the long-run coefficients are represented in Table 5. The asset expenditures appeared to be significant at 5% significance level, showing that the increase in asset expenditures leads to an increase in emitted carbon dioxide in a long-run. The produced energy from renewables is highly significant, showing that the increase in the value of that variable leads to decrease in emitted carbon dioxide in a long-run.

So we can continue with the error correction model **(4)**, which estimates are represented in Table 6. Now we have two ARDL models – a model with long-run variables **(3)** and a model with an error correction **(4)**. By comparing them by Akaike information criterion we chose model **(4)** for further analysis. The diagnostic test of the error corrected model are systematized in Table 6. To find out if there is short-run causality running from the independent variables to the dependent one, a Wald test was applied: it was found that there is short-run causality running from the asset expenditures and energy consumption to the emitted CO_2. The short-run variables for energy consumption ($d(En\_c_t)$ and (En_c_{t-1})) reveal that the energy consumption and emitted carbon dioxide are in a positive relation: the increase in energy consumption leads to increase in emitted pollutant in a short-run. The conducted Wald test confirmed that the short-run coefficient of energy consumption contributes to the model ($\chi 2$ = 13.14, significant at 1% level). The asset expenditures appeared to be highly significant and Wald test confirmed their contribution to the model ($\chi 2$ = 45.99, significant at 1% level). Although the lag 1 of asset expenditures has negative coefficient (-0.039), as a whole the increase in asset expenditures leads to increase of emitted carbon dioxide in the short-run and in the long-run. The short-run coefficient of the produced energy from renewables is insignificant.

The error correction (Ect_CO2), known also as a speed of adjustment, is highly significant with a negative sigh of its coefficient (-0.916, significant at 1% level). This variable assumes that the emissions of carbon dioxide react with 91.6% change after shock from the independent variables.

Table 4. Estimates of model (2) with a dependent variable d(CO2)

Variable	**Coefficient**	**Standard error**
$d(CO2_{t-1})$	0.190	0.200
$d(Exp_t)$	0.055**	0.012
$d(Exp_{t-1})$	-0.039**	0.010
$d(En\_r_t)$	-3.013	3.140
$d(En\_c_t)$	3.069	1.756
$d(En\_c_{t-1})$	3.738	3.174
Constant	64154.9*	20948
$CO2_{t-1}$	-0.916**	0.246
Exp_{t-1}	0.046*	0.0127
En_r_{t-1}	-4.878*	1.376
En_c_{t-1}	-3.169	1.975
R^2/Adjusted R^2	0.956/0.882	
Standard error	1538.13	
F-statistic	12.948**	
Akaike information criterion	17.77	

*Significant at 5% level; **Significant at 1% level. Source: Own analysis

Table 5. Long-run estimates (dependent variable CO_2) (model 3)

Variable	Coefficient	Standard error
Exp	0.050*	0.016
En_r	-5.326**	1.436
En_c	-3.460	2.187

*Significant at 5% level. Source: Own analysis

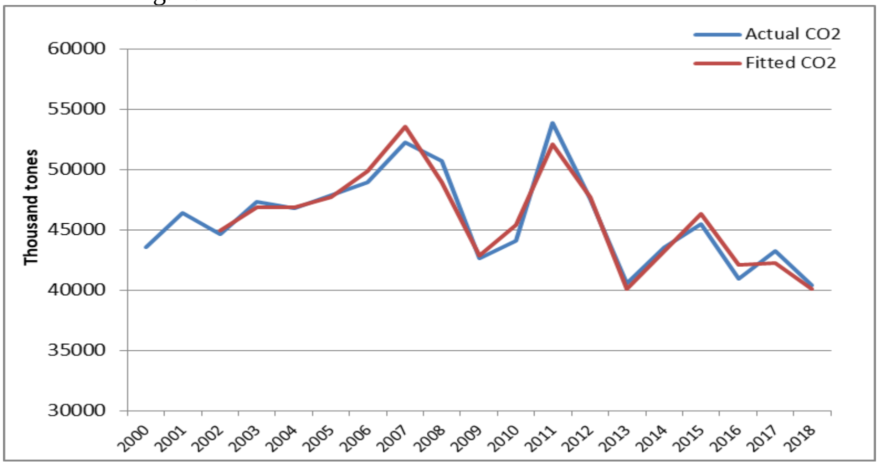
Table 6. ARDL model with error correction (model 4)

Variable	Coefficient	Standard error
$d(CO2_{t-1})$	0.191	0.112
$d(Exp_t)$	0.055**	0.008
$d(Exp_{t-1})$	-0.039**	0.008
$d(En\_r_t)$	-3.013	2.141
$d(En\_c_t)$	3.069*	1.050
$d(En\_c_{t-1})$	3.738	1.890
Constant	64157.5**	10924.4
ECT_CO2_{t-1}	-0.916**	0.157
R^2/Adjusted R^2	0.956/0.921	
Standard error	1255.88	
F-statistic	27.75**	
Akaike information criterion	17.41	
Serial Correlation LM Test (Observations*R^2 /Probability):	2.82/0.093	
ARCH Heteroskedasticity Test (Observations*R^2 /Probability):	0.288/0.591	
Jarque-Bera test (Coefficient / Probability):	0.596/0.742	
CUSUM and CUSUMSQ	The indicators fall between the 5% critical bounds	

*Significant at 5% level; **Significant at 1% level. Source: Own analysis

Figure 1 represents actual and fitted values (calculated from the model 4) of emitted carbon dioxide. The two variables fit quite well.

Fig. 1. Actual and fitted values of emitted carbon dioxide



Source: Data from the National Statistical Institute (Bulgaria) [10], The World Bank [14] and own analysis

CONCLUSIONS

As a whole the increase in asset expenditures leads to increase in emitted carbon dioxide in the short-run and in the long-run. The increase in the produced energy from renewables leads to decrease in the emitted carbon dioxide in a long-run, while in the short-run the relation is insignificant. In a short-run the energy consumption and emitted carbon dioxide are in a positive relation: the increase in energy consumption leads to increase in the emitted pollutant.

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WINE COMPLEX OF THE REPUBLIC OF MOLDOVA AND SOME ASPECTS OF THE COVID-19 PANDEMIC

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Abstract: *The coronavirus pandemic has made its own adjustments in all sectors of the national economy and in the social sphere. This year's drought has also negatively impacted the agricultural sector. Viticulture and winemaking, being strategic sectors of the national economy, suffered heavy losses. The aim of this work is to study the changes in the wine-making complex of the Republic of Moldova under the influence of the pandemic and other related factors. As information sources we used the information obtained from the National Office of Vine and Wine, Ministry of Agriculture, Regional Development and Environment, National Statistics Center of the Republic of Moldova, Academy of Sciences of Moldova , the daily "Logos press". As working methods were used: systemic data analysis; their mathematical-statistical processing; determining the multiple socio-economic indices that characterize the actuality of the wine complex of RM. The main results of the researches: The COVID-19 pandemic has closed practically all social entities, which sell tangible quantities of domestic wines and spirits on the domestic market; The reserves-stocks of 18 million dal of quality wines from the 2019 harvest, currently existing in the country, will satisfy the export demand in the amount of 100%; Among the existing reserves in the increase of sales of high quality wines, remarkable is the online trade, both on the domestic market, but especially on the international one.*

Key-words: *wine, vine, harvest, consumption, winery, local market, profit*

Clasificare JEL: *Q13*

INTRODUCTION

The coronavirus pandemic is the defining global health crisis of our times and one of the biggest challenges since World War II. However, COVID-19 is more than a health crisis, with unprecedented socio-economic implications. The pandemic has disrupted every country it has affected, with the power to generate devastating social, economic and political effects that will leave deep marks. [7]

Even until the beginning of the COVID-19 pandemic period, the pace of economic growth in the Republic of Moldova slowed sharply in the last quarter of 2019. The 3.6% economic growth recorded in 2019 was supported by strong domestic demand, driven by rising wages, remittances, credit expansion and rising public spending. Thus, the pace of economic growth decreased sharply, amounting to 0.2% in the last quarter. At the same time, there was a decrease in production in agriculture and electricity, a decrease in exports and investment. The data shows a recovery to February 2020, mainly due to industry (+ 6.3% year-on-year), transport of goods (+ 9.7%), retail trade (+ 16%) and export of goods (+ 2.3%). Starting with March, with the introduction of the state of emergency and isolation measures related to COVID-19, a significant decrease in economic activities was triggered.

RESEARCH MATERIALS AND METHODS

As information sources we used the information obtained from the National Office of Vine and Wine (ONVV), Ministry of Agriculture, Regional Development and Environment (MADRM), National Statistics Center of the Republic of Moldova (CNS), Academy of Sciences of Moldova (ASM) , the daily "Logos press" (logos.press.md), the publications from 2020. As working methods were used: systemic data analysis; their mathematical-statistical processing; determining the multiple socio-economic indices that characterize the actuality of the wine complex of the Republic of Moldova.

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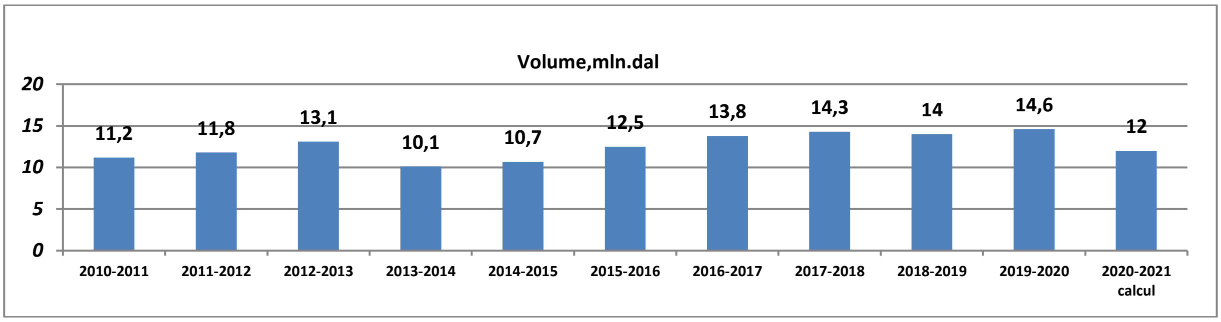
RESULTS AND DISCUSSIONS

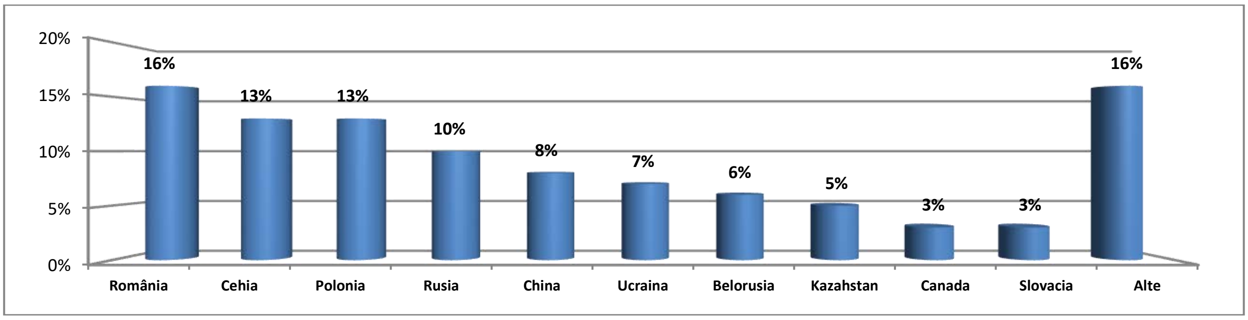
One of the key sectors of the Moldovan economy is viticulture, where a progressive trend has prevailed in recent years. In 2019, despite the overproduction of wine in the world, Moldova achieved good results in wine exports and received a significant number of international awards. The total volume of wine sold on foreign markets increased by 10% in 2019 compared to 2018. Winemakers were able to sell 80% of wine produced in about 71 countries. Incomes, that were obtained from the export of distillates, also increased by 20%. [5] (Fig.1.)



Source: [2]

Figure 1. Evolution of wine exports from the Republic of Moldova

In 2019, Moldova exported bottled wines worth 80 million US dollars, with an annual increase of 9%. The volume of bulk wine that was exported, reached the value of 58 million US dollars, which represents an increase of 3% compared to 2018. The main destinations of exports of bottled wine from Moldova were: Romania, Poland and Russia. The main destinations for bulk wine exports were: Belarus, Georgia, Russia, the United Kingdom, the Czech Republic, Romania, Germany, Ukraine, China and Italy. (Fig.2.)



Source: [8]

Figure 2. Share of exports to the top 10 countries by volume (liters)

In April 2020, Moldova delivered a wide range of wines, cognacs and distillates worth $ 183.7 million. lei, or 4 million lei less (-17.9%) than in April 2019. In general, in the first four months, compared to the same period last year, exports for all categories of products in physical terms decreased by only 4%, and in terms of value - the same by 4%. The profit was lower by 37.1 million. lei. In April 2020, the most significant deliveries of wine products were made in the following countries, Table 1.

Even in this situation in some countries the demand was more satisfied compared to last year. During this period it is important to take into account the changes in the export of wine products every month. The results for June were palpable with the positive changes highlighted, despite the gloomy forecasts of an even greater reduction in deliveries abroad. According to ONVV, in the first month of summer, Moldovan producers delivered 12.6 million. liters of all types of wine products. This is comparatively considerably more than in each of the last three months and coincides with the previous year, 2019.

Table 1.

The value of wine exports in April 2020 compared to April 2019,

County	April 2020, Mln.lei	April 2019, %
Belarus	47,3	-5,5
Romania	17,7	-27,6
Russian Federation	12,5	-47,1
Ukraine	11,9	+12,7
Czech	11,5	-5,7
Holland	10,8	+891,6
China	10,7	-65,3
Great Britain	8,3	-16,6
Germany	8,3	+221,2
Canada	7,0	+83,6

Source: [8]

The value of exports was influenced by the downward trend in world prices due to the total crisis. Therefore, with the same physical volume, the value of sales in June 2020 proved to be lower than in June 2019: correspondingly -223.8 million. lei compared to 238.1 million. lei in 2019. However, during the COVID-19 restrictions compared to May 2020, the value of exports in June of the same year increased by 16.3%.

However, only in the first half of this year, compared to the same period of the previous year, the volume of deliveries for all types of wine products decreased by 3.4% in volume and by 5.7% in value. So it was not disastrous. In the geography of supplies, it managed to cover 56 countries on all continents.

The share of divines (cognac) and distillates of different types in the total volume of transport is only 2.2% in liters, but in financial value - 14.5%. The rest comes from the sale of various types of wines, including sparkling wines and vermouth. It was considered that more wines were exported in June 2020 compared to June.

Viticulture and wine production in the Republic of Moldova play an important role in job creation in rural areas. [1] According to the register of wine producers, in Moldova there are officially registered 36,500 vine owners and 199 wine producers. About 70% of them have their own vineyards.The total area of vineyards in Moldova in mid-2020 is 125,000 hectares. At the moment, in the Register of wine and vines of the Republic of Moldova, 50,200 hectares are registered. Table 2.

Table 2.

Estimated area of vineyards in 2020

1	Area of vineyards in all categories of households (including those auxiliary to the population), Total	125,5 thousand ha
	Including on fruit	118,0 thousand ha
2.	Total area of plantations in commodity production households, total	78,9 thousand ha
	Including on fruit, of all groups of varieties	74,4 thousand ha
	from them:	
	European varieties for wine	55,2 thousand ha
	"Isabella" type varieties	7,0 thousand ha
	table varieties	12,2 thousand ha

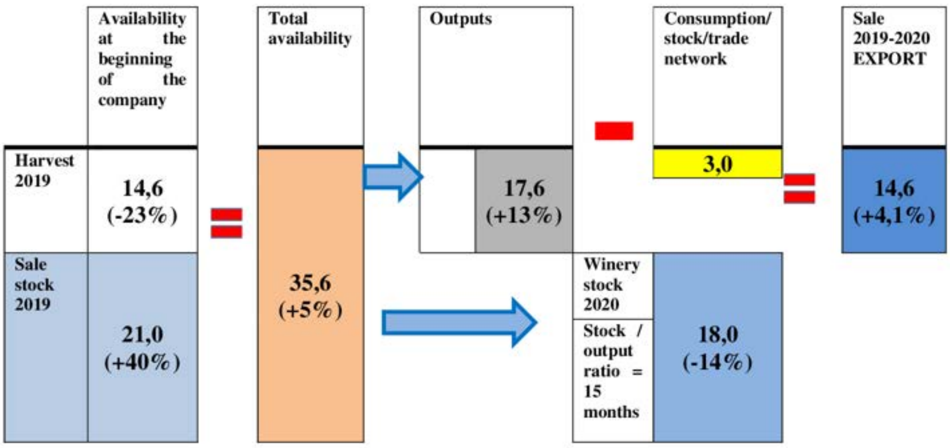
Source: [3]

In 2019, more than 31 million US dollars were invested in the cultivation of vines and wine production. Nearly 20% of these investments were covered by the state from the State Grants Fund, of which $ 1.4 million was invested in modernizing wineries and $ 13.5 million in planting new vineyards and deforesting old vineyards. (with gaps, affected by diseases, unprofitable, etc.). [2]. In recent years, the production of wines with a protected geographical indication (PGI) has increased. There was a sharp increase of 40% in 2019 in the sparkling wine sector, with this geographical indication.

According to the National Office of Vine and Wine (ONVV), in 2019 the bottled wines produced in Moldova were awarded with 842 prizes at 43 international specialized competitions. Thus, 61 Moldovan wines received prestigious awards from foreign juries. The leader in the number of awards remains "Fautor" winery, known throughout Europe, with a record number of 124 medals received. This entity was consulted by the academician-winemaker Boris Gaina (2000-2007). Then follow the wineries “Purcari” and “Chateau Vartely” and “Cricova”, which kept their position. Among the winners there were new wineries, such as: "Imperial Vin", "Aurelius Winery", "Chateau Cristi", "Suvorov Vin", "Vinăria din Vale" and "Winery Poiana".

The COVID-19 pandemic has significantly affected the global wine industry, including one in the Republic of Moldova. According to the National Office of Vine and Wine and the Policy Service in the Wine Sector of the Ministry of Agriculture, Regional Development and Environment (MADRM) [3], at the end of 2019 it was forecast that Moldovan wine exports in 2020 may decrease by 30-50% compared to 2019. According to statistics, exports of wine products from Moldova decreased by 9% in March 2020 compared to the same period in 2019. The main reasons for the expected decline include logistical constraints due to quarantine measures, reducing demand in traditional markets and postponing or even canceling promotional actions of wine (presentations, openings, launches, etc.). Unfortunately, the pandemic came at a time when Moldovan viticulture was slowly emerging from the systemic crisis, caused in particular by several Russian embargo on imports of Moldovan wine products in previous years.

The new year of industrial grape processing and wine production began on 1 August. The fruit of 2020 is already fueling the country's wine stocks, while there is still an "unsold harvest" in the stock of wineries and wineries. (Fig.3.) [2]



Source:[2]

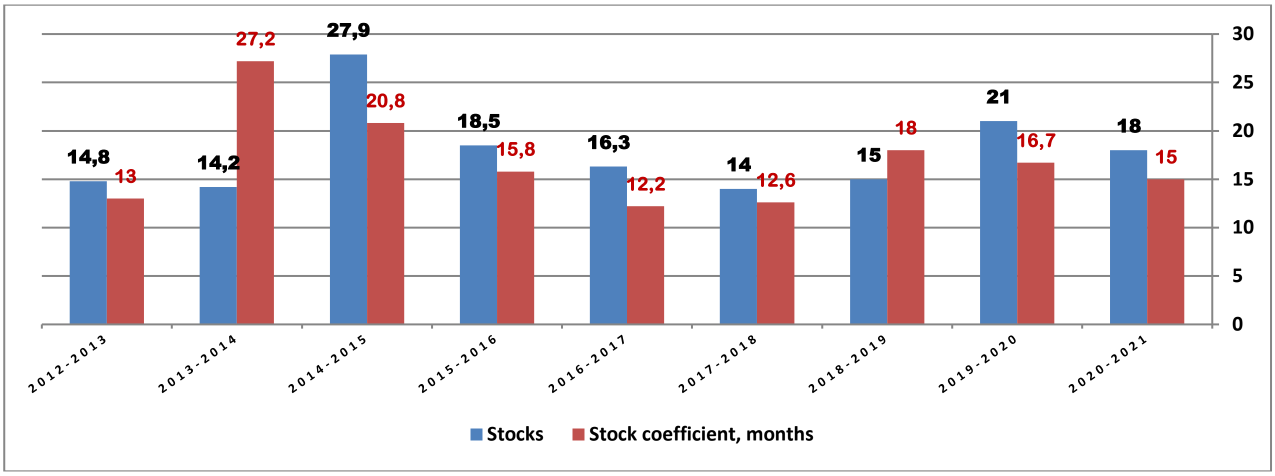
Figure 3. Organization chart of stocks and sales, of the stock / output ratio of Moldovan wines

According to the statements of the National Office of Vine and Wine, in the Republic of Moldova, the wine stocks deposited on July 31, 2020, amounted to 18 million decalitres - 14% less than in the previous year. This quantity is equal to the volume of wine produced from the 2019 grape harvest [2]. The available stock is sufficient for trading for 15 months (this is the stock ratio), while the producers in the country are worried about these figures. (Fig.4)

The winemakers experienced an equally difficult situation in the wine year 2017-2018, when the coefficient of wine stocks was 18 months and in 2013-2014 up to 27.2 months.

The next factor that influenced the quantity and quality of raw material for the wine industry is the drought of the last two years (2019-2020). This period of strong hydrological stress did not pass without leaving a deep and degrading mark on the Moldovan vineyards.

The drought was one of the main factors, which affected the quality of the grape harvest in 2020. The amount of raw material was also much lower (-30%), in the situation when exports and wine stocks decreased. But these factors for winemakers is not the greatest evil. [3].



Stocks at wineries: 18 mln.dal; 219 Statements (73%); 75% V.U.; 25% Warehouses; 52 - On zero
Source: [2]

Figure 4. Evolution of wineries stocks in July 2020 as a whole

They will have more difficulties in processing the grapes they constitute - the raw material for all types of wines. Water stress has negatively influenced the quality of the must through: low titratable acidity; high pH; low yield in must; low malic acid content; higher polyphenol content (red varieties); low degree of seed maturation; blocking or retaining alcoholic fermentation; the phenomena of more pronounced oxidation of the must are amplified, causing the lower potential of the quality and structure of the wine.

The grape harvest this year has suffered a lot. Snowless winters have increased the water dificit. Due to the drought, for the first time in all the years of vineyard observation, there was no traditional weeping vine (at the end of March). Although spring started early, in April the growth of inflorescences and shoots was stopped for about 25-35 days due to spring frosts, drought and low temperatures.

The improvement in the weather in the second half of June did not allow the plants to regain their pace of development. As a result, the grape growing phase and the beginning of ripening began later than last year. In most vineyards, severe water stress continued. For this reason, there are fewer grapes on the stems. Grapes are rarer and berries are 30-50% smaller in volume. The yield in must has also decreased. Grape ripening started 10-15 days later, compared to 2019 [4]. Table 3.

Table 3.

Evaluation of weather indicators 01.08.2019 ... 31.07.2020

Nr	Indicators	Annual averages	01.08.2019…31.07.2020
1	Average annual temperature,˚C	+0,9….+9,9	**11,9…13,3**
2	Absolute minimum temperature, ˚C	-25,3…-31,4	-5,5…-8,8
3	Maximum absolute temperature, ˚C	+39,8…+41,1	+34,3…+39,4
4	The sum of the actual temperatures, ˚C	1413…1807	**1574…2063**
5	The first frost of autumn, the date	17.09.52…28.09.77	08.10.19…31.10.19
6	Last spring frost, date	25.04.88…21.05.52	01.04.20…03.04.20
7	Annual amount of precipitation, mm	479…613	294…426
8	Rainfall 2020 / multiannual,%	100	48,1…80,8
9	Calculated number of months without	12	**2,3…6,2**

Source: [4]

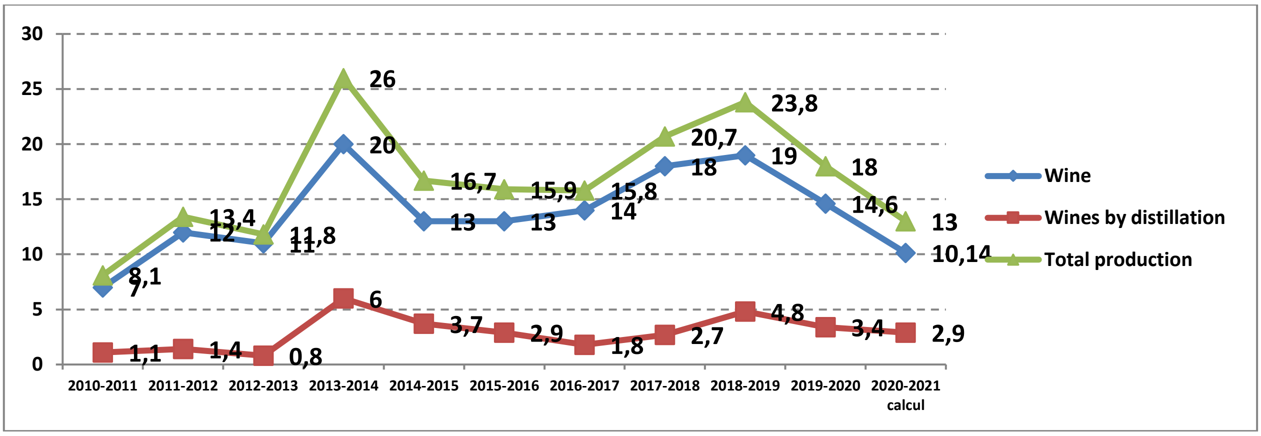
Due to the severe drought of the last 18-24 months, spring frosts and low temperatures in the second half of spring, they damaged the grape harvest by 20-80%, compared to 2019, depending on varieties and viticultural microzones. The yield in must is lower, mainly in the southern regions, as well as in the vineyards of red varieties located in areas unfavorable for the cultivation of grapes over 12-15 years old. The amount of harvest is influenced and depends on the area of the vineyard, the soil moisture, its mechanical structure, the soil maintenance system in the vineyard, the fertilization of the vines, the graft-rootstock combination, the form of management logs, cutting length, loading with shoots from the previous year, etc. Independence from the meteorological factor, if the sum of annual rainfall is less than 400 mm, can be achieved only with the support of large investments in the restoration and expansion of irrigation systems (underground, drip, etc.).

Protection against adverse climatic factors is required to be in the hands of farmers, insurance companies and the state. Only by working together within the cluster it will be possible to overcome the unpleasant surprises (hazards) for which nature has been so generous lately. The Government of the Republic of Moldova has approved the “Law on Subsidized Agricultural Risk Insurance”, recently amended, proposes to strengthen unnatural defense [6].

The country's agriculture suffers losses of millions of dollars every year. Also, every year, the authorities ask farmers to be careful and insure against losses. Recourse to agricultural insurance is often necessary when insurance opens up the possibility of obtaining subsidies for a variety of assistance programs. Now, only 1-1.5% of the area is insured against risks, and this represents only 300 agricultural producers across the country. The need for financing at company level are very important for:

- Modernization of production lines 57%
- Planting vines 50%
- 50% loan repayment
- Investment projects in tourism 43%
- Penetration of new sales markets 79%
- Turnover increase 64%
- Price increase for wine 43%
- Keeping business 36%
- Staff retention 21% [6]

The next factor is the quality of the raw material. According to the Ministry of Agriculture, Regional Development and Environment of the Republic of Moldova, approximately 200 thousand tons of grapes will be offered for processing, including 175 thousand tons of European technical varieties, 17 thousand tons of Isabella and 8 thousand tons of varieties table [3]. Out of the total raw material, over 80 thousand tons of grapes are cultivated by wine companies, which deliver them for industrial processing to wineries in the country and abroad. (Fig.5)



Harvest 2020 (calculated): 150-200 thousand tones (-25…40%)

Source: [2]

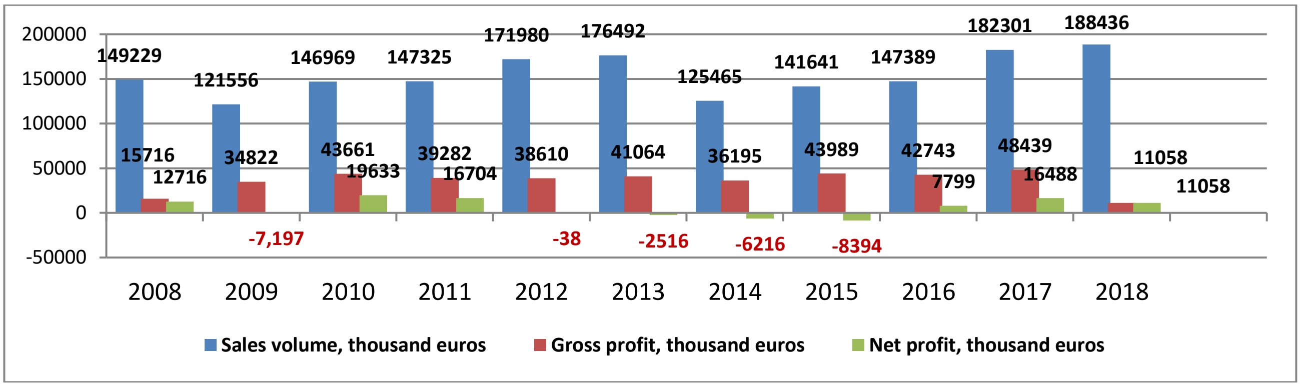
Figure 5. Evolution of the harvest in 2020, mln. dal

ONVV specialists evaluated the quality of grapes grown in all three regions with geographical indication in the Republic of Moldova. There was a decrease in grape mass, titratable acidity, pH increase and K^+ ion concentrations. The harvest has decreased considerably.It is known that if the acidity is above the required level, the wine becomes aggressive in taste. When the pH level is below normal (for white wines - 3.2-3.3, red - 3.5), the wine has an aggressive taste. In the case of high pH, there is a high bacterial risk.

Another factor that influences the efficiency of the wine business is the discrepancy between supply and demand. Every resident of Moldova consumes 15 liters of ethyl alcohol annually, calculated on the consumption of pure alcohol. Of this volume, the amount of industrial wine is only 5%. Also 5% is homemade wine. The rest, unfortunately, is supplemented by beer, brandy and other alcoholic beverages (vodka, whiskey, energy drinks, etc.) [2,6].

For these reasons, the insignificant percentage of wine consumption on the domestic market doesn't worry wine producers too much. Wine is not mainly consumed in Moldova. Therefore, the demand in the country is lower. Consequently, there is a lack of fair competition with other alcoholic beverages and prices for all types of beverages, including alcoholic beverages, are high.

At a sales volume of 188436 thousand euros (year 2018) 51347 thousand euros gross profit were obtained; the net one reached the figure of 11.0 thousand euros. This statistic shows us a relative level of sales, when our reserves exceed 18.0 million dal in stocks. On the other hand, there is a high potential for production-goods for the near future. Fig. 6.

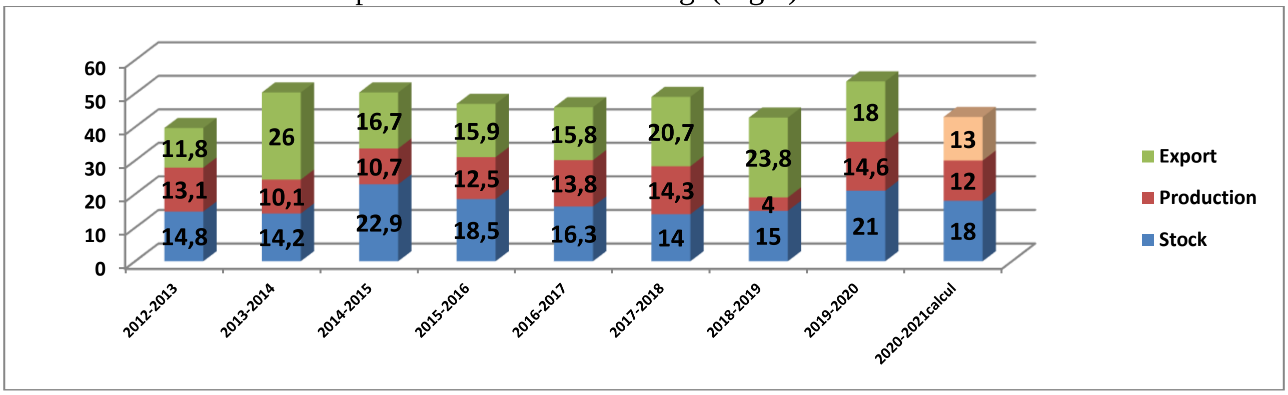


Source: [6]

Figure 6. Wine sales and profit, thousand Euros

The volume of Moldovan wine production is higher than the demand. According to the National Office of Vine and Wine, despite the increase in demand for Moldovan wine products by 10% in the last seven years, wine production in the same period increased by 40%.

Currently, out of every four liters of wine produced, only one manages to be exported. According to estimates for 2020, demand will not exceed one and a half liters. At the same time, the imbalance between supply and demand was caused by several factors, including record harvests in 2017-2018 - 35% more compared to the 15-year average. In addition, the region has been facing low prices for grapes and wine for several years. Wine-producing countries have inregistrated record harvests but consumption of wines is declining. (Fig.7)



Source: [2]

Figure 7. The evolution of the balance between supply and demand

According to experts, in order to remedy the situation, it is necessary to review the subsidy policy of the wine sector in order to finance high quality plantations. There is also a need to improve communication between farmers and producers.

Coronavirus has severely affected the country's public food (HoReCa et al.). According to the Association of Restaurants and Entertainment Units "MAR", after the introduction of quarantine, sales in restaurants and cafes fell from 40% to 60%.

All the restaurants with banquet services canceled the events planned for an indefinite period. Wine and distillate depots were returned to customers, but new time hasn’t been set for the start of activities yet. Institutions specializing in various actions (tastings, exhibitions, presentations, launches, conferences, etc.) also canceled the planned events.

It would seem that during this period online sales should increase, that unfortunately didn’t happen. Physical sales fell by half and very few of the sales were made online. Most customers of online sales until the pandemic crisis came from other countries. Due to the restrictions imposed at the border it wasn’t able to meet the demand of foreign consumers. Very few wines were sold through the online store and the local market. There have been some changes in consumer preferences: in the top of the preferences of local customers, wines from small wineries predominated, as opposed to wines from large wineries that had a lower demand.

CONCLUSIONS

1. The drought of the last two years has severely affected the wine complex of the Republic of Moldova, causing a considerable decrease in the volume of production of wine;
2. The COVID-19 pandemic has closed practically all social entities, which sell tangible quantities of domestic wines and spirits on the domestic market;
3. The reserves-stocks of 18 million dal of quality wines from the 2019 harvest, currently existing in the country, will satisfy the export demand in the amount of 100%.
4. Among the existing reserves in the increase of sales of high quality wines, remarkable is the online trade, both on the domestic market, but especially on the international one.

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ECOLOGICAL AGRICULTURE AND BIODIVERSITY - RELATIONSHIPS, CONGRUENCES, OBJECTIVE CONDITIONS AND PERCEPTIONS OF LOCAL ACTORS

VIOLETA FLORIAN[1], MARIOARA RUSU[2], ELISABETA ROȘU[3]

Abstract: Ecological agriculture provides a favourable framework for maintaining biodiversity by using economically and socially efficient friendly farming practices, generating modern attributes to rural communities and offering a different lifestyle and a different quality of life to the entire society. In two counties ranking in the top ten counties with areas cultivated under organic farming system, Cluj and Suceava, there are positive implications of these farming practices on biological diversity. Qualitative research methods were used to see the local/rural actors' opinion on this topic: hybrid forum and in-depth-interviews. Farmers' decisions to adopt sustainable practices for the environment, which provide positive externalities for biodiversity, water, soil and landscapes, are generated by business-specific economic and social rationality tending to achieve profit specific objectives by using traditional knowledge and skills from the intangible rural heritage.

Key words: *ecological agriculture, biodiversity, rural communities, local actors*

JEL Classification: *Q15, R11*

INTRODUCTION

Worldwide, the decline in biodiversity has reached alarming values: in the year 2019, about one million plant and animal species were in danger of going extinct (IPBES, 2019). Biodiversity loss and the collapse of ecosystems were ranked among the top five threats facing humanity by the World Economic Forum (WEF, 2020). The scientific concerns regarding biodiversity stemmed from a social order, when people got aware of the threats facing biodiversity and humanity began to have a significant interest in biodiversity protection; the cognitive theories and systems began to decipher the intricate characteristics of biodiversity, the multiple relationships with the farming activity and the other action types and the way farmers relate to this whole relational conglomerate.

The reference year is 1992, when the Rio Conference took place and where "3 levels of organization were established: ecological diversity (or ecosystem diversity), specific diversity and genetic diversity" (INRA, 2008).

The evolution of the concept has been permanently subject to coherent approaches: "ecological logic having as objective the conservation; agronomic logic that sought to limit the erosion of genetic diversity, for the improvement of plants; commercial logic expressed by adopting the intellectual property principle on the living environment (Uruguay Round), cultural/native logic added in the late 1980s" (INRA, 2008).

The relationship between biodiversity and agriculture has a recent history: after the Conference from Rio new approaches to the synergies between the two fields emerged: two reflections emerged, i.e. one based on the relations between agriculture and biodiversity, which led to the creation of the agro-biodiversity concept, and the other focused on the multifunctionality of agriculture (INRA, 2008).

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Box 1. Why do we protect biodiversity?

Economic reasons: it supplies raw materials for industry, pharmaceutical products, construction materials and materials for household use; it is the basis of agricultural production, both as number of utilised species and in terms of selected varieties; it is indispensable for the improvement of plant species and animal breeds; provides opportunities for biotechnologies, mainly in plant microorganisms and equally in the field of genetic manipulation; it relates to an economic activity in the tourism sector, to wildlife observation in their natural habitat; it plays an important role in regulating the great physical-chemical equilibria of the biosphere, mainly at the level of carbon and oxygen producing and recycling; contributes to soil fertility and soil protection, through water regulation; absorbs and decomposes different organic and mineral pollutants and participates in water treatment. **Ethical and patrimonial reasons**: it is indispensable for maintaining the evolutionary processes of the living world; people have a moral duty not to eliminate other forms of life; according to the intergenerational equity principle, we must pass on to our children the legacy that we have received; natural ecosystems and their species are real laboratories to understand the evolutionary processes; biodiversity is a carrier of value; what is natural is vulnerable, but at the same time it is good for humans and for the survival of humanity, etc.

Source: INRA, 2008, p. 6-7

Alongside with biodiversity and ecological farming, another key factor is the social actor, with a pro-environmental behaviour/farmer with ecological behaviour who has been the generous subject of multiple integrative theories and models. The social psychology theories have taken over the idea of complex interaction between the environment and the invasive human subject by formulating and adapting concepts and reinterpreting psychological manifestations: a) the theory of activating norms – considers the norms as main activators of behaviours and in this case "the individual/social actor must be aware that his action influences the well-being of others (awareness of consequences) and must be responsible for the pro-social behaviour ... this theory has been used to explain the waste management behaviour" (Le Coent, 2017); b) the theory of planned behaviour – intention is fundamental "intentions are considered motivational factors that influence behaviour", in other words in a reductionist manner, we might say that intention can overcome the difficulty of people to try, so as to have a certain behaviour. The stronger the intention, the more likely the behaviour will be. Thus, three independent drivers of intention are considered: the first is the attitude towards behaviour and refers to "the degree to which a person has a favourable or unfavourable assessment of the behaviour in question"; the second, the subjective norm, represents the "perceived social pressure to perform or not the behaviour"; the third driver refers to "the perceived ease or difficulty in performing a behaviour" (Le Coent, 2017).

The social theories have generated integrative models: "they include the effects of return to individual behaviours, to social dynamics and dynamics of ecological systems ... they take into account social behaviours and behaviours of ecological systems, different social levels and different types of human intervention" (UNESCO, 2013).

MATERIAL AND METHOD

The main purpose of the paper is to provide a structured and integrative overview of the existing relationships between ecological agriculture and biodiversity and how these relationships are perceived by farmers – users of environment friendly/sustainable agricultural practices. Our study does not aim at an exhaustive exploration of the relationship between ecological agriculture and biodiversity and of how farmers' ecological behaviour has been constructed. The scientific vision also oriented a clear, simple and integrating understanding of the functioning mechanism between the two components – ecological farming and biodiversity – starting from the fundamental characteristics, going through the characteristics specific to the territories we focused on, from the quantitative indicators for the statistical, sometimes economic description of the ecological reality, to those adequate to ecological agricultural practices.

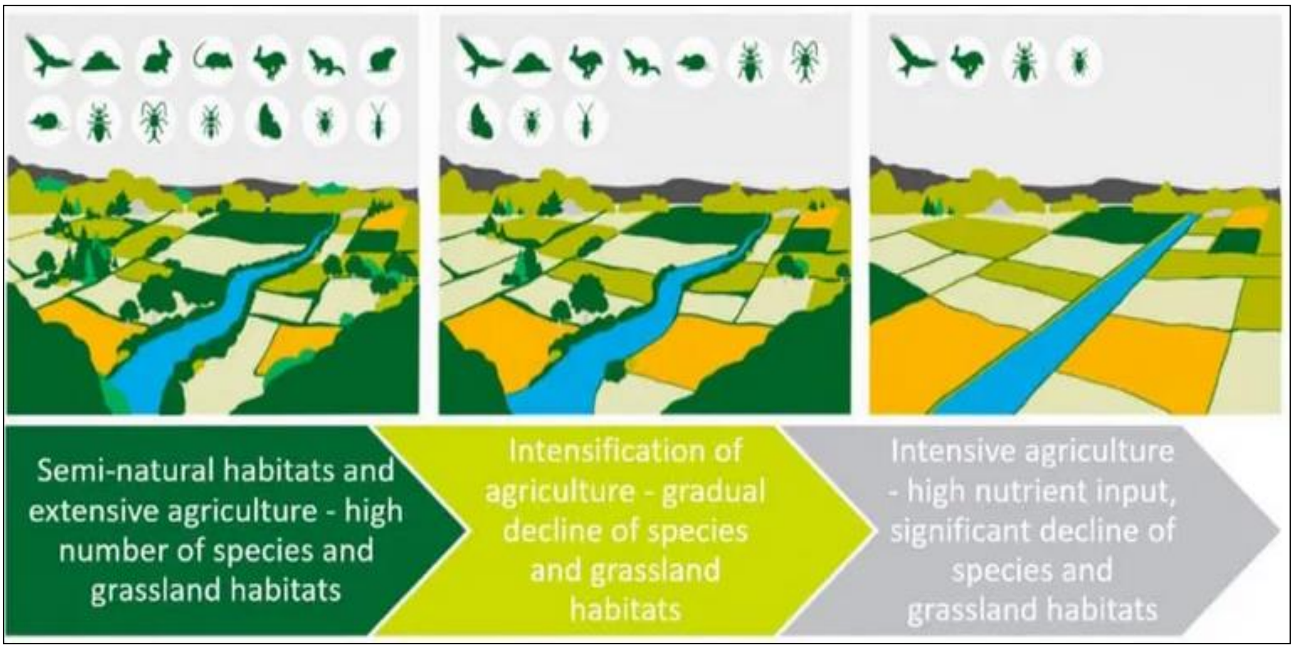
Two qualitative research methods have been used: Hybrid Forum method and in-depth-interviews. The Hybrid Forum – applied in Cluj – can be described as a public discussion meant to build the coherence of diversities of opinions around a defined issue. During the in-depth-interviews – applied in Suceava – sociological information and data were obtained on the opinions of farmers/social actors, generated by the relationships between biodiversity and ecological agriculture (environmentally friendly farming practices).

RESULTS AND DISCUSSIONS

1. Agriculture and biodiversity: a mutually beneficial relationship

In the European Union, according to the European Environment Agency (EEA), agriculture intensification is considered one of the main causes for biodiversity loss and eco-system degradation (EEA, 2019). This trend is associated with the decline in number and diversity of plants and animals (IPBES, 2018). For instance, the bird and butterfly populations, which are considered significant indicators of changes in farmland biodiversity, have experienced an alarming decline since 1990: the bird populations on the farmland declined by 34% in the case of 39 common species; as for the butterfly population, there was a 39% decline in 17 butterfly species (ECA, 2020).

Figure 1. Decline of farmland biodiversity due to intensive farming



Source: ECA, 2020, p.7

The situation of biodiversity significantly varies across the European Union (EU) Member States, and therefore these are facing different challenges. Romania is considered to have a rich biodiversity (due, among other things, to the persistence of traditional non-intensive farming practices and small-sized farms) (Sutcliffe et al., 2015). The ecological structure of Romania's natural capital comprises 53% natural and semi-natural ecosystems that maintain their multifunctionality and 45% predominantly mono-functional agricultural ecosystems (GR-MMDD, 2008).

The two counties of the case studies, i.e. Cluj and Suceava, concentrate significant biodiversity resources. Thus, in the county Cluj, 24 protected areas of national importance have been designated[4], with a total area of 31195 ha (4.7% of the county's area). The subsequently designated

[4] Law 5/2000 on approving the national land-use planning, Section III – protected areas, Government's Decision 2151/2004 on establishing the natural protected area regime for new areas, Government's Decision 1581/2005 on establishing the natural protected area regime for new areas and Government's Decision 1143/2007 on establishing new natural protected areas.

Natura 2000 sites are overlapping the already designated natural protected areas, so that there are 35 Natura 2000 sites in the county, out of which 30 are Sites of Community Importance (SCI), with a total area of 82049 ha and 5 Special Avifaunistic Protection Areas (SPA) totalling 68388 ha. Since the implementation of Natura 2000 Network to present, the areas under these sites have doubled (APM Cluj, 2019). In the county Suceava, 29 natural protected areas of national importance have been designated, with a total area of 16197 ha. These add to the natural protected area of international importance *Tinovul Mare Poiana Stampei* (the largest natural peat reserve in Romania, of 681 ha, which was declared Wetland of International Importance in the year 2011). There are 30 Natura 2000 sites, out of which 24 Sites of Community Importance (SCI), with a total area of 222311 ha on the county's territory and 6 Special Avifaunistic Protection Areas (SPA), with a total area of 123279 ha. These natural protected areas of Community importance that make up Natura 2000 Network cover 17% of this county's territory (APM Suceava, 2019).

In both counties, significant areas are under various protection forms, thus preventing the degradation of ecosystems and contributing to biodiversity conservation.

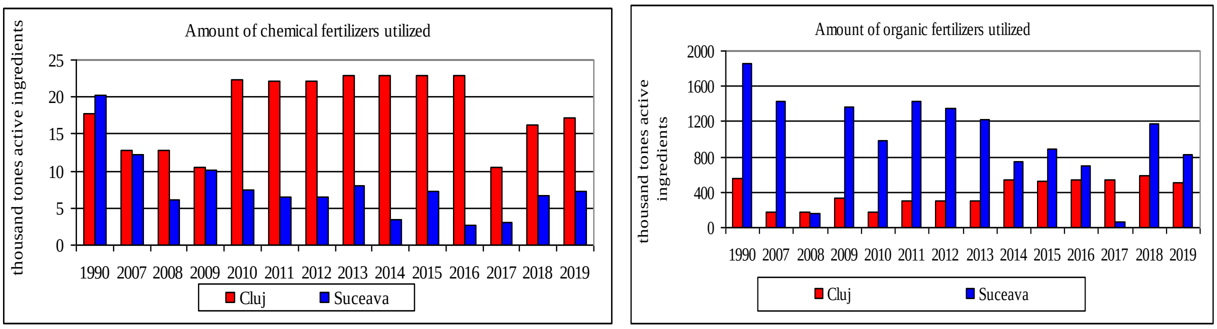
2. Ecological agriculture – role in biodiversity preservation

In the areas where farming activities are practiced, biodiversity conservation and improvement can act positively both on the natural heritage conservation and on the increase of farm production profitability (Barret et al., 2009).

Agricultural ecosystems, as part of natural heritage, can be protected through environmentally friendly farming practices, through ecological farming, which implies a rational use of chemical fertilizers, their replacement by organic fertilizers, giving up the use of pesticides as much as possible, which are harmful to the environment. The investigated counties have a significant ecological orientation, being among the top ten counties with organically cultivated areas in Romania: in the year 2018, in Cluj county 2% of the farmland area was cultivated under organic farming system, 3% in the county Suceava (APM Cluj, APM Suceava, 2019). At the same time, a large number of livestock herds are raised under organic system in these two counties: cattle in Suceava county (39074 heads in the year 2016) and sheep in Cluj county (11354 in the year 2016) (RDA N-V, 2017).

In Cluj county, the use of chemical fertilizers had a sinuous trajectory, in the period 2010-2016 being higher than that in the year 1990. At the opposite pole, in Suceava county, the amount of applied chemical fertilizers steadily decreased, in the year 2019 representing one-third of the amount applied in the year 1990. Nitrogen fertilizers were mainly used in both counties.

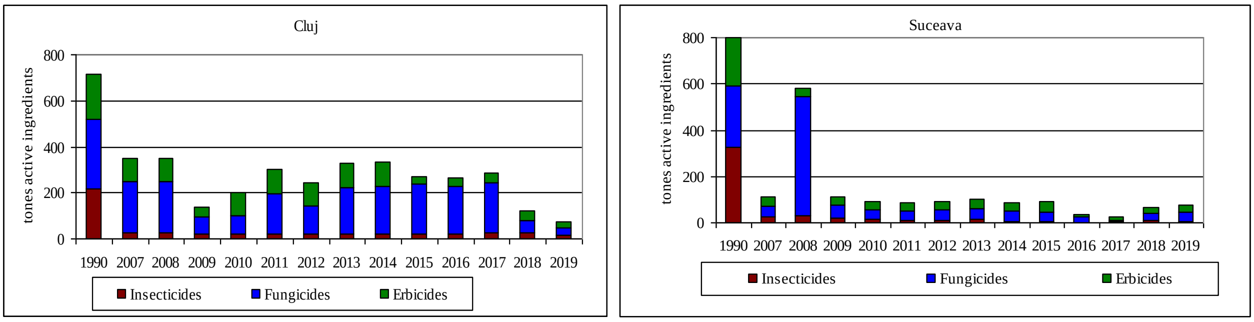
Figure 2. Chemical and organic fertilizers used in the counties Cluj and Suceava



Source: NIS, tempo-online database

In both counties, the use of organic fertilizer fluctuated, in accordance with the evolution of livestock herds. In the year 2019, in the county Cluj the amount of organic fertilizers used was almost equal to that used in the year 1990 (more than 500 thousand tons active ingredients). In Suceava county, the amount of natural fertilizers used was significantly higher than that used in Cluj county, throughout the investigated period, yet the amount used in the year 2019 was twice lower than in 1990.

Figure 3. Pesticides used in the counties Cluj and Suceava



Source: NIS, tempo-online database

The application of pesticides, toxic substances with high environmental degradation potential, significantly declined in both counties. In the year 1990, quite equal amounts for pest control were used in the two counties (715 tons active ingredients in Cluj county and 799 tons active ingredients in Suceava county), aiming at obtaining very high yields, which is a main characteristic of intensive farming. Throughout the investigated period, the decline of the amount of pesticides applied was much higher in Suceava county.

In both counties, the largest amounts of pesticides used were fungicides, followed by herbicides. It is worth noting that in the year 2019 compared to 1990, in both counties, the amounts of pesticides used decreased about 10 times.

3. Opinions and evaluations of social actors

The human-environment relation is generated by the positive valorisation of biodiversity, as multitude of natural resources provided to human activities; it is the perception of a space rich in material opportunities, approachable only in friendly terms: *"... as what you give to the environment, the environment can take away from you when you don't expect, and can be unpleasant"* (M.S., member in an inter-community organization, Suceava county). The moral value assigned to human actions is: *"respect for the environment that offers a respect for us"* (D.Ș., member in a professional association, Suceava county). From a theoretical perspective, farmers with this type of moral relations *"are more likely to adopt soil conservation measures to participate in the voluntary conservation of forests or in wetland restoration. The moral concern affects farmers' behaviours, such as adopting practices that increase animal welfare"* (Dessart, F., Barreiro- Hurlé, J., van Bavel, R., 2019)

The rational relation with the biodiversity-ecological farming system is materialised in multi-dimensional opinions: a) understanding ways to protect nature through the use of friendly agricultural practices and development of ecological farming, conservation and low-input agriculture: "*The ecological practice is the practice that uses and develops natural resources in a sustainable manner"* (D.A., farmer Cluj county); *"... use of traditional practices, avoiding chemical fertilizers and pesticides (with certain exceptions), use of local varieties/animal breeds respectively, well adapted to the living environment"* (T.S., farmer, Suceava county); b) changing the way of understanding the biodiversity – agriculture system and rebuilding the way we relate to this binomial – can start with an education pathway by accumulating basic knowledge and information on the concordance between agricultural activities and natural cycles*: "you have to start with schoolchildren, to know when the agricultural products are available and that's what you can teach them if they come to the farm*" (farmer, Cluj county); c) valorisation of ecological products: "*In my opinion, to promote ecological products or let's say low-input farm products, could start from the change of conception on these products that should begin from basic education, that is to change a little bit the vision of how young people perceive basic life starting from food, from foodstuffs...it's a problem of the society"* (A.D., farmer, Cluj county); d) formulating and supporting the educational path based on ecological values: *"... let us start with children, with their education, with the change of the education system, continuing with the vocational training in this field, from the most serious,* *most professional level, if we must be competitive; ...this shows we can move forward, starting from zero, with children, schoolchildren, students and further on with farmers"* (A.D., farmer, Cluj county).

As an empirical hypothesis, we are tempted to formulate the following statement: farmers' opinions, as users of ecological practices, are influenced by the rules they have to obey to protect the environment. In the case of interviewed farmers, the regulatory/ legal norms work together with the descriptive and injunctive norms. As regards the former, "farmers' decisions to adopt sustainable agricultural practices seem to be influenced by neighbours' behaviour. The spatial data suggest that farmers who live next to each other have similar models for adopting ecological farming" (Dessart, F., Barreiro- Hurlé, J., van Bavel, R., 2019).

The normative process appeared, in the case of investigated farmers, by exemplifying the good ecological practices existing outside the communities they belonged to; knowledge and internalisation of descriptive norms were facilitated by the channels of professional associations: *"We, Bioterra Association, from the years 2000 to 2010, made very many projects and in these projects we tried to help them to see how organic farming is done and to bring a type of model to steal some ideas from it and get started....and I know that many started like this"* (A.I., member in professional association, Cluj county). The adoption of ecological practices, maintaining the balance between biodiversity and ecological faming implies the functioning of the information system; regarding this information system and dissemination of information on ecological practices, it can be noticed that accessibility of reliable and relevant information is partially covered: *"At present I consider that the main reason for the very slow development of this farming system...is the lack of information on these practices. To this end, I consider that efforts should be made to get farmers aware of the benefits of this system as well as of the difficulties they will have to face, it is necessary to present alternative crop technologies and provide advice throughout the period of land conversion to organic farming"* (D.A., farmer, Cluj county). The theoretical and empirical studies converge on the need for a coherent and functional information process: "Those who adopt organic farming use more information and have significantly better attitudes towards gathering information than the others. Acquiring knowledge and information on sustainable practices is an extremely dynamic social process" (Dessart, F., Barreiro- Hurlé, J., van Bavel, R., 2019).

The opinions and evaluations referring to organic farming are generally negative, based on negative assessments, on experiences on the verge of economic failure; in general, there is a reductionist perception of organic farming starting from the difficulties in practicing it and continuing to the obstacles to maintaining the farms with this profile, by emphasizing the factors with negative impact (absence of organizational climate, low and prolix/confusing political involvement, legislative ambiguity, insufficient financial support). To this argument, based on pragmatic factors, a theoretical explanation can be added: "*The literature on farmers' behaviour is quite consistent in showing that the adoption of sustainable practices negatively correlates with the economic objectives and positively correlates with life objectives*" (Dessart, F., Barreiro- Hurlé, J., van Bavel, R., 2019).

The opinions on the motivations/mechanisms of the emergence of farms on which ecological practices are used are divergent: a) opinions focused on explanations of financial nature, more exactly on the precarious resources combined with zonal peculiarities: *"In our area ... they don't have money to buy fertilisers, many don't have anything to carry their garbage with, there are some people who have some equipment, those who have equipment are more skillful,…lack of money leads to subsistence farming,…I don't know anybody who has applied nitrogen*" (M.F., farmer, Suceava county); b) opinions that take into account farmers' desire/passion to grow organically, to raise animals in organic system: "*We have a farm, in Mureş county, a former state farm, they used to grow hops before, then we have dairy cows, we thought to go green...we managed to make low-input agriculture"* (A.A., farmer, Cluj county).

Evaluation of social recognition. The need for the social valorisation of farmer status is formulated in virtual terms, by the actors involved in the system promoting ecological products: *"as far as I could notice, both in urban and rural areas, propagating an idea online has a much greater* *power ... the idea is put into value, the product is supported with a different force, there is another approach to the product"* (academic researcher, Cluj county).

The opinions on the costs and benefits of organic farming are influenced by the mixed perception of economic and financial factors, by the desire to obtain immediate benefits. This type of reasoning is generated by farmers' financial precariousness, by the impossibility to survive financially without the immediate coverage of costs. *"One of the problems I have to face is of financial nature ... as a strawberry farmer, organic strawberries, and not only, ... it is normal for the price of my product to increase, but unfortunately consumers won't like it, they would buy this product, but at the price of the conventional product ... we are often in difficulty and we think as farmers, why should we produce organic products when consumers are not aware of how much effort we put in as producers, and how high the costs are compared to conventional ones ... the profit is not the desired one"* (M.C., farmer, Cluj county); *"we have 100 hectares in conversion, we want to shift to organic milk and meat production, and milk is sold at 1.57 RON, and I, as producer of both milk and meat, cannot close the circuit with 1.57 RON"* (farmer, Cluj county).

The content of this type of opinion can vary, materializing in broader formulations:*" Of course, one of the main motivating factors for farmers is represented by the potential financial advantage obtained from selling high quality products. However, it should be also noted that the operating costs are higher, due to the limited use of fertilizers and pesticides compared to conventional farming. In order to make up for the production differences, the subsidies provided to farmers who use organic farming practices are significantly higher than those for conventional farming".* (D.Ş, farmer, Suceava county). In the literature, the term *"current prejudice" is used, suggesting that the immediate costs and benefits have a disproportionate weight in decisions compared to future benefits and costs. The relevance of this prejudice for decision making by farmers is recognised, and it can be extremely strong in the context of sustainable farming practices, as the adoption of these practices often involves an immediate cost (for instance, investments in machinery, low yields on short term), while the benefits (i.e. higher soil fertility, climate change attenuation) are likely to appear in the future"* (Dessart, F., Barreiro- Hurlé, J., van Bavel, R., 2019).

Opinions on the spatialization of farms with ecological practices

a) proximity to conventional farms is a negative factor with implications in the normal development of ecological production processes: "*Unfortunately it is difficult for us as our land is scattered in very many places, we have many neighbors who are all conventional, but we managed to do low input agriculture, that is we use much less chemical inputs, crop rotation"*(A.A., farmer, Cluj county).

b) zoning as favourable factor. An element of zonal selection is considered to be the geographical one, combined with the traditional ability to practice an environmentally friendly agriculture:" I *consider that the agricultural holdings from the plain area are less motivated to develop ecological practices on medium term. In such areas, the agricultural strategy relies on the quantitative improvement of productions with the lowest possible costs and on the largest possible areas and livestock herds. In the hill and mountain areas ... farmers are more receptive to ecological farming practices"* (D.A., farmer, Suceava county).

CONCLUSIONS

The opinions on biodiversity are based on a good understanding of diversity, of the abundance of natural resources, which can provide a viable framework for agricultural activities. The moral values start from the respect for the environment, from which the construction of a pro-ecological behaviour begins. The biodiversity – ecological farming relationships are perceived in terms of a social process in which the main vector is education and training. The opinions on ecological agriculture focus on the mechanisms of emergence of ecological farms, on their spatialization, on the recognition of the social status of producers/users of friendly practices, on the costs and benefits of this farming activity. In general, there is a convergence of opinions in the two investigated areas, reflecting the perception on this issue, the inhibiting factors and those favourable to ecological agriculture.

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DEVELOPMENT OF GRAPES AND WINE-MAKING INDUSTRY OF MOLDOVA ON THE BASIS OF MODERN ACHIEVEMENTS OF SCIENCE AND INNOVATIONS

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Abstract: *The wine-growing and wine-making complex of Moldova has come a long way: from metal-intensive technical equipment from unalloyed steels to modern European equipment from stainless, food-grade material. All new vineyard plantings are created from planting of certified material of our own production or acquired in Italy, France and Germany. At the present stage, vineyard plantations in Moldova are 80% occupied by classic European varieties. The rest - are local indigenous varieties. All technological processes in primary winemaking are based on modern biotechnology achievements and innovations: enzymes for clarifying wort, yeast for fermentation and bacteria to reduce acidity in red wines. The well-known preservative - sulfur dioxide is replaced with inert gases (nitrogen, carbon dioxide) and the use of low temperatures. Table wines are exported mainly to Romania, the Czech Republic, Germany, Poland, China, the United States and Canada. All the achievements of viticulture and winemaking in Moldova are based on the latest scientific and technological progress, developed and implemented in the Republic of Moldova by scientists from the Academy of Sciences of Moldova, universities, as well as specialists from the National Office of Grapes and Wine.*

Key-words: *grape-wine-making complex, grape-based secondary products, European grape varieties, local indigenous varieties, wine market.*

Classification JEL: *Q13*

INTRODUCTION

The economy of Moldova is closely connected with its traditional sectors, such as agriculture and food industry. At the same time, in recent years, textile production, the manufacture of cables for the automotive industry, as well as information technologies that operate within the framework of international clusters, have intensified.

Nevertheless, the main industry of the republic remains viticulture and winemaking, in which 25% of the working population of the country is involved. In its progressive movement, this complex has reached a sharp leap in its development over the past 15 years and today is the hallmark of Moldova.

MATERIALS AND METHODS

As materials used for the preparation of this work, we studied the annual reports of the Ministry of Agriculture, the Ministry of Economy, the National Office of Grape and Wine, the Academy of Sciences of Moldova, the National Institute of Grape and Wine, as well as articles from national publications such as "Fruit growing, Viticulture and Winemaking" , "Leader agro", "Academos" and others.

The methods of work were: systematization of the information received, its systematic analysis, determining the priorities for the further development of agriculture and, in particular, the grape and wine-making complex of the Republic of Moldova. Some materials of various international organizations were also analyzed, including Moldova's partners from the European Union, who closely cooperate with the state structures of the republic.

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RESULTS AND DISCUSSION

The value of the grape culture for the Moldovan economy is very significant, since in this country there are centuries-old traditions of cultivation, good soil and climatic conditions and the well-established practice of growing table and technical varieties.

Grapes for fresh consumption in 2019 reached 100 thousand tons. Of this amount, 40% is exported to Romania, Poland, the Czech Republic and Germany.

Today, the Republic of Moldova collects more than 400 thousand tons of wine grape varieties with an annual wine volume of 15-17 million deciliters, which allows it to occupy 10th place in the world in vineyard areas equal to 130 thousand hectares, as well as in total volumes produced wines. [1,6]

The range of products produced from grapes in the Republic of Moldova includes:

- from table grapes - fresh grapes, must (fresh filtered wort), pure grape juice or blend, concentrate with min 65^0 Brix, listel, wine materials for distillate, etc;

- from technical varieties - table, strong and dessert wines, sparkling (champagne) and sparkling (artificially saturated with carbon dioxide), aromatic wines, distillates for: divins (cognacs), brandy, vodka or pure ethyl alcohol; [7,11]

- grape-based secondary products - ethyl alcohol from yeast and squeeze, grape seeds oil, natural grape dye, tannin, grape seed powder to replace cocoa powder, tartaric acid, vinegar, soft drinks, etc. [10]

On average, grape products in Moldova are estimated annually at 450 - 500 million US dollars and it is an important component of replenishing the country's budget. [5,8]

The grape culture on Moldavian soil has been known since time immemorial. So, in Naslavcha, a village in the north of Moldova found imprints of grape leaves indicating that the vine grew in these parts a million years ago. Today it is the prestigious and main branch of the agriculture and food industry of Moldova. Currently, Moldova has a total vineyard area of 130 thousand hectares. Of these, 121 thousand ha are fruiting. In commodity farms, there are 82.5 thousand ha of grapes, of which fruit-bearing is 76.5 thousand ha. (56.5 thousand ha - European varieties, 7.5 thousand ha - Isabella species Vitis Labrusca and 12.5 thousand ha. of Table grape varieties). Viticulture of the Republic of Moldova is 90% in the private sector, so, is privatized. [4,7]

In the fruitful 2019, about 300 thousand tons of grapes were processed at the wineries. Of these: 265 thousand tons of European varieties, 18 thousand tons of Isabella species and 17 thousand tons of substandard (non-standard) table varieties. The latter are processed into juice, concentrate or distillate. [1]

In the season of 2019, more than 90 enterprises were involved in the processing of grapes. Moreover, 40 of them had their own vineyards, and 50 enterprises purchased grapes from private winegrowers. Over 40 thousand tons of table grapes were exported from this year's crop. About 40 thousand tons of table grapes were sold on the domestic market (from July of the harvest year until May of the following year). This grape was stored in industrial refrigerators. The Republic of Moldova provides 100% of its needs for table grapes and grape juice. [3]

Unfortunately, 70% of all sold wines are sold in bulk, so the average price of Moldovan wines for export is about 1 euro / l. But the current production potential of the viticulture and winemaking industry allows us to conquer individual markets in which this price will increase by more than 2-3 times. The country has developed the state strategy "Vino-2030", which provides for the further development of the industry based on the introduction of the results of world scientific and technological progress, innovations and new materials - products for the effective protection of vineyards from cold, disease, pests and the harmful effects of drought.

The grape assortment in the Republic of Moldova is approved by the Ministry of Agriculture on the submission of information by scientists from the National Institute of Grape and Wine after 5 years of successful testing of varieties in various soil and climatic conditions.

The republic has its own nursery base in viticulture where they produce their own certified planting material that meets international requirements for virus-free and bacterial-free seedlings.

Today in Moldova, European white grape varieties are cultivated for industrial processing - Aligote, Chardonnay, Sauvignon, Riesling Rhine, Muscat Ottonel, Pinot white, Pinot gris, Rkatsateli, as well as varieties of a new selection - Viorica, Bianca, Legend, etc. Among the red grape varieties for wine production, Moldova traditionally cultivates Cabernet Sauvignon, Merlot, Pinot Noir, Malbec, Saperavi, as well as Sangiovese, Shiraz, Colombarb Senso and others imported in recent years. [9]

Wines from local grape varieties such as Feteasca albă, Feteasca gegală, Viorica (white), Feteasca neagră, Codru and Rara neagră (red) are in special demand.

Based on innovative developments on plantations of vineyards of predominantly red varieties, new industrial forms of bush forming and vine trellis forming are being introduced, which are suitable for harvesting grapes with combines. [11,13]

Complex amploecological studies of the main micro zones of the viticulture of the Republic of Moldova with the mapping of heat supply are also innovative.

On their basis, projects of new vineyards are created with the resolution of specific varieties of this long-standing and traditional culture. In this multifaceted work, Moldavian scientists, such as academician B. Gaina, prof. N. Taran, prof. A. Balanutsa, Dr. G. Arpetii, Dr. I. Prida, Dr. K. Olaru and others work closely with their colleagues from Romania (Dr. A. Ranka - NIIISVV), France (Prof. J-P. Mercier (-Vandee), Ukraine (Academician V. Vlasov - Research Institute V. C) and Russia (prof. T. Guguchkina - SKZNIISV). [14,15]

A new trend in the viticulture of Moldova is the original system of maintaining grape bushes of the Pergola system, developed in Italy and improved for the conditions of Moldova. The cultivation of table varieties according to this system made it possible to sharply improve the quality of grapes and expand its export zones in Russia, Romania, Poland, the Czech Republic and Germany. [2]

The quality of Moldovan wines has increased at the level of ensuring competitiveness in the markets of the European Union, as well as countries from the Commonwealth of Independent States. These achievements are based on innovations of recent years, which can be listed:

- the use of special races of yeast selected in Moldova in the course of many years of research work on their screening; the best of them are used in the technology of natural table wines with a varietal or complex aroma;

- the use of new biological products (bacteria malolactic fermentation from the genus Leuconstoc oenos), providing a qualitative biological decrease in acidity in red table wines, giving them a full and harmonious taste;

- the use of the best grades of bentonite for clarifying wort and colloidal stabilization of wines, providing a high flocculating effect while maintaining a low concentration of ions Ca^{2+} in the finished wines;

- the introduction of effective preparations of enzymes with pectolytic action in the technology of clarification of grape must, ensuring the complete destruction of colloidal particles and the subsequent comprehensive stabilization of wines;

- line up of technological lines for grape processing, conditioning and bottling of wines with new European equipment, ensuring the protection of wort and wines from oxidation by atmospheric oxygen, excluding metal corrosion or enrichment with phthalates derivatives;

-introduction of the best oak species of the Querqus family (robur, petrae, etc.) into the production for the production of oak barrels or chips and liquid extracts, providing a type of “boise” for high-quality wines, especially red table wines;

- use of low temperatures and inert gases (CO_2, nitrogen, etc.) and minimum doses of SO_2 (60-70mg/l) to protect the wort and white wine from oxidation by atmospheric oxygen. [12]

The economy of the grape-growing complex of the Republic of Moldova is closely connected with its material and technical base, with human resources and markets.

In recent years, there has been a movement of specialists and workers from the country to Germany, Spain and France to work, as a rule, in the agricultural sector, including in the viticulture and winemaking sector.

This phenomenon created a large shortage of working hands in viticulture at the peak of the season of technological operations such as trimming and gartering of bushes, protecting plants from pests and diseases, harvesting and processing, etc. This phenomenon is especially pronounced in the cultivation of table grape varieties, where the proportion of manual labor is very big.

In the markets of the European Union and the CIS, as well as China, where mainly Moldovan wines are sold (about 70-75%), competition with wines from France, Italy, Spain, Austria, Chile and Argentina is growing.

In this regard, winegrowers and winemakers, united in the framework of the National Office of Grapes and Wines of Moldova, have adopted tactics to increase the competitiveness of Moldovan wines by reducing production costs and improving the quality of finished products. For example, experts began to introduce mechanized pruning of bushes on industrial plantations of vineyards, followed by manual adjustment of the bush. This increases overall productivity by 2–3 times. To protect the vineyards from hail, the country has created an anti-hail system that is functioning successfully.

The control of pests and diseases of a grape plant is often carried out by the classic drugs of the Bordeaux mixture ($CuSO_4$+$Ca(OH)_2$ and rosin sulfur (S), replacing very expensive systemic drugs that can be characterized by increased environmental toxicity.

The National Office of Grape and Wine tested for the first time a new system for recognizing the phytosanitary status of bushes (and entire vineyard plantations) using drones equipped with special spectrophotometers for detecting diseases of Nois and Flovecence d´ore, etc. [7]

In order to better organize work in the field of viticulture and winemaking in the Republic of Moldova, its entire territory is divided into four zones with a protected geographical indication: Sodru (Center of the Republic), Valul lui Traian (South), Ştefan Vodă (Southeast) and Divin (North) . Comprehensive studies of soil composition, climatic conditions, and grape cultivation technologies are being carried out in each zone, which allow these factors to be optimized in order to ensure high quality grapes and obtained wines. The legal status of these zones was approved by a decision of the government of the republic with the name “Association of Producers of High-Quality Wines” and hereinafter: “Codru”, Ştefan Vodă ”, etc.

The association includes both large enterprises (for example, “Vinăria din Vale” with more than 1.2 thousand hectares of vineyards), as well as small and medium-sized enterprises (20-60 hectares). In total, 40 small and medium enterprises of viticulture and winemaking have been created and are successfully operating in Moldova. The whole republic produces an average of 15-17 million decalitres of wine, which are exported in more than 90%. Unfortunately, 70% of them are exported in bulk. The volume of sparkling wines produced in Moldova reaches 14-15% of the total volume of wines in the country.

The qualities of Moldovan wines are highly appreciated at various prestigious international competitions in Paris and Bordeaux, Brussels and London, Milan and Bergamo, Ljubljana, Bucharest, Moscow, Krasnodar, Chisinau and Yalta, etc. Many wines and divins (cognacs) of Moldova were awarded the highest international Grand Prix award.

Two enterprises of Moldova were determined by the decision of the Government as “National Cultural and Wine-Making and Heritage”. This is the Cricova Vintage Wine Factory and the Mileştii Mici Vintage Wine Factory - both with wonderful cellars and wine collections of millions of bottles. Wine collection "Mileştii Mici", which has about 2.0 million bottles, is listed in the world Guinness Book.

Moldova has a well-established international grape-growing route. About 100 thousand tourists, wine connoisseurs, experts and journalists visit it annually.

CONCLUSIONS

Currently, the economy of the Republic of Moldova is based on IT technologies, the achievements of the country's agricultural sector and the results of other industries (food, textile, HO-RE-CA). Scientific and technological progress in the grape-growing complex of Moldova has become the basis for its re-equipment with new biologics (yeast, NMB bacteria, enzymes, activators of biomass growth), inert gases and low temperatures. A harmonious combination of classic varieties and new hybrids of interspecific selection (Legend, Viorica, Bianca, Solaris, etc.) allows us to ensure high quality of wines produced in the Republic of Moldova, as well as guarantee an increasing demand for wines from local grape varieties (Fetasca white, Fetasca regale, Black fetash, Rara neagre, Codru, etc.).

The competitiveness of Moldovan wines on the world market is ensured by the following factors: high quality of grown grapes, improvement of its processing technologies, application of hygienic biological fermentation processes and, finally, a reasonable quality / price ratio.

Further expansion of the Moldovan wine markets, which have gained a good reputation and received high awards at international wine contests, seems appropriate in China, Singapore, the USA, Canada and Great Britain. The development of these markets has already begun successfully and there is currently an increase in the supply of these products.

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ASSESSEMENT OF COMPETITIVINESS OF MOLDOVAN AGRI-FOOD PRODUCTS AT THE REGIONAL LEVEL

EUGENIA LUCASENCO[1], ALEXANDRU CEBAN[2]

Abstract. *The paper aims to assess the competitiveness of Moldovan agri-food products at the regional level, with an emphasis on neighbouring countries. Taking into account the latest trends in export of agri-food products, it is becoming necessary to analyze what are the most competitive Moldovan products on the regional EU market. In order to carry out the proposed assessment, the Revealed Comparative Advantage index has been used. This index helps calculating the relative advantage or disadvantage of a specific country in a certain class of goods as evidenced by trade flows. As a result, products with a significant comparative advantage have been identified, meaning the existence of the competitive potential at the regional level. At the same time, several proposals have been formulated in order to increase the competitiveness' level of selected Moldovan agri-food products.*

Key words: *trade, Revealed Comparative Advantage index (RCA), Republic of Moldova, agri-food products*

Jel Classification: *Q17.*

INTRODUCTION

The agricultural sector of the Republic of Moldova is going through a significant period of modernization and development, relying on the gradual transition to a competitive agriculture, which implies the existence of advantages, both on the internal and external markets.

One of the methods used to assess the competitiveness of a product on the external market is the Revealed Comparative Advantage indicator (RCA) or Balassa indicator. The RCA of Moldovan livestock products for the period 2005 – 2014 has been studied by Ignat, Stratan and Lucasenco (Ignat et al, 2017). An approach of the RCA in relation to the total trade, including trade with agri-food products for the period 1994 – 2006 has been tackled by Prohnitchi et al (Prohnitchi et al, 2009). Ignjatijević et al focused on analysis of the RCA in the processed food sector of the Danube countries, including the Republic of Moldova (Ignjatijević et al, 2015). Moroz, Ignat and Lucasenco focused their research on the development of agri-food trade opportunities at the regional level, also by using the RCA indicator for the Republic of Moldova, Romania and Ukraine (Moroz et al, 2011).

Therefore, the aim of the paper is to assess the competitiveness of Moldovan agri-food products at the regional level, with an emphasis on neighbouring countries, Romania and Ukraine, by using the RCA indicator.

MATERIAL AND METHODS

The Balassa indicator (RCA) is widely used in the empirical literature to identify the weak and strong export sectors of some countries. The mostly used formula to assess the competitiveness of certain products or categories of products is the following:

$$\mathrm{RCA} = \frac{X_{ij}}{X_{it}} / \frac{X_{nj}}{X_{nt}} = \frac{X_{ij}}{X_{nj}} / \frac{X_{it}}{X_{nt}}$$

where, X represents exports, i – a country, j – a commodity or an industry, t – a set of commodities or industries, and n – a set of countries (Balassa, 1965).

This index starts from the idea of comparing a country's exports of a product or an industry with the exports for the same product or industry made by a group of countries, considered as a

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reference point, but not directly compares the exports of that product or industry, but their share in the total trade.

The Balassa indicator (RCA) is based on the existing models in the foreign trade. This indicator measures the export of a product with the country's total exports and the export performance of a set of countries. If RCA> 1, it denotes a comparative advantage, for example: the sector in which the country is relatively specialized in the terms of exports (Moroz et al, 2011).

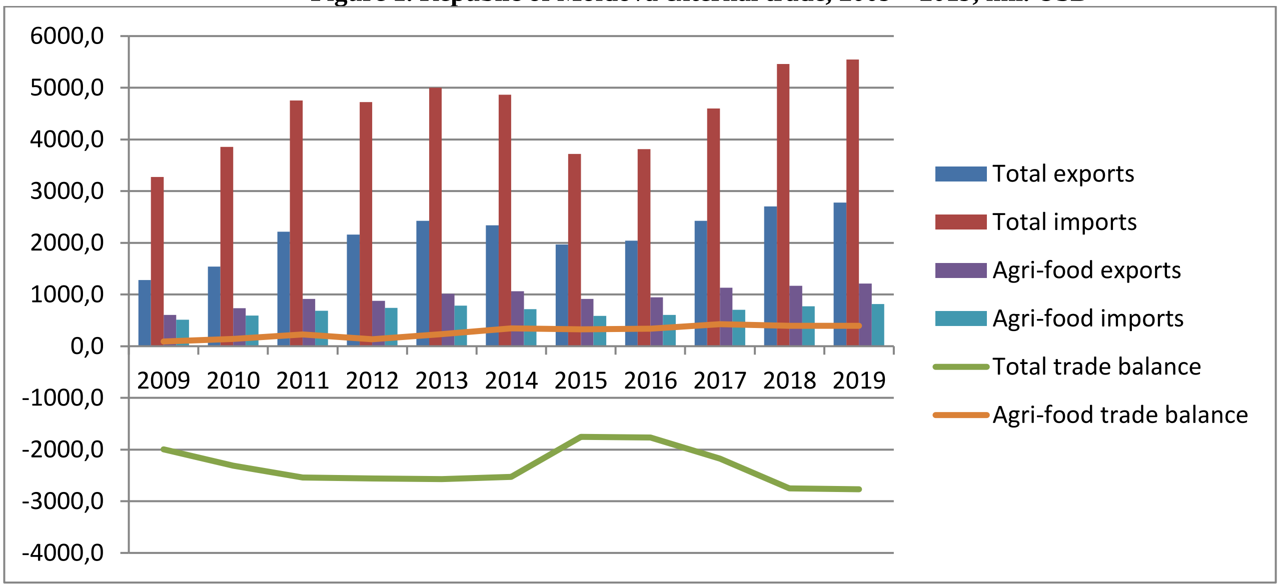
Data on foreign trade of the Republic of Moldova, Romania and Ukraine provided by the UNComtrade and WITS databases has been used for the analysis of the Revealed Comparative Advantage of various groups agri-food commodities from the the specified countries compared to the world and to EU. A limitation of the paper consists in the fact that foreign trade data for Ukraine for 2019 is still not available in official statistics.

RESULTS AND DISCUSSIONS

The foreign trade of agri-food products of the Republic of Moldova plays an important role in the national economy, representing a basic pillar for the general trade. The share of the agri-food exports in the total exports varies from 40.7% in 2007 to 43.6 in 2019. The value of agri-food exports increased from 604.7 mil. USD in 2009 to 1211.1 mil. USD in 2019.

The share of agri-food imports in the total value of imports accounted for 15.7% in 2009 and 14.7% in 2019. The value of agri-food imports experienced an increase from 513.6 mil. USD in 2009 to 815.9 mil. USD in 2019. The agri-food trade balance is positive all over the analysed period, with a considerable increase in the last 5 years.

Figure 1. Republic of Moldova external trade, 2009 – 2019, mil. USD



Source: own calculations based on WITS database (2020)

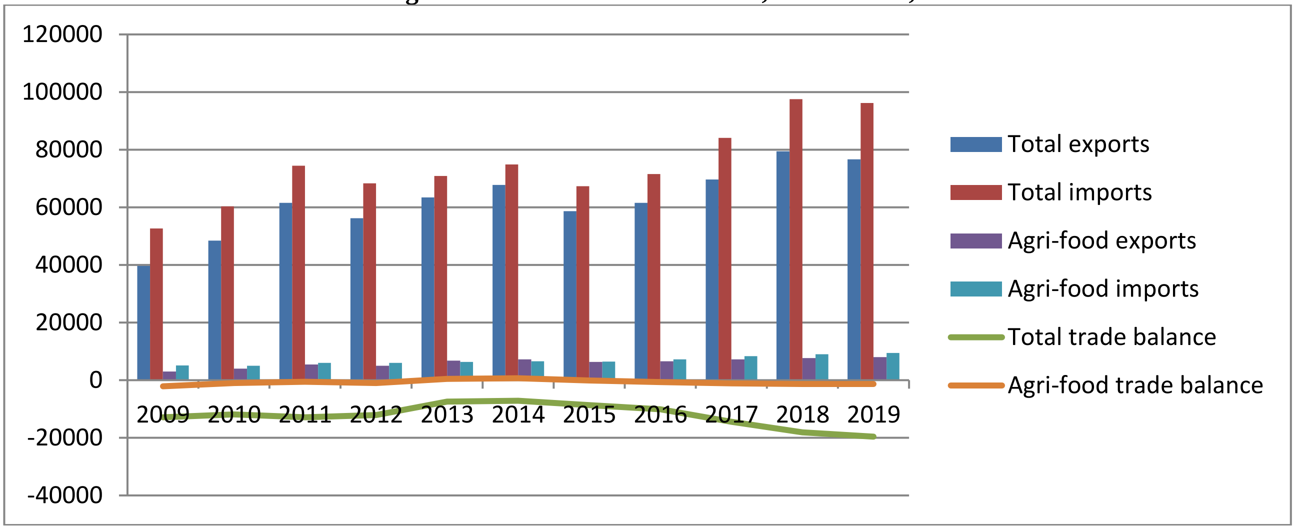
Nowadays, the trade policy of the Republic of Moldova is focused on development of strong trade relations with EU countries in the framework of DCFTA and geographical diversification of the agri-food exports to other countries, although, a certain category of products can still be exported mainly on the CIS market (apples). Thus, in the trade with agri-food products, EU became Moldova’s main partner, with a share of over 55% of Moldovan exports and over 40% of agri-food imports.

At the same time, there is a dominance of exports of low value-added agricultural products, such as cereals, oilseeds and other unprocessed agricultural products. There is also a clear upward trend in exports to the EU and, consequently, a reduction in the share of exports of agri-food products to CIS countries.

In Romania, the share of the agri-food exports in the total exports varies from 7.7% in 2007 to 10.5% in 2019. The value of agri-food exports increased from 3041.84 mil. USD in 2009 to 8055.4 mil. USD in 2019.

The share of agri-food imports in the total value of imports accounted for 9.8% in 2009, with the same value in 2019. The value of agri-food imports experienced an increase from 5167.0 mil. USD in 2009 to 9535.1 mil. USD in 2019. The agri-food trade balance is mostly negative during the analysed period.

Figure 2. Romania external trade, 2009 – 2019, mil. USD

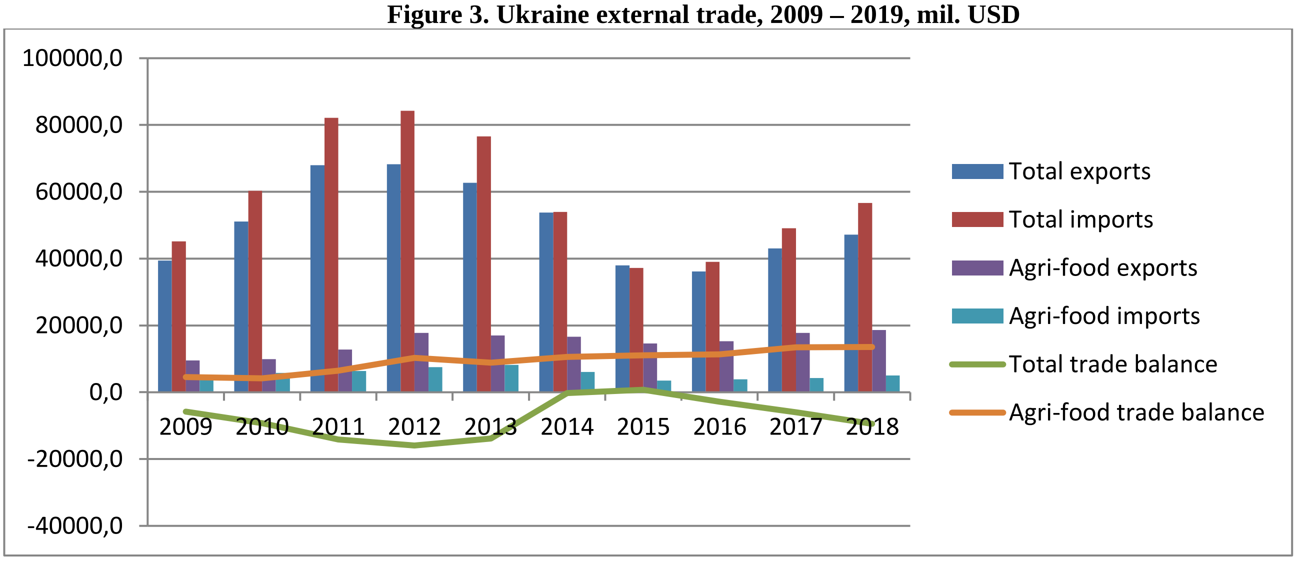


Source: own calculations based on WITS database (2020)

In Ukraine, the share of the agri-food exports in the total exports varies from 24.2% in 2007 to 39.5% in 2018. The value of agri-food exports increased from 9514.8.84 mil. USD in 2009 to 18611.5 mil. USD in 2018.

The share of agri-food imports in the total value of imports accounted for 10.9% in 2009, decreasing to 8.9% in 2018. The value of agri-food imports experienced an increase from 4579.0 mil. USD in 2009 to 13556.4 mil. USD in 2018. The agri-food trade balance is positive all over the analysed period, with a considerable increase in the last 5 years.

Figure 3. Ukraine external trade, 2009 – 2019, mil. USD



Source: own calculations based on WITS database (2020)

The analysis of the comparative advantage of Moldovan, Romanian and Ukrainian agricultural commodities includes two aspects: the comparative export advantage of agricultural products with respect to world exports, and also vis-à-vis the EU countries.

Thus, with respect to the world trade, in 2019, high values of RCA has been identified for the following commodities groups:

Republic of Moldova: oil seeds and oleaginous fruits – 16 (with a considerable increase compared to 2009 and 2014), cereals – 12.4 (increase of the indicator), edible fruits and nuts – 10.1 (decrease from 18 in 2009 and 15.1 in 2014), beverages – 9.5 (considerable decrease) and vegetable planting materials – 7.3. At the same time, very low indicators are observed in the livestock commodities groups.

Romania: cereals – 5.6 (increase compared to 2009), tobacco – 5.6, live animals – 4.3 and oil seeds – 2.7. For the rest of the commodity groups, RCA has values lower than 1, meaning the lack of comparative advantage.

For Ukraine, due to data limitations for 2019, the intermediate period (2014) has been analyzed, being identified high values for vegetable paiting materials – 32.8, cereals – 18.6, animal or vegetable fats and oils – 13.9, oil seeds – 5.8.

Considerable common disadvantages for the three countries in relation to the world market can be observed for some commodity groups like fish and crustaceans, live trees, coffee and tea, lac and gums, being explained by a low level of production or undercompetitive products in these fields.

Table 1. RCA for agri-food exports from Moldova, Romania and Ukraine with respect to the world market, 2009, 2014, 2019

	Republic of Moldova			**Romania**			**Ukraine**		
Commodity group / Year	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**
01 – Live animals	1,2	2,2	2,4	4,0	4,6	4,3	0,2	0,2	n/a
02 – Meat and edible meat offal	0,2	2,1	0,4	0,3	0,5	0,4	0,3	1,0	n/a
03 – Fish and crustaceans	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,0	n/a
04 – Dairy produce	0,8	1,4	1,2	0,4	0,5	0,5	2,5	2,0	n/a
05 – Products of animal origin	0,1	0,1	0,3	0,6	1,1	0,8	0,3	0,5	n/a
06 – Live trees and other plants	0,3	0,4	0,5	0,0	0,0	0,0	0,0	0,0	n/a
07 – Edible vegetables	0,8	1,8	0,8	0,3	0,4	0,3	1,0	0,7	n/a
08 – Edible fruit and nuts	18,0	15,1	10,1	0,2	0,3	0,1	0,8	0,5	n/a
09 – Coffee, tea	0,1	0,1	0,2	0,1	0,1	0,2	0,1	0,1	n/a
10 – Cereals	8,3	11,9	12,4	3,4	5,7	5,6	14,3	18,6	n/a
11 – Products of the milling industry	0,6	1,1	0,4	0,2	0,2	0,2	2,0	2,2	n/a
12 – Oil seeds and oleaginous fruits	10,6	12,2	16,0	2,7	2,9	2,7	5,4	5,8	n/a
13 – Lac; gums, resins	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	n/a
14 – Vegetable plaiting materials	4,5	8,0	7,3	1,0	0,6	0,4	1,5	32,8	n/a
15 – Animal or vegetable fats and oils	9,3	6,5	4,7	0,7	0,8	0,6	10,6	13,9	n/a
16 – Preparations of meat, of fish	0,1	0,0	0,0	0,4	0,8	0,9	0,3	0,2	n/a
17 – Sugars and sugar confectionery	9,5	9,8	1,5	0,4	0,6	0,2	1,5	1,1	n/a
18 – Cocoa and cocoa preparations	0,7	1,0	0,9	0,3	0,3	0,5	4,4	2,2	n/a
19 – Preparations of cereals, flour	1,4	2,0	1,2	0,4	0,6	0,6	1,4	2,0	n/a
20 – Preparations of vegetables, fruit	10,5	7,8	7,1	0,2	0,2	0,3	1,0	1,7	n/a
21 – Miscellaneous edible preparations	0,6	0,9	0,6	0,5	0,6	0,5	0,6	1,1	n/a
22 – Beverages, spirits and vinegar	18,7	13,7	9,5	0,3	0,3	0,3	1,7	0,8	n/a
23 – Residues and waste from the food industry	1,6	2,0	1,9	0,5	0,8	0,7	1,9	4,6	n/a
24 – Tobacco	4,3	3,2	3,3	4,4	5,9	5,6	1,9	2,8	n/a

Source: own calculations based on UNComtrade data (2020)

With respect to the EU countries, in 2019, Republic of Moldova had the highest RCA values for the following commodity groups: oil seeds – 28.8, cereals – 13.9, animal or vegetable fats and oils – 7.8, edible fruits and nuts – 7.5. and vegetable plaiting material 5.1. The 4-digit detalization of the highest RCA values of the commodity groups show that within commodity group 08 - Edible fruit and nuts, the highest indices of RCA are for nuts – 74.7, grapes – 12.5 and apricots, cherries, peaches – 6.4. In the commodity group 10 – cereals, the highest share is hold by maize – 49.9, wheat – 43.5 and barley – 5.2. For sunflower seeds – Republic of Moldova has an RCA of 111.1 in 2019. The highest figures come to prove, once again, the specialization of the country on low added value products like maize, wheat and sunflower.

Romania holds high values of RCA in 2019 at oil seeds – 5.6, cereals – 4.6 and tobacco – 4.6. The rest of the commoditiy groups accounted values less than 1.

As for Ukraine, in 2014, a high RCA rate has been observed in vegetable plaiting materials – 171.2, cereals, 23.8 and oil seeds – 18.3.

Table 2. RCA for agri-food exports from Moldova, Romania and Ukraine with respect to the EU market, 2009, 2014, 2019

	Republic of Moldova			**Romania**			**Ukraine**		
Commodity group / Year	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**
01 – Live animals	0,0	0,0	0,0	1,9	1,2	0,9	0,0	0,0	n/a
02 – Meat and edible meat offal	0,0	0,0	0,0	0,2	0,4	0,3	0,0	0,3	n/a
03 – Fish and crustaceans	0,0	0,0	0,0	0,1	0,1	0,0	0,0	0,1	n/a
04 – Dairy produce	0,0	0,6	0,6	0,2	0,3	0,3	0,1	0,3	n/a
05 – Products of animal origin	0,3	0,1	0,1	0,7	1,2	0,8	0,7	0,5	n/a
06 – Live trees and other plants	0,1	0,0	0,1	0,0	0,0	0,0	0,0	0,0	n/a
07 – Edible vegetables	0,1	0,1	0,3	0,3	0,3	0,3	0,4	0,2	n/a
08 – Edible fruit and nuts	7,7	11,4	7,5	0,1	0,2	0,1	0,8	0,7	n/a
09 – Coffee, tea	0,3	0,1	0,3	0,1	0,2	0,2	0,1	0,1	n/a
10 – Cereals	10,7	12,8	13,9	3,6	3,8	4,6	10,5	23,8	n/a
11 – Products of the milling industry	1,1	1,3	0,6	0,2	0,2	0,2	0,3	0,4	n/a
12 – Oil seeds and oleaginous fruits	20,3	19,5	28,8	5,5	5,0	5,6	30,3	18,3	n/a
13 – Lac; gums, resins	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	n/a
14 – Vegetable plaiting materials	15,3	19,5	5,1	2,4	1,3	0,8	11,0	171,2	n/a
15 – Animal or vegetable fats and oils	6,9	11,1	7,8	0,7	0,7	0,7	9,9	8,9	n/a
16 – Preparations of meat, of fish	0,0	0,0	0,0	0,4	0,7	0,7	0,0	0,0	n/a
17 – Sugars and sugar confectionery	7,8	3,8	1,8	0,6	0,7	0,3	0,6	0,5	n/a
18 – Cocoa and cocoa preparations	0,6	0,4	0,5	0,1	0,2	0,3	0,5	0,3	n/a
19 – Preparations of cereals, flour	1,1	1,5	0,9	0,2	0,3	0,4	0,2	0,2	n/a
20 – Preparations of vegetables, fruit	4,3	5,0	4,7	0,1	0,1	0,2	0,3	1,5	n/a
21 – Miscellaneous edible preparations	0,1	0,1	0,1	0,3	0,4	0,5	0,2	0,2	n/a
22 – Beverages, spirits and vinegar	3,5	2,8	3,7	0,2	0,2	0,2	0,4	0,2	n/a
23 – Residues and waste from the food industry	0,4	0,7	0,4	0,5	0,6	0,4	3,6	6,1	n/a
24 – Tobacco	0,5	0,7	0,2	3,7	4,9	4,6	0,0	0,1	n/a

Source: own calculations based on UNComtrade data (2020)

As a result of comparison with the neighbouring countries, one can note that all the countries have increased RCA figures for cereals and oil seeds, making them competitors on the EU market in terms of exporting these products. Unfortunately, the lack of competitiveness of low RCA products represent a significant obstacle in accesing the world and EU markets. At the same time, EU member states supply the market with more competitive products, making, thus difficult for non-EU countries to access certain segments of the market. The livestock sector products would represent an example in this regard, which makes difficult , due to increased safetry requirements and other standard requests, for prducers to acces the EU market.

CONCLUSIONS

External trade of the analysed countries (Republic of Moldova, Romania and Ukraine) differs considerably in terms in volumes and values. All the countries have important growth rhytms in terms of exports of agri-food products during 2009 - 2019, with more moderate growth rates of agri-food imports. Republic of Moldova and Ukraine are emphasized by high share of agri-food exports in the total export value of the counties during the researched period, while Romania has more modest indicators regarding this chapter. The agri-food trade balance is positive for Moldova and Ukraine, while for Romania – is mostly negative.

Common competitive advantages with respect to EU countries have been observed for cereals and oil seeds, while considerable disadvantages for the three countries have been noted for fish and crustaceans, live trees, coffee and tea, lac and gums.

The perspectives on competitiveness of Moldova's agri-food products should rely on development of added value agri-food production, increase of productivity, improvement of the quality of products, development of quality standard infrastructure, development of other sectors, like the livestock one, etc.

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ECONOMIC ADVANTAGES OF USING BACTERIAL BIOPREPARATIONS IN AGRICULTURAL CROPS

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Summary: *The ecological, genetic, biological approach proposed by agricultural specialists in order to protect plants and crops has a role in reducing the impact of pests through the process of selection and improvement of genetic resources in the processes of planting, development and introduction of biological means to combat pests in agricultural ecosystems. The strategies proposed by the specialists in the agricultural field aim not at the total extermination of the pests from the agricultural crops but at keeping the pest populations at the optimal damage threshold. The most important advantages of these biological processes are those of the evolutionary stability of the crop systems, the ecological stabilization of the pest and crop populations as well as the assurance of a superior quality of the resulting agricultural products.The present paper aims to present the main advantages of using bacterial biopreparations in agricultural ecosystems (research conducted in agricultural research stations in Romania), reducing soil pollution, environmental crops, use of alternative fertilization and cultivation technologies as well as obtaining additional, ecological productions.The aim of this paper is to present the economic advantages of using bacterial biopreparations in agricultural research and development stations, reducing costs in agriculture and the processes that these bacterial biopreparations have on the agricultural ecosystem, the environment and humans and animals.*

Keywords: *bacterial biopreparations, bioinsecticide, green fertilization technologies, economic advantages*

JEL classification: Q56, Q12, Q57.

INTRODUCTION

Every year the quality of the soil and their fertilization decreases due to the excessive use of chemical fertilizers, in increasing doses. Excessive use of chemical fertilizers has led to changes in soil structure and processes, for which the crop ecosystem suffers. A first negative aspect is the acidification of the soil. Through this negative process the pH of the soil becomes acidic fact for which the physiological systems of the plants do not adapt, the plant suffers from certain deficiencies of mineral elements and gradually, as a result of acidification of the soil, the plants dry out. Another negative aspect is the serious impact of the attack of harmful organisms that manifests itself in agricultural ecosystems, organisms that can be so different species of pests, weeds, pathogens in a proportion of approx. 30-35%. Crop losses per agricultural calendar year exceed about 60% (for all cultivated species). In order to reduce these issues, farmers need to use certain technologies so as to avoid crop losses.

MATERIAL AND METHOD

In order to prove the advantages of bacterial biopreparations, certain live bacterial cultures such as *Azotobacter chroococcum, Azospirillum lipoferum, Bacillus megaterium* and *Bacillus thuringiensis* (figures 1, 2, 3 and 4) were used for research in the research and development stations for agriculture in Romania. Following the use of bacterial biopreparations, the pedo-climatic parameters of the ecosystem within the agricultural crops, the biometric data of the crops to which bacterial biopreparations were applied, the production differences between the biologically and chemically fertilized lots and the quality of the soil, plants were followed. and agricultural products obtained. On the lots, major differences were identified both in terms of quantity of agricultural production but especially in terms of quality (soil, plant, production).

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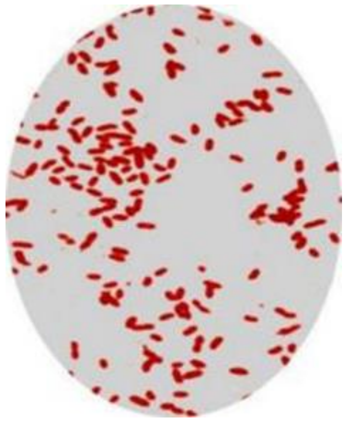

Figure 1- *Azotobacter chroococcum*

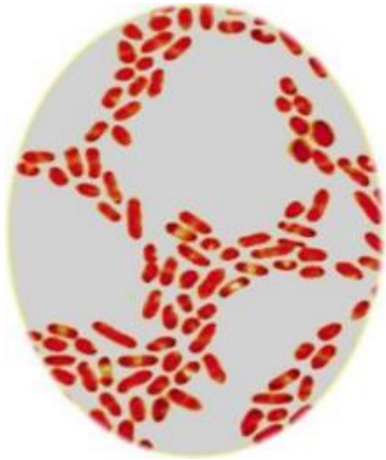

Figure 2- *Azospirillum lipoferum*

Figure 3- *Bacillus megaterium*

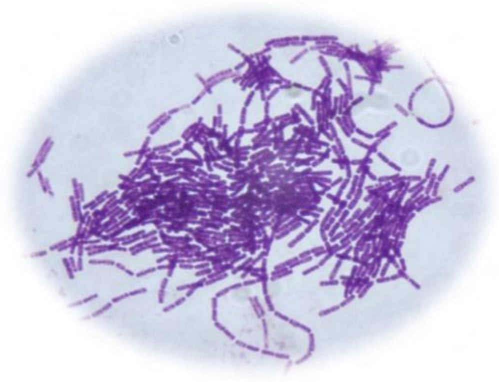

Figure 4- *Bacillus thuringiensis*

RESULTS AND DISCUSSIONS

From an optimo-economic point of view, the use of bacterial biopreparations in agricultural crops has the direct effect of increasing agricultural production by stimulating the growth and development of plants so that the yields of biologically fertilized lots will be higher than chemically fertilized lots. From the economic point of view (of the profit) for the crops tested within the research-development stations for agriculture we have the following optimo-economic situations:

1. Buzau Vegetable Research and Development Station (table 1, 2 and 3):

Table 1. “Buzău” seed cabbage cultivation

Lots	**Average seed production kg / ha**	**Sale price / kg**	**Seed price / ha**	**MMB g**	**No seeds / 1 g**
V1 – Fertilized control	422.46	300	126738	4.11	243
V2 - Rom-Agrobiofertil NP	1171.76	300	351528	6.76	147.8
Growth (%)	**177.37**	**0.00**	**177.37**	**64.48**	**-39.18**

Lot	**Total value of seeds / lei**
V1 – Fertilized control	126,738.00
V2 - Rom-Agrobiofertil NP	351,528.00
Growth (%)	**177.37**
Profit	**224,790**

Table 2. Tomato cultivation "Buzau 1600"

Lots	**No fruit / plant**	**Fruit weight (g)**	**Total seed production (kg / ha)**	**Price kg of seeds**	**Profit lei**
V1 – Fertilized control	8.4	123.9	550	1000	550000
V2 - Rom-Agrobiofertil NP	10.6	137.9	897	1000	897000
Growth (%)	**26.20%**	**11.29%**	**63.09%**	**0.00%**	**63.09%**

Lots	**Total value of seeds / lei**
V1 – Fertilized control	550,000.00
V2 - Rom-Agrobiofertil NP	897,000.00
Growth (%)	**63.09**
Profit	**347,000**

Table 3. Tomato culture "Florina 44"

Lots	**Green fruit weight / pl (kg)**	**Total fruit / plant production (kg)**	**Total number of fruits / plant**	**Total production t / ha**	**Seed quantity kg / ha**	**Profit (900 lei/kg)**
V1 – Fertilized control	1.06	1,862	25.4	78.3	1117	1005300
V2 - Rom-Agrobiofertil NP	2.1	3,351	35.55	132.6	1739	1565100
Growth (%)	**49.52%**	**79.97%**	**39.96%**	**69.27%**	**55.68**	**55.68**

Lots	**Total value of seeds / lei**
V1 – Fertilized control	1,005,300.00
V2 - Rom-Agrobiofertil NP	1,565,100.00
Growth (%)	**55.68**
Profit	**559,800**

2. Bacău Vegetable Research and Development Station (table 4):

Table 4. Corn culture ..sweet from Bacău ”/ beans“ Auria Bacăului ”

Lots	Corn ..dulce de Bacău”	Price/ kg	Profit/lei	Bean ..auria Bacăului”	Price/ kg	Profit/lei
V1 – Fertilized control	7896	50	394800	1058	100	105800
V2 - Rom-Agrobiofertil NP	8760	50	438000	1219	100	121900
Differences lots kg / ha	864 kg/ ha	0	**43200**	161 kg/ ha	0	**16100**
Growth (%)	**10.94%**	0	**10.94**	**15.22%**	0	**15.22**

Lots	**Total value of seeds / sweet corn**	**Total value of seeds / lei of golden bean beans**
V1 – Fertilized control	394,800.00	105800
V2 - Rom-Agrobiofertil NP	438,000.00	121900
Growth (%)	**10.94**	**15.22**
Profit	**43,200**	**16,100**

3. Suceava Agricultural Research-Development Station (table 5):

Table 5. Rapeseed and phleum cultivation

Lots	**Rape (kg/ha)**	**Phelium (kg/ha)**
Chemical fertilized lot (complex 16:16:16)	3260	240
Organic fertilized lot (Rom-Agrobiofertil NP)	3680	310
Growth (%)	12.88 %	29.17 %
Lot differences kg / ha	420 kg	70 kg

The economic advantages of bacterial biopreparations, compared to a chemically fertilized lot, are the sustainability of plants through the processes of decomposition of insoluble elements in the soil structure into soluble elements, easily assimilated by plants. Thus, increasing the level of soil elements leads to a significant growth of plants. A high growth of plants denotes their development by the number of shoots. A number of shoots will lead to a much larger number of inflorescences, which will lead to a larger number of fruits than a chemically fertilized lot. A higher number of fruits per plant denotes a higher amount of fruit per hectare and, implicitly, a higher total production in the organic lot compared to a chemically fertilized lot.

Direct economic advantage

Bacterial biopreparations have many more advantages over fertilizers or fertilizers and plant protection products based on chemical compounds. But the biggest advantage of using bacterial products is their economic part. From a series of comparisons by chemicals with similar action as a biological fertilizer (bacterial biopreparation) their biggest advantage is the PRICE. Thus, from table 6 we can identify a number of differences in the price of chemicals compared to bacterial biopreparations.

Table 6. Competitive advantage chemical fertilizer vs biological fertilizer (price)

Type of fertilization product	**Culture of**	**Dose / ha**	**Presentation form**	**Total ha (bags / bottles)**	**Bag / bottle price (lei)**	**Total cost/ ha**	**Cost: Chemical fertilizer vs biological fertilizer/ ha**	**Cost: Biological fertilizer vs chemical fertilizer ha**
Chemical Fertilizer (Complex 16:16:16)	Rape	300	Bag x 50 kg	6	85	510	**11.57**	**-10.37**
NPK-20-20-0	Barley and triticale	300	Bag x 50 kg	6	92	552	**20.76**	**-17.19**
NPK-15-15-15		400	Bag x 50 kg	8	95	760	**66.26**	**-39.85**
NPK-15-15-15	Corn	500	Bag x 50 kg	10	95	950	**107.83**	**-51.88**
NPK-22-10-10+B+Zn		300	Bag x 50 kg	6	80	480	**5.01**	**-4.77**
NPK-20-20-0		400	Bag x 50 kg	8	92	736	**61.01**	**-37.89**
NPK-15-15-15	Sunflower	500	Bag x 50 kg	10	95	950	**107.83**	**-51.88**
NPK-20-20-0		350	Bag x 50 kg	7	92	644	**40.89**	**-29.02**
Organic Fertilizer (Rom-Agrobiofertil NP)	All crops	15	Bottle x 10 l	3	152.37	**457.11**	0	0

In terms of (direct) economic advantage, bacterial biopreparations have a much lower price than conventional chemical fertilizers. Referring to the activity that bacteria have on the soil, we can say that to achieve or achieve the same bacterial processes in the soil, farmers must use certain products that have the same role (more or less) as chemical fertilizers. . Thus, in order to reduce costs in agriculture, specialists propose the use of these bacteria. The production of enzymes, acids, hormones by them play an important role in the agricultural ecosystem. In order to achieve the same performance with chemicals, farmers should invest a much larger amount but without knowing if they will get a higher production or, implicitly, an additional profit.

Another aspect related to the direct advantage (from an economic point of view) of fertilizers based on bacterial cultures is the application technologies. Bacterial biopreparations are recommended to be applied in the form of two treatments regardless of their form (liquid or powder). The fact that the farmer will make two treatments (one in soil preparation and one in spring) will reduce both the cost per fuel, the cost of labor, the cost of consumables (spare parts) for machinery but especially the compaction of soil by technical equipment. This aspect represents for farmers a decrease of costs by up to approx. 35% of the total expenses from the own farm.

Another economic advantage of using bacterial biopreparations in agricultural ecosystems is the surplus of mineral elements that they provide to crops. Through the activity and processes carried out in the soil structure (decomposition, solubilization, permeability, phytopathological protection, plant growth, seed material stimulation, seedling material stimulation, etc.) bacteria provide all the elements that plants need in their growth and development. As a result of these processes, farmers reduce the costs of applying phytosanitary treatments or soil, plant improvers or products to stimulate the growth and development of seed / planting material. The fact that oil benefits from a surplus of mineral elements without the application of chemical technologies represents a cost savings of about 40% for farmers.

Another aspect directly related to the reduction of the cost and the optimo-economic advantage of microorganisms is the enrichment of the soil with nitrogen. The fact that nitrogen, along with phosphorus and potassium are the basic elements of plant growth and development, with the help of bacteria farmers reduce the costs of both the purchase of nitrogen-based fertilizers but especially by reducing intervention on soil and crops. The fact that nitrogen-fixing bacteria in these biopreparations fix atmospheric nitrogen in the soil through certain processes, automatically farmers will have an economic benefit, the amounts needed to purchase nitrogen-based fertilizers can be used for other purchases or investments.

Indirect economic advantage

The use of bacterial biopreparations in agricultural crops aims to obtain much higher yields than chemically fertilized crops, a significant increase in mineral elements in the soil and greening soils containing large amounts of insoluble complex compounds by solubilizing them by bacteria used. From an economic point of view, bacterial biopreparations have much greater advantages over conventional chemical fertilizers as follows:

1. Bacterial biopreparations have the role of producing hormones, vitamins, growth stimulants that have a role in the growth and yield processes of plants. The use of combinations of bacteria and their application in agricultural ecosystems have the role of reducing the application of chemical fertilizers or chemical compounds in the form of stimulants, growth hormones, etc.

2. The use of microorganisms in agricultural ecosystems is a competitive, complex process, the bacteria used having a role in extra and intra-cellular communication to plants through certain compounds produced by the microorganism and plants so as to process the processes of consumption of mineral nutrients in the soil. to the roots of plants.

3. Production of bioactive factors: root exudates, vitamins, amino acids

3.1. Root exudates are produced exclusively by plant roots and the interaction with the activity of microorganisms in the soil structure. They represent chemical compounds based on organic acids and sugar, polyamines. These exudates have the role of stimulating root growth, increasing the activity of soil microorganisms and the production of certain types of acids such as lactic, succinic, malic, oxalic, amides, etc.

3.2. Amino acids. Compared to a chemical fertilizer, bacterial preparations have the advantage of producing certain amino acids with an important role in plant growth, stimulation of seed material (germination), stimulation of plant fruiting and (all in an ecological system based on bacterial activity in the soil and their interaction with plant roots). Among the most important acids produced by the activity of bacterial biopreparations we mention: glutamic acid, succinic, lactic, oxalic, butyric acid, etc.

3.3. The production of growth promoters (compared to chemical fertilizers, the advantages of using bacterial biopreparations, from an economic point of view is to reduce costs. The use of microorganism products compared to a chemical fertilizer has the advantage of producing formulations with the same bacteria, in order to apply a growth stimulant or certain enzymes necessary for the growth and development of plants, farmers have to buy, in addition to chemical fertilizers and other products, which is an additional cost).

4. Production of phytohormones (phytohormones produced by the microorganism have a role in plant respiration processes, essential plant processes - photosynthesis / chemosynthesis - plant metabolism, acceleration of plant root absorption system, influence of seed germination, plant growth, height inflorescence and increasing the number of fruits per plant).

5. Production of metabolites (metabolites are biological components produced by bacteria or plants that play a role in stopping certain pests or diseases in that crop. Using a fungicidal product would mean an additional cost for the farmer).

6. Enzyme release (process by which bacterial activity based on certain enzymes and soil-bacterium-plant processes produces enzymes. In conventional crops farmers use in addition to the recommended dose of fertilizer per hectare and other products in order to produce or induce certain enzymes necessary for growth and plant development).

7. The production of antibiotics (certain species of bacteria such as Bacillus spp. have a role in the production of phenazine antibiotics, which have the role of balancing the nutrient reserves of the soil, induces a resistance of the root to certain diseases and pests, contributes to antagonistic activity against certain phytopathogens).

8.

CONCLUSIONS

The use of bacterial biopreparations in agricultural ecosystems has the role of stimulating plant growth, restoring soils affected by excessive use of chemical fertilizers, decomposition of complex compounds in soil structure, conferring insoluble matter in the soil into soluble matter, supporting the production and fruiting of plants and , amino acids with an important role in protecting plant roots and plants themselves from certain diseases or certain specific pests. The fact that bacteria lead to the activation of many processes in the soil structure, which are able to produce enzymes, proteins, acids and even the solubilization of insoluble compounds in the soil into soluble compounds, is a significant cost reduction for farmers. Purchasing products that have the same role as the processes and activity of soil microorganisms is an additional cost for a farmer, a cost that is constantly growing. The fact that farmers want to obtain large yields in order to obtain much higher profits, they will use a large amount of chemical fertilizers, in increasing quantities / doses.

By using bacteria beneficial to the soil and agricultural ecosystems, farmers reduce the costs of related chemicals because bacterial activity in organic fertilizers or bioinsecticides, biofungicides used will lead to greening (primarily) the soil, to stimulate planting material (the farmer will have to I buy a chemical = additional cost), crop plants or, implicitly, agricultural production, the farmer will have to focus on these bacterial components.

The microorganisms proposed by agricultural specialists have the role of balancing the soil balance, to ensure the nutrients that plants need in their processes and to ensure a greening of the soil by breaking down complex compounds in the soil. The fact that the farmer uses a scarification technology (plowing between 30-70 cm) so as to bring to the surface the harpoon (resulting from the compaction of the soil and the leaching of complex compounds) for him will represent an additional cost. The use of microorganisms will lead to loosening of the soil, to the decomposition of complex compounds in the soil as well as to the destruction of the harp and obtaining a loose soil, malleable and with a much higher permeability.

Approx. 65% of Eastern Europe's agricultural land suffers from compaction. This phenomenon will lead to production losses between 15% and 35%. As a result, the farmer, with additional costs can obtain either a production enough to bring him a certain profit but also a loss caused by these aspects. Referring to this aspect, we can say that a farmer who has about 1000 ha of land cultivated with corn, wheat and soybeans the losses would be very high (table 7 and 8).

Table 7. Soil compaction- production affected

Culture of	**Harvest tons / ha**	**€/ tone**	**Profit/ha**	**Loss per harvest per 1000 ha**		
				15%	**25%**	**35%**
Grain	5	€ 150	€ 750	€ 113	€ 188	€ 263
Corn	7	€ 140	€ 980	€ 147	€ 245	€ 343
Soya	2.2	€ 330	€ 726	€ 109	€ 182	€ 254

Table 8. Soil compaction-yield reduction

Culture of	**Harvest tons / ha**	**€/ tone**	**Profit/ha**	**Loss per harvest per 1000 ha**		
				15%	**25%**	**35%**
Grain	5000	€ 150	€ 750	€ 113,000	€ 188,000	€ 263,000
Corn	7000	€ 140	€ 980	€ 147,000	€ 245,000	€ 343,000
Soya	2200	€ 330	€ 726	€ 109,000	€ 182,000	€ 254,000

As a result, the use of bacterial cultures has the role of restoring the soil structure, stimulating the seed material in the soil, stimulating the planting material or seedlings in the respective agricultural ecosystem, decomposing complex compounds into soluble forms, easily assimilated by plants. These processes carried out by soil bacteria lead to increased farm yield processes, reduced costs, increased production and, consequently, a large increase in income. Thus, microorganisms used in agricultural crops have a beneficial role both for the ecosystem itself, but especially for the "pockets" of farmers, in their "fight to reduce costs."

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RURAL TOURISM AND TERRITORIAL DEVELOPMENT IN ROMANIA

ELENA SIMA[1]

Abstract: *Rural tourism in Romania has significant potential. The Romanian effort to develop and promote tourism in the rural area has been completed by the support provided by the European Union funds. In this context, the objective of this paper is to highlight the territorial development of the rural tourism market after the Romania's accession to the European Union. The methodology used is based on the synthesis of information from articles and studies published in specialty journals, in Government documents as well as in other development strategies on tourism and rural space. The results reconfirm that the supply of tourist accommodation in rural areas has shown a general upward trend, despite a slight decline during the global financial crisis, and the investments in rural tourism activity have a great advantage, i.e. job creation and maintaining the local (rural) labour, revitalization of rural localities, mainly those from the less-favoured and remote rural areas.*

Keywords: *rural development, rural tourism, competitiveness, regions, Romania.*

JEL Classification: *Q01, L83, R10, Z30.*

INTRODUCTION

The rural tourism is a segment of the tourism sector. This includes tourism-related practices, while facilitating people's coming into contact with the beauty of nature, earth's richnesses and local people's hospitability. The natural and anthropic tourism resources of a certain area generate specific tourism forms, which complete each other within the different destination categories.

The rural tourism is a niche of the Romanian tourism, insufficiently exploited at present. Our country's territory has a great variety of cultural-historical values (folk art, ethnography, folklore, traditions, historical relics) located in a harmonious natural environment, with a various and picturesque landscape. (1)

In the context in which the physical-geographical potential and the available human resources are the strengths of the conditions in promoting and development of rural tourism, to which the financial and information support from the European Union is added, the small-scale business development in this sector is acknowledged as the most important source of income-gaining jobs in the rural area. (7, 8)

Tourism development on boarding houses located in the rural area depends on the specific characteristics of each region – folklore, ethnography and agricultural products. At regional level, rural tourism development largely depends on the existence and quality of tourist accommodation structures and on the presence of various types of activities, i.e. folklore, ethnographic/cultural heritage and farming and vine growing practice (agro-tourism). (2, 3, 4)

Having in view the positive role which is played by the promotion and development of agro-tourim activity as activity complementary to the agricultural one, organically integrated in the farms' economy, as well as benefiting by a non-polluted picturesque environment, and by the touristic natural attractions and the traditions and habits present in the village environment, the paper explores how the Romanian rural tourism market was approached in tourism policies; how the rural economy reacted and developed due to the sustained promotion and development of rural tourism; and how it can further develop and help rural communities in the Romanian area. (5, 6)

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MATERIAL AND METHOD

The methodology adopted for this study consists of secondary data analysis. Secondary data is data that was previously collected and processed and has been reanalysed to satisfy the needs of this study. The analysed information was collected through the documentary study of the works on the approached theme. The statistical data on which the analysis was based covered the period 2000-2019 and had the following sources: NIS statistical data available online; other online sources with information from articles and studies published in specialty magazines, as well as the National Rural Development Plan (NRDP) and non-governmental reports and documents.

The development potential of tourism activities in the Romanian rural area is analysed at the level of the eight development regions taking into account the evolution of the following statistical indicators: the number of agro-tourism boarding houses, the accommodation capacity, the arrivals and overnight stays of tourists in this type of accommodation, both in whole region and in whole county and rural locality.

The number of agro-tourism boarding houses is an indicator showing that the number of tourist reception structures with tourist accommodation functions together with the specific infrastructure and the tourist fund make up the real tourist offer of an area. The existence of accommodation units signals the presence of tourist activities and reveals a certain degree of development of the sector in the area. The indicator is particularly relevant in the case of mountain locations or those located in areas where tourism is an important component of the local economy. Related to the number of arrivals, the indicator shows even better the tourist attractiveness of the area.

RESULTS AND DISCUSSIONS

The Romanian effort to develop and promote tourism in the rural area has been completed by the support provided by the EU funds since the year 2000, in conformity with the priorities and rural development directions of the National Rural Development Plan (NRDP), established in close connection to the community priorities and in relation to the analysis of the socio-economic and environment situation, obtained on the basis of available statistical data.

After Romania’s accession to the EU (in the year 2007), the financial support for the development of tourism in Romanian rural areas has focused on investments in

- the tourist reception infrastructure and leisure activities (both actions related to the construction, modernization, enlargement and endowment of the tourist reception structures, and private investments in the tourism leisure infrastructure, independent or dependent on the tourist reception structure),
- the small-scale infrastructure (such as the tourism information centers, installation of tourism signs/tourist routes, etc.),
- the development of the marketing of tourism services related to rural tourism (design of promotional materials, information materials, etc.).

The beneficiaries of the financial support are the following:

- existing and newly established micro- and small-sized enterprises in the rural area;
- farmers or members of certain agricultural enterprises who wish to diversify their basic farm activity by developing a non-agricultural activity in the rural area within the already existing enterprise that falls into the category of micro-enterprises and small-sized enterprises, except for the non-authorized physical entities;
- communes as defined in conformity with the current legislation;
- NGOs as defined in conformity with the current legislation;
- religious establishment in conformity with the current legislation;
- authorized physical entities/commercial companies, B class into their administration.

The specific eligible costs are the following:

- construction, enlargement and/or modernization and endowment of buildings;

- procurement and installation costs, under leasing inclusively, of new equipment and installations;

- non-tangible investments: procurement or development of software and procurement of licenses, permits, copyright, trademarks;

- rehabilitation, preservation and endowment of buildings/monuments from the immovable cultural patrimony of local interest, class B;

- construction, enlargement and/or modernization of the access roads of monastic establishments, class B;

- rehabilitation, preservation and/or endowment of monastic establishments, class B;

- modernization, renovation and/or endowment of cultural community centers.

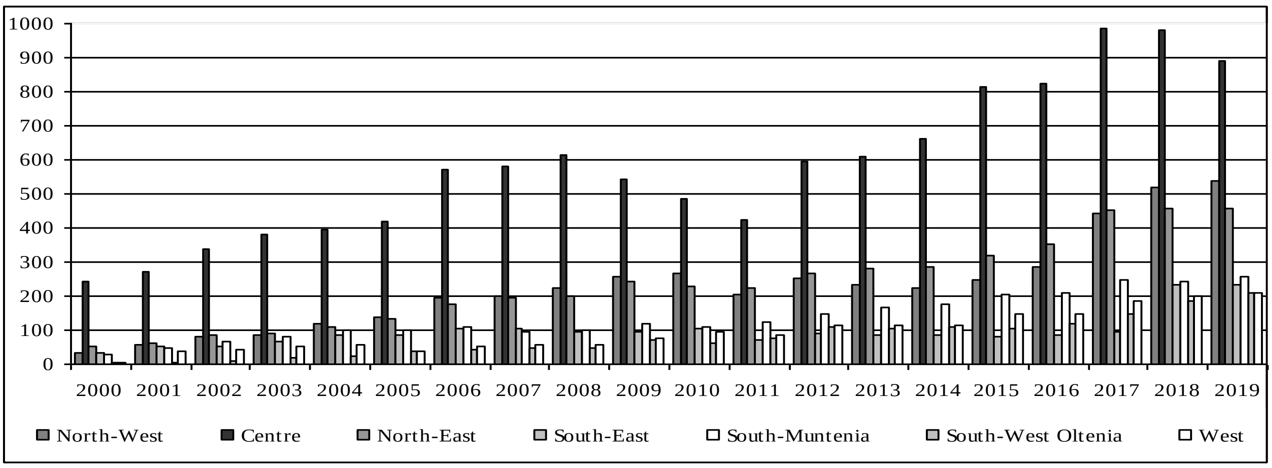
The selection criterion for infrastructure investments on the agro-tourism reception units, leisure activity projects is based on the principle of stimulating the tourism activities in the sense of prioritizing the agro-tourism activities developed in the areas with high tourism potential/ eco-tourism destinations, natural protected areas, which were established in conformity with the National Land Management Plan. The selection criteria for the investments in the rehabilitation and preservation of the cultural heritage of local interest is based on the tourism potential principle, in the sense of prioritizing the projects in the rural localities with tourism development potential.

The Romanian agro-touristic potential is also supported by the variety of natural and anthropic resources determined by the proportionality, concentric disposal and the exposure in amphitheatre form of the three major relief forms (mountains, hills, plains), as well as the maintaining of cultural traditions (literary, musical, popular art, folk art, gastronomy, rreligious habits, etc.). The agro-tourism is a form of tourism emerged from the need to find some solutions for increasing the rural farms incomes by putting into value their potential. This potential refers both to the existent accommodation potential, prepared and arranged mainly for the guests' receiving, and to the goods and services suppplied for consumption to persons coming into the rural environment for relaxing, rest, leisure.

In function to the natural, cultural, folklore environment of the region, *agro-touristic services* offered can vary from meals' serving, accompanying and touristic guide on certain tracks or innitiation in certain traditional crafts, to the practicing of some sports or assistance to a series of traditional habits in the locality or zone (poems sessions, village dances, carols, church holidays, traditional fairs, folklore shows, etc).

The European funds contributed to the development of services related to rural tourism and to the increase of the living standard of the rural people, through the development of the rural economy and of the entire rural space. Thus, in the period 2000-2019 the evolution of the number of agro-tourism boarding houses by development regions continuously developed (Fig. 1).

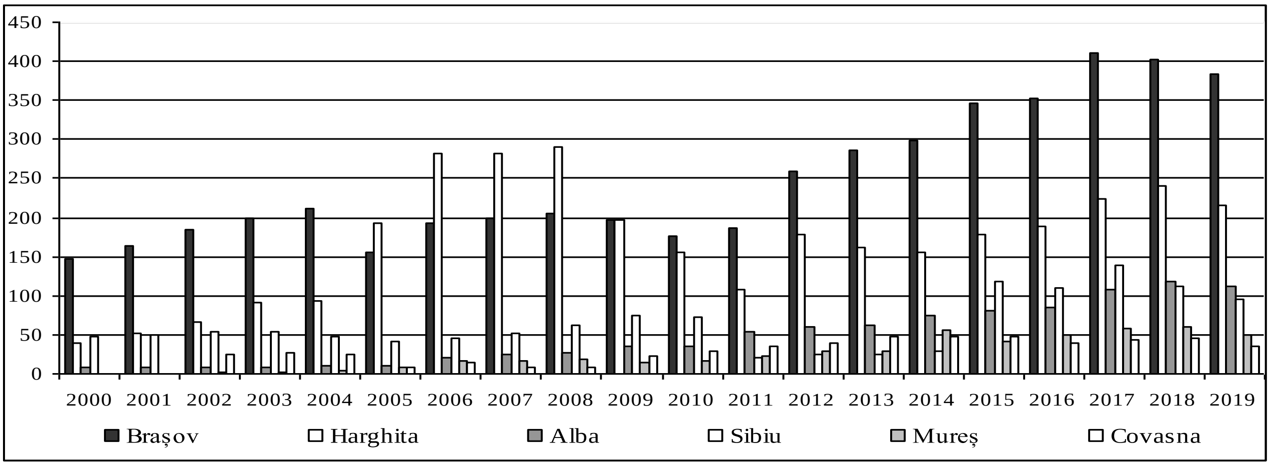
Figure 1. Evolution of the number of agro-tourism boarding houses by development regions, in the period 2000-2019



Sources: Tempo-online database, 2020, http://www.insse.ro/

The main Romanian agro-touristic destinations are mainly situated in the region Centru with mountain and hilly zones in the counties: Brașov (Bran, Moeciu, Fundata), Harghita (Tușnad, Praid, Zetea), Alba (Arieșeni, Râmetea, Garda de Sus), Sibiu (Rășinari, Sadu, Tălmăcel), Mureș (Corunca, Saschiz), Covasna (Arcuș, Bixad).

Figure 2. Evolution of the number of agro-tourism boarding houses by counties of the region Centru, in the period 2000-2019



Sources: Tempo-online database, 2020, http://www.insse.ro/

According to statistical data, at regional level, in 2019, the number of agro-tourism boarding houses registered higher values, exceeding 200 in Brașov, Suceava and Harghita counties and lowest values are registered in the counties with modest touristic resources (Table 1).

Table 1 The clasification of counties based on number of agro-tourism boarding houses in 2019

Over 200 agro-tourism boarding houses	Brașov (389), Suceava (235), Harghita (215)
Between 150 - 200 agro-tourism boarding houses	Cluj (164), Argeş (161), Neamț (152)
Between 100 - 150 agro-tourism boarding houses	Maramureş (147), Bihor (127), Tulcea (118), Alba (113)
Between 50 - 100 agro-tourism boarding houses	Sibiu (96), Caraş Severin (86), Vâlcea (78), Gorj (76), Buzău (62), Hunedoara (59), Bistrița-Năsăud (57)
Under 50 agro-tourism boarding houses	Mureş (49), Prahova (45), Mehedinți (41), Arad (39), Bacău (39), Covasna (36), Dâmbovița (36), Sălaj (31), Vrancea (30), Timiş (27), Constanța (20), Satu Mare (12), Iași (19), Vaslui (11), Dolj (10), Olt (4), Galați (3), Călărași (2), Giurgiu (2), Teleorman (2), Botoșani (2), Ialomița (2), Brăila (1)

Sources: Tempo-online database, 2020, http://www.insse.ro/

In Romania, the quality of agro-touristic services presents important differences within the territorial profile. These differences are due to several factors:

- the quality of the communication and transportation infrastructure varies across different regions and locations;
- there are significant differences regarding the quality of the natural touristic resources and the purpose built tourism resources across different regions;
- quality standards aren't implemented and respected across all regions in the same way.
- the agro-tourism strategy for development and marketing is not clearly defined nationally or locally; attention is paid more to other forms of tourism that might include agro-tourism activities;
- the lack of a strategic management system regarding agro-tourism development in Romania.

In the last decades, the world of the Romanian village was in a continuous transformation process leading to the modification both of the rural localities specific, and of the demographic, occupational, values coordinates of the population.

In this context, agro-tourism proved to be an antidote of the subsistence agricultural production structures, a privilege of the economic phenomenon of pluriactivity and a promotor of founding of a rural society the socio-economic basis of which is represented by the middle class.

For the analysed period, the European programs for the financing the investments in the Romanian agro-tourism represent an opportunity insufficienly put into value, although in the zones in which agro-touristic activity developed, this had a strong favourable impact not only upon the economic and touristic framework of the localities, but also upon their social, cultural, spiritual and ecologic framework.

CONCLUSIONS

The analysis of the territorial distribution of the agro-tourism activities emphasized the causes which determine certain significant differences. The quality of the transport and communication infrastructure contributes to the different development of the touristic areas, representing, in several situations, the essential condition for starting an investment project in the agro-tourism field.

The Romanian agro-tourism sector is adversely affected by the lack of organization, promotion and dissemination of information on the tourism centers and by the limited number of these centers activating at local level. Rural tourism is not fully developed so as to meet the market needs at national and international level, while the tourism infrastructures in particular do not comply with the requirements and needs with regard to the accommodation and recreational structures, from the qualitative and quantitative point of view.

Agro-tourism attracts a wide range of people from all social classes with many interests and motivations. The agro-tourism sector benefits greatly from further support and increased regulations. Further financial support, technical support, land-use guidelines and developing a platform for agro-tourism business owners to share success stories are just some of the tools and measures that could be used to enhance this type of tourism in Romania.

From the annual reports about progresses regarding tthe implementation of the National Rural Development Programs in Romania made by the Ministry of Agriculture and Rural Development it results an average level of financial absorbtion of measures enccouraging rural tourism and implicitly agro-tourism because of lack of own resources of the stakeholders and the difficulties with which they are confronting to obtain the loans ensuring the co-financing necessary to projects' implementation, as well as because of the long period of financing and implementing the integrated infrastructure projects. The reasons for the slow development of the Romanian agrotourism are also holding to the up to bottom approach of the different strategies, to the non-implication of authorities and rural communities, to the systematic non-alocation of funds innitially foreseen and to the lack of any priorities to be maintained on a sufficiently long term.

As a consequence, the strategic direction of action for the next years must ensure the legislative foundation from which the whole system of institutional-legislative instruments should start, meant to foster tourism development and diversification in Romania, as a strong and efficient platform for guaranteeing the sustainable economic and social development.

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OPPORTUNITIES FOR BIOECONOMY IN CENTRAL AND EASTERN EUROPEAN COUNTRIES

DAN-MARIUS VOICILAS[1]

Abstract: *During the last years, the strategies and policies in the world have moved to bioeconomy concept. However we define the bioeconomy, the future of humanity will have to focus on this concept and what derives from it. For European countries, whether EU states or non-EU countries, the bioeconomy will play an important role in their national economy, by policies and strategies promoted. The goals of this paper are to present the bioeconomy concept, the EU bioeconomy strategic agenda, the state of the national bioeconomy strategies creation and implementation at EU level, and the main opportunities and challenges for CEE countries. To carry out this work, data available from different European bodies with responsibilities in this field were used. A text analysis of these documents, a comparative analysis of the implementation stages, as well as forecasts on the chances of approval and implementation of these strategies in the next period were performed. Part of the results of this study is based on the analyses carried out within the Horizon 2020 project "Advancing Sustainable Circular Bioeconomy in Central and Eastern European countries" (BIOEASTsUP). Through the results of this research we consider that, we can offer a broad perspective on the bioeconomy at the level of the EU, CEE countries, as well as Romania, with their own characteristics, opportunities and challenges for the near future.*

Key words: *Bioeconomy, EU Strategic Agenda, National strategies, CEE countries*

JEL classification: *Q57*

INTRODUCTION

During the last years the strategies and policies in the world have moved to bioeconomy concept. For European countries, whether EU states or non-EU countries, the bioeconomy will play an important role in their national economy, by policies and strategies promoted. Not all EU countries created a national bioeconomy strategy. At the end of 2019, only nine EU countries developed a dedicated bioeconomy strategy at national level and other six had dedicated bioeconomy strategy at national level under development (https://ec.europa.eu/knowledge4policy/bioeconomy/country/austria_en). Generally, the countries from Central and Eastern Europe (CEE) are at different stages as regards the creation and the implementation of their national bioeconomy strategies according with bioeconomy strategy that was established at EU level in 2012. Romania is at the beginning of the process, the first steps were already done, but there are many others that must be realised to fulfil the objectives of EU Strategic Agenda. This is the reason why the subject is important and actual for the future evolution of the EU economy and not only.

The objectives we considered in the elaboration of this paper refer to the presentation of the concept of bioeconomy in general, the presentation of the EU's Strategic Bioeconomy Agenda, the stage of creation and implementation of national bioeconomy strategies at EU countries level and last but not least, we will offer ideas of how to create the national bioeconomy strategy in Romania. The main characteristics and differentiations in the evolution of the creation of the national bioeconomy strategies will be analysed, the advantages resulting from their implementation for the states that already have a bioeconomy strategy will be highlighted, what are the opportunities for their implementation and the main challenges for CEE countries will be identified. The benefits of changes in national strategies are many and can be the winning keys to solving all the problems we face today. That is why the opportunity to develop a bioeconomy strategy in line with EU regulations must not

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be lost, so that it is approved and operational at the beginning of the 2021-2027 financial programming period, and EU funds for this purpose can be absorbed.

MATERIAL AND METHODS

To carry out this work, the data available at the level of the European Commission, the European Parliament and other European bodies with responsibilities in this field were used. National data from some EU countries, approved or debated official documents on the bioeconomy were also used. A text analysis of these documents, a comparative analysis of the implementation stages, as well as forecasts on the chances of approval and implementation of these strategies in the next period were performed. Part of the results of this study is based on the analyses carried out within the Horizon 2020 project "Advancing Sustainable Circular Bioeconomy in Central and Eastern European countries" (BIOEASTsUP), funded by the European Commission for the period 2019-2022.

RESULTS AND DISCUSSIONS

There are many definitions for bioeconomy. For instance, the European Commission states “bioeconomy comprises those parts of the economy that use renewable biological resources from land and sea – such as crops, forest, fish, animals, and micro-organisms – to produce food, materials and energy.” *(*https://youmatter.world/en/definition/bioeconomy-definition/) With other words, *“*the bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy independently of the processing technologies. It thus includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, bio-technological and energy industries.” (https://bioeast.eu/bioeconomy/) According to Birner’s paper citing the White House’s National Bioeconomy Blueprint (2012) “bioeconomy is one based on the use of research and innovation in the biological sciences to create economic activity and public benefit. Birner further adds that the U.S. bioeconomy is all around us: new drugs and diagnostics for improved human health, higher-yielding food crops, emerging biofuels to reduce dependence on oil, and biobased chemical intermediates, to name just a few.” (https://youmatter.world/en/definition/bioeconomy-definition/) In a simple way “Bioeconomy can be seen as a knowledge-based production and use of natural/biological resources, together with biological processes and laws, that allow providing economy goods and services in an environmentally-friendly way.” (https://youmatter.world/en/definition/bioeconomy-definition/) However we define the bioeconomy the future of humanity will have to focus on this concept and what derives from it.

The European Commission adopted the Strategy "Innovating for Sustainable Growth: A Bioeconomy for Europe" in 2012. The document includes the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions and the Bioeconomy Action Plan. The goal of the document is to emphasise the importance of the bioeconomy for Europe in addressing major societal and economic challenges and to create a more favourable environment for its realisation (EC, 2012). The text starts from the premises that the world population will reach 9 bil.in 2050 and the natural resources are limited. This is an important reason for EU to look for solutions to keep a balanced development of economies having in view the ecological and environmental aspects, the energy, food supply and the limitation of the natural resources. The Bioeconomy Strategy and the Bioeconomy Action Plan are focusing on three key aspects (EC, 2012):

- developing new technologies and processes for the bioeconomy;
- developing markets and competitiveness in bioeconomy sectors;
- pushing policymakers and stakeholders to work more closely together.

The Strategy elaborated complements other EU policies like the Common Agricultural Policy, the Common Fisheries Policy, the research programs/projects in frame of Horizon 2020, European environmental initiatives, the Blue Growth initiative for the marine sector and the European Innovation Partnership on Sustainable Agriculture.

The Strategy has in view the societal challenges: ensuring food security, managing natural resources sustainably, reducing dependence on non-renewable resources, mitigating and adapting to climate change, creating jobs and maintaining European competitiveness. To develop a coherent bioeconomy there are specific actions that maximize the impact of the Strategy. First is needed a coherent policy, at EU, national and regional level. Secondly, investments in knowledge, innovation and skills are necessary. Thirdly, participative governance and informed dialogue with society will ensure the success of the Strategy. Finally, new infrastructures and instruments are expected like integrated and diversified biorefineries, including small-scale local plants.

The Bioeconomy Action Plan describes the Commission's main actions for the implementation of the Bioeconomy Strategy objectives. It has twelve objectives, in three major areas, which refer to: Investments in research, innovation and skills, Reinforced policy interaction and stakeholder engagement, Enhancement of markets and competitiveness in bioeconomy, each with four objectives. Investments in research, innovation and skills have in view: Research and innovation funding (Horizon 2020), Leadership in biosciences, Implement multidisciplinary education programmes across the EU, Increasing opportunities for high- and low-skilled labour forces. Reinforced policy interaction and stakeholder engagement has in view: Creating a favourable environment for the bioeconomy: policy coherence and cross-sectoral interaction, Policy coherence, Improved policy interactions, Engaging society, reaching end-users and linking with policy makers, Regional approaches, International cooperation for a global bioeconomy, Social innovation. Enhancement of markets and competitiveness in bioeconomy has in view: Agriculture and forestry (Land use and the transition towards more sustainable production, Agriculture and climate change, Livestock production, Forestry, Policies and public goods, Agricultural advisory and support services, extension services), Fisheries and aquaculture (Sustainable fisheries, Sustainable aquaculture, Marine biotechnology), Bio-based industries (Biorefineries, Waste as an alternative biomass source, Biotechnologies, Bio-based products), Food chain (Resource efficiency, Food waste, Packaging, Food safety, Nutrition and dietary choices).

The document also includes a series of actions which are necessary for the implementation of the objectives, which are not discussed in this paper. The reason and the justification of the EU Strategic Action Plan derive from the roles the EU has in the world as regards the future economic development. They are synthetizing as follows: A common view and a global answer for the main challenges, Overall economic added value in a single market, A stronger EU commitment, The benefits of EU research and innovation.

The document ends with four scenarios to assess how to best unlock the innovation and employment creation potential of Bioeconomy research. The analysis of the social, economic and environmental impacts of the four scenarios will allow for identification of the most efficient one to achieve the objectives, while respecting the principles of subsidiarity and proportionality (EC, 2012). The scenarios are:

- SO1: The bioeconomy under "business as usual" conditions;
- SO2: A Non-EU coordinated Research and Innovation in bioeconomy: In this option, EU research efforts in the bioeconomy are discontinued, but are undertaken by Member States;
- SO3: The bioeconomy is supported by enhanced efforts in research and innovation: In this scenario, the bioeconomy research benefits from a new approach supporting the implementation of the Innovation Union through the Horizon 2020 programme: research is performed under an integrated research and innovation approach specifically aiming at tackling societal challenges,

and in an effort to support innovation to allow a better deployment of products and processes on the market and to enhance social innovation. It is also supported by instruments to foster excellence in the science base and create industrial leadership and competitive frameworks. The different policies related to the bioeconomy continue to work on a sectoral approach at both EU and Member States' levels;

- SO4: The bioeconomy supported by reinforced policy interaction and enhanced efforts in research and innovation: In this option, the bioeconomy is given a coherent interaction framework of supportive public policies that aim at reconciling competing activities and overlapping initiatives. Research and Innovation is structured so as to match societal challenges and policy objectives. This scenario links with the CAP and CFP, as well as industry, environment and energy related policies, due to the potential of innovation in these sectors. The future European Innovation Partnership (EIP) on "Agricultural Productivity and Sustainability" as proposed in the reform package for the CAP post 2013 and the Communication "Innovation Union" will, for example, become a key tool for inducing innovation in agriculture. Regional policy contributes to the development of new innovative businesses and infrastructures in Europe. Provision of appropriate human capital requires coordination with training and educational policies.

In 2018, the European Commission lunched the new Bioeconomy Strategy for a Sustainable Europe. Actually, it is an update of the old Strategy, based on the objectives from the political program of former President Juncker and First Vice-President Timmermans of the European Commission. The document is called "A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated Bioeconomy Strategy". Why was important to update the old Strategy? Because the research done in the last years gave us many evidences that the bioeconomy sector is huge at EU level, how demonstrates the data available for 2015 (see figure 1).

Figure 1. Bioeconomy in EU

Source: European Commission, 2018, A new bioeconomy-Strategy for a sustainable Europe

The purpose of this update to the 2012 Bioeconomy Strategy was to address these challenges through a set of 14 concrete actions. These actions reflect the conclusions of the 2017 review of the Strategy from 2012. The 2018 update of the Bioeconomy Strategy aims to accelerate the deployment of a sustainable European bioeconomy so as to maximise its contribution towards the 2030 Agenda and its Sustainable Development Goals (SDGs), as well as the Paris Agreement (https://ec.europa.eu/knowledge4policy/publication/updated-bioeconomy-strategy-2018_en). The update also responds to new European policy priorities, in particular the renewed Industrial Policy Strategy, the Circular Economy Action Plan and the Communication on Accelerating Clean Energy Innovation, all of which highlight the importance of a sustainable, circular bioeconomy to achieve their objectives. The update proposes an action plan with 14 concrete measures, based on three key priorities:

1. Strengthen and scale up the bio-based sectors, unlock investments and markets
2. Deploy local bioeconomies rapidly across the whole of Europe
3. Understand the ecological boundaries of the bioeconomy

In the next figure (2), we present the new bioeconomy concept.

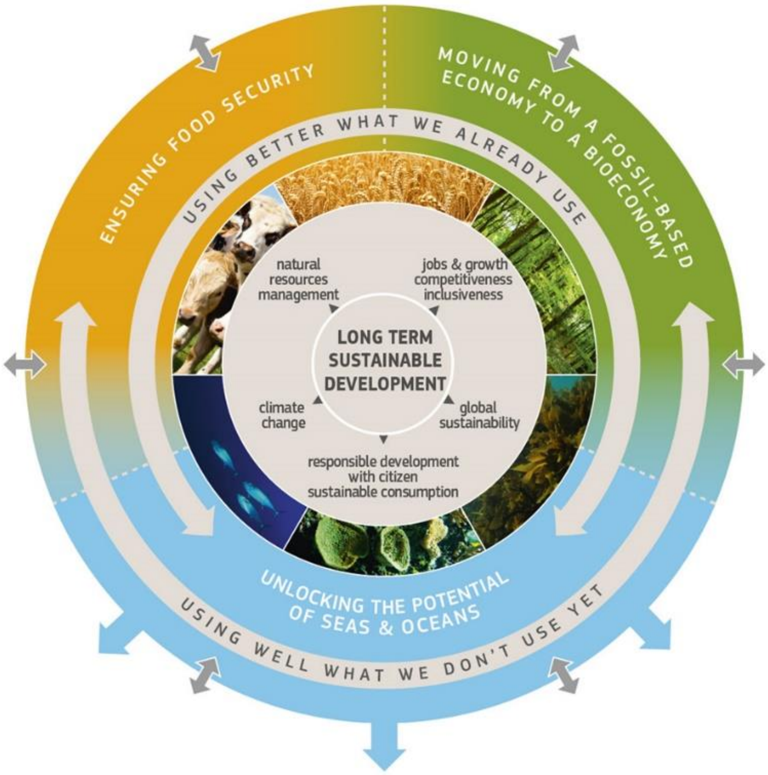

Figure 2. New EU Bioeconomy Strategy 2018

Source: https://ec.europa.eu/knowledge4policy/publication/updated-bioeconomy-strategy-2018_en

The 14 actions proposed are graphic presented in figure 3. Five of them are from the old Strategy: Ensuring food and nutrition security, Managing natural resources sustainably, Reducing dependence on non-renewable resources, Mitigating and adapting to climate change, Strengthening European competitiveness and creating jobs.

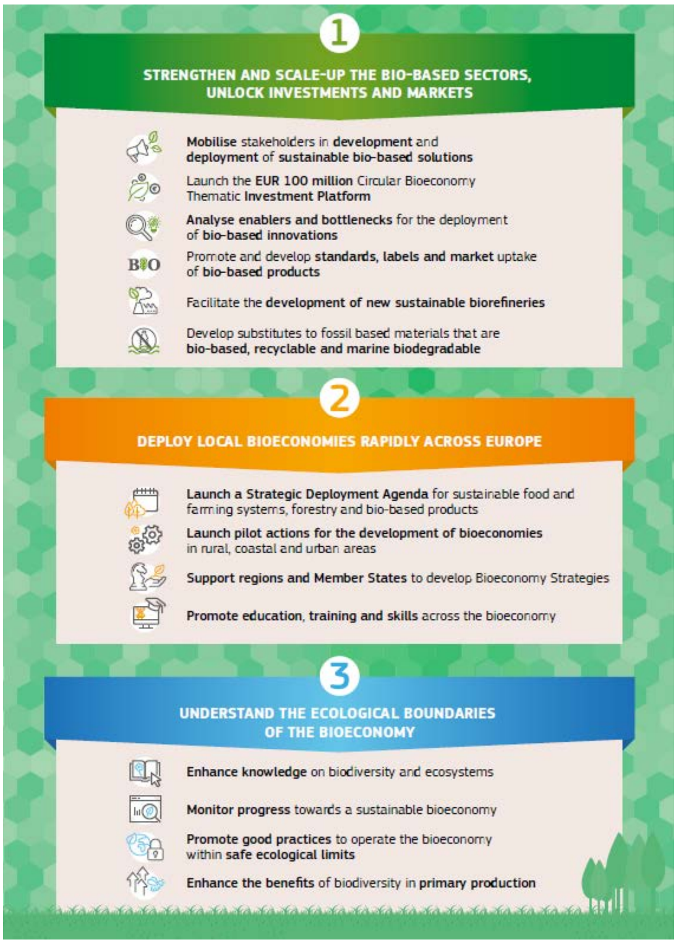

Figure 3. Actions for New EU Bioeconomy Strategy 2018

Source: European Commission, 2018, Bioeconomy: the European way to use our natural resources-Action plan 2018

Sustainable bioeconomy activities are deemed central to meet the Sustainable Development Goals (Figure 4), from food and nutrition security to ensuring energy access and health. The figure is an overview of the economic, social and environmental dimensions of the bioeconomy and its expected impacts towards 2030.

Figure 4. Sustainable Bioeconomy Activities and Sustainable Development Goals

Source: European Commission, 2018, A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated Bioeconomy Strategy (pick up after Azote Images for Stockholm Resilience Centre)

The bioeconomy was in the centre of the discussions and political agenda for many EU officialities. For instance, the subject was on the agenda of the former president of the European Commission Juncker (Agenda for Jobs, Growth, Fairness and Democratic Change) or on the agenda of Commissioner Carlos Moedas (Agenda for Research and Innovation). All these efforts during the last years made possible the implementation of bioeconomy principles in a few EU member states. Despite of so many debates, not all EU countries have a Bioeconomy Strategy and the efforts of the present EU commissioners are focused on the elaboration and implementation for the next financial programming period.

In EU there are nine countries (2019) which have dedicated bioeconomy strategy at national level: Austria, Finland, France, Germany, Ireland, Italy, Latvia, The Netherlands, Spain (https://ec.europa.eu/knowledge4policy/visualisation/bioeconomy-different-countries_en). Other six countries have dedicated Bioeconomy Strategy at national level under development: Croatia, Czech Rep., Lithuania, Poland, Portugal, Slovakia. The rest of the EU member states have other policy initiatives dedicated to the bioeconomy or related strategies at national level, including Romania. Among Western and Central European countries, there are other two that have national bioeconomy strategy: Norway and U.K. Also, Switzerland has dedicated Bioeconomy Strategy at national level under development. As we see, from 27 EU member states only 15 have already, or are going to have in short time, dedicated bioeconomy strategies, that show how difficult and slow the process is. Based on these simple statistics, we can conclude that the Central and Eastern European (CEE) countries are behind the Western countries in this process. From, CEE, only Latvia has a bioeconomy strategy. Other five (Croatia, Czech Rep., Lithuania, Poland, Slovakia) have strategies under development and the rest have other policies and strategies. For comparisons, we will give the example of Latvia, Poland and Hungary, countries which are in different stages of creation and implementation of Bioeconomy Strategy and can be examples for Romania. Why we choose to give examples only from countries from CEE? Because these countries have different background and evolution than Western countries, which are similar with Romanian evolution, from some points of view. In 2014 started the meetings for the creation of a Central European strategy based on Bioeconomy Strategy. This was the spring for the future BIOEAST Initiative under Hungarian involvement, plus other countries from Visegrad Group (Czech Rep., Slovakia, Poland). Meantime, the group became bigger and bigger and presently, it gathers eleven countries: Bulgaria, Croatia, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia. All these countries from Central and Eastern Europe put the efforts to establish the BIOEAST Initiative, which "offers a shared strategic research and innovation framework for working towards sustainable bioeconomies in the Central and Eastern European countries" (https://bioeast.eu/home/). The next map presents the countries involved in this initiative (figure 5).

Figure 5. BIOEAST Initiative
Source: https://bioeast.eu/home/

Through the BIOEAST Initiative, the Central and Eastern European (CEE) countries set the vision for 2030 to develop knowledge and cooperation based circular bioeconomies, which helps to enhance their inclusive growth and to create new value-added jobs especially in rural areas, maintaining or even strengthening environmental sustainability.

The BIOEAST Initiative's mission is to assist Central and Eastern European (CEE) countries to operationalise their vision for 2030 drawing on their potential and offering opportunities for (https://bioeast.eu/home/):

1. A sustainable increase of biomass production, to become competitive and leading, high quality, food and feed producers worldwide;
2. A circular ("zero waste") processing of the available biomass, to become key players in the development of new bio-based value chains;
3. Viable rural areas: to develop an innovative, inclusive, climate-ready and inclusive growth model.

Based on this collaboration, the BIOEAST Initiative proposed and applied for the project BIOEASTsUP (H2020 Project "Advancing Sustainable Circular Bioeconomy in Central and Eastern European countries") which aims at supporting Central and Eastern European countries in their bioeocnomy development. What was achieved till now, in these countries? Except, Latvia, which has its own Bioeconomy Strategy, the rest of the countries are at different levels of development of their strategies. As we said above, we analyse by comparison the evolution of three countries from this region: Latvia, Poland and Hungary (based on IEA Bioenergy, 2018).

Latvia

National institutions involved in the bioeconomy: Lead Ministry is Ministry of Agriculture of the Republic of Latvia. Other Ministry: Ministry of Economics of the Republic of Latvia; Ministry of Education and Science of the Republic of Latvia. Other Institutions: Forest and Wood Products Research and Development Institute (MeKA); Institute of Agriculture Resources and Economics; Institute of Food Safety, Animal Health and Environment "BIOR"; Institute of Horticulture; Latvia University of Life Sciences and Technologies; Latvia Plant Protection Research Centre; Latvia State Forest Research Institute "Silava"; Latvia State Institute of Wood Chemistry.

National bioeconomy definition is: Bioeconomy covers those parts of economy where renewable bio-resources (plants, animals, microorganisms etc.) are used in the production of food, feed, industrial products and energy in a sustainable and well-considered way. The definition is based on the EU definition provided by the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Innovating for Sustainable Growth: A Bioeconomy for Europe" Status of national policies and bioeconomy Dedicated Bioeconomy Strategy at national level (Latvian Bioeconomy Strategy 2030).

Hungary

National institutions involved in the bioeconomy: Lead Ministry is Ministry of Agriculture. There is no national definition for bioeconomy. There is a dedicated Bioeconomy Strategy at national level under development (In Hungary, a dedicated Bioeconomy Strategy at national level is under development. Hungary also participates in BIOEAST, a macro-regional bioeconomy initiative being developed by Central and Eastern European countries). Other national bioeconomy-related strategies: Medium and long-term food industry development strategy 2014-2020.

Poland

National institutions involved in the bioeconomy: Lead Ministries are Ministry of Agriculture and Rural Development, Ministry of Entrepreneurship and Technology, Ministry of Investment and Economic Development, Ministry of Science and Higher Education; Other Ministries are Ministry of Energy, Ministry of Environment, Ministry of Maritime and Inland Waterway Transport. Other Institutions: AgroBioCluster; Green Chemistry Cluster "West-Pomeranian Bioeconomy Cluster";

Institute of Soil Science and Plant Cultivation – State Research Institute; Klaster Life Science Kraków; Polish Bioeconomy Technological Platform. There is no national definition for bioeconomy. Poland participates in BIOEAST, a macro-regional bioeconomy initiative being developed by Central and Eastern European countries. Poland is also developing a Roadmap towards Circular Economy. Other parts focus on sustainable industrial production, sustainable consumption and new business models. Other national bioeconomy-related strategies: BIOSTRATEG Strategic and Research program "Environment, Agriculture and Forestry"; Map towards Circular Economy (not approved yet); National Smart Specializations.

We gave all these examples to show how different are the countries in this region. Of course, the initiative to develop the macro-regions and the national strategies is welcome and can help the development of the countries, including Romania.

CONCLUSIONS

The COVID-19 Academy can be that key moment in the evolution of humanity and its economic development in which, in order to have positive perspectives, it is necessary to reset the policies and strategies promoted so far and promote new ones that include the concept of bioeconomy as we define it. we at present. The opportunities to implement the bioeconomy strategy are multiple and beneficial to the states that adopt this concept, both in terms of future economic activities and in terms of daily life, ours and our descendants. The presentation we gave about the Bioeconomy Strategic Agenda, Bioeconomy Action Plan, the level of development of these strategies at national level among EU countries and generally in Europe, offers us a wide image about this process. As we said, it is not finished yet, the countries are at different levels of creation and implementation. We consider that, the BIOEAST Initiative, also the BIOEASTsUP Project will help the countries from CEE to create and approve their national strategies in very short time and then to contribute, all together, to the development of the bioeconomy macro-regions in this area. In this way, the gaps between Western and CEE countries will be attenuated..

ACKNOWLEDGEMENTS

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THE ROMANIAN RURAL HOUSEHOLD UNDER THE IMPACT OF RURAL DEVELOPMENT POLICIES

LORENA CHIȚEA[1]

Abstract: *The present paper aims to assess to what extent the rural development policies have had any impact on the Romanian rural household. For this purpose, it was decided to develop a theoretical model for assessing the degree of modernization and socio-economic development of rural areas from the perspective of increasing the rural household welfare. This was achieved taking into consideration the following dimensions of the rural space: natural-anthropic, demographic, social and economic; for each dimension a set of indicators were selected considered relevant for the investigated issue. These indicators lay at the basis of a composite indicator meant to make a diagnosis of the modernization and development degree of the rural area at a given moment, in order to provide proper solutions/directions for rural development policies. To capture the impact of rural development policies on the rural area and on the rural household implicitly, the paper will analyse the correlations between the rural development measures implemented in the programming period 2007-2013 and the composite index of rural modernization and socio-economic development.*

Key words: *rural area, rural household, sustainable development*.

JEL Classification: *R20, Q 01, O2.*

INTRODUCTION

Following the author's previous scientific approach to consult the literature concerning various models for assessing the impact of rural development policies [6]; [11]; [8]; [2]; [13]; [12], it was opted for a theoretical model synthesising the main pillars of rural modernization and socio-economic development from the point of view of the main player in the rural area, i.e. the rural household.

The Romanian rural area is seen as a system where each dimension (natural-anthropic, demographic, social and economic) can feel, to a certain extent, the effects of the modernization-development process, with the rural household as the central entity of the countryside, driver of the modernization process propagation in all the rural area domains. It is obvious that the reactions of the rural household are difficult to estimate, as besides the external factors (the rural development policies through all their levers) there are also internal factors (reduced ability to adapt to novelty elements; lack of demographic, social, economic possibilities to adapt to the new requirements of the agricultural and rural development policies) [14], these acting as a hindrance to the modernization and development process. For the rural household, modernization would involve the modern personality, in which family members exhibit intellectual openness, detachment from tradition, a sense of personal efficiency, desire to be an informed citizen, ability to adapt to new experiences [10].

The rural area with all its dimensions (demographic, social, cultural, economic, institutional, environmental, etc.) is the subject of rural development policies. Rural development is the second pillar of the Common Agricultural Policy, funded from the European Agricultural Fund for Rural Development (EAFRD). Taking into consideration the amount allocated to Romania in the period 2007-2013, i.e. 8.4 billion euros out of the 96.2 billion euros total amount allocated to Pillar 2 at EU level, our country was one of the main beneficiaries of the rural development policy [1].

The programmatic document for Romania for the period 2007-2013 was the National Rural Development Programme (NRDP 2007-2013). The proposed objectives were the following: improving the competitiveness of the agri-food and forestry sectors (Axis 1), improving the environment and the countryside (Axis 2), improving the quality of life in rural areas and

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diversification of the rural economy (Axis 3), starting and operating local development initiatives (Axis 4).

The rural household is the main actor in the rural area, whose main activity is agriculture, yet a subsistence agriculture is practiced, which is reflected in the standard of living and quality of life of the rural population. This is the result of the negligence of the agricultural policies in use since 1990 and before the accession to the European Union.

In the year 2007, there was a dual farm structure, where the small-sized farms (individual agricultural holdings) prevailed, which totalled 3830.80 thousand (97.39%), and operated 6846.90 thousand ha (49.78%), while the large-sized farms (agricultural holdings with legal status) accounted for 2.61% of the total number of farms and operated 50.22% of UAA [15]. In the period 2007-2016, the number of small-sized farms diminished by 13.6% and the utilised agricultural area operated by these declined by 29.3%; the large-sized farms experienced a consolidation process, i.e. the number of these farms increased by 47.5%, alongside with an increase of the utilised agricultural area operated by these by 16.5% [1]. Both the legislative basis in the transition years and the new agricultural programmes in the pre-accession and accession periods led to an increased discrepancy between the rural households with agricultural activity (subsistence and semi-subsistence holdings) and the large-sized, commercial competitive farms, eligible to attract EU funds.

In the programming period 2007-2013, the semi-subsistence farms received direct support through the following rural development measures (Pillar 2): Measure 141 Supporting semi-subsistence farms (total number of funded projects 50486); Measure 112 Setting up of young farmers (total number of funded projects 12635); Measure 121 Modernisation of agricultural holdings (2789 projects received funding).

About 350,000 holdings fall in the category of semi-subsistence farms, which is a very small number out of total individual farms (household farms). The terminology used for subsistence farms has changed in the two programming periods in Romania. Thus, in the period 2007-2013, the farms below 2 ESU[2] were in the category “subsistence” farms, while those from 2 to 8 ESU were considered “semi-subsistence” farms, according to NRDP. The access of individual subsistence farms (small farms) to direct payments under Pillar 1 has not been excluded, yet there are certain limitations as regards eligibility. The eligible farms for the Single Area Payment Scheme are those with minimum 1 hectare, while parcels should not be smaller than 0.3 hectares. Therefore, in Romania, about 3 million farms did not comply with these eligibility criteria [5]. There was an uneven distribution of direct payments between the small and large farms as a consequence of the dual structure of Romania’s agriculture [4].

MATERIAL AND METHOD

The present paper aims to quantify the impact of rural development policies on the Romanian countryside from the rural household perspective. For this purpose, the funds allocated under NRDP in the programming period 2007-2013 were taken into consideration, as well as the related measures that were correlated with the composite rural development index, as well as with each of its dimensions and with each indicator. The analysis is made at county level, so as to measure the impact of the rural development measures on the rural area and the rural household implicitly in the programming period 2007-2013.

The theoretical model for assessing the rural development impact on the modernization and socio-economic development of the rural household is the basis for constructing the indicator of modernization and socio-economic development (IMSED). This is a composite index on the socio-economic situation of the Romanian rural household, and can be useful both for researchers and for decision-makers at local, county, regional or national level. The composite index provides useful information for complex comparisons across regions and counties, as well as specific aspects

[2] ESU = Economic Size Unit

regarding the natural-anthropic, demographic, social and economic dimensions. When the analysis is performed at regular intervals, the rural development index can reveal the trend of change by each criterion, as well as chronologically.

Theoretical model for assessing the rural development impact on the modernization and socio-economic development of rural household

Dimension	*Indicators*
Natural-anthropic dimension	- agricultural area per person employed in agriculture - share of new dwellings in total dwellings - share of localities connected to the sewerage, drinking water supply and natural gas supply networks - share of modernised roads in total county and communal roads
Demographic dimension	- rural population (number) - natural increase of rural population - demographic ageing of rural population - degree of demographic dependency - population renewal index - migration balance
Social dimension	- average life span - fertility rate - infant death rate - number of pupils per teacher in the countryside - number of physicians in 1000 rural inhabitants
Economic dimension	- gross domestic product - agricultural output value - average salary in agriculture - labour force renewal rate - share of population employed in agriculture in total population of working age

Source: own model

The data on each indicator were entered in SPSS, and next several stages in the creation of final index followed, namely:

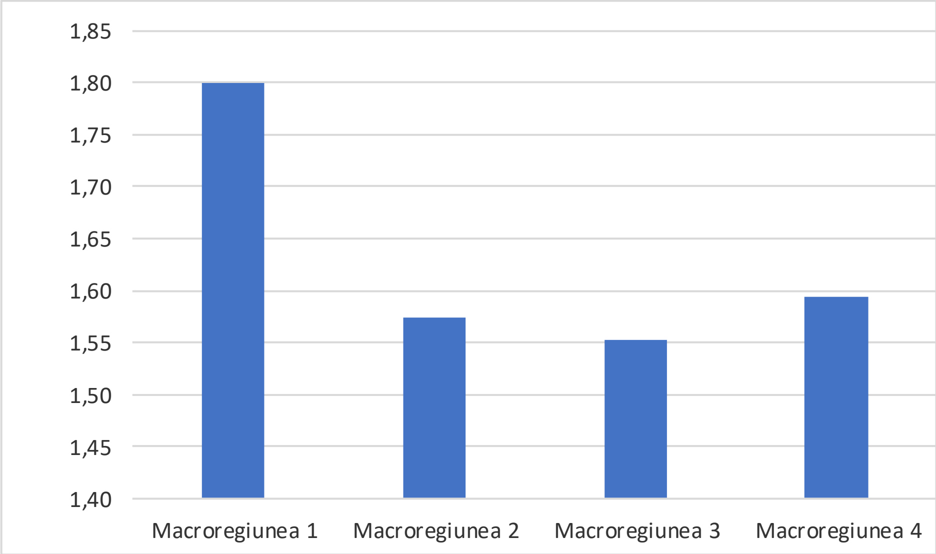
a. data normalization – for each indicator, each analysed entity is ordered in the 0-1 interval, where the lowest value receives 0, and the highest value is assigned 1. The following formula is used for primary indicators normalization:
   N=(X-Xmin)/(Xmax-Xmin)
b. establishing the weighting of each dimension and each indicator – each dimension and each indicator are assigned equal weights
c. domain aggregation and index calculation – for each dimension an average grade will be calculated D1=(X1+Xn)/n, and the Total index = (Dna+Dd+Ds+De)/4.

To get a picture of the development level, nationwide and by regions and counties, aggregate indicators are increasingly used, even though individual indicators are not neglected either. The statistical method used for the assessment of the correlation between the NRDP measures and the modernization and development level of the rural area is based on the Pearson correlation coefficient that can be positive (in the case of direct correlations), negative (in the case of inverse correlation) or neutral (no influence) between the investigated variables.

RESULTS AND DISCUSSIONS

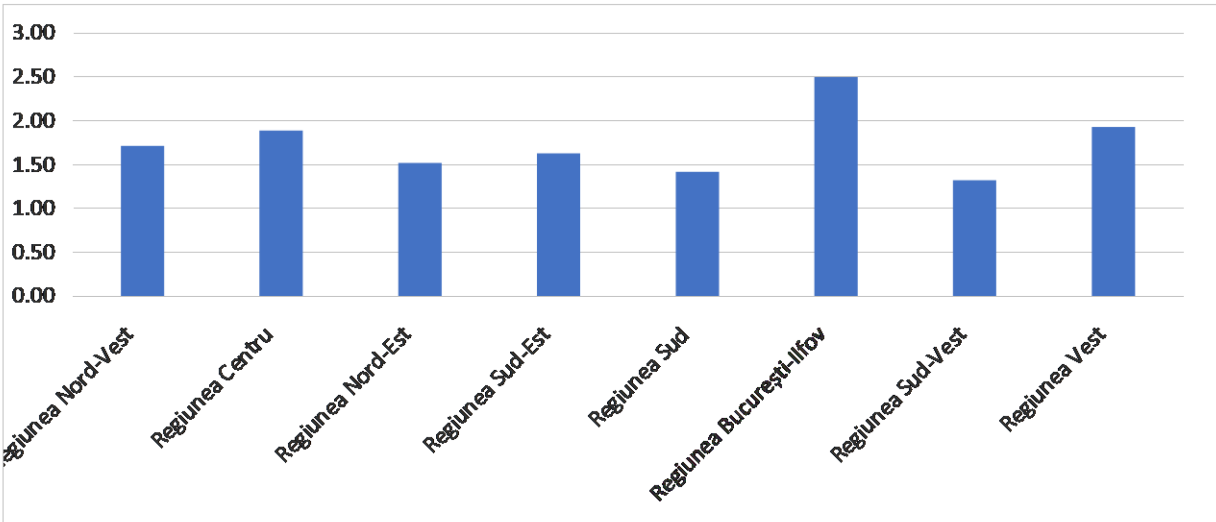
The value of the index of modernization and socio-economic development (IMSED) of the rural area, at county level, ranges from 0.96 (in Teleorman county) to 2.77 (in Timiș county); this value increases as the degree of rurality decreases. Thus, the average value of the index is 1.45 in the predominantly rural areas; 1.90 in the intermediate areas and 2.50 in the predominantly urban areas.

Figure 1. IMSED value at macro-regional level



Source: author's own processing based on NIS, tempo online data

Figure 2. IMSED value by regions



Source: author's own processing based on NIS, tempo online data

From the analysis of IMSED by macro-regions and regions, we get the following situations:

- Macro-region 1 has the highest IMSED value, at significant difference from the other macro-regions, although the component regions are not necessarily the ones with the best results; the regions București-Ilfov and Vest rank first, while the regions from Macro-region 1 (Nord-Vest and Centru) rank 3rd and 4th among the regions of the country.
- A similar situation can be found in the case of the region București-Ilfov, which takes the lead, at a significant distance from the other regions, which is a normal situation if we take into consideration the fact that we speak about the rural area adjacent to Bucharest, the capital city. Even though the gap between the region București-Ilfov and the other regions is great, the contribution to Macro-region 3 where it belongs is not significant, so that Macro-region 3 takes the last place among the macro-regions.

Following the analysis of Pearson correlations, it results that the 4 dimensions of the IMSED index have a significantly strong influence on the index, but they also strongly influence each other. This confirms the theory from the literature that the rural space is operating as a system where each dimension and component is important throughout the entire system [7]. Yet, unfortunately, the demographic, social and economic structural dysfunctions that have appeared in Romania are difficult to correct.

Table 1
Intensity of Pearson correlations
between the four dimensions of the IMSED index, in the year 2017

Dimension	Natural-Anthropic	Demographic	Social	Economic
Natural-Anthropic	1	0.563**	0.347*	0.420**
Demographic	0.563**	1	0.646**	0.542**
Social	0.347*	0.646**	1	0.530**
Economic	0.420**	0.542**	0.530**	1
IMSED	0.740**	0.879**	0.785**	0.772**
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Source: author's calculations in SPSS based on NIS tempo online data

In 2008, Bertolini [3] brought into discussion 4 categories of problems in the rural area that function as "Vicious Circles" (demography, distance/infrastructure, education, labour market), and their interaction amplifies the poverty phenomenon in the rural area. To break these "vicious circles", policies should focus on investing in human capital (education, vocational training), infrastructure (technical, road infrastructure, transport services, ICT dissemination, etc.), on labour market (increasing the occupational diversity by stimulating entrepreneurship in agriculture and non-agricultural sectors), on healthcare, etc.

A classification of rural areas according to their modernization and development degree is useful to highlight certain characteristics of a given area; the smaller the territorial unit, the more specific the information provided. The counties are classified according to IMSED index values into 5 favourability categories, namely: a. very low modernization and socio-economic development level (22%); b. low modernization and socio-economic development level (39%); c. medium modernization and socio-economic development level (24.4%); d. acceptable modernization and socio-economic development level (9.8%); e. good modernization and socio-economic development level (4.9%). For each favourability class, the indicators related to the calculation model of the IMSED index were calculated.

This typology is only one example that the rural area is extremely diverse and is facing different problems, requiring different development models. The Romanian reality of rural areas needs top-down interventions, as well as the participation of rural communities for a sustainable rural development. However, the current rural development programmes do not take into consideration the specificity of each area, which can result in a structural change of the rural space, through the increasing abandonment of rural localities.

Impact of PNDR 2007-2013 measures on the Romanian rural area

The analysis of the links between the main rural development measures specific to NRDP 2007-2013 and the IMSED index, using the Pearson method, reveals a weak link between them, which leads us to the conclusion that the impact on the rural area and on the rural household, implicitly, is low. Only in specific cases a positive correlation can be noticed on certain indicators taken into account in the calculation of the global index. The measures under Axis 1 had a strong positive impact on two indicators, namely:

- "agricultural area per person employed in agriculture" – Measure 121 - Modernization of agricultural holdings (+0.517**) and Measure 123 - Adding value to agricultural and forestry products (+0.330*);
- "agricultural output value" – Measure 123 - Adding value to agricultural and forestry products (+0.602**), Measure 121 - Modernization of agricultural holdings (+0.586), Measure 142 – Setting up producer groups (0.397*) and Measure 112 - Setting up of young farmers (+0.353*).

The indicator *"Average agricultural area per person employed in agriculture"* can represent an important element in guiding the strategies for the development of a certain rural area.

In the period 2007-2017, the analysed indicator had a favourable evolution for the modernization of the farming activity, the value of the indicator increasing in all regions. This is a beneficial aspect, but other less visible aspects should also be taken into consideration at first glance, such as the decline of the population and labour force, land areas that remained uncultivated, land concentration on large-sized farms and not on family farms that would strengthen the middle class to be able to ensure food security, to protect the environment and the rural landscapes, to maintain a territorial balance by maintaining the population in all rural areas in order to facilitate human proximity to natural resources.

The large farm does not automatically imply economic competitiveness, and for the rural area, as Otiman (2012) [8] noted, "a negative correlation is noticed in this sense between the farm size and the persistence of rural poverty: in the areas with the largest farms in Romania, the areas with the widest poverty bags can be also found".

Competitiveness can be also obtained by increasing the value added of traditional agricultural or non-agricultural products, or of services provided by small farms (rural tourism, traditions and customs).

At macro-regional level, the hierarchy highlights two categories: the first category, above the national average (Macro-region 4, with 9.64 ha/person employed in agriculture and Macro-region 1, with 9.19 ha/person employed in agriculture) and the second category under the average (Macro-region 3, with 7.67 ha/person employed in agriculture and Macro-region 2, with 7.63 ha/person employed in agriculture). There is no uniform trend across the macro-regions, one can even notice that in each macro-region there is a region under the national average, and another above the national average.

At county level, the differences between counties grew larger year after year. Thus, while in the year 2007 the difference was 8.67 ha/person employed in agriculture between the county with the highest value and the county with the lowest value (i.e. 3.15 ha/person employed in agriculture in the county Ilfov, and 11.82 ha/person employed in agriculture in the county), in the year 2017 the difference reached 12.16 ha/person employed in agriculture (4.09 ha/person employed in agriculture in the county Ilfov and 16.25 ha/ person employed in agriculture in the county Tulcea).

The increase of the average agricultural area per person employed in agriculture does not result in an increase of the average agricultural area of individual agricultural holdings, being the result of other processes of demographic nature, i.e. decline of population and labour force employed in agriculture. The fact that part of the land is left uncultivated (by the rural land owners or by the new owners who are not rural residents) also adds to this motivation; this can be also seen in the decline of the utilised agricultural area, in the period 2005-2016, from 9,886,159.43 ha to 6,926,256.09 ha [15]. At the rural household level, no agricultural land consolidation can be noticed, on the contrary, the agricultural area used by an individual household farm decreased from 2.33 ha in 2005 to 2.05 ha in 2016 (Farm Structure Survey).

Agricultural output value is the other indicator on which the rural development measures under NRDP – Axis 1 had a noticeable impact.

At macro-regional level, Macro-region 2 has the highest share of agricultural production (33.37%) at quite a great distance from the following macro-regions (Macro-region 4, with 23.37%, Macro-region 1 with 22.79%, Macro-region 3 with 20.47%). The development regions with the greatest contribution to national agricultural production are the following: Sud 19.20%, Sud-Est 17.69% and Nord-Est 15.69%. By counties, the share of agricultural production ranges from 0.86% in Ilfov to 4.80% in Timiș. The following counties had the greatest contribution to national agricultural production: Timiș 4.80% of total agricultural production, Dolj 4.06%, Constanța 3.54%, Călărași 3.43%.

The total agricultural output value featured high volatility also due to the high share of crop production [1]. The importance of crop production in total agricultural production increased by 22.97% from 1990 to present, except for only two counties where the importance of livestock production increased (Vrancea and Brașov). At macro-regional level, the share of crop production ranges from 59.77% in Macro-region 1 to 72.89% in Macro-region 3. By regions, we have the following hierarchy depending on the importance of crop production: Sud-Vest 75.34%, Sud 73.97%, Sud-Est 73.58%, Vest 65.27%, Nord-Vest 62.44%, Nord-Est 61.99%, Centru 56.72%, București-Ilfov 56.47%. At county level, the share of crop production ranges from 38.31% in the county Brașov to 81.20% in the county Galați.

As it could be noticed, the effects of measures from Axis 1 of NRDP 2007-2014 are punctual, the targeted aspects being infrastructure and economy.

The measures from Axis 3 had no noticeable impact either on the degree of modernization and development of the rural area, the effects were felt only in particular cases, with no impact on the structural problems of the rural area. The measures of Axis 3 had a strong and significant positive impact on several IMSED indicators, namely:

- two of the measures from Axis 3 had an effect on the indicator "share of localities connected to the sewerage network", M322 (strong correlation +0.335*) and M313 (significantly strong correlation +0.513**). M322 supported investments in public infrastructure, and M313 supported investments in connecting tourism structures and recreational infrastructure to public utilities.
- M313 had an effect on the indicator "number of physicians in 1000 rural inhabitants" (strong correlation +0.337*). The effect of this measure on the number of physicians may be a simple coincidence, the author thinks that as M313 is applied in tourism areas, these areas have higher living standards than the areas where the farming activities prevail, which is also reflected in the attractiveness of these areas for physicians.
- M312 had an effect on the GDP indicator (strong correlation +0.312*), which confirms the fact that the diversification of non-agricultural activities contributes to the improvement of the population's standard of living.
- M312 also had an effect on the indicator "agricultural output value" (significantly strong correlation +0.602**), which reveals that the diversification of non-agricultural activities can result in higher valorisation and utilisation of agricultural production.

The effects of measures from Axis 3 of NRDP 2007-2013 are felt in particular cases, without generating chain reactions, opposed to "vicious circles", the targeted aspects being technical infrastructure (sewerage system) and economy (diversification of non-agricultural activities and better valorisation of agricultural products). Unfortunately, the effects of the rural development measures are like a drop in the ocean, without generating changes in the existing structural problems of the countryside.

CONCLUSIONS

The impact of the rural development policy on the rural area and on the rural household/small farm was low in the first programming period. As main obstacles in NRDP 2007-2013 implementation, from the point of view of small farms, we can mention the following:

- the rural development objectives at EU level are not appropriate for the new member states like Romania, but they rather correspond to the needs of the old member states, which are also great contributors to the CAP budget;
- the programming period 2007-2013 can be considered an adaptation period to access and implement projects with non-reimbursable financing; several bureaucratic difficulties both at national and EU level;
- the small farms have low co-financing capacity and limited access to credits due to the lack of financial instruments dedicated to small and medium-sized farms, high interest rates;
- small farms are poorly informed and poorly advised;
- Romanian farmers' reluctance to get associated, only 1% of farmers are members in an association;
- small farmers' precarious financial situation; in many areas of the country, agriculture (subsistence farming) continues to be the only income source for many households (small farms), as there are no other occupational opportunities;

- social and economic disequilibria in the rural area generated by the communist period (when the agrarian structures radically changed) and by the transition period with no strategic vision on the rural area.

Romania's rural area is highly diverse and faces different problems, requiring different development models. The Romanian reality of the countryside needs top-down approaches, alongside with the participation of rural communities for a sustainable rural development. But the existing rural development programmes do not take into account the specificity of each area, which can determine structural change of the rural area by the increasing abandonment of rural localities.

For Romania, the rural household/small farms have an important economic, social and environmental role. The diminution of the number of farms should not be an objective *per se* in the process of increasing the productivity and competitiveness of the agricultural sector, as this may have undesired results such as rural area depopulation and agricultural land areas left uncultivated. Unfortunately, small farmers are not given any alternatives, and there is also one aspect that is less considered, namely the fact that small farmers are increasingly less resilient after the period of transition to market economy (lack of consistent agricultural and rural development policies) and after the pre-accession and accession period (policies focusing more on the increase of competitiveness).

Even though there are great and diverse needs in the rural area, in the absence of a coherent rural development policy in Romania, targeting real and solvable problems, in the absence of an overall vision and without dedicated people to represent us and negotiate at the EU level for Romania, the rural area may lose many of the basic functions it has at present (food security function, territorial balance function, environmental protection function, preserver of traditions and crafts).

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RURAL TOURISM IN BUKOVINA IN THE FACE OF SARS-COV-2 PANDEMIC

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Abstract: *Tourism is one of the most vulnerable industries when facing a global threat of sanitary, economic, or military considerations. From an economic activity comprising nearly 3% of the country's GDP, the tourism has dropped to a flat zero in Romania. For three months, specifically March – May 2020, almost 97% of the accommodation units were closed, and only those hosting medical staff or quarantined persons were open during this period. The present study runs an analysis on the tourism in Bukovina during March-July 2020 and employs both quantitative and qualitative methods. The results have highlighted that tourists were partial to a certain type of accommodation units, namely agritourist and tourist guesthouses in Bukovina. Another visible fact is the predilection for remote places with good accessibility located along the main road axes to Bukovina (stopovers, tourist cottages, chalets, and campsites).*

Keywords: *Tourism, Pandemic, SARS-CoV-2, Resilience, Bukovina.*

JEL classification: *Q26, Q54, Q56, Z32*

INTRODUCTION

The literature review emphasizes the high level of complexity of the current crisis triggered by the new coronavirus pandemic (Zenker, Kock, 2020). There is talk about a natural disaster affecting a large part of the globe and generating instability of the interdependent sanitary, socio-political, or economic systems (Ritchie & Jiang, 2019). Even if we are still far away from understanding the way in which these crises influence each other (Pennington-Grey, 2018), there is a domain which registers the most critical response to the variables of the systems mentioned earlier, namely tourism. Tourism is one of the economic sectors which has been profoundly affected by the current SARS-CoV-2 pandemic, both in terms of offer and demand. As an interdependent industry, the present context of the global economy with high odds of recession, along with the geopolitical tensions, social and commercial pressures, as well as the yet uncertain status of the pandemic evolution coupled with the measures of security enforced by most countries (travel restrictions, closing borders, suspension of cultural events, activities of the commercial centres, accommodation units, restaurants, etc.) are all extra risks to be taken under consideration by the tourism industry (Muscalu, 2020, McCreary, Fatoric & Seekamp, 2018).

The analysis run covers the reference area of Bukovina region, the third tourist destination in Romania according to the number of accommodation places. The paper aims to show the impact of the pandemic upon the Bukovinian tourism, especially on its rural side. The starting point of this analysis is addressing the premise of a faster recovery of the tourist fluxes to the small accommodation units, particularly the units located in the deep rural areas benefiting from good access. Another analysis hypothesis presumes a more active involvement of the local administration in identifying some sources of resilience adjusted to the specificity of the tourist region, considering the confrontation with a real change of paradigm regarding the tourism business.

MATERIAL AND METHODS

To get an image as accurate as possible of the pandemic impact on the rural tourism of Bukovina, we have used a blend of methods, namely quantitative and qualitative methods complemented by the analysis of relevant studies for the current pandemic context of the national and international tourism. In the case of the quantitative analysis, the focus is placed on the

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systematization of data recorded by the National Institute of Statistics for the indicator *Arrivals of tourists at hosting facilities*, at the lowest possible level of aggregation (on localities) covering the period between March and July 2020, and also the same period of the 2018 and 2019, for comparison reasons. The qualitative method has been engaged for increasing the relevance of the analysis run in relation to the specificity of the Bukovinian rural tourism. The analysis relies on the results of the field research done by the authors themselves in June 2020, who used the techniques of direct interviews. All six phone interviews focused on the perspective of the questioned persons upon the tourist activities and evolution of tourism in Bukovina during and post-pandemic. Out of the persons interviewed, three were with the local public administration, two were owners of accommodation units, and one was a tourism agent. It was proceeded on the basis that the tourist phenomenon has reached a restart point where it is crucial to understand the private and institutional mechanisms which must be primed locally to create or increase the resilience of a key economic sector of Bukovina region.

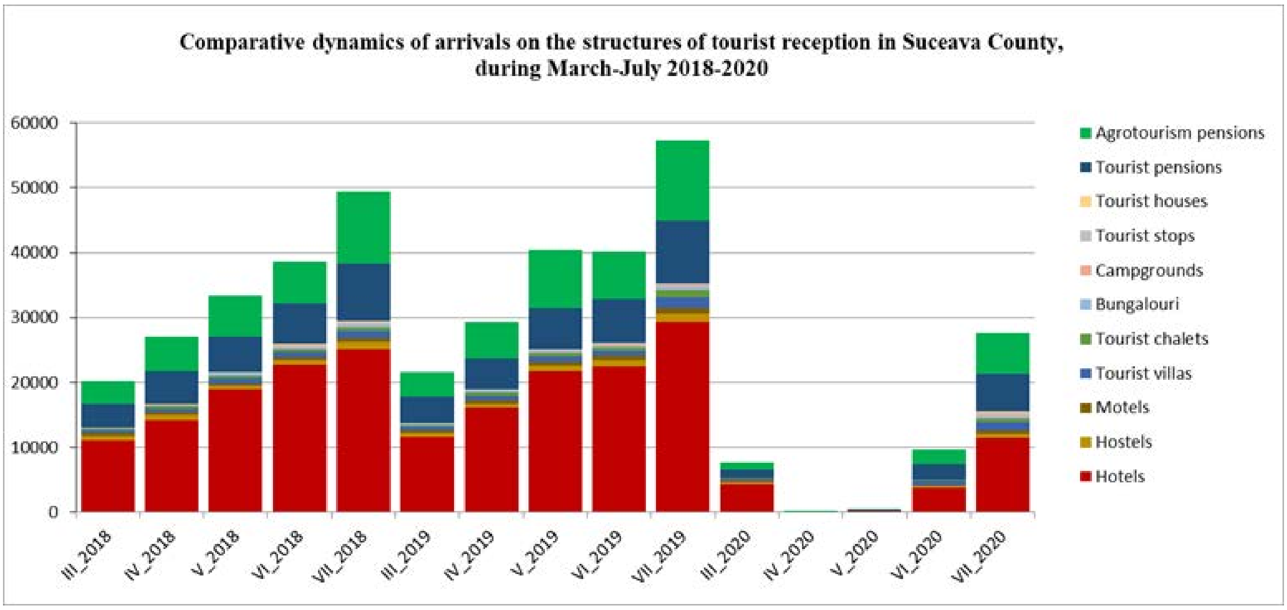
RESULTS AND DISCUSSIONS

Several days after the new coronavirus outbreak was officially labelled a pandemic by WHO (World Health Organization), the state of emergency was enforced on the Romanian territory, which lasted 2 months (March 16 – May 14, 2020). Two weeks after enforcing the state of emergency, during March 1 and May 15, 2020, Suceava city and 8 of its neighbouring localities were under total quarantine (red zones) as a measure limiting the spread of SARS COV 2 virus. The initial premise of this research is based on the fact that this pandemic completely blocked the movement of people and radically modified their attitude towards human interaction, travel, and, generally, towards tourist phenomenon (Glowka & Zehrer, 2019). The changes induced by the sanitary circumstances compounded by the mass media and complemented by the uncertainty of a time horizon difficult to estimate, have generated shock waves for each player involved in the tourism industry. The Tourism of Suceava holds 59% of the accommodation units in the rural area, and, additionally, the category of agritourist guesthouses located in the urban area, which registers hosting units in the following towns (one in each town): Broșteni (12 accommodation places since 2017), Frasin (14 accommodation places), and Gura Humorului (8 accommodation places since 2017). As nearly 60% of the tourism is run in rural areas, we can state that Suceava county is a travel destination predominated by rural tourism (PATJ Suceava, Faza II-a, 2019).

The present study has been built so it could employ two types of approaches (Hammersley et al., 2008). The data used belong to these two categories: analysis of the indicator *Tourists 'arrivals at accommodation units* has employed quantitative data — which are relatively easy to process and interpret (observing trends in the evolution of certain tourist variables for a larger number of data) — and qualitative data supplied by the questions with free answers included in the interviews. For fluency reasons, we have firstly approached the quantitative analysis. By corroborating the number of arrivals registered in all the accommodation units (AU aka STP) from Suceava county (which largely overlaps the tourist region of Bukovina), it can be noticed that they can be correlated with the sanitary measures taken all over the country. Firstly, the month of March, although is not a period of high tourist season for Bukovina, has only registered the arrivals in the first half of the month since that the state of emergency was decreed on the 16th of April. The decreased number of arrivals is shown in Figure 1, and made by comparing March, April, May, and July in 2018, 2019, and 2020.

It should be mentioned that, during the state of emergency, the accommodation units were not suspended; however, they were severely affected by the travel restrictions enforced during this period. Thus, they could offer accommodation services, if not for tourist purposes, for reasons such as business trips, maintenance, etc. Furthermore, this is the reason for which we have introduced in the analysis the number of arrivals at urban locations, which along with the rural ones, highlight the number of quarantined persons and medical staff accommodated by hosting units. Additionally, the month of April renders the particular dynamics of the urban environment (Tables 1,2) and rural space as well. All the relaxation stages of the sanitary conditions have a counterpart in the economic dynamics of tourists' arrivals. After 1st of June, most restrictions were lifted, such as movement of people outside the locality, resumption of the international railway and road transport, and opening of outdoor terraces.

Figure 1



Source: authors processing by tempo online site

Resuming the balneotherapy activities, reopening the gyms and outdoor pools, restarting the activity of the gambling operators have translated into an instant increase of the number of tourists in the resorts of Bukovina. The increase of 7 times the number of arrivals in July 2020 registered in the hotels of Vatra Dornei, for example, is correlated with the opening of Bradul and Călimani hotels, and with resuming the balneotherapy activities from the 10th of July.

Table 1 Arrivals of tourists in hotels in the urban area of Suceava county

The city	March 2020	April 2020	May 2020	June 2020	July 2020	August 2020
Suceava	1651	20	80	1807	4845	7679
Vatra Dornei	532	:	:	283	2075	3949
Gura Humorului	682	:	30	524	1400	3935
Câmpulung Moldovenesc	193	:	:	137	512	1274
Fălticeni	194	:	:	183	421	805
Rădăuți	98	:	:	48	90	225
Siret	30	:	:	30	50	165

Source: National Institute of Statistics

In the case of the tourist guesthouses, the most important figures, which show a recovery of the tourist activity, record three particular situations: a) small isolated guesthouses (from Dornelor Basin, Dorna Arini, Dorna Candreni, Pojorâta, Vatra Moldoviței, Șaru Dornei, including Vatra Dornei resort); b) accommodation units located on the main road axes or nearby major tourist attractions, such as: Putna, Sadova, Mănăstirea Humorului, Pojorâta, Gura Humorului, and Câmpulung Moldovenesc); c) guesthouses from resorts, nearby resorts or located in the periurban area of the municipalities (Cacica, Șcheia).

Table 2 Arrivals of tourists in tourist and agritourism guesthouses in the urban area of Suceava county

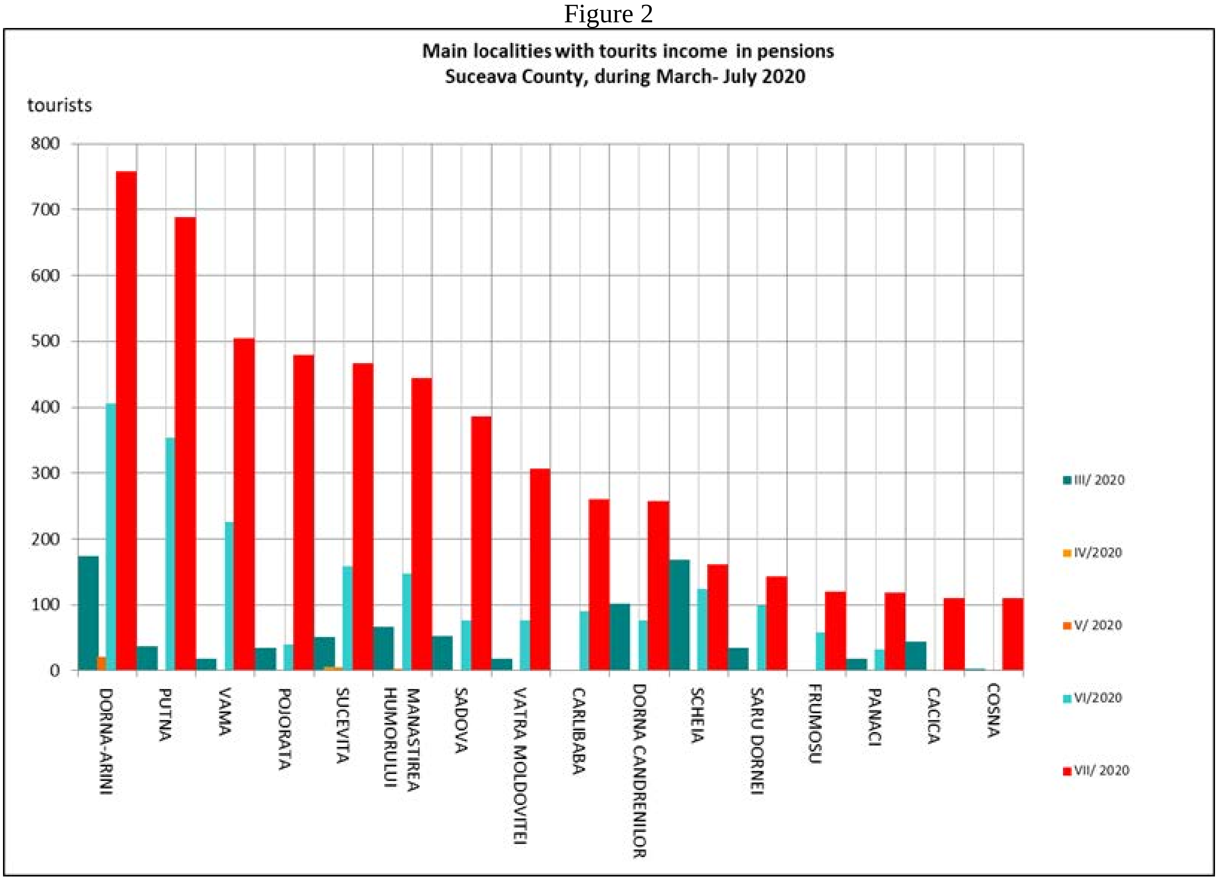
The city	Martie 2020	Aprilie 2020	Mai 2020	Iunie 2020	Iulie 2020	August 2020
Suceava	243	:	:	258	378	482
Vatra Dornei	216	25	31	409	1542	2573
Gura Humorului	671	2	47	1178	2674	5046

Câmpulung Moldovenesc	50	12	13	175	459	962
Fălticeni	80	:	54	138	163	204
Rădăuți	33	:	:	29	57	95
Siret	10	:	:	70	212	240
Frasin	:	:	:	32	336	432
Broșteni	10	:	:	22	64	152
Solca	6	:	:	:	23	66

Source: National Institute of Statistics

In the rural area, the tourist activity has taken a turn for the better since July 2020, especially for the small accommodation units (tourist and agritourist guesthouses) located in relatively isolated regions (Figure 2). Considering the emphasis on the special sanitary conditions imposed by this pandemic, the highest influx of tourists occurred in the months of June and July, at the relatively remote guesthouses, due to, most likely, a regular clientele (Pojorâta increased 10 ten times the number of arrivals during June and July, Sadova increased 5 times, and Vatra Moldoviței increased 4 times), which, in August this year, led to a level of tourists 'arrivals recorded in July 2018. The urban-rural analysis has highlighted that the recovery is made at a faster pace in the case of the small guesthouses with fewer accommodation places, regardless of their location (urban or rural), yet correlated with the isolation degree of their position.

Figure 2



Source: authors processing by tempo online site

Although the number of arrivals per total region shows a recovery (in June, July, and August 2020) which is about the level of June 2018 (statistically, 2018 was a less successful year for the tourism industry than 2019), we have identified several types of accommodation units which surpassed the level of the previous years:

1. Agritourist guesthouses located in some mountain localities, namely Berchișești, Breaza, Brodina (registering an increase of 3 times the number of arrivals compared to the same period of the previous year), Cârlibaba (registering an increase of 3 times and a half) or Ciocănești, Sucevița, Vama and Putna (they doubled the arrivals by comparison to 2019). These communities

have overtaken some traditional tourist localities, such as Panaci, Frumosu or Șaru Dornei. The analysis proves that there is a tourist reception basin, at least in the case of Putna and Sucevița, comprising all those who are familiar with the region and favour certain places in terms of service quality (and sanitary safety too) and active tourism.

2. The campsites from Vatra Dornei and Sucevița have registered aa higher number of arrivals than it was recorded in the same month of 2019. Here we are talking about the tourists who have a high degree of independence in planning their holidays.

3. The tourist chalets from Crucea, Horodnic de Sus, and Sucevița have also registered a higher number of arrivals than it was recorded in previous years, while the chalet from Pârteștii de Jos has doubled the arrivals recorded in July and August.

The total analysis reveals that the tourism in the rural space has registered, even under the circumstances dictated by the state of alert, the most constant increases of the number of tourists. Most tourists prefer agritourist guesthouses, tourist villas, tourist cottages or chalets rented by groups of people. All the categories of the above-mentioned accommodation units provide good conditions under the circumstances of the current sanitary crisis, and their relatively small sizes allow a fast adjustment at low costs to the extra demands of sanitary materials for disinfecting and sanitizing purposes. Hotels have been most affected by the present sanitary crisis. Not only their size can present an impediment for an effective management of the extra costs, but they can barely function without restaurants (only outdoor terraces have been open). Moreover, the mandatory decrease of the rooms used, as well as the present collapse of the business tourism where many of these were active, or of those which operated in closed circuit accommodating mainly foreign tourists, are other negative factors.

To further the quantitative analysis, we have taken an interest in the manner in which the tourism entrepreneurs managed the period under investigation, and which were/ will be their most appropriate strategies for increasing the resilience of the tourist sector in Bukovina. For this purpose, several research questions have been formulated, each provided with the answers of the persons interviewed, along with our conclusions and comments.

Q1. How was affected, in terms of percentages, the profit of the tourism business during the states of emergency and alert?

The answer to this question varies depending on the size of the tourist location and its position in the tourist region. Thus, during March-June 2020, the small guesthouses had an occupancy degree of 30-40%, especially during the Eastern celebrations, while, in the case of hotels the variation ranges between 70% and 100% for the same period. Since May 2020, the entrepreneurs from Bukovina have relied on the weekend trips. All the persons interviewed have agreed with the fact that what is a real cause of concern is not missing out the Eastern celebration or the reduced number of tourists in the following period, but the cancellation of reservations till July, lack of new bookings for the summer, and cancellation of school summer camps which were off-season. Nevertheless, the interviews have highlighted a rather optimistic attitude of the managers of small accommodation units (both guesthouses and hotels) about the tourist season in 2020 as follows: *What it has been reserved from now on, it has not been cancelled anything. However, to be sure, from now on we will start calling our tourists who made reservations and see what they think of it. We have not cashed anything in advance. Maybe just holiday tickets. Those who came for Christmas, left their holiday tickets for Eastern or summer. We will have to make calls for confirmation. And if they cancelled for Eastern, they told us to keep the tickets for the summer or next year, because their validity has been prolonged. So, we are waiting for the time being, and so are our clients. (Valentina, C., tourism entrepreneur, Vatra Dornei resort)*

In financial terms, all tourist locations of Bukovina have been severely affected. The only revenue during April-May was generated by using the hotels/ guesthouses as quarantine accommodations. However, merely 9 units from Gura Humorului and another 9 from Vatra Dornei resorts benefited from this facility, covering a maximum of 500 accommodation places during the state of emergency. Although the period of reference corresponds to the worsening of the sanitary crisis and some major travel restrictions, it is necessary to underline that it did not overlap the peak season of Bukovina, and, consequently, the losses were moderate by comparison to the profits registered in the same period from previous years. The financial situation has taken on a whole new meaning since June 2020, which has led to extra losses as follows:

1) the recoil of the tourist activity triggered by the tourists 'fear of coming to Bukovina after the 15th of June relaxation.

2) many units have failed to adjust to the new requirements related to social distancing (which imposes the use of fewer accommodation places out of the available ones), the exclusive use of places on terraces for locations which have restaurants, or adjusting the internal spaces and their constant sanitizing with extra costs which are hard to manage.

During the same period, another negative impact is the issue of cancellations for the peak season and 2020/2021 winter celebrations (Christmas, New Year's Eve) potentiated by the adverse weather conditions from June-July in Romania and uncertainty caused by the global pandemic. The most professional accommodation units were, are, and will be most affected, namely, those units holding contracts with corporations, foreign tourists, large, organized groups. They no longer can open their restaurants or bars inside the building, and the capacity of terraces is generally reduced. They have big losses, as the more they were involved in the tourist systems of booking, the bigger the loss. (Laurențiu, B. — manager of tourist agency)

The result of all these unknown data invites to caution when it comes to safely assess the profit evolution for the following period, especially in the case of tourist and agritourist guesthouses.

... Generally, the reservations are for smaller accommodation units and, especially, for those isolated. In this case, we are even talking about 80% booking, especially the remote ones. (Petru, tourist local councillor, Vatra Dornei resort)

Q2. Which are the strategies employed for increasing the resilience of the tourist sector?

Two strategies of resilience have been identified in the case of the Bukovinian tourist sector, depending on their applicability level, namely individual solutions (applied by managers/ owners of hosting facilities) and regional or local solutions (at the level of Bukovina region).

Most tourist structures focused on survival strategies during the period under analysis. The interviews have tried to get more data about the behaviour during the states of emergency and alert, and post them, on medium-term.

Saving financial resources and reluctance to apply for bank loans.

Both guesthouses (tourist and agritourist) and hotels showed, during this period, a saving behaviour determined by the inability to predict the end of restrictions and return to normality.

We cut down expenses everywhere we could, and this was visible on the bills. We tried to be as thrifty as possible, use our own reserves for the bare necessities, we used what we had in the freezers or pantry, so we would keep our expenses to minimum. (Valentina, C., tourism entrepreneur, Vatra Dornei resort)

We did not apply for bank loans. We confined our tourist activities and focused on agriculture since we have a farm. We were not idle. We said that if one does not work, the other one will, and we have always kept them in tandem. (Mihaela, I., agritourist guesthouse, Neagra Șarului).

1. **Communicating and keeping in touch with tourists.**

Most reservations directed to tourist and agritourist guesthouses are made through personal channels of accommodation to which generally resort the same families or groups, year after year. Even if the cancellations from March-April were numerous, the owners/ managers kept in touch with their tourists by engaging into a bidirectional communication via social media and phone. A part of the tourists rescheduled their holidays after June 15, when the relaxation of restriction was expected to happen. Mindful of the emphasis placed on sanitary safety, the guesthouses have wrapped their offers around the security of their locations and isolation of their places.

Most small guesthouses have their own clientele and speak directly tot them. Thus, the owner can persuade his/ her clients to overcome their fears and go on holiday. Yes, I believe that here there is still some hope for normality. However, the strength of the Bukovinian tourism does not lie here. (Emil, manager of the Bukovina's Museum /National Museum of Bukovina)

We have kept in touch with our clients mostly by phone. They called us, we called them too. They called to inquire how were things here, if we opened and under which conditions, we called to check the reservations for the following period. (Valentina, tourism entrepreneur, Vatra Dornei resort)

The offer must start from the epidemiological safety. All packages to be sold from now on must start with the phrase "from an epidemiological point of view, the destination is safe, our guesthouse offers complete safety". (Emil, manager of the Bukovina's Museum /National Museum of Bukovina)

2. Re-dimensioning the tourist activity

Even if all tourist structures have been gravely affected by the sanitary crisis and travel restrictions imposed by the pandemic, many of them do not wish to confine their activities, but merely broaden their offer or even reorganize. In the case of hotels, there is a wider view shared by the managers about resizing the type of activity and redirecting towards investments in staff training. For instance, if we take into account that one of the highest costs is related to food preparing, a hotel manager suggests a Western model for serving meals in accordance with a tight schedule, between certain hours, and wishes to invest in the training of the kitchen staff to be able to come up a with new and diverse menu.

All the offers like all inclusive or half-board have disappeared. Instead, it has appeared catering and room-service. (Petru A., tourism local councillor, Vatra Dornei resort)

I will not confine my activities, I will reorganize. Let me tell you what I have in mind: all the countries, that are famous for their tourism, share a common praxis which I am thinking of putting into practice: I will reduce the meal programme at certain hours of the day, because I think that only in Romania one can enter and have a meal at any hour of the day. This way we will be more effective without any real confinement. Because, after all, in a hotel, the kitchen carries the most part of expenses. And, under these circumstances, with only three courses and a tight schedule, people will self-discipline in time and, definitely, the expenses will look differently. (Valentina, tourism entrepreneur, Vatra Dornei resort)

Solutions are sought for hotels and guesthouses with a larger number of accommodation places, such as checking in tourists according to a chess scheme, so after they check out, their rooms should stay unoccupied for at least 48 hours for safety and sanitizing reasons.

Q3. How is the tourist activity supported by the central administration?

One of the aspects we have taken a special interest in was the viewpoint of small entrepreneurs about the utility of the protection measures and the support given to the entrepreneurs and population promoted by the central/ governmental administration. If all the categories of persons interviewed agree that, in sanitary terms, all the necessary measures were taken quite quickly, regarding the financial support, the answers were far more nuanced. Thus, the small entrepreneurs consider that the only real help received from the government was the possibility of starting technical unemployment of the tourism workers, while the facilities for accessing loans (granted through emergency ordinance OUG 29/2020 which stipulates, among others, the implementation of a multiannual programme for supporting SMEs by ensuring certain loans and interest subsidies for these grants) are difficult to access and also risky on long term. The same ordinance specifies the possibility of suspending the utilities payment. However, this provision did not apply as the big utility companies accepted a deferral period of no more than 1 month for utilities payment. In addition to these measures adopted nationwide, some local administrations stepped in with their own support packages for entrepreneurs. Therefore, if in the case of Vatra Dornei resort it was implemented a 50% reduction of local taxes and duties, the townhall of Gura Humorului supported the local economic activities not only by cutting down taxes and duties, but by cancelling the penalties for those indebted from previous years, lowering rents for the spaces leased by townhall, annulment of leasing for several parking lots on public domain, and the 25% reduction of taxes in the local farmers 'market.

The biggest threat to tourism is, now, the fiscal and legislative instability. Mihaela states the following: *We know nothing of the conditions under which we will be able to carry on our activity and, especially, since when can we start making certain reservations... We do not expect much from anyone. We are used to doing it ourselves ... I am certain that things will come back to the way they were... I do not know what is going to happen in autumn and what can we expect once the cold comes back again. Who knows how things will go? We cannot make long-term projects because it is not possible. That's it!* (Mihaela, I., agritourist guesthouse, Neagra Șarului).

Speaking of agritourist guesthouses, the optimistic attitude pairs well with the mutual supportive activities of the farm: *I believe that the small-scale tourism will be fine, I mean we hope that the mountain agritourism is going to work here too, at least in this area.* (Mihaela, I., agritourist guesthouse, Neagra Șarului).

CONCLUSIONS

In the case of most tourists, knowing the risks taken by travelling to a certain tourist region comes mainly from information picked from social media and mass media channels. From this viewpoint, both tourism managers and managers of local administration admit that they are facing two main insecurities about Bukovina as tourist destination. The former is generated by the status "awarded" to Suceava county, namely Lombardy of Romania, by mass media in March-April 2020. The latter is related to the fact that the decision taken by the county council do not reflect the will and requests of the tourism operators.

Far from regarding the summer season of Bukovina as a failure, we consider that the post-pandemic strategies of tourist development are shadowed by uncertainty. First, it concerns a decisional incoherence about tourism which is visible nationwide, complemented by the difficulty of understanding the local mechanisms that make it run. Locally, the situation is nuanced by the different capacity of administrations for taking over a part of the central administration's attributes and come up with solutions for concrete issues of strategic management. This pandemic has actually awakened numbed social instincts and brought back the necessity of joint action in the face of a problem which affects severely a major resource on which everybody's well-being depends, namely tourism. For this purpose, the small entrepreneurs, and representatives of the public administration (local and county) rely on integrative strategies of tourist development, such as Bukovina Tourist Resort. For now, they do not include scenarios of a crisis comparable to the current one (and which displays the signs of a real economic hiatus), instead, they bet on growing the degree of tourism appeal, a constant marketing, expanding the stays, developing novel forms of tourism in certain areas or on the festival tourism. At the moment, it is clear that the largest accommodation units were the most affected. Therefore, the most likely strategy for the following period will aim at winning back their place in the market through a series of actions meant to win again the interest of the foreign or corporate tourists.

The conclusion of the analysis run here suggests two types of scenarios for restoring the prior- pandemic status of the Bukovinian tourism. The optimistic scenario is based on the need of returning to an unconstrained lifestyle which could compensate psychologically for the months of social and travel restrictions. Regarding this scenario, we can estimate that coming back to the prior-pandemic parameters will take up to one year since the state of emergency was ended. However, the central administration needs to come up with clear rules on sanitary and legislative issues, and activate forms of supporting the tourism entrepreneurs, regardless of their business size. The pessimistic scenario takes into consideration the extension of the pandemic duration over a period we cannot possibly predict. Each month that passes by brings up more economic insecurities, and affects the recovery capacity of the tourist sector, as well as its resilience on medium and long-term. Under these grey perspectives, tourism will finally breathe again in two years after the pandemic comes to an end. In both scenarios, tourism will be mainly supported through an active type of tourism, such as agritourism, hikes, ecotourism, cyclotourism, hipotourism, which boost the natural potential of Bukovina region.

Tackling the relaunching of tourism in Bukovina is, we believe, a bold strategy and brave solution for rebuilding the trust of tourists and rediscovering its destinations. At least, for some time, the home tourism will be on the preference list of the Romanians, favouring short distance travelling, most likely in their home region. The key criteria for choosing a holiday destination this year will be primarily the following: sanitary safety, uncrowded places, quality, sustainability, and ecotourism. The cottages and apartments will be on the top of the list, as well as smaller boarding houses and hotels. In this respect, Bukovina has all the ideal options of a such a holiday, despite being flagged by the quarantine shadow cast upon the metropolitan area of Suceava.

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STRATEGIC MANAGEMENT OF THE AFRICAN SWINE FEVER

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Abstract: *African swine fever (ASF) is a disease with a devastating impact on economy, affecting seriously the pig industry production and trade, discouraging farmers to restock their farms and continuing their business, overall changing policies and markets. In the last five years the ASF has badly affected the world: 50 countries affected on 4 continents, about quarter of pig world population died or was killed in order to control the disease, and millions of euro were paid to manage (eradicate) the disease. Despite the new policies, the overall management, the preventive and control measures taken, the disease is continuing to spread and leave behind huge losses into the global pork industry. In essence the paper aims to review experience on the management of ASF in affected countries and Romania and try to identify what went wrong in the management of the ASF and how countries can be better organized to react to an outbreak of African Swine Fever and to identify better ways to diminish the devastating impact of the disease upon societies, consumer, trade between the countries, economy.*

Key words**:** *animal health, crisis management, risk factors, economy, trade,*

***JEL classifications:* H12, Q18**

INTRODUCTION

This article is looking to review management practices to control emergency crisis [11], in veterinary health. We would like to stress that despite a wide range of approaches and new and high-tech management achievements (modelling, risk management, genotyping and mapping technique followed by comparisons studies, etc) managers face huge problems in controlling critical situations as effectively and efficient as should be. From this standpoint, we selected African Swine Fever (ASF) as disease to analyse, because documented evidence show that it is a disease with a past (first described in 1921 in Kenya by Montgomery), endemic in several sub-Saharan countries (probably before 1921) and Sicily, was and is a challenging and devastating disease (Figure 1, 2 and 3, Table 1, 2) as regards the evolution and control, and after 99 years is still a problem with global impact which requires increased attention from all parties involved (government, scientists, industry, population). Studies performed by economists of Iowa State University estimated that if ASF enter in the North part of America (USA) the cost might be around 50 billion $ over a period of 10 years. Therefore, the paper go over the chronology of the African swine fever (ASF) in the world, then focus on the most representative epidemiological part of 2018 year in Romania (devastating evolution, high speed of spreading, huge losses, the eradication programme faced hard choices), describing epidemiology and eradication policy chosen, trying to identify the reasons beyond the failures of the implementation of 2018 eradication programme.

MATERIAL AND METHODES

In order to review the management and epidemiology of PPA we used the retrospective method. The data used for the paper are only published data. For Romania data were collected, registered and notified to OIE and European Commission by the National Sanitary Veterinary and Food Safety Authority and for the other countries the data we refer in the paper are data collected,

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recorded and notified to the OIE, by the competent authorities (CA) of the respective countries, or data published in various scientific articles, or official presentations (OIE, EC etc).

RESULTS AND DISCUSSIONS

Overall, virology studies characterise the virus as a very complex molecular structure which is not entirely known, high genotypic and serogroups variability, not entirely known[2], unpredictable and very complex pathogenity and pathogenesis [8] producing acute, sub- acute, chronic disease or nothing (non-infected strains) mechanisms of the immune response to ASFV remain still unclear [9], the detection of the virus is hampered by short viremia and the related high mortality[14], long distance jumps (Poland,18 Nov 2019) great resistance and long-term virus survival in the environment[5,6,7], (faeces, 60-100 days (Strauch - 1991 Haas et al, 1995), manure at 17 °C, 84 days - (Haas et al, 1995), blood on the buried bricks – 112 days , in soil – 81 days (Kovalenko et al. (1972) [4,5], up to 18, 60, and 83 days of curing in Italian salami, pork belly, and loin (Stefano Petrini et al, 2019), can persist indefinitely in frozen food etc), resistant to chemical and physical disinfectants[9].

The exposed population for ASF is a population represented by domestic and wild pigs from the Suidae family, order Artyodactylia. For this paper we considered that the domestic population as the entity that it is controllable (under control - the official surveillance and control of the CAs, the number of the pigs known, follow a known production technology, the population is easily traceable, bio-security measures are in place, etc), of course where is applicable, and the wild population (the main ASF reservoir host, where the real number only can be estimated, the itinerary – that it only can be predicted and however despite the studies – it can changed right away depending of many factors, different reaction (immunity) to the ASF pathogenity (genetic diversity not predictable, infection depending the dose, way of exposure etc), most of the exposed wild boars becoming the new sources of virus for the non exposed population).

So, there are a lot of unknown or not documented enough factors which imply many assumptions, and even if their evolution it is predicted by scientists through modern technology/different scenarios/modelling, we have to accept that these predictions can encompass sometimes big errors and the evolution of these factors or are out of the human control or are not controllable enough (Table1).

Table 1 Impact of ASF in the world, period 2016-2020 (source OIE)

Region	Swine				Wild boar				Total Outbreaks	Total Cases
	Outbreaks	Susceptible	Cases	Losses**	Outbreaks	Susceptible	Cases	Losses**		
Africa	128	213 795	61 459	85 539					128	61 459
Asia	9 928	8 107 951	115 309	6 733 791	631	NA	1 121		10 559	116 430
Europe	4 271	1 859 480	625 269	1 383 372	17 307	NA	29 513		21 578	654 809
Total	**14 327**	**10 181 226**	**802 064**	**8 202 702**	**17 938**	**NA**	**30 634**	**0**	**32 265**	**832 698**

Table 1. Impact of ASF by region based on the information submitted through the Early Warning System (2016-2020).

* NA: Not applicable. ** The impact of this disease is measured in terms of losses, which are calculated by the sum of dead and culled animals from the infected farm or backyard premises of the reported outbreak. ***Total of susceptible andlosses do not appear in the table as for wildlife, it is often not possible to calculate the number of susceptilble animals, and the losses are calculated only for swine.

Therefore, the unknown factor we can call it "X" and the characteristic of the "X" is that it can vary widely and it can change very quickly depending of many trigger factors. The "X" represents in the management of the ASF the uncontrollable/less controllable and the unpredictable fraction.

Epidemiology of the African Swine Fever (ASF) in the evolution of the ASF in the world, temporarily and spatially, literature differentiates several stages, described below.

A) Up to 1921, African continent the first outbreak, described in 1921 in Kenya, by Montgomery. However, probably before 1921, ASF was evolving endemic in several sub-Saharan countries. Then, the ASF remained confined until 1957, to the African continent where it continued to exist and spread, producing endlessly contaminated products. The results of ASFV genotyping/serogroups known [1, 3, 2] notes that in Africa the diversity of genotypes (I, V, VIII, X, untyped) and serotypes is the maximum recorded compared with other parts of the world where ASF evolved.

B) Between 1957-1995, Western Europe in 1957, the ASF virus went out Africa for first time and entered Europe through Lisbon, from Angola. This may have contributed to the most important epidemiological change in ASF at that time. From there was spread to Spain (1985-1995), France (1964, 67,77), Italy (1967,1980), Malta (1978), Belgian (1985), Netherlands (1986), coming back again in Lisbon in 1960.

Figure 1 Entrance of ASF in Europe 1957 and Latin America in 1971 (source OIE)

According to literature the ASF was eradicated in all countries in Europe, except Sardinia where is still evolving endemic. It is interesting to highlight that the eradication of ASF in Spain lasted 10 years, and sources indicates that this was due primarily to the need to build up a new infrastructure and the need for qualified staff. Literature [13] mentions that the last 5 years of the eradication programme in Spain were estimated to have cost US $92 million (Arias & Sanchez-Vizcaino 2002). It should be noted that at that time the Spanish production system was open and ASF eradication was indeed difficult. The literature [1, 3, 2] register that in Europe the virus was mainly genotype I. The literature reviewed say that the entering of ASF virus in Europe/Lisbon was done via contaminated food waste originated from the African flights or vessels.

C)From 1971 to 1980, Latin American continent [14] from 1978 up to 1980, the ASF entered and spread in several American countries: Brazil, Cuba, the Dominican Republic, Haiti (table 2)

Table 2 – Evolution of ASF in Latin American continent

Country	YEARS	OUTBR.	POLICY ADOPTED	IMPACT		
				Duration	Cost USD	Pigs killed
Cuba	1971	33	Total eradication Radical change production system	1 year	No data	463,332
Brasilia	1978-1981	231	Targeted eradication	4 years	1.8 mill	66,966
Republic Dominican	1978-1980	374	Total eradication slaughtering of the pigs free of clinical signs	3 years	8,5 mill	192,473
Haiti	1978-1983	93	Total eradication	5 years	9.5 mill	384,391
Cuba	1980	56	Total eradication Radical change production system	1 year	9.4 mill	137,287

ASFV crossed the Atlantic Ocean and entered in Carrabin Islands. In 1971, Cuba was the first country of the Caribbean region who notified infection with ASF (Seifert 1996,), and the virus is believed to have been introduced from Spain thorough food waste from flights and vessels (Lyra 2006) or/and live pigs/pig products products (McDaniel, 1986), however again is not clear from the literature how has been transmitted.

In almost all cases described above (A, B, C) depopulation method (total/targeted), ban of animal moving and, in several cases, radical changes of the pork production system have been the control instruments for eradication of ASF in their countries.

D) <u>Starting with June 2007- up today, Eastern Europe and Asia</u> The ASFV left for the third time the African continent in 2007 and enter for the second time in Eastern Europe - Georgia (June 2007) and later on for the first time in China (August 2018).

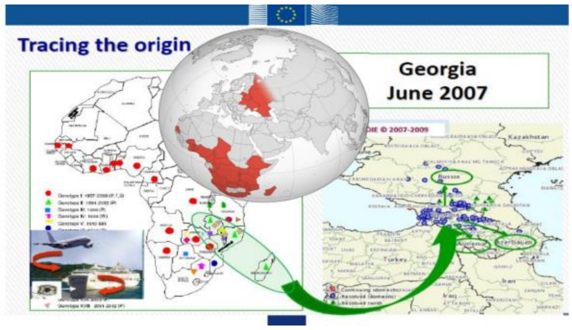


Figure 2 Tracing the origin from Africa to Georgia (source OIE)

Starting with June 2007, ASF had a devastating evolution and became a real threat to the global pork industry, because from Georgia it continued to spread very fast and affected 3 continents, more than 50 countries (Armenie, Azerbaijan and Russia in 2007, Ukraine in 2012, Belarus in 2013, Estonia, Latvia, Lithuania and Poland in 2014, Moldova in 2016, Romania and Czech Republic in 2017, Hungary, Bulgaria, Belgium in 2018 etc) and above 75% of world pig population. Genotype II was demonstrated that was/is present in Ukraine and Eastern Europe.

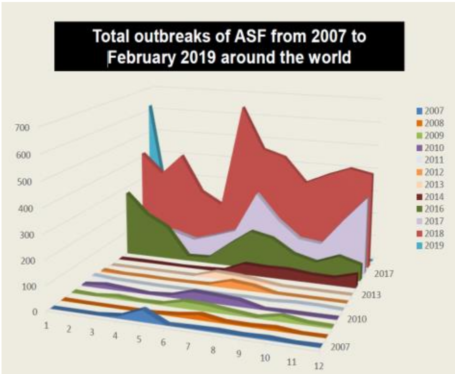
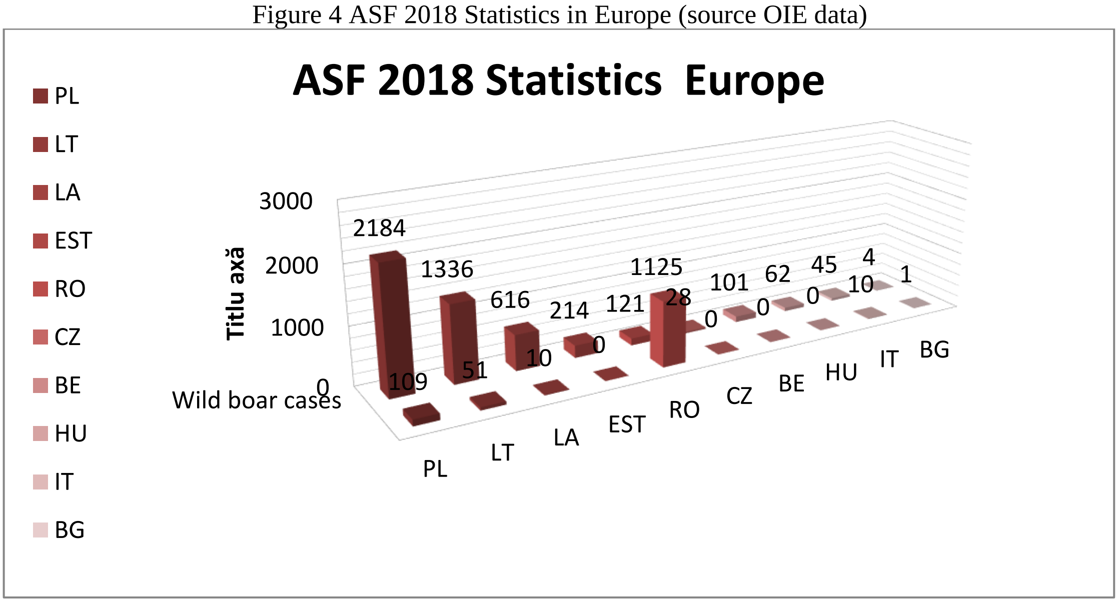


Figure 3 Total outbreaks in the world from 2007 to 2019 (source, Prof.JM Sanchez Viscaino, Beijing, 2019)

<u>E) Romania</u>

The first outbreak in Romania was in Satu Mare District (N-W, Romania), on 31 July 2017 (when two outbreaks were confirmed, source Ukraine). However, we focus primarily on the analyse of the Tulcea District (S-E, Romania), period 10 June- 17 October 2018 because that was the time of the 2018 year when the ASF had an explosive evolution in the Romanian pig domestic population. Furthermore, Tulcea was the point of entry of the virus in the S-E part of Romania (on 10 June 2018). Therefore, this was the moment when the management of the disease was hampered by different drivers. Compared with the other member states in Europe Romania had 1125 outbreaks in 2018, in the domestic pig (Figure 4). The data below shows that at the RO CAs had been really challenged and the ASF evolution escaped to some extent CAs control.

Figure 4 ASF 2018 Statistics in Europe (source OIE data)



<u>The pork production system and the susceptible population in 2018 in Romania</u> the susceptible pig population to ASF in Romania in 2018 was formed from 3.698.293 domestic pigs and X wild

boars. In line with Romanian legislation at that time the domestic pigs were raised in three types of farms: commercial farms (2.145.856 pigs), type A farms (109.289 pigs, also commercial farms) and backyards (1.443.148 pigs) (Table 3).

Table 3 pork production system in 2018 in Romania

	01/01/2018	%
PIG SECTOR DATA / DOMESTIC SECTOR		
Number of commercial farms	168	0.03
Number of "Type A" farms	13578	2.75
Number of non-commercial farms	479675	97.2
NO OF DOMESTIC PIGS		
Number of domestic pigs in Romania	3698293	58%
Number of pigs on commercial farms	2145856	2.95%
Number of pigs "Type A" farm	109289	39.05
Number of pigs on non-commercial farms	1443148	
WILDE SECTOR		
Number	Dont exist	
DATA CONCERNING THE WILD SECTOR		
Number hunting grounds in Romania	2154	2154

Furthermore, the legislation requirements concerning the biosecurity at that time were different for each type of farm. From proper biosecurity requirements applicable to commercial farm to insufficient biosecurity requirements for „Type A" farms and in the end to none biosecurity requirements applicable to non-commercial farms (population backyards). This means that 60.95% of the RO domestic pigs were more or less exposed to the virus (58% of domestic pigs raised in commercial farms plus 2.95% type A farms) and the other 39,05% were practically vulnerable and not protected in front of the ASFV. On the other hand, statistics shows that the pork production system in Romania at that time was obviously dominated by backyards (97,2%) making practically the pork population vulnerable to the ASFV.

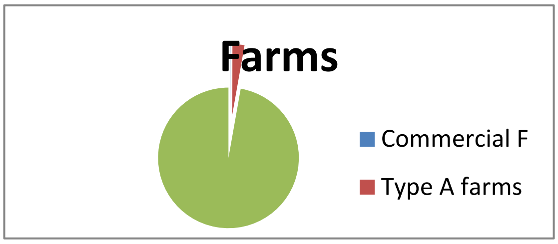
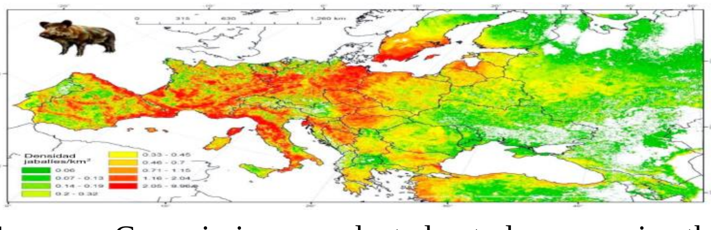


Figure 5 - System production pork in RO

Figure 6 –Population of domestic pork in RO

Other weak link in the chain of the production of the pig in Romania was that a lot of people were traditionally raising their pigs grazing freely in the proximity of forests and water increasing the risk of infection with ASFV by oral, environmental and possible vector contamination. Moreover, the reproduction of the domestic pigs in the backyards was allowed at that time.

Figure 7 – Density of wild boars in Europe (source EFSA)



On the top of that at that time/also possible now the wild boar number/density/their itinerary were not known. That’s why EFSA - Panel on Animal Health and Welfare, African Swine Fever on the request of the European Commission - conducted a study concerning the comparisons on the reliability of wild boar density in Europe in order to improve the collection data system and to validate the data (guidance adopted in June 2018 [6]). At that time the only data available on wild boars were estimated based on hunting data. Based on points described above we have to point out that the pork production system in Romania was unprotected in face of ASF virus and widely exposed to hazard.

Epidemiology of ASF in Romania on 10 of June 2018 in Delta area (Ceatalchioiu village), next to the Ukraine border the first outbreak was confirmed. Ceatalchioiu is a small fishermen village hardly accessible by people. One of the hypotheses would be that at that time the start of hunting in the Ukrainian delta would have caused the migration of wild boars on the Romanian bank of the Danube. Consequently, the wild boars carrying PPA virus would have come /not into contact with wild boars and/or domestic pigs, especially the domestics pigs supposedly raised free by the villagers.

Figure 8 – First outbreak in the SE of Romania (source OIE)

In short, Tulcea is located in northern part of Dobrogea and borders Ukraine in the north part. It is located on the right bank of the Danube and borders the communes of Ceatalchioi (34 outbreaks/only backyards), Pardina (61 outbreaks/only backyards), Malcoci (20 outbreaks/only backyards), Nufăru (5 outbreaks /only backyards), Valea Nucarilor (2 outbreaks' /only backyards), Mihail Kogălniceanu (2 outbreaks/only backyards), Frecăței (5 outbreaks/only backyards) and Somova (37 outbreaks/only backyards). Located at 45o 10 'north latitude and 28o 47' east longitude with a population of 194.421 inhabitants (2019, wikipedia source) with an area of about 19.9933 ha (199 km2), of which about 31% is included in the Danube Delta Biosphere Reserve. it is located on a continental promontory, its upstream extremity extends to the two forks of the Danube River (the arm Chilia and the arm St. George), in part it is submerged under the meadow and the Danube Delta. The relief includes regions with low altitudes (alluvial plains, deltaic and marshy lakes), but also regions with higher altitudes (maximum elevation in the Macin Mountains). In the Măcinului mountains there is a National Park (intersection - Mediterranean, Balkan and Caucasian area). Hydrographically, the territory is dominated by the Danube river, but there is also an important area covered with water, respectively two natural lakes Ciuperca and Zaghen. The Danube annually floods the territory, a phenomenon that begins in spring after the melting of snow and ice bridges, especially affecting the surface of the meadow on the left bank of the Danube. Few days later, during 3 days (13/15/16 06.2020) huge number of outbreaks were confirmed in the next villages. Then the ASFV spread extremely fast: on 03/07 the ASF was confirmed in Braila and in Constanta, on 27/07 was confirmed on Galati (Moldavia border), on 15/08/2018 was confirmed on Calarasi and on 18/08 was confirmed in Ilfov (next to Bucharest).

Figure 9 - Temporal evolution of the ASFV by week, between 10.06-16.09.2018 (source EC, ADNS data).

Figure 10 - Spatial evolution of the ASFV, between 10.06-16.09.2018 (source CA presentation 2018, CE)

Pardina was the village with the biggest number of outbreaks. 61 outbreaks were registered from 16.06 to 11.07 (in less than 1 month), as it is exemplified below.

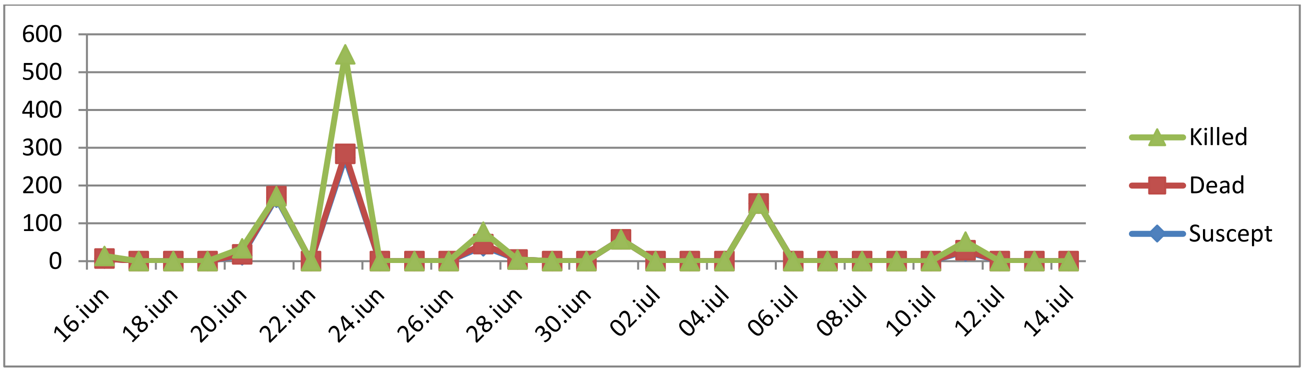


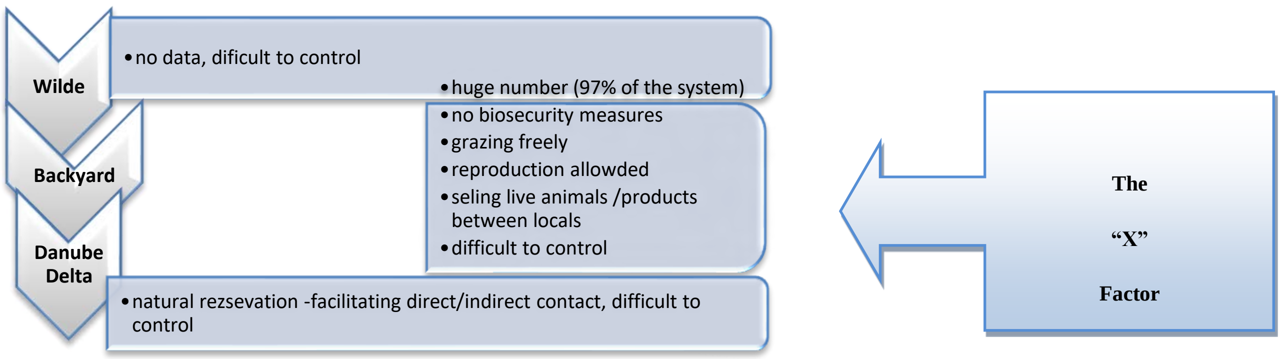
Figure 11 Outbreaks evolution in Pardina during period 16.06-11.07 2020 (source CA presentation 2018, CE)

Based on the spatial – temporal analyses of the ASF statistics we observe that a big number of outbreaks were confirmed in a very short time, majority of the outbreaks were confirmed in backyards (the weak link of the chain, the vulnerable point of the production system), many outbreaks were confirmed in the same time in close points (cluster evolution), possible multifocal introduction. Therefore, we consider that the epidemiological evolution was very aggressive and spread all of the sudden. The fact that the firsts events occurred at once in close/distant points suggesting cluster evolution and spread unexpectedly in the following days it is obvious that the detection of the disease was missed at moment zero / the moment of entry of the ASFV into the pig population of Romania. So, the virus was already in the area and was circulating in the wild boar population, the disease becoming visible later on, for the first time in the backyards (no biosecurity measures, domestic pig – more vulnerable compared with wild boar). Furthermore, the surveillance system set up by the CAs of the wild boar population didn’t work at all to diagnose the ASFV in the wild population before the first outbreak in the domestic pig to emerge. <u>Might</u> “*the short viremia and high mortality associated with ASF make it virtually impossible to detect the disease through active surveillance.”* <u>was the cause.</u> *(African* Swine Fever in the Russian Federation: Risk Factors for Europe and beyond study by *Sergei and al* (FAO),2013 [12*]).* On the other hand, the spreading of ASF was frequently attributed to humans – people, hunters, farm keepers etc. In this kind of situation sometimes because of the impact of the crisis desperate people do desperate things. EFSA in 2019 did an Epidemiological analysis of African swine fever in the European Union (November 2018 to October 2019) based on extensive review of the updated data send by the member states concerning their experince with ASFV and concerning human contribution they conclude in theire study that there is sufficeint evidence in this direcion (sufficent documented evidence provided- for Belgium, Czechia and western Poland/ for wild boar population) [7]).

CONCLUSIONS

Compared with the period described before 2007 thinks have definitely changed in the management of ASF after the first outbreaks/cases of ASFV. European Commission, FAO, OIE and the other international entities involved cooperate together and use all the experience in the world to continuously improve the legislation, tools displaying regionalisation, lunched research projects to identify and read the X mentioned at the start of the article and to find and develop a vaccine to eradicate the ASF, carry out audits to identify the problems in the country living behind recommendations in order to improve the control systems, share the experience with all the world even the ASFV management strategies still rely today only on early detection, strict biosecurity measures, strict quarantine and culling policies/depopulation. However, from the analyse in Romania we learned that the following drivers hampered the management of the ASF. Primarily we consider that failing the early detection of the disease was the crucial cause that did the management of the disease inefficient in Romania. During that time the infective animals but clinically healthy were continuing contributing exponentially to the spread of the disease in parallel with many other possible factors (humans, environmental contaminated staff etc), the traceability of the disease was lost and the eradication actions were implemented too late, leading to culling large number of animals. Due to the particular characteristics of the ASFV which produce short viremia associated with high mortality literature sais that the detection of disease is very difficult through active surveillance and recommends strongly the use of passive surveillance.In 2009 to 2011, an average of 4.6 days and up to 11 days (Dudnikov *et al.*, 2011) passed from the first sign of disease (usually indicated by death) before the ASF diagnosis was confirmed. Another factor that contributed to high vulnerability of the production system of the pork in Romania was the legislation. Applying gradual biosecurity measures depending of the size of the farm created breaches /vulnerable links in the pork production system (97% being backyards) and consequently increased the velocity of the transmission of the virus from one backyard to other with the help of the people/reproduction/contaminated food, habits to sell live pigs/products etc. Cooperation with the other authorities, mass media and trust of pig owners and consumers is a must, the responsibility of the eradication plan must be legislative shared with all the stakeholders involved, otherwise the implementation of the eradication plan is unsuccessful. Education and communication are crucial tools in the eradication of a disease. Supplementary we describe below the X factor the unknown factor, impossible/very hard to control and very costly.

Figure 12 Description of X factor in Romania



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ROLUL SI AVANTAJELE SISTEMELOR INFORMATICE IN AGRIBUSINESS

ELENA COFAS [1], IRINA-ADRIANA CHIURCIU[2]

Abstract: *The agribusiness sector has continued to contribute significantly to Romania's GDP, and the positive results are due to Romania's agricultural potential, increased production, as well as investments in infrastructure and state-of-the-art tools made in recent years by large companies operating in this field. sector and thus contributed to increasing productivity. However, the agribusiness sector in Romania is far from reaching its maximum potential. Although Romania is a major exporter of agricultural products, the "produced in Romania" label is not enough to become a global player. Agribusiness companies should invest to understand the needs of customers and global markets and provide higher value-added products than other global players.*

Information systems as a broader, comprehensive form is an essential field of study in business administration and management - areas considered major in the economic area. Thus, IT systems must respond to issues related to the management of hardware, software, data, and computer networks, in a strategic way for business success. Today, IT systems are increasingly becoming a vital component of business success for an organization or an entrepreneur.

Keywords: *agribusiness, computer system, market*

JEL Classification: *M15*

INTRODUCTION

With the new technological discoveries, agriculture and agricultural business are undergoing radical changes, innovation being the core around which farmers seek solutions to streamline their activities, increase their production by maximizing resources. The business process consists of any group of activities performed in order to produce a specific customer-oriented or market-specific result. The business environment is constantly changing and new techniques and methods for developing this process are required.

In Romania, through the funds attracted by agricultural entrepreneurs, higher productivity and access to modern solutions for agriculture can be obtained, with a major role in increasing efficiency. An information system created in support of agribusiness companies offers farmers the opportunity to reduce raw material costs, to optimize their production flow, this being possible by applying better technologies, based on information taken directly from the field, or the production area. Each IT solution is based on microservices, on the breakdown of agricultural processes into activities and sub-activities. In this way, we are talking about the overall efficiency of production.

A good IT solution for agribusiness has the effect of performant management of agricultural farms, regardless of their size, being able to carry out the following types of actions:

→ *Management of agricultural works* - planning, execution, and monitoring of agricultural works and the necessary resources (labor, use, materials).

→ *Mapping* - mapping plots and geolocation by interconnection with GIS solutions.

→ *Treated forecasts* - forecasts based on information and alerts from weather stations and field sensors.

→ *Alerts* - alerts generated based on inspections and observations and external data (drones, other devices).

→ *Planning agricultural works* - generating work orders based on inspections and alerting with resource allocation.

→ *Treatments* - correct treatments on crops, depending on adversity (diseases, pests), weather forecasts, previous treatments, and field observations.

→ *Personnel management* - personnel allocation for each task with a specific assignation of hours and quantities carried out individually and in teams.

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→ *Equipment management* - integration with GPS systems for tracking mechanized work.

→ *Reports and analyzes* - tracking costs and profitability on farms, plots, works and activities.

MATERIAL AND METHODS

Information systems play a vital role in the success of a business, which must be measured not only by its efficiency (in minimizing costs, time, or use of information resources) but also by the support it provides in: elaboration of business strategies, carrying out commercial processes, improving the organizational structure and culture of the organization, increasing the turnover and value of the company in a dynamic and competitive environment.

From a managerial point of view, the computer system represents:

- an important means for ensuring the functionality of the business;
- an essential factor that influences the operational efficiency, the productivity of the employees, and the relationship with the clients;
- a basic amount of information that ensures correct decision making;
- a means to develop new products (services) that ensure a competitive advantage;
- one of the most important resources of the organization and business cost analysis.

Integrated Enterprise Resource Planning (ERP) systems took their place in business applications in the context of the information explosion and unprecedented development of information and communication technology in the early 1990s.

Integrated IT systems for business management - Enterprise Resource Planning (ERP) have made their way into enterprise applications in the context of the explosion ERP consists of software modules that cover all functional areas, structured such as: marketing and sales, service, product design, and development, production and inventory control supply, distribution, human resources, finance and accounting, IT services, being developed for processing transactions and facilitating the integration of all processes, from the planning and development phase of production to relationships with suppliers, customers, and other business partners.

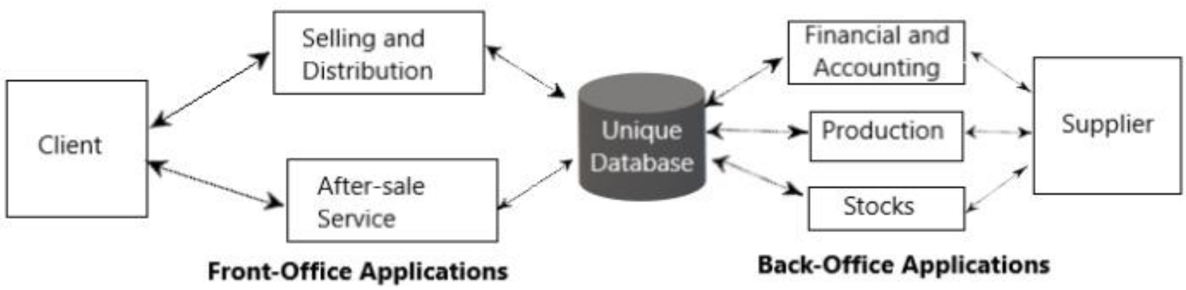

Fig. 1. The conceptual scheme of an ERP system (source: own contribution)

An ERP system, "considered the most accurate expression of the interdependence between economics and information technology, is a software multi-modular infrastructure, that provides management support and coordination of various structures and processes in the company, in order to achieve the business objectives." Concisely, ERP represents the planning of the 4 determining factors for a successful business: the human, financial, technical, and resource ones (the 4 M - Man, Money, Machines, and Materials).

In a simplified form, an ERP system can be defined in terms of two fundamental properties: functionality and integration.

→ *The integration* ensures the connectivity between the flows of functional economic processes. It can be thought of as a communication technique. Some common ways in which communication takes place through and for integration are: source code, local and extended computer networks, Internet, e-mail, workflow, automatic configuration tools, protocols, databases. We can say that integration is achieved through communication, and communication is achieved through integration.

→ *The functional* part of an ERP system ensures the flows of economic processes within each function. Thus, in an ERP suite, there are found from a few to dozens of functional modules (general accounting, debtors, salaries, stocks, supply, production planning, logistics, orders, and sales).

The current ERP systems integrate all the management functions of a company, starting from: planning, ensuring the stock of raw materials and materials, defining technologies, coordinating production processes, financial-accounting management, human resources, stocks of finished products, developing and maintaining relationships with customers and business partners.

RESULTS AND DISCUSSIONS

Real-world computer systems are combinations of computer systems typical of a particular function. Companies see in these systems a way to share information resources and improve the efficiency and effectiveness of the business, which implies the easy fulfillment of strategic objectives.

1. Production IT systems

Computer systems are used in operations management and transaction processing and support the production of a business and can be specialized in: computer-aided engineering, computer-aided production, machines with program control, material demand planning, supply, robotics. Such systems can be used by companies in the agricultural production and processing sector, which must plan, monitor, and control stocks, purchases, and the flow of goods and services.

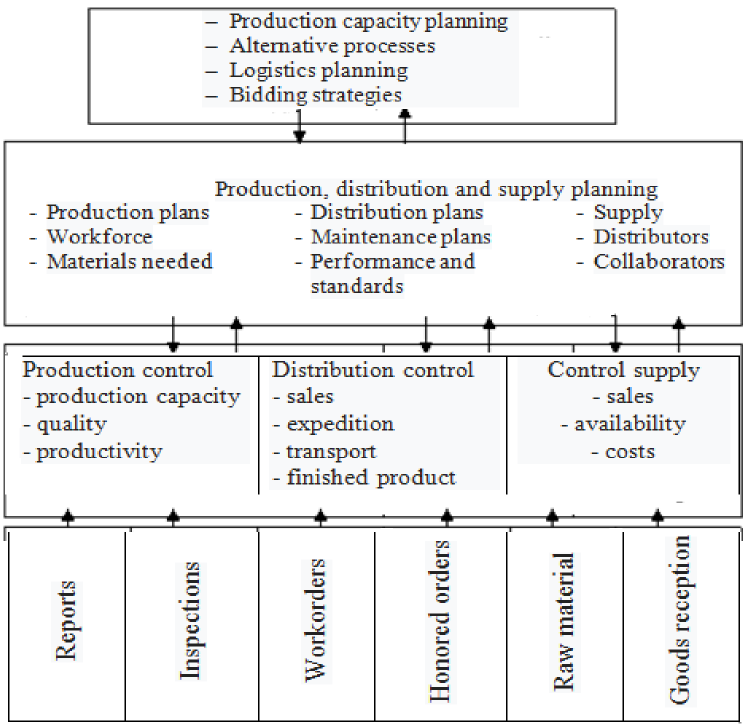

Fig. 2. The structure of a production IT system (source: own contribution)

Production information systems highlight the purposes of using the computer in a factory, with namely advantages of:

- ✓ ***simplifying*** the production process, product design, and enterprise organization.
- ✓ ***automation*** of the production process and business functions with the help of computers and robots.

- ✓ ***integration*** of the entire production and auxiliary processes using computers and telecommunications networks.

2. Marketing IT systems

Marketing, in a business, has the role of dealing with the planning, promotion, and sale of existing goods in existing markets and to discover new products and new markets to better serve current and potential customers. That's why marketing is a vital function of a business. Companies started to use computers more often as a way to advertise themselves optimally in daily-changing free market. As such, computers have been involved in the development of marketing information systems in the last years, which integrated the flow of information necessary for many marketing activities.

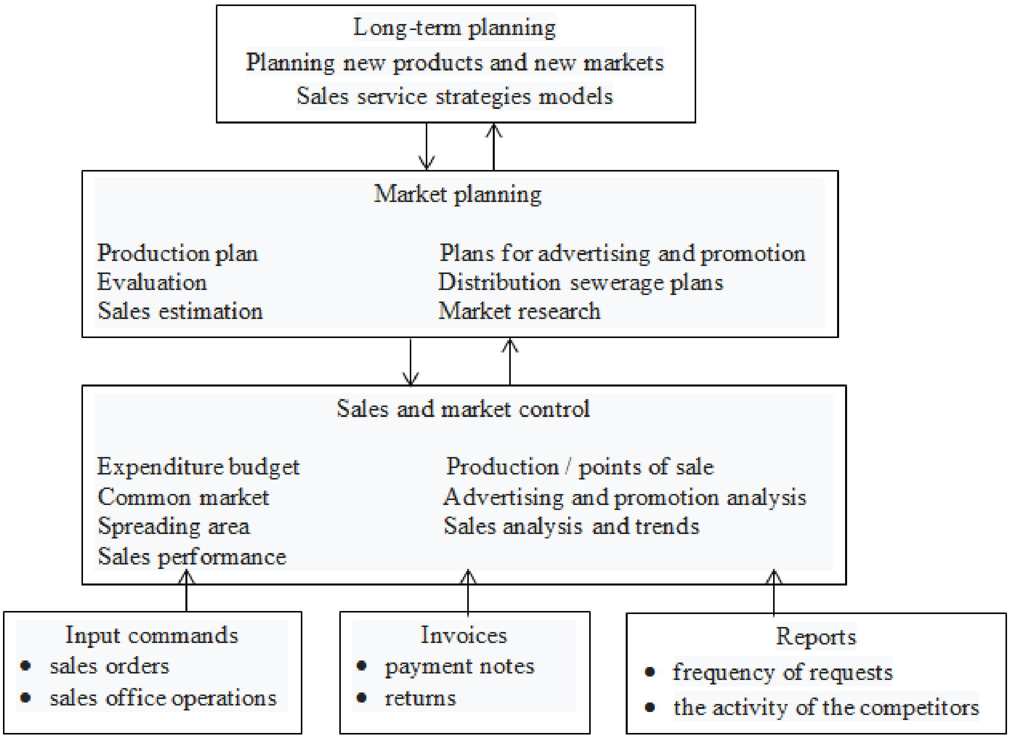

Fig. 3. The structure of a marketing IT systems (source: own contribution)

Analytical reports provide information about a company's current performance against planned objectives. The following are the most important areas in which marketing can be supported by computer-based information systems.

→ ***Sales Management*** – the sales manager must plan, track, and support the performance of his/her subordinated salespersons. Thus, computer systems create sales analysis reports, which help the sales manager to develop programs that will improve sales results (fig. 4).

→ ***Sales automation*** – the sales analysis is one of the main aspects, that sustains and coordinates sales, by having automatized records and reports of sales activities, communications and sales management.

→ ***Production management*** – the leaders of a production cycle need information to be able to plan and control the performance of specific production, mass production, and assortment. Computers can help set prices, costs, revenues and they can later help develop future production. Providing this information and analyzing it for evaluation decisions is a basic function of this system. The computer can provide models that can evaluate the performance of the current production and can prospect the success of the proposed production.

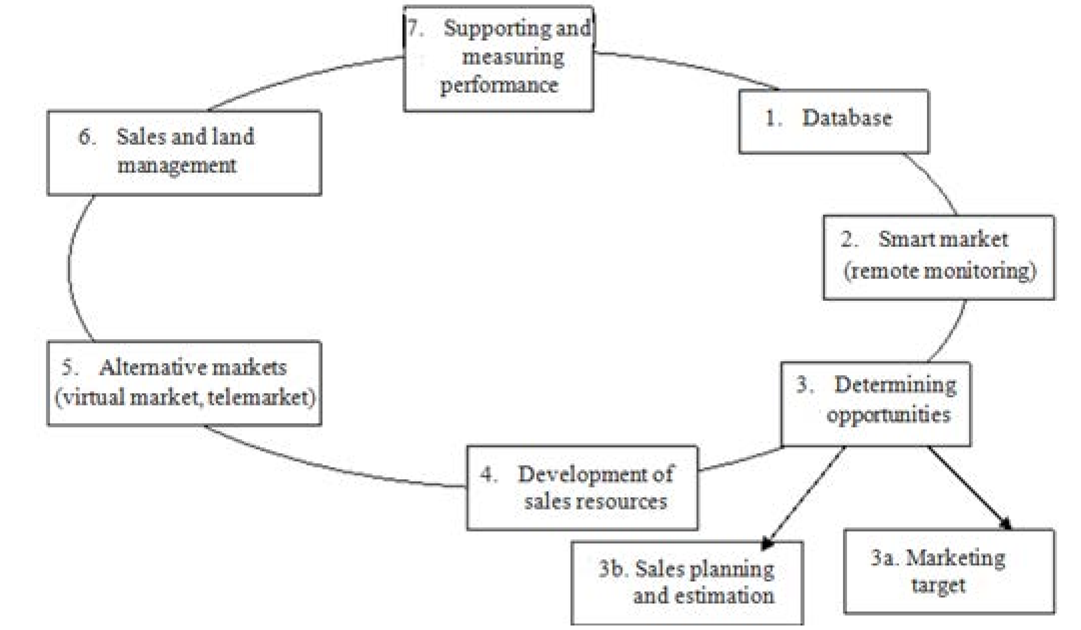

Fig. 4. The cycle of a sales report (source: own contribution)

→ ***Advertising and promotion*** – marketing needs information that will help it to achieve the sales goals and the lowest possible costs for advertising and promotion. Computers use information and market research models that aid the:

- selection of media and promotional methods
- allocation of financial resources
- monitoring and evaluating the results of various advertising and promotion campaigns.

→ ***Sales Estimation*** – the basic functions of sales estimation can be grouped into two categories: short-term estimates and long-term estimates. Short-term estimates are made for a period of up to one year, and long-term estimates are made for periods exceeding one year. Market research data, sales history, promotion plans, and statistical estimation models are used to generate these estimates.

→ ***Market research*** – the market research information system offers managers support in decision making, help in market research for the activities of collecting, analyzing, and storing an enormous amount of information (internal and external data) from a wide variety of markets. , which are constantly changing. It can include information about sales, prospecting, consumers, competitors, economic and demographic prospects, but also development, respectively trends.

→ ***Marketing management*** – the use of IT systems for the realization of short-term or long-term sales perspective plans, the establishment of profit and development objectives, the development of marketing strategies, and basic plans associated with market goals and research. It also provides feedback and analysis, establishing the performance achieved against the plan for each area of marketing.

3. Financial IT systems

Computer-based financial systems support the decisions regarding business financing and the allocation and control of financial resources.

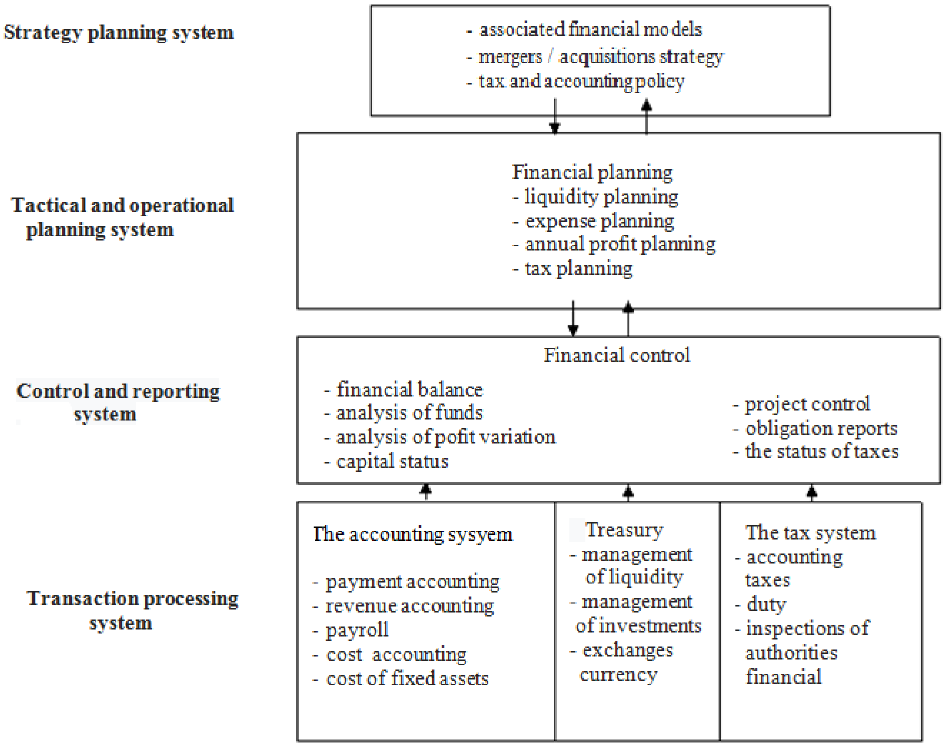

Fig. 5. The structure of a financial IT systems (source: own contribution)

The computer system for accounting is often included as a vital component of the financial system. Most financial information systems include the following categories:

→ ***Liquidity management*** – information systems collect information related to liquidity receipts and the necessity for real-time or periodic investments, allowing saving or reinvesting additional funds. Information systems can help the CFO make purchases, sales or make purchasing decisions so that the risks are minimal and the gains maximum.

→ ***Capital distribution*** – assumes the evaluation of the profitability and financial impact involved in capital expenditures. Long-term expenses for installations and equipment can be analyzed using a wide range of techniques, which includes analyzing the present value of the estimated expenses, such as analyzing the probable risks.

→ ***Financial estimates*** – a business must make financial and other estimates of economic trends. A wide range of statistical packages that offer analytical techniques resulting from national or local economic or financial estimates, salary level, price level, interest rate. These estimates may involve the use of data on environments outside the business generally obtained from demographic or financial databases provided by information services such as Statistical Yearbook, Internet, Official Monitor.

→ ***Financial planning*** – financial planning systems provided information on the economic situation, business operations, possible ways of financing, interest rates, stock prices, and bonds. They are used to develop an optimal financial plan for business and help determine financial needs and analyze alternative methods for financing business. I use financial planning models to evaluate the present and future financial performance of the business or a subdivision of it (spreadsheet packages and DSS generators are frequently used to build and use these models).

4. Accounting IT systems

Accounting information systems are the oldest and most widespread business information systems. They record and report business transactions, ie the flow of funds throughout the history of an organization, and produce financial documents such as balance sheets, income statements, and others. Such systems produce estimates of future conditions such as financial projects, budget allocation, etc. The financial performance of a company is measured by other such accounting estimates. The figure below describes the relationships between the most important computerized accounting information systems for both small and large companies.

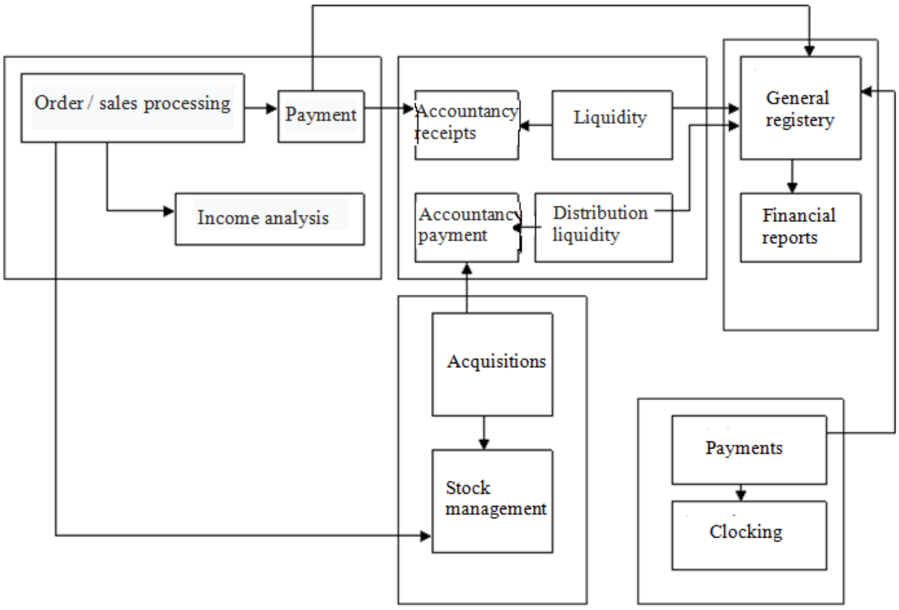

Fig. 6. The structure of a accounting IT systems (source: own contribution)

→ ***Order processing –*** is an important transaction processing system, which collects and processes customer orders, produces invoices and data necessary for sales analysis and inventory management.

→ ***Stock management*** – the inventory management system processes data that reflects the quantitative changes of the products in stock. Once the order is received from the customer, the order processing system processes and transmits the data to this system, which produces the notices accompanying the goods. It also performs stock changes, provides replenishment data, and many other inventory reports.

→ ***Revenue accounting*** – these systems keep records of amounts owed by customers and provide monthly payments and loans. It provides managers with reports that help them control the number of loans and the amount of money owed and help maximize profitable loans and minimize inefficient debt.

→ ***Payment accounting*** – it records purchases, amounts due to suppliers, payments to suppliers, and produces liquidity reports.

→ ***Payroll*** – records work performed by employees, compensation, leave allocation, and produces payroll and other reports to management and government agencies regarding earnings, taxes, and other deductions.

→ ***General register*** – it synthesizes the data received from the payment, collection, salary, and all other accounting systems and, at the end of each accounting period, the balances, journals, and other accounting documents are generated much better and cheaper than if they were done manually.

5. Human resources IT systems

Managing human resources (staff/personnel) in an organization involves establishing staffing requirements, efficient placement of employees, evaluation, remuneration, and specialization. Initially, computer-based computer systems were used in businesses to:

- generate the remuneration reports (payment statements, paychecks)
- keep the data of the employed personnel
- analyze the use of staff

Many companies later developed this function, becoming the human resource information systems (HRIS) system that deals with:

- ✓ recruitment, selection, and employment of staff
- ✓ distribution at work

- ✓ appreciation of employees' performance
- ✓ analysis of employee benefits
- ✓ training and improvement of employees
- ✓ safety and health security

CONCLUSIONS

The use of intelligent software solutions in agriculture helps to significantly increase the performance and quality of processes and thus also the quality of crops and provides competitive advantages and sustainable approaches, necessary to process the data generated and used in business operations. Currently, innovative solutions in the cloud, dedicated to farmers, help to efficiently manage all activities on the farm, from planning, execution, and monitoring of agricultural works, with the allocation of resources, forecasting treatments to be applied, real-time alerts, inspections, and observations, equipment management, up to supply, stocks, sales, financial management and P&L reports on farms, plots, works, and activities.

The main functionalities that an application dedicated to the agricultural industry should contain would be the following: monitoring and measuring agricultural business figures (financial, accounting, profitability indicators, forecasts, etc.), risk management, inventory management, activity measurement, and evaluation, respectively measurement data/performance through integration with IT technologies and systems.

ACKNOWLEDGEMENTS

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EDUCATION - BASIC PILLAR OF THE SUSTAINABLE RURAL DEVELOPMENT. EVOLUTIONS AND GAPS IN THE SOUTH-MUNTENIA REGION

SORINEL IONEL BUCUR[1]

Abstract: *The sustainable development of an economy, either viewed as a whole or at the local level, is based on at least two essential pillars, namely the stock of human resources and the educational system. If the demographic system is the backbone of development, education plays an important role at least in terms of building a system of values related to structural changes in the economy. Although at the level of rural communities there is often opposition to further studies, generated either by the local behaviours, specific to each area, or by the lack of motivations in this field, investments in this field should be in the first place. In this context, the present approach aims to carry out an analysis of the educational system in the rural area of the South-Muntenia region, as an essential element of the local sustainable development process.*

Keywords: *educational system, gaps, regional dimension.*

JEL Classification: *Q01, Q19, R11, R19.*

INTRODUCTION

Over time, the Romanian education system has been the subject of multiple discussions related either to the need to ensure an adequate material base, an appropriate level of salary for teachers, but also to reduce the gaps between urban and rural areas. All these discussions come against the background of a declining school population, but also of a deficient infrastructure.

In the current conditions generated by the pandemic situation, the problems of the Romanian educational system are even more accentuated, on the one hand, by the limited access or poor training of teachers and students in using of modern IT equipments, but especially for approx. one third of schools lack access to infrastructure (electricity and internet). Even insofar as the state intervention in the latter aspect may seems to have positive effects, it should not be overlooked that, at this time, in Romania there are 52,233 households that do not have access to electricity. Or the problem of developing the education system, in accordance with current limitations, is becoming more and more acute, accentuating the existing gaps between urban and rural areas.

MATERIALS AND METHODS

The evaluation of the educational system at the level of one of the largest development regions - South-Muntenia region - is based on public information provided by national statistics, through the Tempo-Online database, but also information of local and central authorities, founded in the analyzes in this domain. From a methodological point of view, the approach uses established statistical methods, such as structures and comparisons, with the identification of existing gaps either interregional or intra-regional, depending on the availability of statistical data. In order to ensure the uniformity of the data, the analysis period is 2007-2019, limited by the existing statistical support at regional level.

RESULTS AND DISCUSSIONS

Grouping a number of seven counties with different characteristics, both from the perspective of geographical location, but especially of the economic activities (mono or multi-activities), the South-Muntenia region occupies an important position in the overall national economy. Within the seven component counties, four are located in the plain area, the main activity

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being agriculture. The other three counties (Argeș, Prahova and Dâmbovița) are characterized by an economic system based on multi-activities, with an impact on the level of local development.

In relation to the educational system, it should be noted that the present approach was based on the analysis of some primary indicators, namely the number of school units, school population, teaching staff and the educational infrastructure.

From the perspective of the number of education units, the period 2007-2019 is characterized by a visible downward trend both in total and in the main types, respectively: primary and lower-secondary, upper secondary, vocational and undergraduate education. Thus, for example, in the urban environment, on the total of primary and lower-secondary education, we witness a regional rebound of 20.4%, with oscillations at county level between -7.2% (Argeș) and -30.2% (Dâmbovița).

It should be noted, however, that at the level of upper education, except Prahova and Teleorman counties, during the analyzed period the number of education units increased by percentages between 2.4% (Argeș) and 21.4% (Călărași).

However, unlike the urban environment, in the rural area, the number of education units in upper school registered a significant increase in Călărași and Giurgiu counties, so that in the other counties the decreasing trend is maintained as in the case of urban ones (**Table no. 1**).

Table no. 1. Dynamic of the number of school units by levels of education in 2019 comparing with 2007, urban/rural areas (%)

		Total	Primary and lower-secondary education	Upper secondary education
	TOTAL	-14.9	-15.7	2.9
Urban	**Sud-Muntenia**	-20.4	-20.4	1.1
	Argeș	-5.3	-7.2	2.4
	Călărași	-28.0	-25.8	21.4
	Dâmbovița	-22.0	-30.2	0.0
	Giurgiu	-18.7	-25.3	9.1
	Ialomița	-21.7	-21.1	5.9
	Prahova	-22.1	-24.7	-6.5
	Teleorman	-28.7	-8.4	-5.0
Rural	**TOTAL**	**-17.0**	**-15.5**	**24.3**
	Sud-Muntenia	-24.6	-21.0	19.2
	Argeș	-6.7	-6.3	-14.3
	Călărași	-31.7	-28.6	300.0
	Dâmbovița	-28.1	-31.1	20.0
	Giurgiu	-23.4	-26.7	100.0
	Ialomița	-16.9	-16.9	0.0
	Prahova	-29.8	-25.8	-14.3
	Teleorman	-29.5	-9.2	33.3

Source: Calculation on the Tempo-Online database, 2020.

If in terms of the number of education units things are different by levels of education, in terms of enrolled population, we are witnessing in the last 13 years a significant decline in all levels, the most pronounced decline being found in vocational education and tertiary education, both in urban and rural areas.

An explanation of this phenomenon is represented, on the one hand, by the changes in the demographic level, but mainly in the permanent changes in the local economy.

To these are added the local behaviours specific to each community, the habits and customs maintained in most areas (**Table no. 2**).

Table no. 2. Dynamic of the enrolled population, by levels of education in 2019 comparing with 2007, urban/rural areas (%)

		Total	Primary and lower-secondary education	Upper secondary education	Vocational education	Tertiary education
	TOTAL	-19.9	-9.3	-21.9	-54.3	-70.3
Urban	**Sud-Muntenia**	-20.6	-15.2	-20.1	-62.1	-88.3
	Argeș	-19.4	-11.4	-17.0	-61.0	-64.2
	Călărași	-21.0	-13.5	-27.5	-59.7	-78.9
	Dâmbovița	-21.0	-17.8	-19.2	-55.8	-59.9
	Giurgiu	-17.5	-16.4	-8.8	-68.7	-59.6
	Ialomița	-23.1	-18.0	-23.6	-60.2	-96.0
	Prahova	-17.3	-8.5	-21.4	-59.9	-55.1
	Teleorman	-29.9	-28.9	-22.3	-78.3	-60.1
Rural	**TOTAL**	-25.1	-22.3	-14.9	-59.9	-65.2
	Sud-Muntenia	-25.9	-23.2	-8.5	-70.5	-21.2
	Argeș	-26.6	-24.6	-0.7	-70.3	-58.6
	Călărași	-20.0	-16.3	-13.7	-88.3	
	Dâmbovița	-27.1	-26.2	3.8	-64.2	-56.8
	Giurgiu	-19.4	-18.4	15.9	-78.9	-26.2
	Ialomița	-28.5	-26.2	-58.5	-59.9	-65.6
	Prahova	-21.6	-16.8	-22.7	-59.6	
	Teleorman	-38.2	-35.1	-7.5	-96.0	

Source: Calculation on the Tempo-Online database, 2020.

The number of classroom teachers is on the same decreasing trend, both by areas of residence and especially by levels of education. Thus, in the rural area of the South-Muntenia region, with the exception of Călărași and Giurgiu counties, where the number of teachers has increased in upper secondary education, we are witnessing a strong setback on all levels of education. As previously mentioned, the lack of a proper salary of teachers, incentives for those who settle in rural areas, correlated with the demographic decline and the enrolled population have had the effect of significantly reducing the classroom teachers (**Table no. 3**).

Table no. 3. Dynamic of the classroom teachers, by levels of education in 2019 comparing with 2007, urban/rural areas (%)

		Total	Primary and lower-secondary education	Upper secondary education	Vocational education	Tertiary education
	TOTAL	-15.2	-16.7	-13.2	-74.8	
Urban	**Sud-Muntenia**	-20.8	-23.1	-19.6	-74.8	
	Argeș	-20.5	-21.0	-19.8		
	Călărași	-13.2	-19.0	1.5		-68.9
	Dâmbovița	-24.3	-30.2	-19.3	-55.6	-3.3
	Giurgiu	-6.9	-7.9	1.0		-17.3
	Ialomița	-21.8	-21.2	-23.6	-47.6	-28.7
	Prahova	-16.3	-15.0	-25.9	-58.5	-32.6
	Teleorman	-35.9	-39.7	-23.9		-18.2
Rural	**TOTAL**	-20.4	-19.9	17.0	-80.5	-32.1
	Sud-Muntenia	-25.7	-26.5	-10.2	-63.2	-25.0
	Argeș	-30.6	-29.9	-18.6		0.0

	Călărași	-14.2	-18.9	360.0		0.0
	Dâmbovița	-29.7	-32.3	-12.7		0.0
	Giurgiu	-8.1	-8.1	46.9	-68.9	0.0
	Ialomița	-22.0	-21.5	-25.0	-3.3	0.0
	Prahova	-18.8	-17.4	-49.3	-17.3	0.0
	Teleorman	-41.2	-42.2	-7.7	-28.7	0.0

Sursa: Calculații pe baza datelor din Tempo-Online, 2020.

In the context of the current crisis generated by the pandemic, the education system is more than ever in the presence of real challenges, related, on the one hand, to the large number of localities which are not connected to electricity, but also to the existence of communication networks, necessary to allow access at the Internet.

Even trying to address these issues cannot ignore the ability of residents to bear additional costs. If we refer, for example, to the relative poverty rate, it should be noted that within 13 years, in the South-Muntenia region, this indicator decreased by only 1.1 percentage points, respectively from 26.8% (2007) to 25.7% (2019).

Although Romania has the highest rate of internet expansion, there are still a number of 52,233 households without electricity, located, compared to the distribution network of operators, as follows [1]:

- 26035 households under 500 m;
- 19062 households between 500-2000 m;
- 7136 isolated households, located over 2 km away.

Of the 7136 isolated households, for which funds were allocated for the installation of photovoltaic panels, 5% are in the South-Muntenia region (356 isolated households), respectively (Table no. 3) [2]:

Table no. 3. The number of isolated households of the rural area of region South Muntenia without electricity in 2018

	Number	% in total
Argeș	13	3,7
Călărași	99	27,8
Dâmbovița	13	3,7
Giurgiu	109	30,6
Ialomița	3	0,8
Prahova	110	30,9
Teleorman	9	2,5
Total	356	100,0

Source: Ministry of Energy, 2018.

What is worrying is the fact that out of the 356 isolated households, 58.4% are located in two counties characterized by a high degree of poverty (Călărași and Giurgiu), followed by Prahova with no less than 110 isolated localities, without electricity.

Regarding the access to the internet, in 2019 compared to 2007, the share of the rural households with internet access increased by 66.4 percent, reaching practically 66.7%, by 9 percent below the total levels the country.

Although there is a high degree of expansion of the internet network, currently approx. 5000 education units are not connected to the internet. In these conditions, the development of online educational activities is quite difficult, having a direct impact on the quality of the educational act and the knowledge acquired by students.

CONCLUSIONS

The evolutions of the current educational system of the rural area of the South-Muntenia region do not give it sustainability. As an essential pillar of the development of a given nation or local area, education must be a real priority among decision makers.

Basically, the education system must be reformed in accordance, first of all, with the requirements of the labour market. Although at the level of rural communities there is often opposition to further studies, generated either by the local behaviours specific to each area or by the lack of motivations in this field, investments in this field should be in the first place.

Equipping education units with adequate infrastructure, ensuring a proper salary of teachers, changing the *curriculum* to be oriented to the vocational education, can be a starting point in the sustainable development of the local education system.

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AGRICULTURAL EDUCATIONAL ROUTES – STATISTICAL REFERENCES

VIOLETA FLORIAN[1], MARIOARA RUSU[2], ELISABETA ROȘU[3]

Abstract: *Human capital theories consider that education generates skills with economic efficiency because they make it possible to produce value. Generating appropriate skills in agriculture and an educational system specific for rural areas is a dynamic objective, mainly in the information-based developed economies, where technology and production methods are changing fast. The main objective of this paper is to analyse the educational training routes in agriculture, starting from pre-tertiary education, with all its forms, and ending up with tertiary education in this field. Based on the analysis of available statistical data, the paper emphasises that despite the progress that has been made in recent years, access to education, educational training levels measured in schooling years, insertion/integration opportunities throughout the educational cycle do not meet the human capital requirements specific to modern agriculture.*

Key words: *agricultural education, pre-tertiary and tertiary agricultural education, educational routes*

JEL Classification*: I21, Q19*

INTRODUCTION

In the recent decades, many countries have put on their agenda to expand their capacity for education and technical and vocational training in agriculture. This objective is supported, in the first place, by the fact that gradually the social mechanisms for the inter-generational transfer of agricultural skills are falling apart: more and more children have attended primary, secondary and high-school education, which translated into a low participation in agricultural activities, which has implicitly led to lower opportunities to acquire basic agricultural skills (practical experience). Furthermore, in most countries with emerging economies and in developing countries, young people do not seem to be interested in learning the traditional farming practices from their parents, as these do not match their aspiration to modern lifestyles. At the same time, the very nature of farm production is changing: the young people who go into the farm business are currently facing new challenges and opportunities: climate change, market instability, new technologies, innovative marketing models, etc. (Brown, T., Majumdar, S., 2020). The main objective of this study targets the analysis of educational paradigm, mainly of agricultural educational routes, starting from pre-tertiary education, with all its forms, and ending up with tertiary education.

MATERIAL AND METHOD

The approached topic required the use of appropriate methodology, which included documentary and statistical analysis methods. To describe the statistical model specific to the agricultural education system, secondary data were mainly analysed, from formal sources: statistical information provided by the National Institute of Statistics (NIS) and Eurostat. In this logic, the *educational paradigm* was analysed with the help of quantitative dimensions – for the high school, vocational, post-high school and higher education level – and the *socio-demographic paradigm* – focused on population employed in agriculture, educational capital of the farm head, etc.

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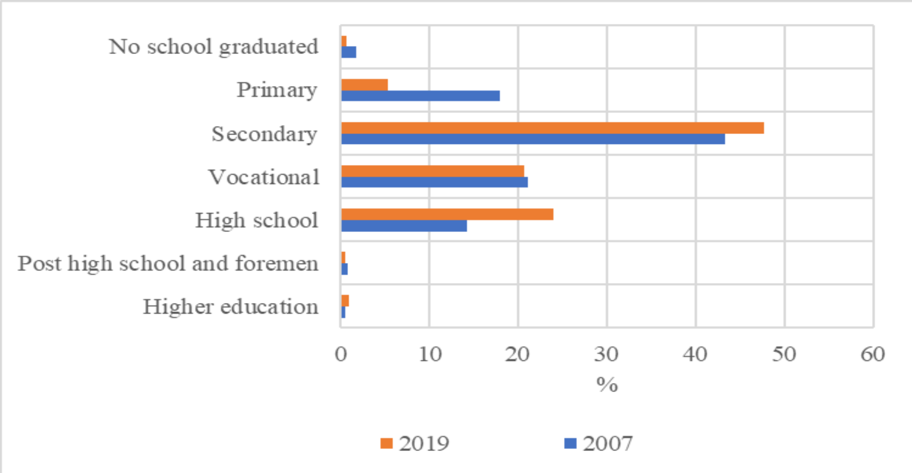
RESULTS AND DISCUSSIONS

1. Human capital – need to improve education and vocational training

The professionalization of human capital in agriculture aims at transforming, both farmers and other actors in the agricultural and food system, into qualified entrepreneurs able to run their farms or business as productive and sustainable economic enterprises (Kirui, O.K., Kozicka, M., 2018).

Romania has significant human resources in agriculture (23% of total employed population), which places it on the first position among the European Union member states. Human factor contribution to economic growth depends not only on the number of involved persons but also on the educational level: in the year 2019, almost half of the population employed in agriculture had attended secondary education (48%), while the persons with vocational training and high school education took second place (45%). Among the people working in agriculture in Romania, the share of higher education graduates was very low – less than 1%.

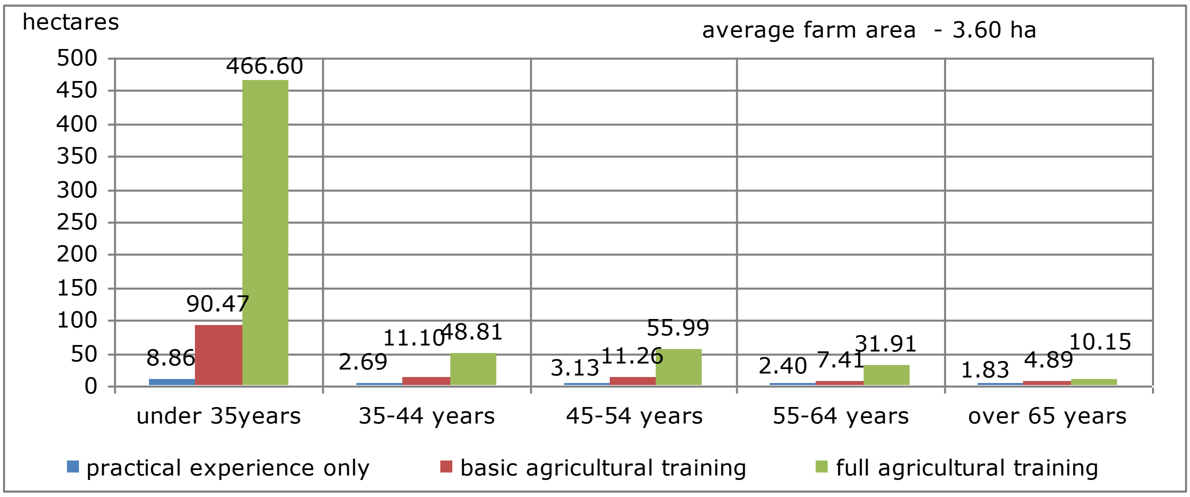
Figure 1. Evolution of skilled workers in agriculture, forestry and fishing, by training level



Source: NIS, Tempo-Online database, accessed in June 2019 (AMIGO)

In the year 2016, Romania had the most fragmented agrarian structure and had about one-third of the total number of farms (3.422 million) in the EU-28.

Figure 2. Distribution of farm heads by vocational training level, average operated area and age group



Source: authors' processing of Eurostat data, accessed June 2019

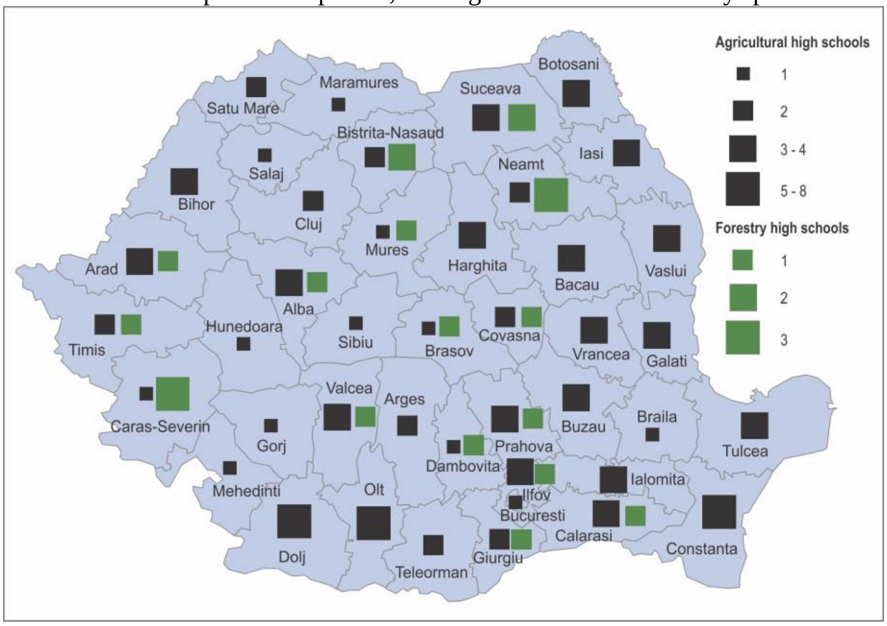
Most of these farms are run by farmers with low vocational training: 96.40% have only practical experience, 3.13% basic agricultural training and 0.47% full agricultural training.

In this context, the education system should take into consideration the following exogenous factors: *a) dual farm structure* – out of the total number of farms, 99.24% have an average size of 2.04 ha and 0.76% have an average size of 213.64 ha. This duality draws the attention on the fact the agricultural education and training system should respond to the specific needs of each group of farmers; *b) agricultural population ageing and the generational renewal implicitly* – the group of young farmers, under 35 years of age, although small in number (172 thousand persons), farm about 4 million ha, out of which 1.8 million ha are farmed by young farmers with full agricultural training. The new farmers' access to quality education and vocational training continue to be low, as a result of various barriers, including accessibility, admission requirements, physical distance to the training centres, rural poverty, etc.

2. Agricultural high school, vocational and post-high school education

High school education is focused on the creation, development and diversification of skills depending on branch, profile, specialization or qualification. High school education covers the following fields and profiles: theoretical fields, with profiles: sciences and humanities; technological fields, with profiles: technical, services, natural resources and environmental protection; vocational/professional field, with profiles: military, theological, sports, arts and pedagogy. Within the technological field of high school education, and more precisely, of the profile natural resources and environmental protection, there are 4 basic training fields: ***agriculture, food industry, forestry and environmental protection.*** In each county in Romania, there is at least one technological high school with natural resources and environmental protection profile, with specialization in agriculture and/or forestry.

Figure 3**.** Distribution of technological high schools, with natural resources and environmental protection profile, with agriculture and/or forestry specialization



Source: author' processing based on the Ministry of Education and Research data, 2018

The high schools with technical profile prevail in total technological high schools, while those with natural resources and environmental protection profile do not exceed 18%. The number of pupils enrolled in this profile had a decreasing trend, similarly with the number of pupils enrolled in total technological high schools.

Table 1. Technological high school education
– natural resources and environmental protection profile

Item	School year			
	2015/2016	**2016/2017**	**2017/2018**	**2018/2019**
Number of technological high schools, out of which with the following profile:	801	765	727	712
- natural resources and environmental protection	135	136	129	125
Pupils enrolled in technological high schools, out of which with the following profile:	299490	278141	268287	262908
- natural resources and environmental protection	49207	45679	43864	43128
Graduates from technological high school, out of which the following profile:	65290	63158	59119	...
- natural resources and environmental protection	10108	10279	9478	...

... missing data
Source: NIS, Romania's Statistical Yearbook 2019, p.330-331

At the same time, there is a very small number of technological high school graduates in the natural resources and environmental protection profile, in which agriculture and forestry are included, these representing 15% of the total number of graduates. "In the three categories of high schools, the technological high schools have the lowest graduation rates and the highest number of pupils who have to repeat the year or have been expelled from school" (GR, 2016).

The evolution of **vocational education**, mainly of agricultural education, is characterised by an increasing trend (except for the school year 2018/2019), both in the number of enrolled students and in the number of graduates.

Table 2. Evolution of the number of enrolled pupils and of graduates in vocational education
– profiles: agriculture and forestry

Education level	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**
Vocational schools - enrolled pupils - graduates	 25673 11403	 49479 10942	 65221 9752	 79735 18620	 84852 22404	 84966 ...
out of which the following profiles:						
Agriculture - enrolled pupils - graduates	 1748 697	 4044 757	 5253 718	 6522 1590	 7100 1766	 6639 ...
Forestry - enrolled pupils - graduates	 140 61	 180 59	 304 31	 385 71	 406 143	 332 ...

… missing data
Source: NIS, Romania's Statistical Yearbook 2019, p.331-332

Post-high school education is part of vocational education and lasts 1-3 years, depending on the complexity of qualification and the number of credits required for vocational training. Post-high school education takes the form of post-high schools and foremen schools. The beneficiaries of this education form are the pupils who completed their high school studies, with or without high school graduation diploma. Agriculture and forestry are among the main domains of post-high school education.

Table 3. Evolution of the number of enrolled pupils and of graduates in the post-high school and foremen education – agriculture and forestry profiles

Education level	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Post-high school education, out of which:						
1. Agricultural - enrolled pupils - graduates	 754 218	 768 315	 845 334	 736 290	 703 308	 756 ...
2. Forestry - enrolled pupils - graduates	 1011 441	 961 409	 1138 440	 1040 461	 907 333	 949 ...
Foremen schools – agricultural profile - enrolled students - graduates	201 51	285 124	161 69	102 57	64 16	96 ...

… missing data
Source: NIS, Romania's Statistical Yearbook 2019, p.334-335

A characteristic of the post-high school and foremen education in agriculture and forestry is the oscillating dynamics of the number of enrolled pupils and of graduates.

3. Tertiary agricultural education

The statistical picture of tertiary education is that of a declining system generated by the contraction of demand. The demographic supply for 2022 is ensured by the young people who were born after 1999, substantiating a potentially limited demand: "As a result, the segment of potential students in the period 2017-2022 are the young people born in the period 1999-2004. In this sense, starting from the number of children born in the period 1999-2004 and then following their educational path/their number in the education system at 8 years, at 14 years, assigning the pass rate of the high school graduation exam and other indicators previously mentioned, … the estimated number of students in the 1st year, from high school graduates, in the academic year 2020/2021 is 66,304, in 2021/2022 is 66,321, while in the year 2022/2023 is 67,792." (Petrescu, I., Gogu, E., Anghelache, C., Anghel M-G., 2018)

In the education system, there are four state tertiary education institutes only with agricultural and veterinary medicine profile and 13 tertiary education institutions, out of which 9 state institutions and 4 private institutions, with different profiles, among which agricultural faculties. The educational routes provided by the agricultural education structures have an increasingly lower attractiveness, the number of students steadily diminishing. It is worth noting, from statistical perspective, that the absolute diminution of the number of students has a selective character, depending on the levels of academic training (bachelor degree, master degree and Ph.D.); we also mention the fact that slow diminutions are mainly found in the number of students enrolled for bachelor degrees.

The University of Agricultural Sciences and Veterinary Medicine from Bucharest (USAMV Bucharest offered for the academic year 2019-2020, programmes for: bachelor degree (30 study programmes – full-time learning and distance/part-time learning); master degree (33 study programmes – full-time learning and part-time learning); Ph.D. (6 Ph.D. fields – agronomy, horticulture, animal science, veterinary medicine, biotechnologies, engineering and management in agriculture and rural development). However, the number of participants in educational activities is on a downward curve. For instance, if we compare the number of participants in the educational activity, in the academic year 2017/2018, we can notice that it decreased by 337 students compared to the previous year. In the case of master and Ph.D. programmes, the values indicate an increase, by 119 and 19 students respectively.

Table 4. Evolution of participants in the educational activity

Level of studies	2016-2017	2017-2018
Bachelor degree	9727	9252
Master degree	2011	2130
Ph.D.	310	329
Total general	12048	11711

Source: USAMV Bucharest, 2018, p. 20

The contracting number of students can be also noticed in the *University of Agricultural Sciences and Veterinary Medicine from Cluj-Napoca*. In the year 2019, there were 23 full-time bachelor degree programmes, and 5 part-time and distance learning bachelor degree programmes; there were 26 master degree programmes; the doctoral studies are performed in the Doctoral School of Agricultural Engineering Sciences and the Doctoral School of Veterinary Medicine (Rector's Yearly Report, 2019). The academic offer is focused on training experts in agriculture, horticulture, biotechnology, animal science, veterinary medicine, food science and technology.

Table 5. Situation of the total number of students

	Bachelor degree students		Master degree students		Ph.D. students	
	2015	2019	2016	2019	2015	2019
Total students	4652	4020	953	988	264	331
Students-state budget funded	3563	3035	803	822	258	292
Students -fee payers	1089	985	150	166	6	39

Source: USAMV Cluj-Napoca, 2019, p. 14-15

In the *University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" from Iaşi*, the evolution of the number of students in recent years has revealed a tendency to stabilise the number of enrolled students at about 4500 students. The university offers educational routes focusing on: "training engineers specialised in agriculture, science of mountain agriculture, horticulture, animal husbandry, economic engineering, environmental engineering, agro-processing, control and expertise of food products, engineering and management in public food service and agro-tourism, bachelor degree in biology and veterinary medicine" (USAMV Iaşi, 2018).

The *University of Agricultural Sciences and Veterinary Medicine Banat from Timişoara* has experienced fluctuations in the number of students; in the year 2017, there was a contraction in the demand of part-time or distance learning: "The analysis of the number of students by education forms reveals a slight decrease of the number of students who attend distance learning or part-time courses, while the number of students who attend full-time courses increased (by 3.08%)" (USAMV Timişoara, 2018). Two years later, it was noticed that: "In the university, the total number of students (cycle 1 Bachelor degree), at the beginning and at the end of the year 2019, had a positive evolution ... thus, the number of students increased from 3,908 to 4,139 ... while the number of students (cycle 2 Master degree) increased by 9.2%)" (USAMV Timișoara, 2019)

Table 6. Number of enrolled students for Bachelor and Master degree, by fundamental fields, in the academic year 2017-2018

	Engineering sciences		Biological and biomedical sciences		Total	
	Bachelor	Master	Bachelor	Master	Bachelor	Master
USAMV Bucharest	7659	2132	1553	...	9212	2132
USAMV Cluj-Napoca	2954	890	1397	40	4351	930
USAMV Iaşi	2536	728	909	...	3445	728
USAMV Timişoara	2836	956	988	45	3824	1001

Source: Petrescu, I, Gogu, E., Anghelache C., Anghel M-G., 2018, p. 515-517, 538-539

The agricultural universities are trying to ensure complex educational routes, structurally and functionally, to create the necessary premises for professional qualification and specialization in an academic framework. The creation of academic competencies is a process that is institutionally completed through doctoral studies; each university has doctoral schools. The doctoral fields are diverse and in significant number (USAMV Bucharest - 6 fields, the other universities 5 fields each) (Petrescu, I., Gogu, E., Anghelache, C., Anghel M-G., 2018).

CONCLUSIONS

The agricultural education system dynamics is generated by exogenous factors – demographic, economic and social – as well as by internal factors, coming from its own structures and functionalities. Its social adaptability to the requirements of a society in transformation, in permanent evolution, should confer it both continuity and consistence for ensuring an efficient human capital for a vital field of activity, such as the agricultural sector. The educational routes provided by the agricultural education structures have an increasingly lower attractiveness, as the number of enrolled pupils and students is steadily diminishing, facing significant problems in terms of efficiency, quality and relevance.

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THE IMPACT OF CUPPLED SUPPORT ON TOMATOES AND CUCUMBERS FOR PROCESSING CULTIVATED IN FIELD

CORNELIA ALBOIU[1]

Abstract: *The paper presents the impact of the coupled support on tomatoes and cucumbers cultivated in filed in Romania. In this study a detailed analysis is made regarding the coupled support received in the period 2015-2018 for the following products: field cucumbers and tomatoes for processing The main indicators used refer to the evolution of cultivated areas, both in field and in greenhouses and plastic tunnels, the evolution of productions and yields, of prices and trade balance. The paper also presents an analysis of the evolution of the number of farmers who received coupled support, of the areas entitled to payment and of the coupled support calculated per hectare in territorial profile. The analysis is based on data provided by the Agency for Payments and Intervention in Agriculture and the National Institute of Statistics. The results reveal a low impact of the coupled support on the main analysed indicators, as well as the lack of consistency in the support provided in the investigated period.*

Key words: *coupled support, vegetable sector, impact.*

JEL Classification: *Q10, Q19.*

INTRODUCTION

The coupled support in the vegetal sector is granted starting with 2015. According to Order no. 619 of April 6, 2015, issued by the Ministry of Agriculture and Rural Development, in Romania is granted coupled support in the vegetable sector to active farmers who grow tomatoes for industrialization cultivated in the field; cucumbers for processing grown in the field; vegetables grown in greenhouses - tomatoes, cucumbers, peppers, cabbage for fresh consumption and cucumbers for processing; vegetables grown in plastic tunnels - tomatoes, cucumbers, peppers, cabbage and eggplant for fresh consumption and cucumbers for processing. Among the stated objectives of providing this support were to increase the cultivated areas, productions and yields in the vegetable sector.

MATHERIAL AND METHODS

This paper studies the impact of coupled support on tomatoes and cucumber grown in the field meant for processing in the period 2015-2018 and performs a detailed analysis in territorial profile. The coupled support is conditioned by the production, but also by certain documents that the farmer must submit to APIA (Agency for Payments and Interventions in Agriculture). The aim is to avoid overproduction of certain products and to ensure that farmers respond to real market demand. But sometimes a struggling agricultural sector or subsector may receive dedicated aid. The optional coupled support scheme aims to prevent the aggravation of difficulties, which could lead to the abandonment of production and could affect other parts of the supply chain or associated markets. Therefore, EU countries can maintain a link (coupling) between income support payments (with a limited amount) and certain sectors or products (European Commission 2019).

EU countries may review their decisions on optional coupled support by August 1st of any year, with effect from the following year. All EU countries, except Germany, have decided to apply the scheme in the period 2015-2020. The amounts granted and the range of sectors targeted varies greatly from one country to another. (The European Commission).

The allocated amounts decreased by approximately 4% from 190 million euros in 2015 to 181.5 million euros in 2019, for 2020 the amount of 179.9 million euros was allocated. The fruit and vegetable sector has always been and remains the 5th largest beneficiary of the CFS and also the second most important beneficiary (after the protein crops sector). Its share in the CFS

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decreased from 5% to 4.2%, which is about 0.4% of the annual national ceiling for all direct payments. The fixed area (EU28) decreased from 728,656 ha to 718,328 ha. An EU-wide estimate shows that support has fallen from EUR 259 / ha to EUR 251.5 / ha (EU average 28).

The approach carried out in this paper is based on quantitative analyzes, which include both a descriptive part of the vegetable sector in evolution after accession, and a comprehensive analysis of the impact of the application of the payment scheme - coupled support - on the sector, in territorial profile, during 2015-2018.

The purpose of the paper is to analyze the impact of coupled support on field tomatoes and cucumbers for processing cultivated in field in 2015-2018, both territorially and nationally on important indicators such as: cultivated area, yields, total production, prices, trade balance. For this analysis, data provided by APIA and the National Institute of Statistics were used, and the research was conducted for the period 2007-2018, using the calculation of the growth rates of the above mentioned indicators in dynamics over four time intervals, respectively: 2007-2010, 2011-2014, 2015-2018 and 2007-2018.

RESULTS AND DISCUSSIONS

The impact of coupled support granted for field-grown tomatoes meant for processing

The impact of coupled support granted for field-grown tomatoes for processing. Coupled support for field-grown tomatoes for processing did not evolve steadily over the period under review, although the number of farmers applying for this support increased by 400% from 2015 to 2017. In the first year of coupled support a number very few farmers (26) received this support due to insufficient information, with very few farmers being informed about this support.

Table 1 Number of farmers, authorized amount and area entitled for payment in territorial profile granted for field tomatoes for processing%

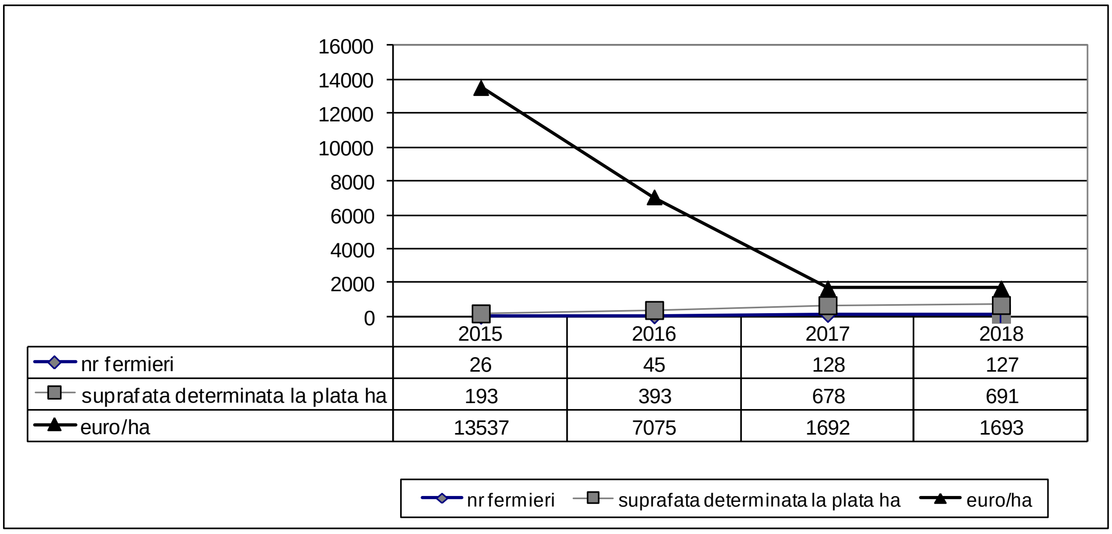
Jud	2015			2016			2017			2018		
	Nr of farmers entitled for payment	Authorized amount for payment	Area entitled for payment	Nr of farmers entitled for payment	Authorized amount for payment	Area entitled for payment	Nr of farmers entitled for payment	Authorized amount for payment	Suprafața det. la plată	Nr of farmers entitled for payment	Authorized amount for payment	Area entitled for payment
	1	2	3	4	5	6	7	8	9	10	11	12
BH	8*	7	6	4	0	0	5	2	0	4	4	4
BR	12	3	3	4	99	99	4	0	53	1	1	1
CJ	4	17	17	2	0	0	2	4	0	0	0	0
Cl	4	2	2	2	0	0	3	3	0	3	3	3
Gl	8	8	8	24	0	0	13	8	0	9	9	9
Il	23	43	43	33	0	0	20	39	1	34	34	34
IS	4	1	1	0	0	0	1	0	0	0	0	0
OT	15	6	6	2	0	0	14	6	0	8	8	8
TR	23	6	7	13	0	0	9	3	0	9	9	9
VL	0	7	8	2	0	0	1	3	0	3	3	3

*(1), (4) , (7), (10) Nr of farmers entitled for payment in %; (2), (5), (8), (11) Authorized amount for payment in %; (3), (6), (9), (12) Area entitled for payment in %.

Source: calculations based on APIA data, , 2019

In 2015, the main beneficiaries came from Ialomița and Teleorman, respectively 6 for each county (23%), and the largest area entitled for payment was 85 hectares in Ialomița county (43%), followed by Galati counties , Teleorman and Olt (table 1). In total, in 2015, 193 hectares cultivated in the field with tomatoes for processing received support. As the number of farmers who applied was very low, respectively 26, a very high support per hectare was reached. For tomatoes for industrialization, according to the legislation, growers could receive 1,400 euros per hectare, but because very few farmers knew about this support, the value of this support reached 13,537 euros / hectare (figure 1).

In 2018, the number of farmers who benefited from support increased to 45, and the value of support per hectare decreased to 1692 euro / hectare, in total area entitled for payment representing 691 hectares (figure 1). The farmers who benefited from support came mainly from the counties of Galați (26), Olt (17), Ialomița (25), Teleorman (13). The largest area determined for payment is found in Ialomița County (232 ha, respectively 34%), followed by Galați and Teleorman (62 ha, respectively 9%), table 1.



Source: APIA 2019

Figure 1. Coupled support per hectare for tomatoes for processing, 2015-2018.

To observe the impact of this support on cultivated areas, yields and total tomato production I calculated the dynamics of these indicators over several time intervals covering the period 2007-2018.

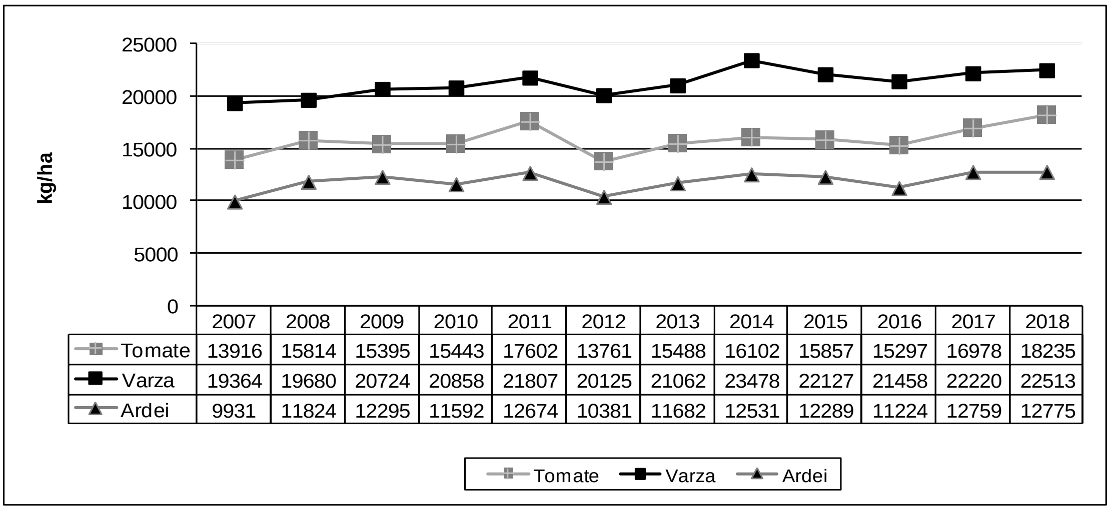
Tabele 2 Impact of coupled support on cultivated areas, total and average tomato production in the period 2007-2018; period dynamics in %

	2007-2010	**2011-2014**	**2015-2018**	**2007-2014**	**2007-2018**
Cultivated area tomatoes	8%	-15%	**-9%**	-5%	-12%
Total production tomatoes	20%	-22%	**6%**	10%	16%
Yields tomatoes	11%	-9%	**15%**	16%	31%

Source: own calculations based on APIA data

It is noted that the only period when areas increased is 2007-2010, while in 2011-2014 they decreased dramatically (-15%) primarily due to the drought of 2013. The rate of decline continued in 2015- 2018, but still not so dramatic (-9%). Therefore, the objective of increasing the cultivated areas of this coupled support scheme has not been achieved, as field production also requires drought-resistant varieties or to climate change. Tomato total production and yields increased slightly in 2015-2018, but this is rather a consequence of areas grown in greenhouses and solariums (unfortunately the available data do not allow a very accurate analysis of the evolution of tomato yields grown in the field).

In order to see the evolution of the yields by vegetable species, in this study the period 2007-2018 is considered, (figure 2).



Source: INS; tempo online, 2019

Figure 2. Evolution of yields by vegetable species, kg / ha

Thus, it can be seen that the yields had slightly increasing evolutions starting with the year 2007. A slightly higher yields is noticed for tomatoes only in 2018, when the yield reached 18235kg / ha, 4% higher compared to 2011, when the yields reached a maximum of 17602 kg / ha. Compared to 2014, the yields in 2018 increased by 13%. Therefore, it cannot be concluded that there is a significant impact on yield, given that slightly increasing yields have been observed since 2007. Rather, the correlation on this increase can be made with the increase in areas in greenhouses and solariums which in 2007 -2014 doubled, and which allowed to obtain higher yields due to the use of more productive varieties and more correct application of technology.

Coupled support - cucumbers for processing grown in the field

In territorial profile, in 2015, the largest number of farmers who benefited from support came from the counties of Ialomița (3 farmers), Galați (2 farmers), Olt (1 farmer), Călărași (1 farmer) and the area entitled for payment registered the highest value in Ialomița (27 hectares) and Galați counties (4 hectares), table 6. Practically in 2015 and 2016, over 87% of the total amount of 99356 thousand euros went to the 3 farmers (43%) from Ialomița county.

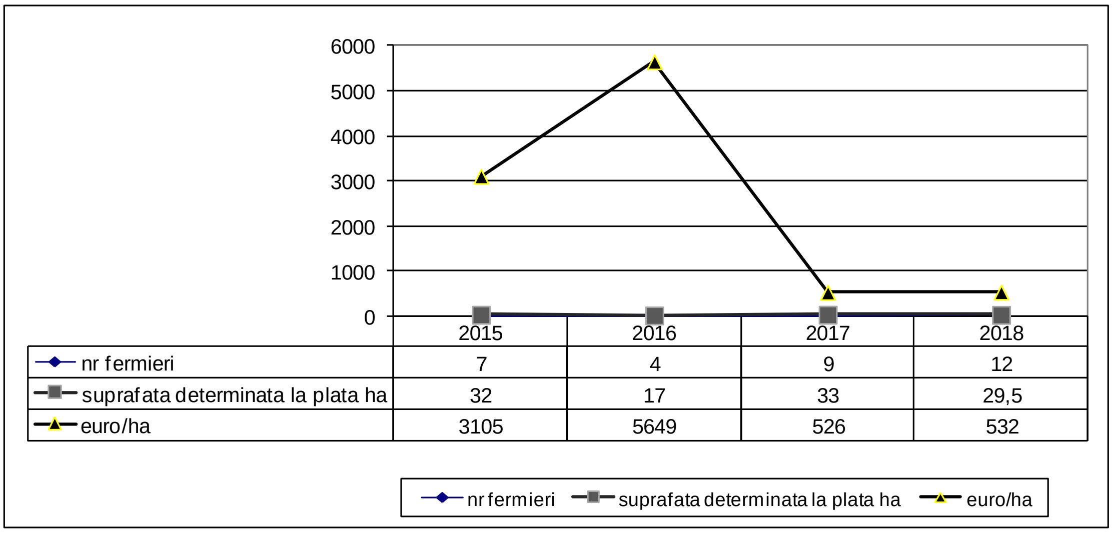
Tabele 3 Number of farmers, authorized amount and area entitled for payment in territorial profile granted for cucumbers grown in the field intended for processing, in%

Jud	2015			2016			2017			2018		
	Nr of farmers entitled for payment	Authorized amount for payment	Area entitled for payment	Nr of farmers entitled for payment	Authorized amount for payment	Area entitled for payment	Nr of farmers entitled for payment	Authorized amount for payment	Suprafața det. la plată	Nr of farmers entitled for payment	Authorized amount for payment	Area entitled for payment
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Bt	0	0	0	25	8	8	11	4	3	0	0	0
Cl	14	3	3	0	0%	0	0	0	0	0	0	0
Db	0	0	0	0	0	0	0	0	0	8	3	3
Dj	0	0	0	0	0	0	11	3	3	8	2	2
Gl	29	12	13	0	0	0	0	0	0	0	0	0
Il	**43**	**83**	**84**	**75**	**92**	**92**	**56**	**89**	**91**	**42**	**78**	**78**
Is	0	0	0	0	0	0	0	0	0	17	6	7
Ot	14	2	0	0	0	0	22	4	3	17	7	7
Sm	0	0	0	0	0	0	0	0	0	8	5	3
Total	100	100	100	100	100	100	100	100	100	100	100	100

*(1), (4) , (7), (10) Nr of farmers entitled for payment in %; (2), (5), (8), (11) Authorized amount for payment in %; (3), (6), (9), (12) Area entitled for payment in %.

Source: calculations based on APIA data, 2019

In 2017 and 2018 the number of farmers in Ialomița County increased to 5, to which are added 7 farmers in 2018 from Dâmbovița, Iași, Olt, Satu Mare counties. It should be noted that approximately 80% of the amounts granted and approximately 87% of the areas determined for payment for the entire period 2015-2018 went to Ialomița County.



	2015	2016	2017	2018
nr fermieri	7	4	9	12
suprafata determinata la plata ha	32	17	33	29,5
euro/ha	3105	5649	526	532

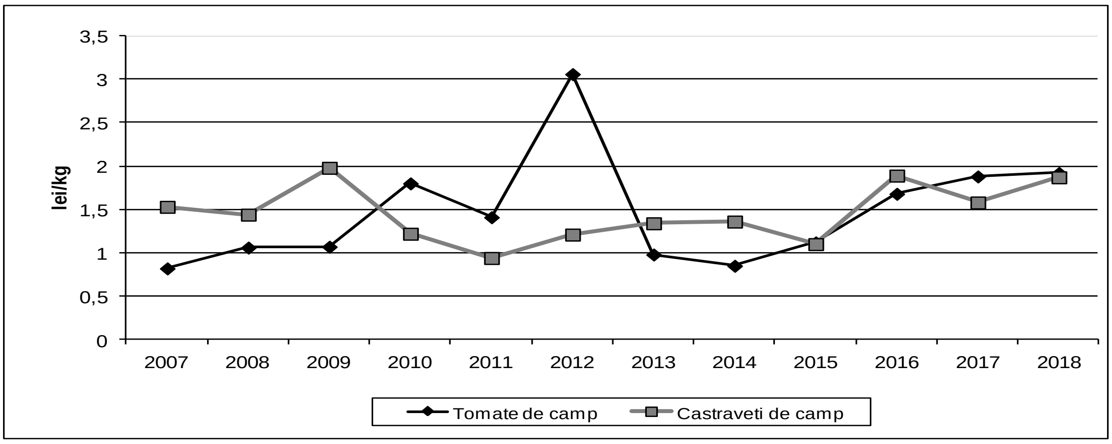
Source: calculations based on APIA data

Figure 3. Coupled support per hectare for cucumbers grown in the field for processing, 2015-2018.

In total, in 2015 a number of 7 farmers benefited from this support, the total area entitled for payment representing 32 hectares. As the number of farmers who knew about this support was very small, especially in the first two years, the value of this support was extremely high 3105 euro / hectare in 2015, respectively 5649 euro / ha in 2016. Under the coupled support schemes related to the payment applications submitted in the 2018 campaign, the amount was reduced to 532 euro / ha, the area entitled for payment remaining approximately the same, amid the significant reduction of the support granted (figure 5), the number of farmers receiving support reaching 12.

Impact on prices for tomatoes and cucumbers grown in the field

The impact on price volatility for field-grown tomatoes and cucumbers is insignificant, with prices continuing to be highly volatile, with high differences during seasons.



Source: INS, tempo online, 2019

Figure 4. Evolution of purchase prices for tomatoes and cucumbers grown in the field.

As can be seen from Figure 8, in the period 2015-2018 the average purchase prices at the farm gate for tomatoes and cucumbers grown in the field recorded a significant increase, so it can be said that there is a positive impact on this indicator (theoretically, this support should have contributed to a reduction in their volatility). Probably the most important impact was the help that farmers received to support their production costs for small investments.

CONCULSIONS

In the vegetable sector, the share of areas that have benefited from coupled support is 1%, the impact being very low / insignificant on the dynamics of cultivated areas, yields and total production of both vegetables grown in the field.

The impact of coupled support in Romania's vegetable sector was relatively modest and did not lead to an improvement in the situation as there was no consistency in itsprovision although the number of those requesting support increased significantly from 2015 to 2018.

In territorial terms, the coupled support granted to the species of cucumbers for processing cultivated in the field was destined mainly to the farmers from Ialomița with 83% of the amounts granted for this product for the entire analyzed period, and with over 85% of the areas meant for payment.

The authorized amounts and the areas determined for payment in territorial profile granted for tomatoes for industrialization grown in the field, were concentrated in the following counties: Ialomița (34%), Galați (9%), Tulcea (9%), Olt (8%), Bihor (4%).

This support was primarily an aid to cover production costs, which was appreciated by the farmers who received it. However, as it was shown in this study, the impact of this support has been modest in terms of the indicators analyzed. For a major impact on the sector, investments in productive varieties, technologies and new equipment / machinery are needed primarily to increase yields, correlated with the improvement of the chain's functioning (through the organization of the sector, respectively the increase of the number of producer groups and organizations).

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PANDEMIC'S IMPACT ON EDUCATION

CORINA GEORGETA DINCULESCU[1]

Abstract: *In a world crisis generated by the spread of Covid-19, beyond the negative consequences, fast and efficient responses were needed from the authorities across the world, both for the scenario in which the crisis was on a short period and education would have recovered quickly, and especially for the scenario in which the crisis persisted for a longer period (several months), and in this case the solutions should provide equal access to education for all children and young people. We are still in the second scenario, and during this time momentary solutions have been found, yet far from being efficient and sufficient.*

At the beginning of pandemics, school closure was considered necessary by the authorities throughout the world, including Romania. On the long term, this action has had, and will continue to have negative effects on education, mainly for vulnerable and marginalised children and young people: the disappearance of direct learning opportunities (which can create serious inequality of opportunity), a high school dropout rate, etc.

Most school systems in the world have offered various ways of distance (online) learning, but some of them could not be applied in certain areas or in the case of certain categories of children/young people, due to limited access to internet and to a personal computer/tablet from home. Romania also embraced this idea, yet in practice the online teaching modalities have been extremely low (insufficiently trained teaching staff in using digital systems for online education and pedagogy, as well as in developing online teaching tools, insufficient platforms with free use – without cost to be used for online lessons, etc.).

This paper attempts to highlight the challenges that the education systems had to face as a result of the health crisis that began in early 2020 (which still continues, provided that the threat of infection has not disappeared yet). Another objective was to identify the solutions adopted by authorities to reduce the negative impact on education, avoiding the increase of discrimination of the already disadvantaged categories of persons, in particular (children and young people coming from low-income families, disabled children and young persons, with learning difficulties, etc.), as well as the disparities between residence areas.

Key words: *education, online learning, inequalities in education, urban-rural disparities*

JEL Classification: *I21, I24, J14, J15, R11*

INTRODUCTION

In a period of global crisis, generated by the spread of COVID-19 virus, fast and efficient reactions from the authorities are needed, both for the situation/scenario of a short-term crisis and fast recovery of education, and mainly for the scenario of a longer period of crisis (several months), in which case the implemented solutions should provide equal access to education for all children and young people.

School closure in the context of COVID 19 pandemic has been considered necessary by health authorities all over the world (there are also exceptions, Sweden for instance), by Romanian authorities inclusively, both for slowing down the spread of disease and for attenuating the effects on the health system that will not be able to cope with the potential massive number of critical patients (in the context in which the Romanian health system is the weakest in the EU, weaker than in Bulgaria, Albania, and also than in countries from former Yugoslavia, such as Macedonia or Montenegro. While the European Union average healthcare expenditure relative to GDP is 9.6%, Romania allocated only half of this average in 2019, i.e. 4.84% of GDP).

One of the most important aspects of education, in general, is its need to adapt to all categories of children/young people – be they disabled children and young people, with learning difficulties, from different social backgrounds or from disadvantaged areas. Such an adaptation method is the inclusive and discriminatory school, with no inequities between students from disadvantaged and advantaged backgrounds, a school that focuses on the inclusion of all categories of children/young people who have been previously marginalised.

In this context, children and young people in rural areas can be considered at high risk (of learning loss, in general, but mainly in this period of school closure, when they are unable to

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participate in direct learning (through courses taught at school), and not having access to internet, to a PC/Tablet from home, they risk becoming vulnerable.

The digital divide, being the most important factor that affects equal opportunities for people, should be avoided or minimalised as much as possible, so that these differences in opportunities should not grow larger and trigger an even greater negative impact on the learning process of disadvantaged children or of those from disadvantaged areas.

Home schooling is not only a massive shock for parents' lives, but also for children's social and learning life. This seems very unlikely to replace learning at school, and furthermore, the substantial disparities between families will even grow larger (the extent to which parents can help their children learn, the time available for teaching and learning testing, parents' non-cognitive abilities, resources, amount of parental knowledge). All these may have long-term consequences for the affected cohorts and increase human capital inequalities.

MATERIALS AND METHODS

One of the methods used to prepare the raw material for analysis was the personalised query of the official databases available. For the indicators on internet and computer access from home we used the results published by the National Institute of Statistics (NIS), in the Survey on Access to Information and Communication Technology (ICT). Therefore, the information base mainly consists of NIS and EUROSTAT databases.

For documentation, the *national and international literature* (treatises, monographs, research projects, articles/scientific communications from established journals), various *studies and analyses* of nationally and internationally reputed institutions represented significant benchmarks. The information from informal analyses, reports and studies as well as from regional development strategies was also used.

Another method used in this study was filtering, collecting and analysing complementary information (internet, publications), comparing the methodological content of indicators obtained from various data sources.

RESULTS AND DISCUSSIONS

The challenge has been (and will continue to be in the school year 2020/2021, which has just begun) to reduce as much as possible the negative impact that this pandemic will have on learning and schooling.

The school closure action may have long-term consequences, mainly for the vulnerable and marginalised people, increasing the already existing disparities, with regard to:

(a) ***access to direct learning*** (which can create serious inequalities of opportunity, on the long run);

(b) ***school dropout rate*** – is still very high (15.3% in 2019), by almost 10 percentage points higher than the EU average. In the rural area, this can reach much higher values (22.4%[2]). A long period of non-active participation can lead to a further increase of this rate;

(c) ***access to food*** **–** access to the Government's Roll and Milk Programme 2019-2020, which, although it is allocated an extremely low budget per child, for certain children it can be a reliable food source and its loss could lead to a disequilibrium in these children.

Measures and solutions[3] of other states

[2] *EUROSTAT - https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=edat_lfse_30&lang=en*

[3] *refers to the school year 2019/2020, which ended beginning with the month of May, depending on each country.*

Many school systems across the world are offering **online learning modalities**, now when schools closed. To reduce the impact of school closure on children/young people, distance learning strategies can be developed, but some of them cannot be applied in certain areas or in the case of certain categories of children/young people due to the low access to internet and to a computer from home.

The school closure measure has determined *moving courses online*, which is a solution in order to avoid learning disturbances; thus distance learning has been organised, by various modalities: books and materials taken from school; different e-learning platforms, giving teachers and pupils the possibility to work together and interact, also with the help of national TV programmes or lessons developed quickly on social platforms.

According to Eurydice[4], **most European countries have decided to close schools** as part of the measures to limit the spread of virus. The first country to close schools was Italy, on March 5, followed shortly by Albania, Greece, Czech Republic and Romania. Most European education systems closed their schools by March 23 (except for Sweden and Iceland).

Most European countries use the Internet, offering online platforms for lifelong learning (Croatia, Cyprus, France, Greece, Italy, Portugal, Serbia etc.).

In almost all countries, teachers and school managers have been encouraged to offer live lessons or record online lessons. The learning content have been also delivered via TV and other media (Croatia, France, Serbia, Spain, etc.).

Some countries have maintained a small number of schools to accommodate children who cannot be cared for at home (France, for instance).

Equity in access to ICT-based learning is a major concern, as schoolchildren from disadvantaged backgrounds tend to have less access to computers and other out-of-school devices, in the pandemic period in particular. In France, for instance, efforts have been made to lend devices and provide printed courses to those 5% of pupils who do not have access to Internet or computers, while in Portugal postal services were used to send worksheets at home.

Solutions for Romania

Romania has adopted the same distance learning modality, yet in practice online teaching has been inadequate, it was practically an improvisation in a time of crisis, teachers being insufficiently trained in using digital learning management systems and online learning pedagogy or they do not have the necessary infrastructure. At the same time, teachers' and children/young people's digital skills are insufficiently developed to access learning platforms and other necessary resources, etc.

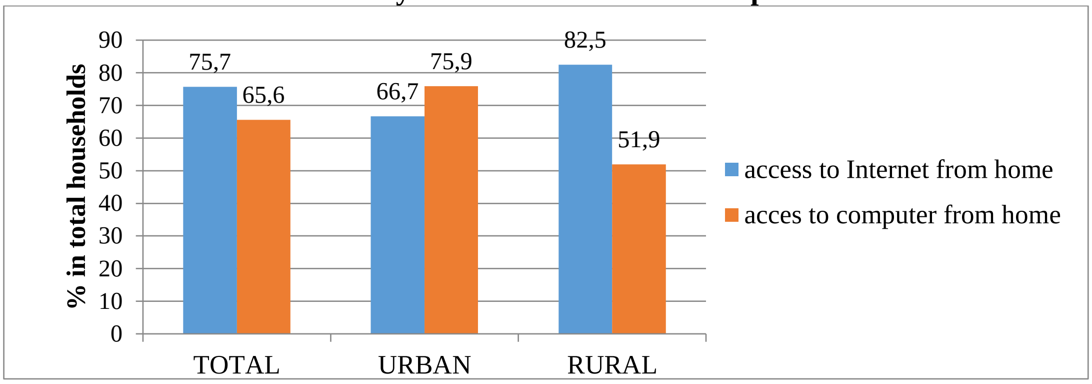
According to the results of Survey on Access to Information and Communication Technology (ICT)[5] of the year 2019[6], ***slightly more than three quarters of Romanian households had access to the Internet network at home***, almost two-thirds of these being found in urban areas and only one third in the countryside (almost double in the urban area compared to the rural area).

[4] Eurydice Network is the network of information on education from Europe, its objective being to provide this information to political decision-makers from the EU member states.

[5] Survey on Access to Information and Communication Technology (ICT), conducted by NIS, with the main objective to provide information on population's access to different communication technologies, such as computers, mobile phones, as well as Internet access.

[6] The data source is NIS, the data referring to access to computer refer to the year 2017 (latest year available), and those referring to Internet access to the year 2019.

Share of households by access to Internet and computer from home



Source: NIS, Survey on Access to Information and Communication Technology (ICT)

Nationwide, ***two-thirds of households have access to computer from home.*** This indicator is differentiated by residence areas, namely three-quarters of households have access to computer from home in the urban area, while in the rural area only half of rural households have access to computer from home. In the rural area, the share of households with access to computer from home is lower than access to Internet from home (by 30 percentage points), the limited access being determined by the Internet connection mainly from mobile phones and other mobile devices.

For certain children from the disadvantaged categories (coming from low-income families, from different social backgrounds or from less-favoured areas), school is, among other things, the source by which they find out that they can have a different life from their parents (marked by physical work and multiple difficulties), with the hope for a better life. In these circumstances, it is important to identify the vulnerable communities and the necessary educational resources to continue home schooling.

In the early period of the pandemic, **solutions for distance learning** were provided, through ***lessons delivered via TV*** (Tele School training programme), as well as through various agreements/partnerships of the Ministry of Education with different platforms, companies, universities. Practically, after school closure, there have been many initiatives to mitigate the negative impact of the difficult access to educational resources, both for teachers and for children/young people.

The campaign ***#ÎmiPASĂ #ŞcoaladeACASĂ*** **[*#ICARE #SchoolfromHOME*]** – developed by the Ministry of Education and Research together with the University of Agricultural Sciences and Veterinary Medicine from Bucharest (USAMV) and Cora Romania – is a project by which tablets with Internet connection will be donated to high school pupils from disadvantaged areas, with subscription included, supported by USAMV for 24 months, with *the aim of ensuring a fair and quality education for rural pupils*. Taking into consideration the urban-rural discrepancies, between the communities with access to technology and the disadvantaged communities, the tablets and subscriptions with unlimited Internet access for a 24-month period are purchased by USAMV Bucharest, aiming at an efficient online training.

Another initiative is ***"Reaction for Education"***, by which Narada, with the support of the Ministry of Education and Research and Cora Romania, launched a digital platform through which *teachers can make public the necessary equipment for them and their pupils*, in the context of continuing education in a digital context, and companies, communities and any natural person can choose, in real time, where to contribute.

EduPedu.ro, a non-profit organization, *has published a multitude of resources and references for distance teaching and learning*, since the authorities decided to close schools.

A recent measure of the Ministry of Education and Research (MER), MER Order no. 4135/21.04.2020, regulates the pre-university education system by on-line learning. This document contains the guidelines for creating and/or strengthening the pre-university education system capacity through online learning. The Ministry has also outlined new responsibilities and tasks for teachers, as well as for parents – the obligation to provide the necessary means for children's participation in online courses (which became mandatory, by this order), yet without mentioning concretely how to ensure the necessary means for this action, in the case of those who do not have them.

At the same time, by this ministerial order, the digital portal on educred.ro has been operationalised, as the whole of e-learning platforms and online learning resources, including tutorials and other learning aids dedicated to teaching staff training and support, some of these resources already made available for potential users even since the closure of schools.

The analysis of the access to Internet and computer from home reveals that in the countryside, access to the Internet and, in particular, to a home computer is quite limited, so that the practical applicability of measures taken by the Ministry of Education is quite limited.

CONCLUSIONS

Those marginalised before the pandemic are even more at risk now. The correlation between the socio-demographic factors (gender, ethnicity, age, residence area) and the economic factors (poverty) can highlight multiple forms of discrimination and exclusion. At the same time, despite the existence of such initiatives to create distance learning platforms and systems, even though these have gradually appeared since the authorities decided to close schools, they cannot reach/and have not reached all children/young people. Despite repeated assurances from the authorities, it has not been possible to create distance learning platforms and systems to include all children/young people, as access to distance learning is conditioned by their social background, parents' level of education, etc. This deepens the inequality of educational opportunities for the disadvantaged children/people, with a negative effect upon the future of these persons.

If these measures taken for the school year that is about to begin become operational, part of the rural children will be able to benefit from online courses delivered by their teachers, like their colleagues with access to Internet and PC. The sooner these initiatives reach the disadvantaged categories of children/young people, i.e. those from rural areas, the more children/young people will become equal in continuing learning.

Yet we express our reservation about the operationalization of all these large-scale projects and we want them not to remain only at declarative level.

Regardless of the formula adopted by authorities to support, encourage and streamline education, through online courses, during this period, pupils will remain with a deficit of knowledge. Even though small steps have been taken in the implementation of online education during the state of emergency, nobody knows exactly if these measures will be efficient, but they are certainly not applicable to all children/young people, mainly to those in the categories at risk.

Hence the conclusion that, although even before this exceptional situation, facing our country and the entire planet, obvious disparities existed between residence areas, between different areas of the country, between the disadvantaged and non-disadvantaged areas, inequalities of opportunity regarding the education of children/young people in Romania, now these disparities are deepening even more. Therefore, practical, applicable emergency measures are needed to ensure access to distance learning programmes for all children and young people – increased funding for education and broad access to distance education and learning, so that education can continue on the short and medium term, and the health of teachers and children/young people can be protected. At the same time, it is necessary to analyse and find fast, applicable solutions to problems related to: access to information technology for pupils and teachers, especially in the communities and families that are economically disadvantaged and have no access to ICT; training teachers in online teaching and improving their digital skills, training children/young people in using the necessary devices and applications for the participation in online courses. All these, in the conditions in which the new school year will start soon.

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EVALUATION OF COMPETITIVENESS AT COUNTY LEVEL, BY URBAN-RURAL TYPOLOGY

CHIȚEA MIHAI ALEXANDRU [1]

Abstract: *The main objective of the present paper was the evaluation of the overall performance of the territorial units, at county level, expressed through competitiveness, based on an evaluation model designed specifically for this aggregation level. The theoretical model was elaborated taking into account the specific literature regarding the territorial competitiveness, that highlighted the need for further development at local level, which in our case is represented by the county level. Furthermore, the analysis focused on the results based on the urban-rural typology, that pointed out some differences between the competitiveness level, namely a lower level in the case of predominantly rural regions, compared to the intermediate and predominantly urban ones*.

Key words: *territorial competitiveness, county level, urban-rural typology.*

JEL Classification: *O18.*

INTRODUCTION

Although the debates regarding the competitiveness of territories have been around for a very long time, going back as far as the original trade theory or Adam Smith's "labor division" supporting economies of scale and productivity differences between nations [3], in the last decades we have witness an increase of the efforts at academic, economic and institutional level directed towards the development of theories and evaluation methods, aiming to identify and take into account all the facets of territorial competitiveness. Needless to say, this was not a straight, easy process, as we can recall the ideas of Krugman, pointing out that the "obsession regarding competitiveness is not only wrong, but also dangerous…thinking in terms of competitiveness can lead to bad economic policies regarding a whole series of problems" [1], and Porter and Ketels, who stated that the true competitiveness is measured through productivity [2]. Nevertheless, these different opinions have only pushed the efforts further and supported the development of evaluation models that are today used widely, at national and regional level, like the Global Competitiveness Yearbook, Global Competitiveness Index or the Regional Competitiveness Index (European Commission). Besides those, many more methods and models have been developed worldwide, aiming to surprise the overall performance of territories in the form of competitiveness, especially at national and regional level. This brings us back to our current objective, of designing an evaluation model for the competitiveness at local level, which in this case is represented by the county level. At this aggregation level, the existing models are far and few in between, being developed, in general, by universities and research centers, in order to evaluate competitiveness at local level in different areas.

MATERIAL AND METHOD

The present endeavor started from an extensive literature review regarding the theories, models and methods of evaluating the overall territorial performance, at different aggregation level, expressed through competitiveness. Based on this, for the current research objective, competitiveness at county level can be described by six categories of factors, regarding the economic, human and physical characteristics of territorial units that determine the performance level: economic performance, population and labor force, infrastructure, education, health and research-development-innovation. 22 indicators were selected from the official databases elaborated by the National Institute for Statistics, i.e Tempo-online and E-Demos, based on their relevance in describing the competitiveness at county level and availability (the data was extracted for the year 2016), taking into consideration the replicability criteria.

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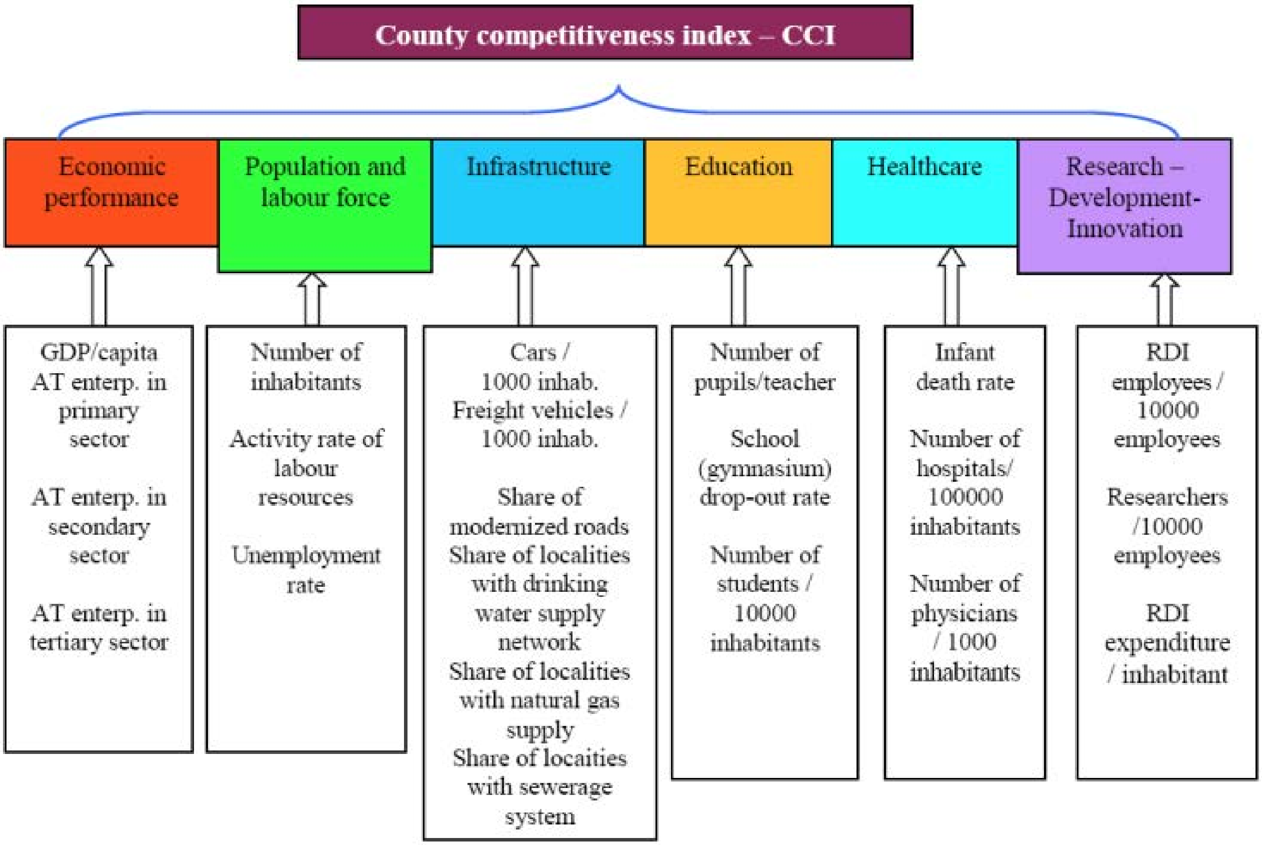
Figure 1. County Competitiveness Index scheme



Source: author's own scheme

The first step in the processing of statistical data was represented by standardization/ normalization of data, having in view the fact that the indicators were expressed in different units of measure. This process took into account all the variables (indicators) and all the county level territorial units (42 in case of Romania).

Figure 2. Normalization of variables

County/indicator	V1	V2	...	V22	V1 normalized	V2 normalized	...	V22 normalized
ACU1								
...								
ACU42								
Maximum								
Minimum								
Absolute amplitude								

Source: author's own scheme

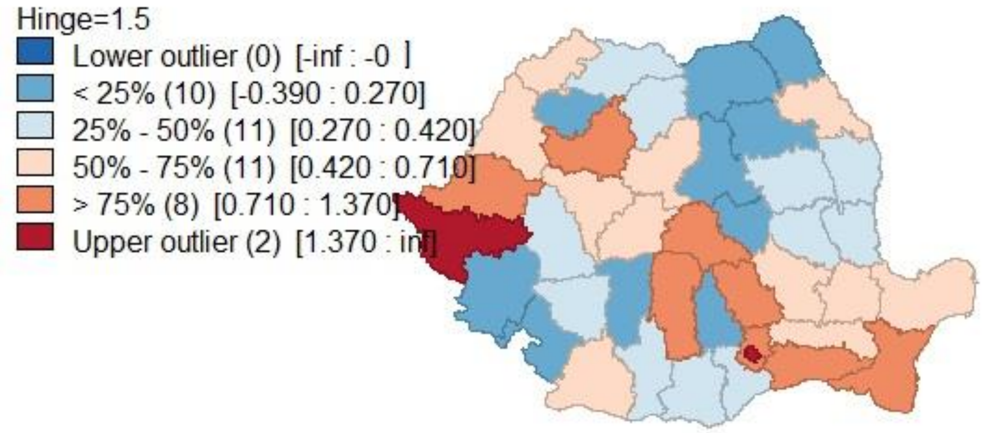
By summing up the normalized values of indicators, a value has been obtained for each of the six criteria of the model, and finally, by summing these results, the final value of the County Competitiveness Index (CCI) was obtained. The processing of data included in the model was achieved with the specialist software SPSS (descriptive analysis, Pearson coefficient), detaching the determining causality relations and identifying the trends (factor analysis).

For the graphical representations of partial and final results, we have turn to a GIS software, GeoDa, having in view the large number of territorial units. The results for each criterion were introduced in a table, based on the SIRUTA code for the county units. The final step was the creation of maps, representing the values for each of the 42 investigated territorial units.

RESULTS AND DISCUSSIONS

For each of the six criteria included in the evaluation model, a map was created based on the normalized values of the indicators, for each county.

Figure 3. Clustering of counties, by the Economic performance criterion

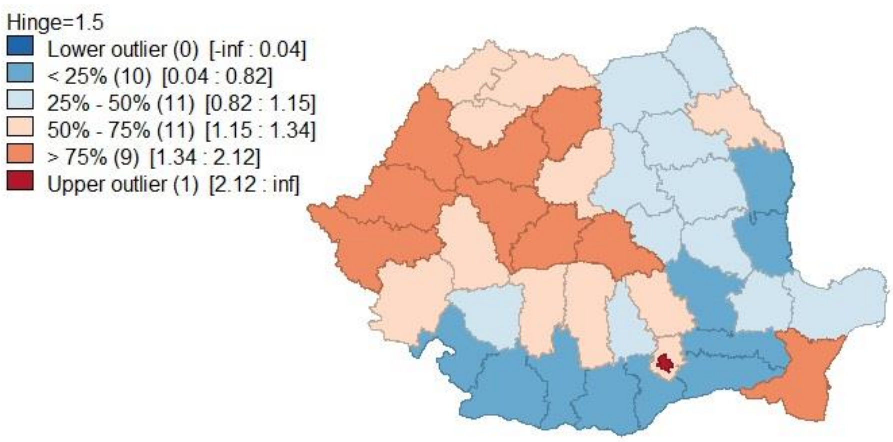


Source: own processing based on Tempo-Online and E-Demos, NIS

The București municipality and Timiș county stand out, compared to the rest of territorial units, being in the upper outlier, based on the value of the *Economic performance* criterion. There is an evident concentration of units, with low values, in the north-east, center and south-west, like Mehedinți, Botoșani, Covasna, Vâlcea, Harghita, Caraș-Severin și Neamț, most of them being predominantly rural counties.

The second part of classification is dominated by counties from south, south-east, center, west and north-west areas. By urban rural typology, all types of counties are present here. However, those that stand out, based on the values for *Economic performance* are Argeș, Cluj, Prahova, Brașov (intermediate units), Călărași (predominantly rural), Ilfov (predominantly urban) and Constanța (intermediate unit).

Figure 4. Clustering of counties, by the Population and labor force criterion

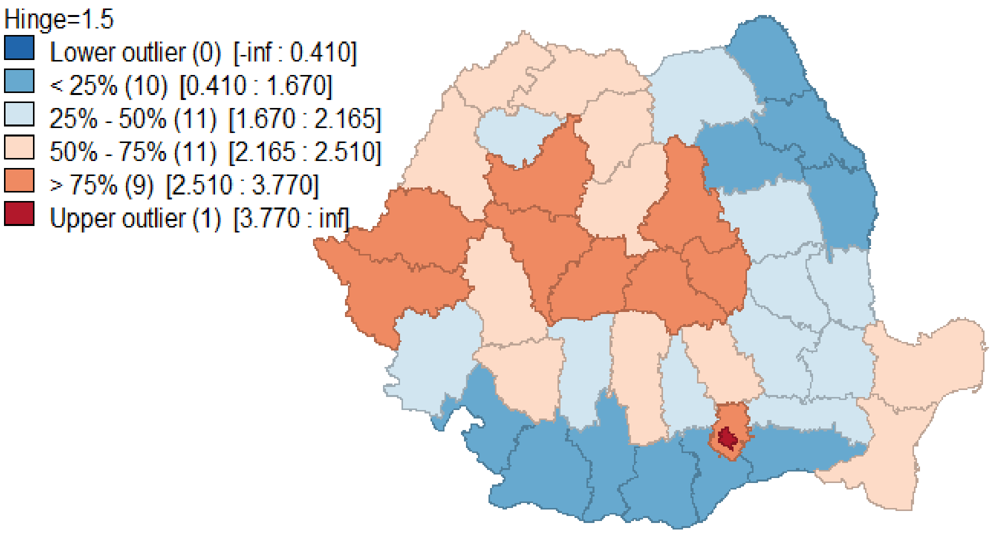


Source: own processing based on Tempo-Online and E-Demos, NIS

The first quantile of counties (low values), based on the values of the *Population and labor force* criterion is dominated by predominantly rural units, located especially in south, south-west, south -east and north-east areas, creating visually a corridor along the Danube river: Mehedinți, Dolj, Olt, Teleorman, Giurgiu, Călărași and Ialomița. Another corridor is emerging, on the south-east north-east direction, of counties from the second quantile of values, also mostly predominant rural units, like Botoșani, Tulcea, Suceava and Vrancea.

In the case of the next 2 quantiles, there is an evident concentration of units in the center, north-west and west areas, all types of counties by the urban rural typology being present here. Timiş county, together with another 8 counties – 5 intermediate (Cluj, Bihor, Sibiu, Brașov, Constanța) and 3 predominantly rural (Bistrița-Năsăud, Alba și Arad) make up the last quantile, by the value of the criterion – the results were supported mainly by the high values registered in the case the activity rate of labor resources and a lower level of unemployment. Again, the București municipality ranked first, being in the upper outlier, with 2.95 points out of a maximum of 3.

Figure 5. Clustering of counties, by the Infrastructure criterion



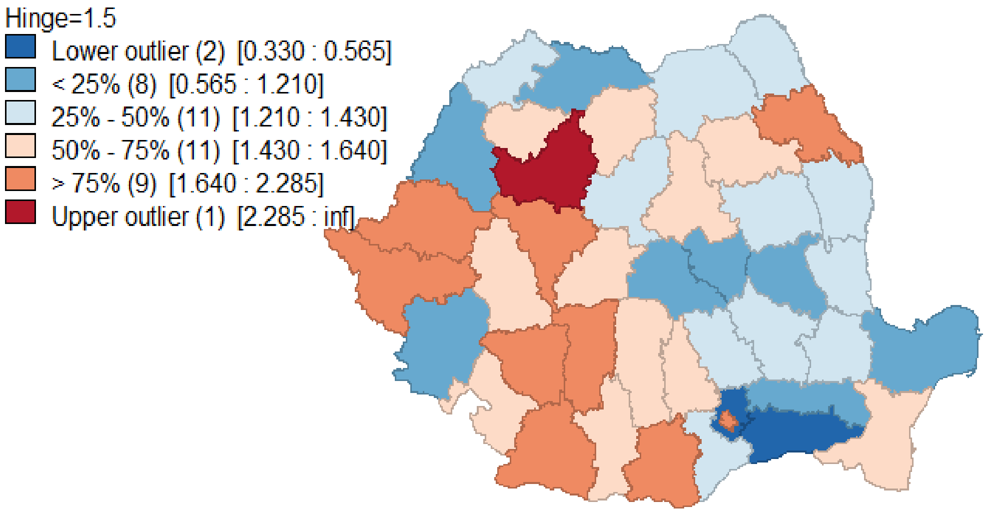
Source: own processing based on Tempo-Online and E-Demos, NIS

Based on the value for the *Infrastructure* criterion the first two counties are both predominantly urban, namely București municipality and Ilfov county. They are fallowed by counties from the center and west areas, like Cluj, Brașov, Arad, Sibiu and Timiș. The results obtained by these counties were based on the development level of the water supply network, population's mobility and freight road transport capacity. Still, the quality of the road infrastructure remains week in many cases, the share of the modernized roads having, in general, the smallest contribution to the total value of the criterion.

As for the other end of the hierarchy, were the lowest values are registered for this criterion, it is dominated by counties from the north-east, south, south-east and south-west, both intermediate and predominantly rural ones: Botoșani, Teleorman, Vaslui, Olt, Neamț, Giurgiu, Dolj, Iași, Mehedinți and Călărași. The territorial distribution reveals two areas that concentrate the lowest values for this criterion, one towards north-east and a corridor along the Danube river. The modest results were determined by low normalized values of the indicators specific to population's mobility and freight road transport capacity, but also by the development level of the utilities networks, especially in the case of natural gases and sewerage. This corridor extends to the north with counties from the second quantile of values, like Ialomița, Buzău, Brăila, Galați, Bacău and Suceava. Those that come closest to the upper quantile are Ilfov, Cluj, Brașov, Alba, Sibiu, Arad, Timiș, Harghita and Covasna counties. The only county that meets the criteria for the upper quantile is București municipality with a total value of 6 points (maximum).

The *Education criterion* groups three indicators considered relevant, as for the current objective, for evaluating the performance of the educational system at county level: number of pupils/teacher, school (gymnasium) drop-out rate and number of students/10000 inhabitants.

Figure 6. Clustering of counties, by the Education criterion



Source: own processing based on Tempo-Online and E-Demos, NIS

Based on the value for the *Education* criterion, the first place is occupied by Cluj county, with a score of 2.48 points, followed by Vâlcea with 1.97 points, Arad – 1.90 points, Timiș – 1,89 points, Gorj -1,81 points and București municipality – 1.78 points. The result obtained by București municipality, on the 6th place based on the value for this criterion was determined, în principal, by a higher level of pupils/teacher, compared to other counties, that translates into a shorter time allocated to pupils by the teaching staff. Also, the significant reduction of the student population during this period contributed to the decrease of the number of students/10000 inhabitants.

The graphical representation of the values registered at county level for the *Education* criterion, highlights the existence of a lower outlier represented by Călărași and Ilfov counties. The low values in this case were determined by the level of indicators included in this criterion. Thus, Călărași county registered the highest value of the school drop-out rate and a reduced number of students/10000 inhabitants. In the case of Ilfov county, the number of pupils/teacher (the highest value of all counties) and number of students/10000 inhabitants were the determining factors of the final result.

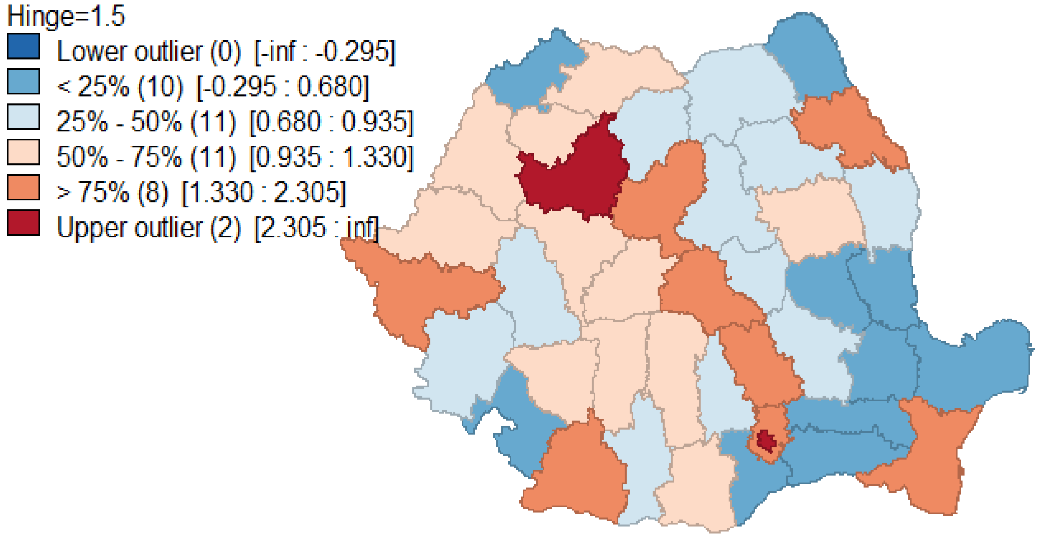
Modest values are also found in the first quantile, most of the counties present here being predominantly rural ones, like Ialomița, Caraș-Severin, Vrancea, Tulcea and Covasna. Still, it comes as a surprise the situation of Brașov county, also present in the first quantile of low values. În this case, the high level of school drop-out rate was the determining factor.

The last two quantiles, base on the values for the *Education* criterion, where counties having a higher value are present, highlight a concentration of units in the south-west, south, center and west areas, all types of territorial units by urban rural typology being present here. As for the upper quantile, only one county meets the criteria for being placed here, namely Cluj county, with a value of 2.48 points (out of a maximum of 3 points). In this case, the performance was determined firstly by the highest value for the number of students/10000 inhabitants, but also by the levels registered in the case of *de minimum* indicators - number of pupils/teacher and school drop-out rate.

The territorial distribution of the values for the *Education* criterion, by urban rural typology, highlights again, a concentration of predominantly rural counties in the first quantiles (with low values) along a corridor with the starting point in the south area towards south-east, north-east, and of those with higher values towards the west part of the country (south-west, west, north-west). This process is also evident in the case of other criterions and signals the existence of a development gap, based on the overall performance of territorial units, between the east and west part of the national territory.

The next evaluation criterion, within the model for evaluating the competitiveness at county level, is the *Health* criterion. This groups 3 indicators considered relevant for evaluating the population's access level to medical services, overall performance of the health system and specific infrastructure's: infant mortality rate, number of hospitals/100000 inhabitants and number of doctors/1000 inhabitants.

Figure 7. Clustering of counties, by the Health criterion



Source: own processing based on Tempo-Online and E-Demos, NIS

Based on the value for the *Health* criterion, the first place is occupied by București municipality, with 2.96 points, followed by 6 intermediate counties, namely Cluj, Timiș, Iași, Dolj, Brașov and Constanța. A common element in all these counties is the presence of university centers and university medical units, that provide a solid base of qualified human capital needed for this sector.

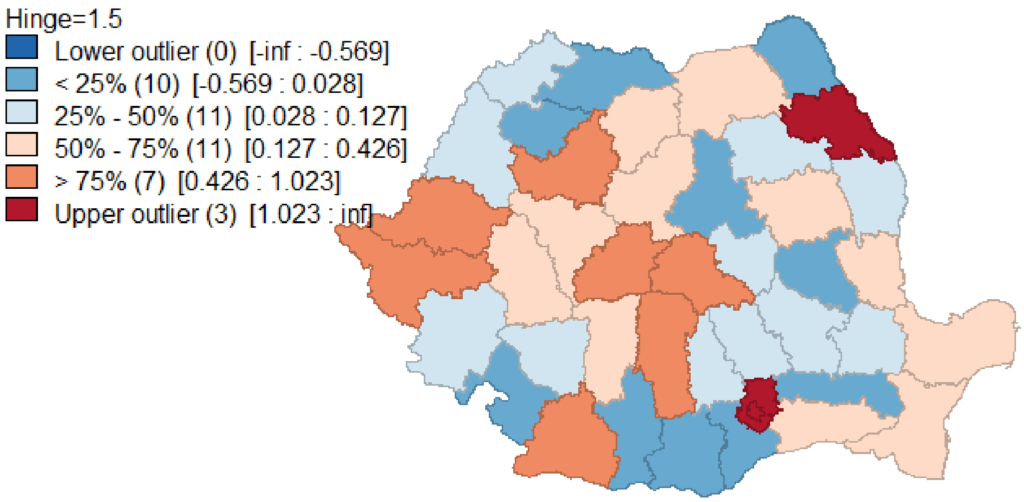
The graphical representation of the values at county level for this criterion highlights a concentration of units from the first quantile (lowest values) at the level of south and south-east areas, most of them being predominantly rural ones, likeȘ Călărași, Giurgiu, Tulcea, Brăila, Ialomița, Vrancea and Galați. Călărași county registers the lowest value, of 0.17 points – the results being determined by the highest value of the infant mortality rate and the lowest value in the case of the number of doctors/1000 inhabitants.

The same geographical areal is also represented by counties from the second quantile (low values), the majority of them, again predominantly rural units, that are joined by some counties from the center, south-west and vest areas. There is an evident gap, based on the urban rural typology, the vast majority of predominantly rural units being present in the first 2 quantiles, compared to the other types, intermediate and predominantly urban, that fall within the last 2 quantiles, with higher values for this criterion.

The only 2 counties that meet the criteria for the upper quantile are Cluj county are București municipality, this result being determined by the values of all 3 indicators from this criterion, both units benefiting from the presence of specialized higher education institutions/ university medical units, but also of a strongly developed private medical sector.

The last of the six evaluation criteria is the *Research -Development-Innovation* criterion, that includes three indicators referring to the human capital from this activity sector and to public expenses per capita.

Figure 8. Clustering of counties, by the RDI criterion



Source: own processing based on Tempo-Online and E-Demos, NIS

Based on the value for the *Research -Development-Innovation* criterion, the first place is occupied by Ilfov county, with the maximum score of 3 points, followed by București municipality – 1.54 points and 7 intermediate counties: Iași, Argeș, Cluj, Timiș, Dolj, Sibiu and Brașov the values ranging between 1.12 and 0.56 points. The only predominantly rural county that comes close to this echelon is Arad, with 0.43 points. The result obtained by Ilfov county, was determined by the performance registered at the level of the 3 indicators – number of employees/10000 occupied persons, number of researchers/10000 occupied persons and public RDI expenses/capita. Although it is hard to believe, București municipality comes second, at a considerable difference from Ilfov county.

The graphical representation of the values at county level for *RDI* criterion highlights, again, a significant gap between the territorial units, based on the urban rural typology. The first two quantiles are clearly dominated by predominantly rural units, the first one being exclusive represented by these. As for the territorial distribution, the units from the first two quantiles are mainly localized in the south, south-east, north-east and north-west areas, like: Ialomița, Mehedinți, Olt, Maramureș, Vrancea, Giurgiu and Teleorman.

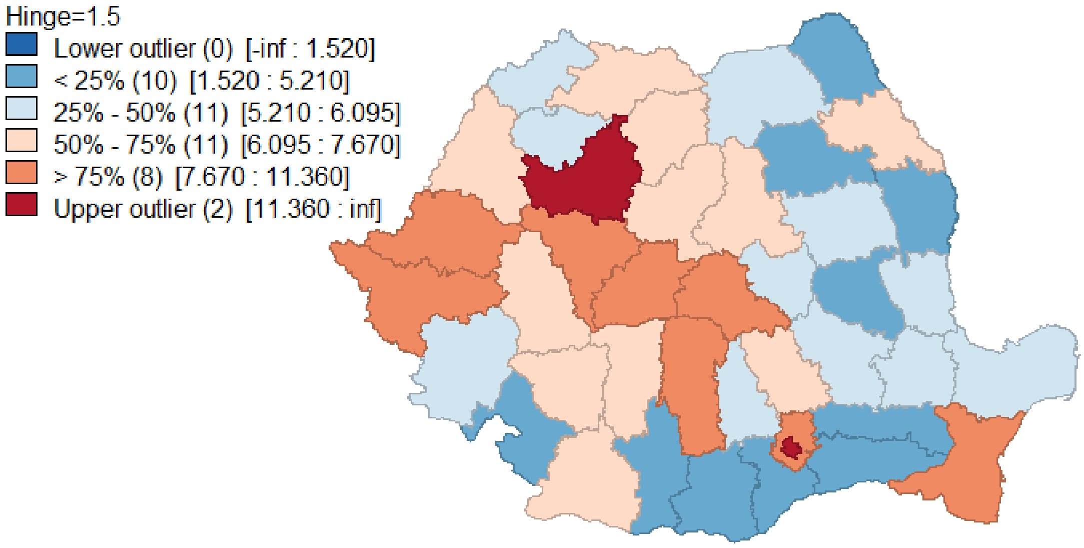
As for the upper quantile, that of counties that registered the highest values for this criterion, it includes 3 countie: Ilfov, București municipality and Iași. All three indicators from this criterion have contributed to this result, but in the case of București municipality and Iași county, the main contribution came from the highly qualified human capital, expressed through the number of researchers/10000 occupied persons.

The last step of the methodological process is the summing of the values for the six criterions (*Economic Performance, Population and labor force, Infrastructure, Education, Health and Research-Development-Innovation*) for each of the 42 county level territorial units, leading to the County Competitiveness Index (CCI).

The final hierarchy, by the value of the *CCI* comes as no surprise, confirming, overall, the individual performance of the territorial units for all the criterions included in the evaluation model.

The first place, is occupied by București municipality, followed by Cluj, Timiș, Arad, Brașov, Constanța, Sibiu and Argeș counties. In the case of București municipality, the main contributors to this result were *Economic Performance, Population and labor force, Infrastructure and Health* criterions, sectors were this developed urban area clearly dominates over the other counties. Each of the counties present at this level has some strong and week points, represented by the values of the criterions, that have all, however, contributed to the final result.

Figure 9. Clustering of counties, by the County Competitiveness Index (CCI)



Source: own processing based on Tempo-Online and E-Demos, NIS

The graphical representation of the *CCI* values at county level, highlights the distribution of the investigated territorial units in 4 quantiles and one upper outlier, of those that detached from the rest of the units. The first two quantiles are clearly dominated by predominantly rural units, like: Botoşani, Călăraşi, Giurgiu, Vaslui, Mehedinţi, Ialomiţa, Olt, Teleorman and Vrancea. Botoşani county registers the lowest *CCI* value, determined by modest results, mainly at the level of *Economic performance*, *RDI* and *Health* criterions.

The third quantile groups 11 counties, both predominantly rural and intermediate, concentrated mainly in the south-west, center and vest areas, like: Gorj, Hunedoara, Bistriţa-Năsăud, Dolj and Prahova. The fourth quantile is represented by 8 counties from the south, center, west and south-east areas, were all types of counties, by urban rural typology, are present: Timiş, Ilfov, Arad, Braşov, Constanţa, Sibiu, Argeş and Alba, the *CCI* values ranging from 8.17 points (in case of Alba county) to 11.11 points (in case of Timiş county).

The upper outlier is represented by two counties,, namely Bucureşti Municipality and Cluj county.

If we were to group these 42 county level units based on the *CCI* value in 3 categories, associating them an overall performance expressed through competitiveness, then:

- The first 2 quantiles would represent the group of counties with a low level of territorial competitiveness: Botoşani, Călăraşi, Giurgiu, Vaslui, Mehedinţi, Ialomiţa, Olt, Teleorman, Vrancea, Neamţ, Brăila, Tulcea, Galaţi, Caraş-Severin, Buzău, Suceava, Dâmboviţa, Covasna, Bacău, Satu Mare and Sălaj;
- The third quantile would represent the group of counties with an average level of territorial competitiveness: Gorj, Hunedoara, Harghita, Maramureş, Bistriţa-Năsăud, Bihor, Dolj, Mureş, Vâlcea, Prahova and Iaşi;
- The fourth quantile and the upper outlier would represent the group of counties with a high level of territorial competitiveness: Alba, Argeş, Sibiu, Constanţa, Braşov, Arad, Ilfov, Timiş, Cluj and Bucureşti municipality.

CONCLUSIONS

Based on the 22 indicators included in the six evaluation criterions we have calculated the County Competitiveness Index, allowing the creation of a hierarchy of territorial units, based on the value of *CCI*.

The predominantly rural counties place themselves, by the *CCI* value, mainly at the level of quantiles with low values, highlighting a gap based on urban rural typology, at the level of overall performance expressed through competitiveness. Some of these counties are: Botoșani, Călărași, Giurgiu, Vaslui, Mehedinți, Ialomița, Olt, Teleorman and Vrancea. In this context, an important aspect has to be mentioned: there are also predominantly rural counties that registered higher values of *CCI*, allowing them to reach the third and fourth quantiles, most of them located at the level of the regions within the inner Carpathians arc, process that highlights a cleavage in this category of units, based on the spatial distribution, namely a gap between the counties from the perimeter delimited by the south, south-east, north-east areas and the center, west and north-west areas.

This process in even more evident at the level of the fourth quantile, the only two predominantly rural counties present here being Alba and Arad, localized in the center and west areas of the national territory.

The intermediate counties, with only a few exceptions (Neamț, Bacău, Galați and Brăila) cluster in the third and fourth quantiles, based on the *CCI* values. Here also there is an evident gap based on the territorial distribution, the south-east and north-east areas being represented, in general, by counties that have registered lower values of *CCI*. Iași and Constanța counties represent the exception in this case, being place in the third and fourth quantiles. At this level, the intermediate counties Argeș, Sibiu, Brașov and Timiș, as well as Ilfov county (predominantly urban) complement the general overview of competitiveness, the *CCI* values being close to the upper outlier represented here by București municipality and Cluj county.

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*** Baza de date Tempo-Online, Institutul Național de Statistică

***Baza de date E-Demos, Institutul Național de Statistică

EVOLUTION OF LIVING STANDARDS IN ROMANIAN RURAL AREA DURING THE COVID – 19 PANDEMIC

LUPU GEANINA-VALENTINA[1]

Abstract: *Throughout its history, Romania has gone through many crises in many sectors of the society. The premise, for the present situation, is that the reaction to a total crisis arising from a health problem, is being investigated. The consequences for the economy are still for analysis, but from now on they exceed the most pessimistic forecasts. The COVID -19 pandemic has consequences on the living standard of the population, especially if we consider the link between wage income fluctuations, gross domestic product, consumer price index in this period. All these indicators are analyzed and interpreted quantitatively and qualitatively based on data provided by the National Institute of Statistics, Eurostat and other institutions and organizations, which conducted studies between January and June 2020. This paper uses statistical data in order to highlight changes and effects on living standards in rural areas. In this sense, the economic, health, social measures adopted at national level are presented, with an emphasis on the impact for rural areas and the agricultural field. We consider in this sense, the decrease of the activity of certain sectors such as hotels and restaurants, tourism, transport, food, reduction of production, consumption, technical unemployment which has visible effects on the decrease of income of all, but especially on those in rural areas. All the factors presented increase the risk of poverty for the categories at the limit of this threshold and already affect negatively the standard of living for people living in rural areas.*

Key words: *health crisis, wage income, unemployment, poverty, rural areas*

JEL Classification: *O15, J38, I38, P46*

INTRODUCTION

For the last 20 years there has been an extensive loss at national level of economic employment opportunities. Unfortunately, the industry has lost almost two million employees. The situation in rural areas is quite disorganized if we take into account the destructive agrarian measures. At the level of the whole economy, underemployment is the key word. The labor shortage has become a problem for Romanian employers in all economic fields, especially through the economic migration phenomenon. The new coronavirus highlighted and deepened this situation. At the level of the Romanian, European and international labor market, a series of jobs have disappeared. Decreasing job opportunities has exacerbated the crisis in the labor market. The current health crisis contributes to increasing the disparities between urban and rural areas, the poverty level comprising approximately 30% of Romania's population.

The aim of this study is to analyze the dynamics of developments in the number of employment contracts, unemployed, earnings compared to the consumer price index and their impact on the living standards of the rural population in the first six months of 2020 in the context of the declaration COVID 19 pandemic.

MATERIALS AND METHODS

In order to carry out a comprehensive analysis of the situation of living standards in rural areas, economic statistical indicators were taken into account regarding the level of incomes, expenditures, wages, consumer prices, restrictive measures taken by the authorities during January-June 2020, following the COVID-19 pandemic. The data are provided by the National Institute of Statistics (INS), Eurostat and the Ministry of Labor and Social Protection.

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Quantitative and qualitative analysis of data was performed using methods such as: comparison, induction and deduction, interpretation and synthesis of statistical indicators. The research does not analyze the demographic evolution of this period, but studies the situation, more in terms of the economic impact of the health crisis.

RESULTS AND DISCUSSIONS

The health crisis highlighted all the shortcomings of the Romanian economic model. Romania's public spending system differs from other countries, especially those in Western Europe. In recent years, the tax revenues of the Romanian state are very low. Most of them are collected from the labor and consumption tax. So the contributions for social contributions, value added tax, income tax are among the highest in the European Union. The poor collection of taxes by state institutions, the Romanian taxation system, the underground economy, work and undeclared income also contribute to this aspect. At the time of the declaration of this pandemic, the general consolidated state budget was in a state of recession due to low tax revenues.

The pandemic highlighted another important aspect. Romania distributes a low percentage of public spending on GDP, compared to other European countries. Eurostat statistics show that Romania has the lowest number of employees in the public sector per 100 inhabitants, approximately 18.2% of the total number of employees in 2019. In Romania, public services with an impact on the quality of life are among the lowest in the EU: health it is financed with 4.7% of GDP, and education with 3.2%. Compared to the European average, Romania stands at -2.4% of GDP for health and -1.5 of GDP. In the same sense, the share of total public spending in GDP is 35% for us, and social public spending in GDP is 19.5%. These low levels in the areas with impact for this crisis show the vulnerability of the Romanian society as a whole.

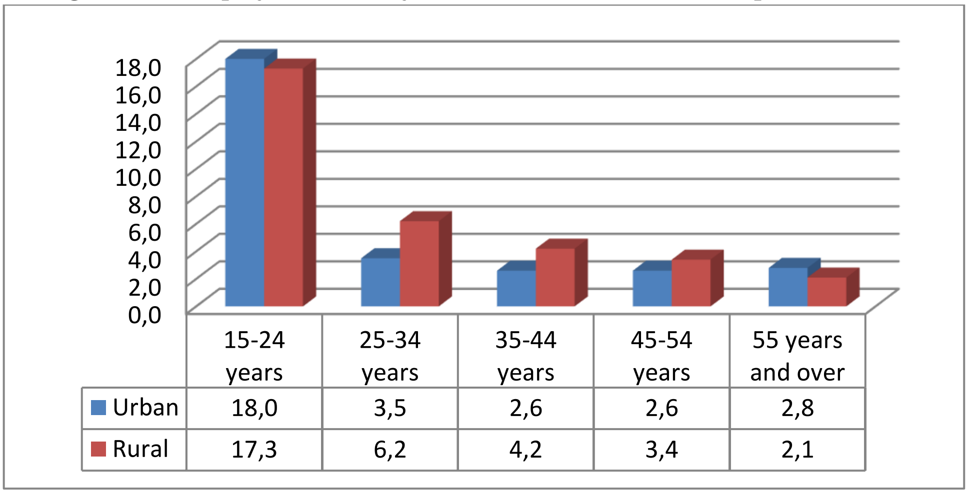
Regarding the health of the population, Romania is facing a profound socio-economic transformation as a result of recent demographic changes. Estimates show that the proportion of the population aged 65 and over will increase from 15% today to 30% in 2060, which will put strong pressure on the costs of health care, long-term care and pension insurance. On the other hand, the current state of health of the young and middle-aged population, as well as the quality of medical services will influence how life expectancy will evolve and the need for long-term care will increase. (Mărcuță and all., 2018, p. 257) The declaration of the current pandemic at international level, determined the Romanian authorities to establish the state of emergency, followed by the state of alert, which led to the closure or restriction of some sectors of the economy (HoReCa, cultural-artistic, education, etc.….) and the freedom of movement of the population. The measures were taken in order not to put too much pressure on the sanitary system, insufficiently developed and poorly equipped with sanitary materials, but also personal.

Regarding the labor force, on the Romanian labor market, it is poorly prepared and poorly paid. There are many low wages and precarious jobs. This contributes to the accentuation of the lack of labor force and of the accentuated depopulation of Romania. The precarious situation of employees is highlighted by the increase in the number of fixed-term employment contracts and those with part-time work. Between April 2017 and April 2018, there was a 30% decrease in the number of such contracts due to legislative changes regarding social contributions and income tax, which were paid in full by the employee even if the remuneration was lower than the minimum wage. (ICCV, 2020, pp. 16-20)

During the pandemic, efforts are being made to protect the middle class and help the vulnerable. There is an acute risk of chronicizing the risk of poverty and the return in large numbers of those who have gone abroad. There is a paradigm of redistributing benefits at the social level, which argues: the more the benefits are directed towards the poor and the more we are concerned with creating equality through public transfers for all, the less we will be able to reduce poverty and inequality. (Korpi & Palme, 1998, pp. 681-682)

Regarding the active population in the first quarter of 2020, it was 8902 thousand people, the employed population was 8502 thousand people, and the unemployed were about 382 thousand people, according to INS. The occupancy rate was higher in urban areas by about 3.9% compared to rural areas. Figure 1 shows that unemployment in rural areas was higher by 2.7% for those aged 25-34, by 1.6% for people aged 35-44 and by 0.8% for those aged between 45-54 years. One situation that needs to be mentioned is the increase in the number of people absent from work who have been absent due to the pandemic. During the mentioned period, there was an increase of absences from work of 31.8% in the first quarter of 2020, compared to the fourth quarter of 2019.

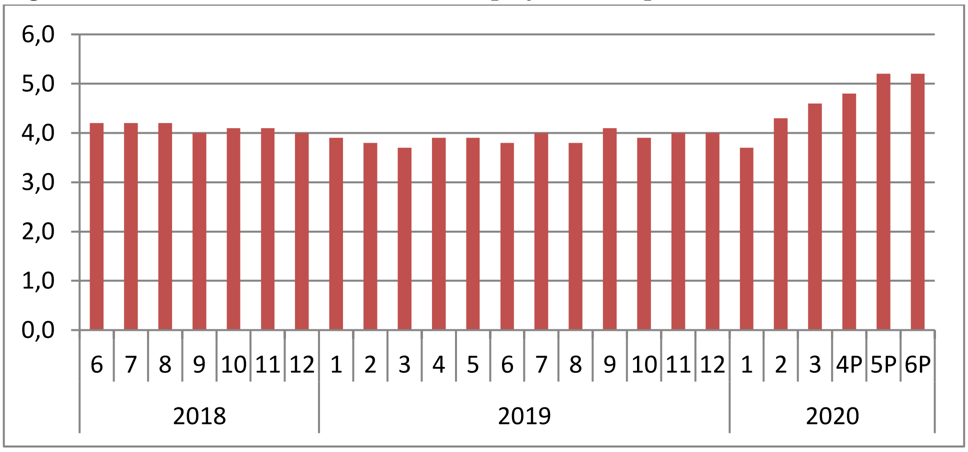
Figure 1. Unemployment rate by area of residence in the first quarter of 2020



Source: data synthesized by the author according to National Institute of Statistics, Press release no. 167/26 June 2020

For the working age population, from 15 to 64 years old, the employment rate was 65.4%, down from the fourth quarter of 2019. Figure 2 highlights the evolution of the unemployment rate, seasonally adjusted during June 2018 - June 2020. Starting with February 2020, there is an increase in the number of unemployed from 386,257, reaching 466,583 people in June. The unemployment rate is constantly rising from 3.7% in January to 5.2% in June. There is an increase this year, of 1.4% compared to June 2019, and 1% compared to June 2018.

Figure 2. Evolution of the number of unemployed in the period June 2018-June 2020



Source: data synthesized by the author according to National Institute of Statistics, Press release no. 197/30 July 2020

Due to the particular situation, which was triggered by the health crisis, the data previously presented for this period are still partial and incomplete, the real situation could be much worse. There were difficulties in collecting data, and the financial measures taken by the government, which supported companies and their employees, also contributed to the figures presented.

According to the Ministry of Labor, the information on technical unemployment for the beginning of July was: 102,830 employment contracts suspended nationwide, of which 24,464 in the hotel and restaurant sector, 20,573 in the manufacturing industry, and 8,996 in the retail sector. In a press release, the Ministry of Labor announces measures for the adoption of a flexible work schedule and the payment of the gross salary will be divided between the employer, which will cover at least 50% of the duration provided in the individual full-time employment contract, and the state, which will cover 75% of the difference between the gross basic salary provided for in the individual employment contract and the gross basic salary for the hours actually worked as a result of the reduction in time.

Until now, the low wage policy has been used, which proves to be inefficient, especially in the battle with poverty and social inequity. Low wages are a condition of low labor productivity. For rural areas, despite the fact that the average monthly income per household has increased in recent years, it is quite far from the level of urban or national level. Employees have the highest income compared to other categories of people in rural areas. Farmers earn on average about 40% less than employees and 12% less than rural income. (Popescu and all., 2018, p. 345)

A study conducted earlier this year highlights the inseparable link between wage labor force and Gross Domestic Product (GDP). The study undertaken and the econometric model used showed that the labor force has a decisive influence on GDP growth or decrease. (Anghel and all., 2020, p. 99) The current situation clearly shows, according to statistics, a decrease in the number of employees, which leads to a decrease in GDP.

According to the INS, in the first quarter of 2020, the average total monthly income per person was 1989 lei, and the total expenses per person were 1659 lei and represent 83.4% of income. Wage incomes with 67.8%, agricultural incomes with 1.3%, those with social benefits with 18.9%, those with self-employed non-agricultural activities with 1,8%, incomes in kind with 8%, the value of consumption of agri-food products from own sources with 6.7%, contributed the most to the formation of total incomes in the same period. Table 1 shows a lower income for farmers in the first quarter of 2020 compared to the fourth quarter of 2019, which worsens the already precarious situation of this category.

Table 1. Structure of average monthly income in the first quarter of 2020 compared to the fourth quarter of 2019

Occupatio-nal status	Year	Average monthly incomes Lei / person	Percentage of money income				Percentage of in kind income	
			Gross wages and other salary entitlements	Income from agriculture	Income from independent non-agricultural activities	Income from social benefits	Equivalent income in kind obtained by employees and beneficiaries of social benefits	Consumption of agri-food products from own sources
Employee	T IV 2019	2512	89.7	0.3	0.3	4.4	1.2	3.2
	T I 2020	2627	89.6	0.3	0.2	4.3	1.1	4.0
Farmer	T IV 2019	947	16.8	34	4.4	9.9	1.1	26.5
	T I 2020	933	23.8	22	2.9	10.1	1.3	30.5
Unemployed	T IV 2019	721	46.6	0.7	1.6	16.8	1.2	10.3
	T I 2020	866	39.5	0.2	4.5	14.8	0.7	11
Retired	T IV 2019	1521	27.4	0.9	1	59.7	1.7	7.7
	T I 2020	1575	27.9	0.9	0.6	57.9	1.8	9.6

Source: data processed by the author according to National Institute of Statistics

As can be seen in Table 2, there are decreases in wages between January and June 2020 in all analyzed sectors. The largest decrease in earnings of -22.69% is observed in the field of hotels and restaurants where many of them have closed or reduced their activity. The situation of individual employment contracts terminated at the end of May was of 429,585, of which 76,543 in the manufacturing industry, 75,848 in the retail trade, and 64,573 in construction. In agriculture, the level of earnings is in May at the level of January, and in the field of manufacturing, the decrease is of 4.73%.

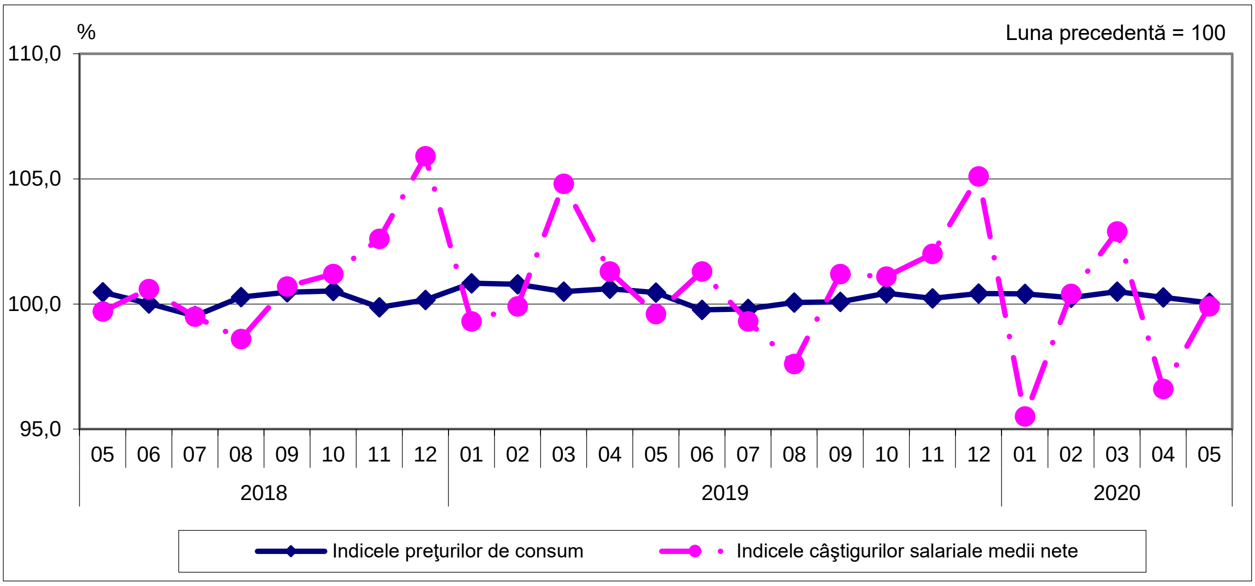
Table 2. Evolution of average net earnings in different sectors of the economy during May 2019 - May 2020

Year	2019								2020				
field	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Febr.	Marc.	Apr.	May
Agriculture, forestry and fishing	2353	2422	2486	2421	2393	2425	2406	2568	2397	2441	2431	2398	2379
Manufacturing industry	2673	2693	2707	2635	2643	2684	2797	2915	2707	2728	2807	2556	2579
Trade	2622	2568	2593	2552	2549	2583	2629	2841	2693	2718	2854	2632	2629
Transport and storage	2798	2832	2873	2824	2901	2913	2972	3243	3030	2954	2979	2878	2909
Hotels and restaurants	1794	1801	1841	1843	1832	1862	1879	1928	1803	1781	1605	1340	1394

Source: data processed by the author after the National Institute of Statistics

In May 2020, the real earnings index was of 99.9% compared to April 2020. The fluctuations of the average net earnings experienced decreases and increases, as can be seen in Figure 3, the decreases were due to interruptions or cessations of activities, continued technical unemployment, lower returns and partial remuneration of employees in some economic activities.

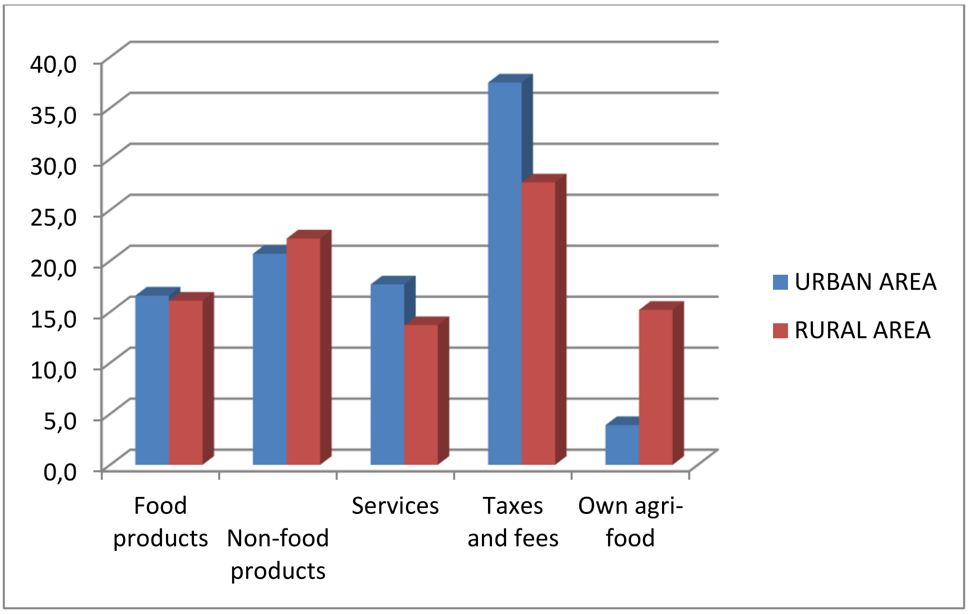
Figure 3. Comparison of consumer price indices compared to average net earnings indices in May 2018-May 2020



Source: National Institute of Statistics, Press release no. 179/9 July 2020

Figure 4 illustrates the level and structure of average monthly expenditures per person which were of 1944 lei in urban areas and of 1326 lei for rural areas. Of these amounts, monetary expenditures represented 96.1% for urban and 84.8% for rural areas. Consumption expenditures account for the majority of 55% for urban and 52% for rural areas, respectively.

Figure 4. Percentage of expenditures in the first quarter of 2020 by areas of residence



Source: data processed by the author according to National Institute of Statistics

An analysis carried out in April 2020 on measures taken in the state of emergency highlighted the following: limiting farmers' access to markets due to transport restrictions and quarantine led to the impossibility of capitalizing on fresh products; changing consumption habits by buying canned products, which led to difficulties in selling perishable products; the closure of peasant markets had negative effects on small farmers; the closure of the HoReCa sector affected many farmers who had contracts with these units (mainly for dairy, fruit and vegetables, potatoes, wine); The development of e-commerce was achieved through online sales and home deliveries. (Alexandri, 2020, pp. 29-30) The COVID-19 pandemic led the authorities to take restrictive measures for farmers and agriculturists, which deepened the decrease of incomes and the decrease of the quality of life, especially for the rural environment.

CONCLUSIONS

Sustainable development depends on and is closely linked to the quality of life of the population. The health crisis and the measures that followed had a negative impact on the activity of some sectors of the economy, on employment contracts by reducing or suspending their number, on lowering income levels, raising prices for certain products, especially for food and health . All this leads to a decrease in living standards, especially in rural areas.

The analysis shows that the COVID-19 pandemic has a disproportionate effect, the most exposed being the vulnerable categories, who work in the most affected sectors, with a low level of qualification and salary. The most affected are those who were laid off, those who entered technical unemployment, those in informal employment, people returned from abroad, without income, their number being unknown. After the adoption of the first measures imposed by the health crisis, many categories of workers are not found in aid schemes, i.e. unpaid family workers, day labourers, small farmers or those without employment contracts. And most of them live in rural areas. Along with declining employment and employment opportunities, there is a decline in income. This is happening at the same time as prices rising for a range of basic food and non-food products and health services.

This analysis led to the conclusion that, even if the rural population has a fairly large share in the total population of Romania and is an important labor resource in the economy, life in rural areas is difficult and has the lowest living conditions. The fight against the COVID-19 pandemic is one against the clock, and the measures to be taken for economic recovery must be swift and consistent. Stopping the economic crisis triggered quickly and systematically by the health crisis, which is beginning to be felt at the level of society as a whole, depends on the speed and correctness of the measures adopted at governmental level. The steps taken in time and in accordance with the real economic requirements can allow, in an optimistic scenario, the gradual return to the standard of living before the outbreak of this epidemic and even its increase to ensure sustainable development in rural areas.

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STUDY ON THE EVOLUTION OF THE FINANCIAL SUPPORT GRANTED TO THE AGRICULTURAL SECTOR IN THE PERIOD 2008-2019

ILIE (NECULA) DIANA MARIA[1] , BĂDAN DANIELA NICOLETA[2]

Summary: *The Common Agricultural Policy is the basis for ensuring food security, the sustainable use of natural resources and the balanced development of rural areas in the Member States of the European Union. The three paths of the CAP through which these objectives are achieved are: direct payments, market measures and rural development. In the last ten years, Romania's agricultural development has been achieved with the help of European subsidies established on the basis of the European Common Agricultural Policy. At national level, over 70% of the total funds allocated to the agricultural sector are managed by the Agency for Payments and Intervention for Agriculture, which registered over 1 million beneficiaries, with a funding of over 15 billion euros. This study aims to analyze the evolution of financial support to the agricultural sector through direct payment schemes in Pillar I, in the period 2008-2019, using statistical methods of analysis, thus creating a broader view of the situation of these support schemes.*

Keywords: *financial support, pillar I, direct payments*

JEL classification: *Q14, Q18*

INTRODUCTION

The common agricultural policy was created to provide support to European farmers to meet the needs of a market to which more than 500 million citizens have access. It mainly aims to ensure a stable supply of safe food, sustainably produced at affordable prices and a decent standard of living for farmers.

The CAP is valid for all 28 EU countries, giving Member States the flexibility to adapt certain instruments to the specific situations of each country. It is financed by two funds drawn from the European Union: the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD).

The main financing instrument for agriculture in the European Union in the 2007-2013 programming period was represented by direct payments granted through two payment schemes, namely: the single payment scheme (SPS) applied in the old Member States, and the single area payment scheme (SAPS) applied in some of the new Member States.

According to Regulation (EC) No 73/2009, farmers are required to comply with a number of rules concerning good agricultural and environmental conditions, as well as statutory management requirements relating to environmental protection, public health, animal health and welfare, all of which in order to be eligible for direct payments. Direct payments are a key element of the policy that provides income support for farmers and promotes the competitiveness, sustainability and practices of organic farming.

This topic is of interest and studied among researchers. Cionga et al., (2008) studied the importance of subsidies allocated by the CAP and concluded that these subsidies are very important for the stability of farms but also dependent on the level of specialization of the farm and the size of usable agricultural areas. According to him, large farms benefited most from the payments and aid allocated by the EU.

MATERIAL AND METHOD

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The paper aims to analyze the financial support provided to the agricultural sector in Romania through direct payment schemes granted under Pillar I.

In order to follow the evolution of the support granted through Pillar I-direct payments, the number of beneficiary farmers, the areas authorized for the payment of financial aids and the payments granted were analyzed.

The research method used is the quantitative and qualitative analysis of the statistical data provided by APIA. The processing of statistical data is performed using statistical calculation methods: minimum, maximum, average, standard deviation, coefficient of variation and the average annual rate.

RESULTS AND DISCUSSIONS

For ten years, Romania's agricultural development has been achieved with the help of European subsidies established on the basis of the Common European Agricultural Policy, through which Europe pursues food and environmental security and territorial balance. 70% of the total funds allocated to the Romanian agricultural sector are managed by the Payments and Intervention Agency (APIA). Over the last ten years, APIA has managed the applications submitted by over 1 million beneficiaries and provided them with funding of over € 15 billion [2].

Analysis of the number of beneficiaries of direct payments

Analyzing, at national level, the number of farmers who requested financial support in the period 2008-2019, it was observed that it followed a decreasing trend with an annual rate of -2.6%, reaching in 2019 a number of 844 thousand applicants, representing the minimum peak of the period. During this period, an average of 1,003 million applicants were registered, and the coefficient of variation of 10.6% indicates that the data series is relatively homogeneous.

Table no.1. The structure of the number of farmers according to the legal status they requested financial support in the period 2008-2019

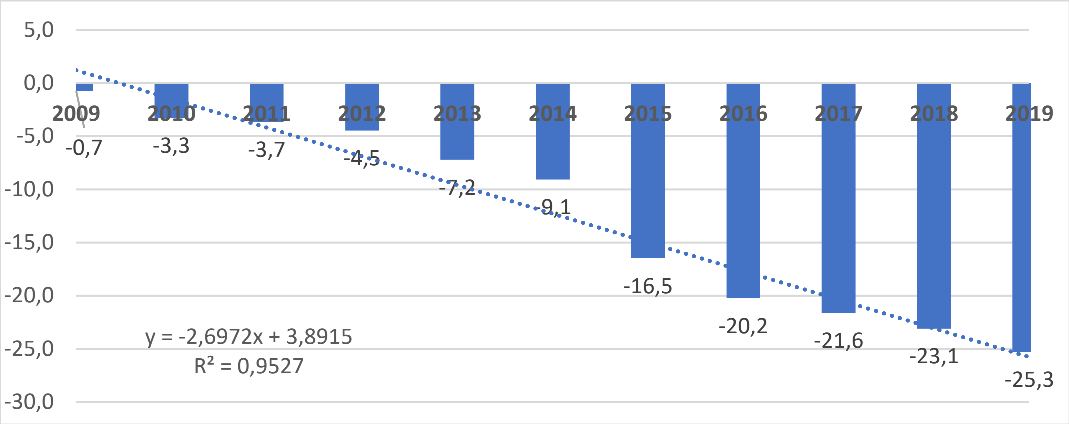
Type of farmers	2008	2013	2019	Minim	Maxim	Average	Stdev	Cvar		Growth rate
	No. farmers	No. farmers	No. farmers	No. farmers	No. farmers	No. farmers	No. farmers	%	Semnf	%
Foreign citizen	72	171	183	72	197	149,6	37,4	25,0	big	8,9
Forms of simple association	1	99	10	1	99	40,4	37,4	92,6	big	23,3
Family businesses	0	523	5832	0	5832	1161,0	1703,0	146,7	big	63,4
Individual enterprises	0	4046	15521	0	16826	6655,2	6259,7	94,1	big	68,3
Individual	1114333	998808	618758	618758	1114333	900747,8	200652,1	22,3	big	-5,2
Legal entity	15966	29020	176698	15966	191384	77236,3	79550,1	103,0	big	24,4
Authorized individuals	0	16061	27468	0	31701	17016,2	13399,8	78,7	big	67,0
Total	1130372	1048728	844470	844470	1130372	1003006,3	106609,6	10,6	mijl	-2,62

Source: data processed according to APIA

Considering the distribution of the number of farmers applying according to the legal status, it is found that most applicants are registered as individuals, their number following a decreasing trend until the end of the analyzed period, with an annual rate of -5.2% , holding a share in the total number of applicants of 98.58% (1.11 million farmers) in 2008, of 95.24% in 2013 and continuing to decrease to 73.27% in 2019.

Regarding the percentage changes in the number of farmers who applied for financial support, in figure no.1 it can be seen that compared to the reference year 2008, the next 11 years registered gradual decreases reaching - 25.3% (in 2019). Calculating the equation of the linear trend, it can be seen that from one year to another the percentage of farmers decreased by an average of 2.69%. It is also observed that there is a very strong link between the two variables, the correlation ratio r = 0.976.

Figure 1. Percentage changes in the number of farmers requesting support financial services in Romania in the period 2008-2019 (+/-% compared to 2008)

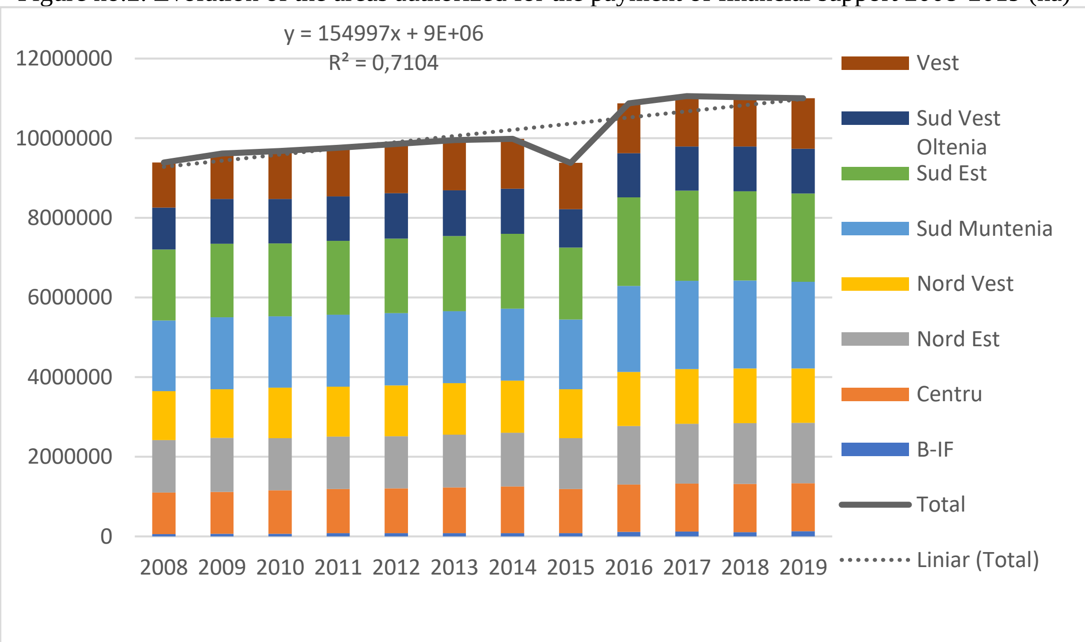


Source: data processed according to APIA

Analysis of the areas authorized for the payment of financial support

The evolution of the areas authorized for the payment of financial support from APIA in the period 2008-2019 is presented in the figure below. According to statistics, the total area that received financial support increased and as previously shown the number of applications decreased indicating the trend of land consolidation.

Figure no.2. Evolution of the areas authorized for the payment of financial support 2008-2019 (ha)



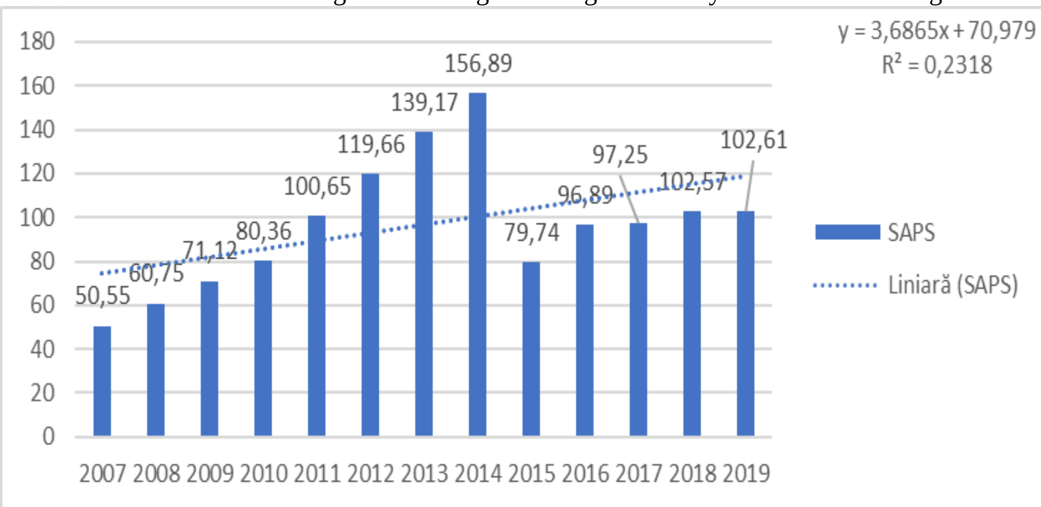
Source: data processed according to APIA

The minimum area of the period was registered in 2015, of 9.37 million ha, by 14.77% lower than in 2019 (11 million ha). The average of the analyzed period was 10.13 million ha. Calculating the equation of the evolution trend of the authorized areas during the study period, it can be seen that the level of the coefficient of x is high, respectively 154.9 thousand ha, which means that on average each year the areas authorized for the payment of financial aid increased by this value.

Single Area Payment Scheme Analysis (SAPS)

SAPS has been implemented since 2007, in order to practice a competitive, sustainable and market-oriented agriculture. During the analyzed period, the amount of SAPS had an increasing trend until 2014, reaching 156.89 euro / ha, then decreased sharply in 2015 (79.74 euro / ha). In the last 5 years it has gradually increased, registering in 2019, the value of 102.61 euro / ha.

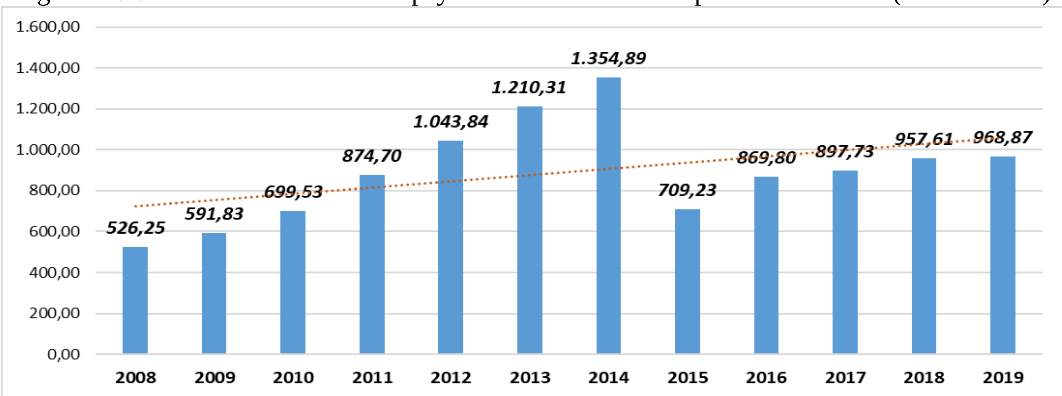
Figure no.3. Evolution of the amount granted through the Single Area Payment Scheme during 2008-2019



Source: APIA processed data

In the case of the evolution of authorized payments, for the Single Area Payment Scheme (SAPS) it is observed in figure no. 4 that they followed an increasing trend in the period 2008-2014, following that in 2015 to register a sudden decrease.

Figure no.4. Evolution of authorized payments for SAPS in the period 2008-2019 (million euros)



Source: APIA data

The maximum value of the authorized amount for SAPS registered for the period under study was reached in 2014 (1,354.89 million euros), which was 28.3% higher than in 2019 (968.87 million euros) . The average annual rate recorded during this period was 5.70%.

CONCLUSIONS

The development of the agricultural sector in Romania was achieved with the help of European subsidies established on the basis of the Common Agricultural Policy. Through the CAP, the U.E. aims at the stability of food and environmental security as well as a territorial balance.

At national level, approximately 70% of the total funds allocated to the Romanian agricultural sector are managed by APIA.

Analyzing both the number of grant applicants and the total beneficiary areas, it was observed that the evolution is reversed, if the number of applicants decreased during the period 2008-2019, the areas increased as a result of the land merger.

The most requested payment scheme is the Single Area Payment Scheme, which was implemented in 2007, contributing to the practice of a competitive, sustainable and market-oriented agriculture.

The lowest value of the amount authorized for SAPS was registered in 2015, being also the year with the lowest amount per hectare.

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MAIN DIRECTIONS FOR ENERGY USE OF BIOMASS IN ROMANIA

BEREVOIANU ROZI LILIANA[1]

Summary: *Energy is an area of strategic and vital importance for Romania's economic development. At national level there is a wide activity of using biomass for the production of electricity and heat, determined by the requirements of the European Union's energy policy to reduce CO2 emissions. The availability of biomass resources has made it an attractive source of renewable energy, with the potential to provide economical and cost-effective energy. The paper presents a review of directions and policies on bioenergy and energy production through the use of biomass.*

Keywords: *biomass resources, renewable energy, energy policies*

JEL classification: *Q16, Q42, Q48*

INTRODUCTION

The European Union's energy policies are focused on ensuring safe, sustainable and affordable access to energy. To achieve these goals, the European Union aims to adopt a long-term energy strategy with clear directions on energy security and efficiency, reducing carbon emissions, including through the increasing use of renewable energy.

Ensuring energy security at national level, especially with regard to bioenergy as part of an energy portfolio, allows for synergies between systems and policy objectives related to energy access, economic development, growth and stability of environmental objectives. In the general context of environmental security, the role of bioenergy is very important in mitigating climate change. Currently, in Romania, renewable energy constitutes 30% of the total percentage of energy used. Biomass is the main type of renewable energy source in our country. It is represented by organic components formed by photosynthesis, which use solar energy, as well as by fixing nitrogen from the air and CO2. Depending on the type of waste used or the destination of the final consumption, the amount of heat resulting from the energy recovery of biomass has different weights in the balance of primary resources. Thus, the use of biomass is done by thermal conversion or by conversion of solid, liquid or gaseous energy sources.

In order for renewable energy sources to become an important factor in mitigating climate change and improving the overall energy security of the European Union, it is necessary to change the way renewable energy is promoted in EU member states.

MATERIALS AND WORKING METHODS

The materials used in this paper refer directly to specialized scientific studies in the field and the processing of related data as a result of the research conducted. The paper presents a review of directions and policies regarding bioenergy and energy production through the use of biomass.

RESULTS AND DISCUSSIONS

"Green energy", clean and renewable, is one of the major concerns of the European Union, but also of many Member States, for the development of clean energy that can reduce the impact on the environment associated with conventional energy generation and increase energy independence.

"Green energy" is a term that refers to renewable and non-polluting energy sources. From the energies generated by wind and solar panels to the energies obtained from biomass, ecological concerns and efforts aimed at obtaining green energy and replacing traditional energy sources have become increasingly intense recently, not only in Romania but also at sea. part of the world. Globally,

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it is estimated that green energy, renewable, constitutes about 20% of the total energy produced, the variations remaining quite large, depending on the climate and the means invested.

"Renewable energy" is a term that refers to forms of energy produced by energy transfer of energy resulting from renewable natural processes. Thus, the energy of sunlight, winds, running water, biological processes and geothermal heat can be captured by humans using various processes. [35]

"Renewable energy" is also called alternative energy, usable energy derived from sources that are able to recover, such as the sun (solar energy), wind (wind energy), rivers (hydroelectric energy), hot springs (energy geothermal), tides (tidal energy) and biomass (biofuels). [2]

The major advantage of using energy from renewable sources is that these sources are non-polluting, reduce dependence on imported fossil fuels and significantly reduce the greenhouse effect, have low operating costs and are important in the rational dosing of depletable resources. It also increases security in local and national power supply.

The priority objective of Romania's energy policy has been and is to promote the capitalization of renewable energy resources (RES). [9] So:

- By HG 443/2003 (repealed by OUG 88/2011), the provisions of Directive 2001/77 / EC on the promotion of electricity production from renewable energy sources were transposed. The following objectives have been set: the legal framework necessary to promote E-RES, the indicative targets on the share of RES in Romania's gross energy consumption, as well as the share of E-RES in the country's gross electricity consumption. A target has also been set. 12% of gross national consumption, which was to come from renewable energy, and the electricity component of this target was set at 22.1% of total Community electricity consumption by 2010, a share which was to be produced from renewable energy.
- By HG 1535/2003, Romania adopted the “Strategy for capitalizing on renewable energy resources” which presents the advantages and potential of renewable energy sources in the European Union and Romania. It included an indicative program for capitalizing on RES in Romania. The necessary actions, financial resources (internal and external), responsibilities and estimated deadlines were also mentioned.
- By HG 1892/2004 (repealed by HG 1479/2009) established the system for promoting electricity produced from renewable energy sources (E-RES), thus stimulating the production of E-RES in Romania by applying mandatory quota systems combined with the trading system of green certificates.
- By HG 958/2005 (repealed by HG 1479/2009), for the amendment of HG 443/2003 on the promotion of the production of electricity from renewable energy sources and for the amendment and completion of the Government Decision no. 1.892/2004 for the establishment of the production promotion system electricity from renewable energy sources, the system of mandatory quotas was established, combined with the trading system of green certificates. The share of electricity produced from renewable energy sources in the gross national electricity consumption was changed from 30% to 33%. The green certificates market initially operated based on the ANRE Order 22/2006 on the Regulation on the organization of the green certificates market.
- HG 1069/2007 approved the “Romania's Energy Strategy for the period 2007-2020”, in which the level of national indicative targets on the share of electricity from renewable energy sources in gross domestic electricity consumption in the perspective of 2010, 2015 and 2020 is 33%, 35% and 38% respectively.
- HG 750/2008 approved the “Regional state aid scheme for the capitalization of renewable energy resources” which regulates the financing granted to economic operators for making initial investments in order to capitalize on renewable energy resources for electricity and heat production.
- HG 1661/2008 approved the “National Program for increasing energy efficiency and the use of renewable energy sources in the public sector, for the years 2009-2010. This program co-

finances investment projects on increasing energy efficiency and the use of renewable energy sources, with local government authorities as direct beneficiaries.

- In order to reach the national target for 2020, Law no. 220/2008 regarding the establishment of the system for promoting the production of energy from renewable sources. Thus, a system was established to promote the production of electricity from renewable sources based on the imposition of mandatory electricity quotas, combined with the trading of green certificates. The promotion system is applied for electricity produced in units qualified by the National Energy Regulatory Authority - ANRE and delivered in the National Energy System, respectively: hydro energy produced in power plants with an installed capacity of up to 10 MW, put into operation or modernized since 2004, wind energy, solar energy, geothermal energy, biomass, biogas, waste fermentation gas, also called landfill gas, sludge fermentation gas from wastewater treatment plants. This law was amended and supplemented with the provisions: OG 29/2010, Law 139/2010, OUG 88/2011 approved by Law 134/2012, OUG 57/2013 approved by Law 23/2014, OUG 79/2013, HG 994 / 2013.
- HG 1479/2009 (repealed by OUG 88/2011) established the system for promoting the production of electricity from renewable energy sources, which provides that the system of mandatory quotas combined with the trading of green certificates is applied to promote electricity produced from renewable sources. Thus, E-RES producers can have revenues both from the sale of electricity on the electricity market and from the sale of green certificates on the green certificate market. Renewable electricity producers have also been exempted from paying for the imbalances caused.
- HG 835/2010 amended the “National Program for increasing energy efficiency and the use of renewable energy sources in the public sector, for the years 2009-2010”, approved by HG no. 1661/2008. Thus, it was decided to reduce the funding of the National Program 2009-2010 and to change the deadline for the submission by the beneficiaries of the investment projects of the documents for establishing the eligibility.
- In accordance with the provisions of Decision COM C (2011) 4938 final of July 2011, in order to reduce overcompensation and so that the scheme does not lead to some undue competitive advantages, Romania has assumed the obligation to monitor the costs and revenues of the producers benefiting from the support scheme.
- By Decision COM C (2015) 2886 of May 2015, Romania notified a set of measures that led to changes in the system for promoting energy production in RES

In 2009, Directive 2001/77 / EC was replaced by Directive 2009/29 / EC which decided that Member States should contribute to the 20% target for energy produced from renewable sources in gross final energy consumption. To this end, each Member State negotiated the target it wanted to assume with the European Union, adopting a National Renewable Energy Action Plan (PNAER) by the end of June 2010. Thus, the directive 2009/28 / EC, in PANER, Romania has assumed a target of 24% energy produced from renewable sources in final energy consumption.

In 2017, The Council of the European Union has reached a general agreement between Member States and set a target of 27% renewable energy in 2030 at EU level. The European Parliament has proposed that in 2030 at EU level the target be 35% energy from renewable sources.[7]

The "Energy - Climate Change 2020" legislative package, adopted by the European Council, sets targets for the EU for 2020, also known as the "20-20-20 targets", namely[34]:

- reducing GHG emissions at EU level by at least 20% compared to 1990;
- a 20% increase in the share of renewable energy sources (RES) in total EU energy consumption, as well as a 10% target for biofuels in energy consumption for transport;
- a 20% reduction in primary energy consumption, to be achieved by improving energy efficiency, compared to the level of consumption in the absence of these measures.

Romania, by modifying the National Integrated Plan for Energy, Climate Change, has assumed the modification of the target of energy produced from renewable sources to over 30% of the internal energy consumption provided by renewable resources by 2030. Implementing this objective is essential to attract investment and non-reimbursable funds, as well as the creation of new jobs.

Biomass resources for energy production

In Romania, more than 60,000,000 tons of biomass/year can be produced, from which, by using conversion technologies, over 280,000,000 MWh of electricity and heat can result. The Energy Strategy of Romania (SER) for the period 2017-2020 (updated for the period 2011-2020) has established as a key objective for 2020 the increase of the renewable share in the final gross energy consumption to 24%.

Our country has favorable environmental conditions for a wide variety of renewable sources with great energy potential. Renewable energy sources in Romania are presented in the table below:

Table 1: The national potential of renewable sources in Romania

Renewable energy source	Energy potential	Energy equivalent energy (thousand toe)	Application
Solar energy			
-terme	60x106GJ	1433.0	Thermal energy
-fotovoltaic	1200 GWh	103.2	Electricity
Wind power	23000 GWh	1978.0	Electricity
Hydroelectric power of which:	40000 GWh	3440.0	Electricity
-under 10 MW	6000 GWh	516.0	Electricity
Biomass and biogas	318x106G	7597.0	Thermal energy
Geothermal energy	7x106GJ	167.0	Thermal energy

Source: National Action Plan in the Field of Renewable Energy (PNAER) - 2010

On the Romanian territory, the distribution of renewable energy resources depends on the physical-geographical characteristics. Thus, the plains and low hills of the south and southeast of the country have resources of solar energy, wind and biomass, the west of the country has most of the geothermal resources and mountainous areas concentrate significant resources of biomass and microhydro.

Depending on the costs of use, the volume of resources, the technologies used, the most convenient renewable resources for electricity production are hydroelectric power plants including micro hydropower plants, wind turbines and congeneration plants that use biomass, and for heat production are biomass and solar energy.

Biomass is a reliable and renewable local energy source, with which fossil fuels can be replaced. Being the main fuel used in rural areas, biomass is used for space and water heating, as well as for cooking. It covers about 7% of primary energy demand and about 50% of Romania's renewable resources potential. Given that fossil fuels come from biomass, it follows that biomass can easily be transformed into solid, liquid or carbon-based fuels.

Energy produced from biomass includes any solid, liquid or gaseous fuel or any electricity or product derived from organic matter, either directly from plants or indirectly from industrial waste derived from plants, commercial and urban waste or agricultural and forestry residues.

Biomass sources that can be used for energy production are:

- Wood (forest timber, wood residues, etc.)
- Agricultural residues (straw, rice husks, fibrous matter remaining after sugar cane or sorghum stalks, olive waste, etc.)
- Energy crops (mischantus, panicum virgatum, etc.)
- Solid municipal waste, waste fuels, liquid waste and organic waste.

The energy incorporated in biomass is released by various methods. The technologies for energy use of biomass are:

- Direct combustion in boilers with heat generation.
- Advanced thermal conversion of biomass into a secondary fuel, by thermal gasification or pyrolysis, followed by the use of fuel in an engine or turbine.

- Biological conversion to methane by aerobic bacterial digestion.
- Chemical and biochemical conversion of organic matter into hydrogen, methanol, ethanol or diesel fuel.

The use of biomass as an energy resource has economic, social and ecological benefits, among which we mention:

- continuous energy, renewable annually, inexhaustible
- safety and economic sustainability
- ensures total energy independence
- has the lowest generation cost comparable to any other renewable energy source
- creating new jobs
- ensures quality thermal comfort at a low price
- non-polluting energy, because by drying it is processed into pellets, briquettes or chopped, becomes storable and can be stored for a longer period of time
- helps to dispose of waste
- ensures effective ecological protection for the population and the environment
- by using advanced technologies, it can be transformed into energy efficient, economical and environmentally friendly

The disadvantage is that carbon monoxide is released by combustion

CONCLUSIONS

In Romania, obtaining renewable energy from biomass occupies an increasingly important place in national energy strategies. The energy obtained from biomass is in different stages of technological and commercial development.

Biomass is the most widespread and most abundant renewable energy resource in Romania. This representsthe biodegradable part of the products agricultural waste and residues, including plant and animal substances, forestry and related industries, as well as the biodegradable part of industrial and urban waste. [6]

Biomass can be used for several purposes and its energy use has many advantages, including:

- the use of biomass for energy promotes a change in society towards improving the efficiency of the use of sustainable biomass resources and energy autonomy;
- maximizing the reduction of greenhouse gases by replacing fossil fuels (coal, oil, gas) with biomass;
- is an ecological solution for the energy needs of local communities (electricity, heat or urban cooling)
- is an effective solution for the disposal of solid agricultural, industrial and household waste, thus reducing emissions of carbon dioxide and nitric acid;
- electricity from biomass has the lowest cost of generation compared to other renewable energy sources;

The future of the European Union's energy policy - climate change aims to:

- ensuring the functioning of energy markets in conditions of competitiveness;
- ensuring the energy security of the European Union;
- promoting energy efficiency and energy saving;
- development and promotion of renewable energy sources;
- minimizing greenhouse gas emissions;
- developing and promoting the interconnection of energy networks

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ANALYSIS OF THE AVERAGE YIELD PER HECTARE FOR THE MAIN AUTUMN CROPS AND DETERMINATION OF THE INFLUENCING FACTORS

PETRE IONUȚ LAURENȚIU[1]

Summary: *In this paper we will analyze the average yield per hectare for the main field crops, autumn, in order to determine the development regions with a higher potential. It will be analyzed from a statistical point of view whether regions with higher productivity differ significantly from the national average. This analysis will be determined by testing the hypotheses using the t test. Determining the region with the best yield for autumn crops will be analyzed and possible factors that led to this distancing in that region, also with the help of the t test it will be possible to see if certain inputs differed quantitatively in that region from the national average.*

Keywords: *field crops, autumn crops, yield, hypothesis testing, inputs.*

JEL Classification: *Q10, Q15*

INTRODUCTION

The present study wants to analyze the average production per hectare in Romania, both the national average and the average of the eight development regions in order to determine the performing regions in this regard, but also the possible factors that may influence this yield. In the analysis, the main autumn crops were taken into account, depending on the cultivated areas, respectively, wheat, barley and rapeseed.

Studying the literature, Bouregaa (2019) conducted one of the first studies that analyzed the impact of future climate change on the need for water and the yield of harvested crops in the Setif region. Among the main findings of the research, it results that the average temperature will increase by 0.73 to 3.42 ° C, and rainfall will decrease by 1 to 52.7 percent. Winter wheat and olive production is expected to decline and barley yields to decline only under light soil (ShalekBriski et al., 2020).

A similar research was conducted by Hesam Arefi et al. (2017), which aimed to simulate the impact of climate change on winter wheat production and to evaluate the possibilities of using different varieties and changing the planting date as two strategies for adapting to climate change in Kerman Province, Iran. The simulated results indicated that the wheat production of the common variety (with average maturation) of winter wheat will decrease, ranging from -0.27 to -18.71% depending on future climate change. The earlier planting date (October 20) increased the yield of wheat cereals in future climatic conditions than the usual planting date (November 5). Conversely, subsequent planting (November 20) would accelerate the harmful effects of climate change on wheat cereal yields.

Zhang and Wang (2010) conducted research to assess the production risk for winter wheat producers in Beijing, China. They found that the loss rates of wheat production in the districts of Beijing are between 6 and 15%, which is considered the average range in most regions. The highest production risks are located in the western regions of Beijing (Mentougou and Fengtai), while the lowest production risk is located in the southeastern region of Beijing (Daxing District).

The purpose of Wang et al. (2014) is to explore the impact of climate change on net crop income by region. In particular, the authors focus on the differences in impact between the northern and southern regions. The authors' results show that, on average, the increase in annual temperature will affect farms in the north or south. The impact of climate change on both rainfall and temperatures has different seasonal impacts on producers in northern and southern China. Consequently, the impact on farm net income varies depending on the farms in the north and south, being negatively affected (to varying degrees) by an increase in temperature, but both benefiting from an anticipated increase

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in rainfall. Also, that irrigation is a key measure of adaptation to climate change management (Khuu and Juerg, 2013).

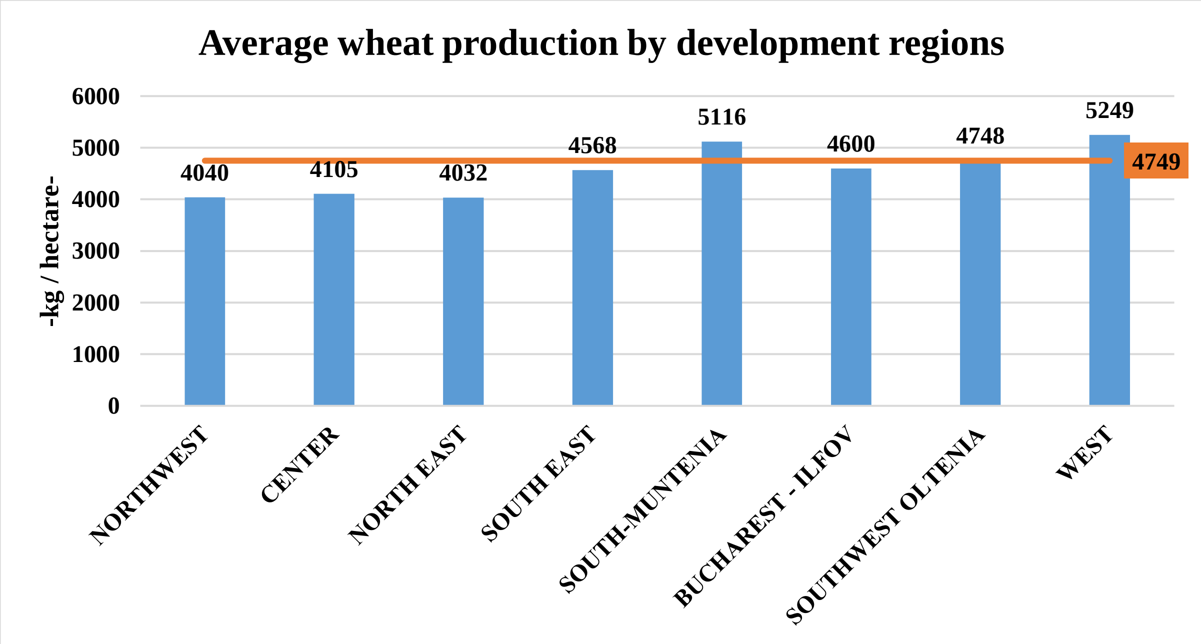
MATERIAL AND METHOD

In this paper we want to analyze the average yields per hectare for the main autumn crops in order to analyze them comparatively between development regions and the national average. For this analysis, data on the average production per hectare will be used with the help of the national databases, respectively those of the National Institute of Statistics. Following this quantitative analysis, a statistical analysis of the averages between the yields recorded in the counties of the regions with the highest productivity and the average yield at national level will be performed, using the bilateral hypothesis test, respectively the t test. Finally, if there are statistically significant differences, the influencing factors of these differences will be determined.

RESULTS AND DISCUSSIONS

The average yield per hectare can be influenced by several factors both endogenous and exogenous, thus, the average yields per hectare for the main three autumn crops (wheat, barley and rapeseed) by development regions were analyzed, compared to the average national.

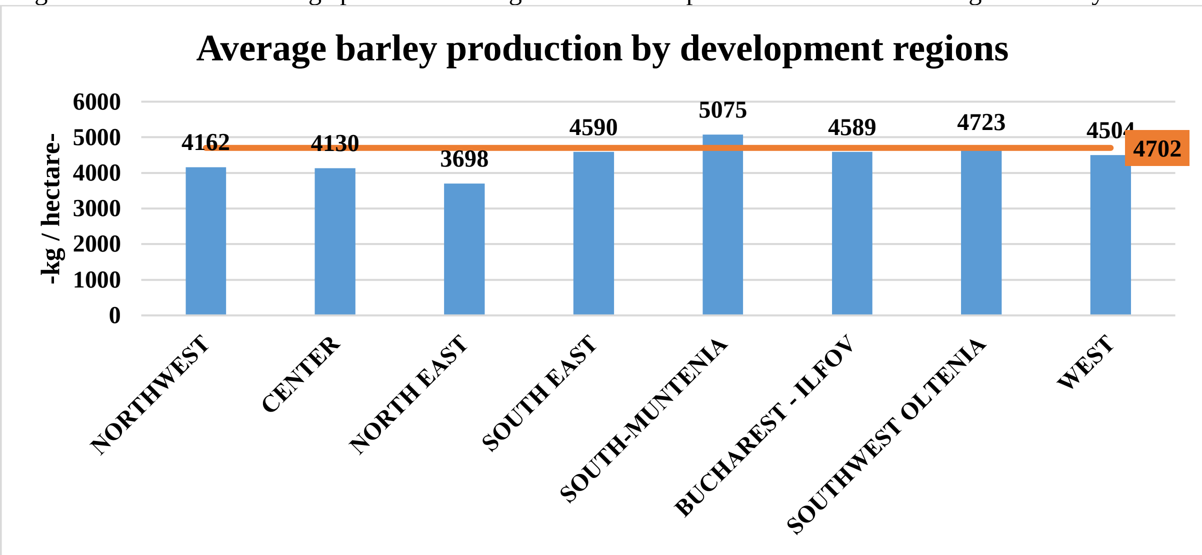
Figure 1. The level of average production at regional level compared to the national average for wheat in 2019



Source: own processing based on NIS data

Figure 1 shows the average yields per hectare for wheat cultivation, from 2019, for all eight development regions of Romania, but also the national average. It can be seen from the graph that the latter is at the level of 4,749 kilograms per hectare. Of the eight development regions, five have an average yield per hectare below this threshold, and three of the regions exceed this national average. Among the regions with a lower level of average production, the North-East region stands out, with the largest gap between its yield and the national yield, the average wheat production in this region being 4,032 kilograms per hectare, lower than the average with 15.1%. Among the regions with an average level of production per hectare higher than the national average, the West region stands out, with an average wheat crop yield of 5,249 kilograms per hectare, with a surplus of 500 kilograms compared to the national average, respectively with 10.5%.

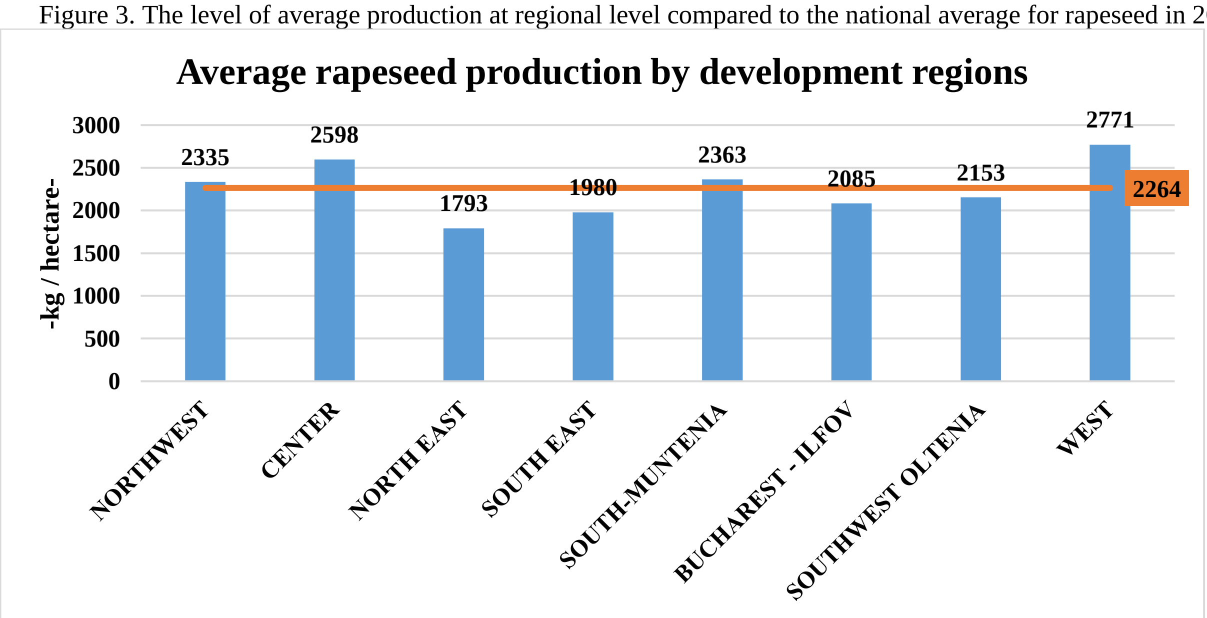
Figure 2. The level of average production at regional level compared to the national average for barley in 2019



Source: own processing based on NIS data

Figure 2 shows the average yields per hectare for barley cultivation, from 2019, for all eight development regions of Romania, but also the national average. It can be seen from the graph that the latter is at the level of 4,702 kilograms per hectare. Of the eight development regions, six have an average yield per hectare below this threshold, and two of the regions exceed this national average. Among the regions with a lower average production level, the North-East region stands out, with the largest gap between its yield and the national yield, the average barley production in this region being 3,698 kilograms per hectare, lower than the average with 21.35%. Among the regions with an average level of production per hectare higher than the national average, the South-Muntenia region stands out, with an average barley yield of 5,075 kilograms per hectare, with a surplus of 373 kilograms compared to the national average, respectively by 7.93%.

Figure 3. The level of average production at regional level compared to the national average for rapeseed in 2019



Source: own processing based on INS data

Figure 3 shows the average yields per hectare for rapeseed cultivation, from 2019, for all eight development regions of Romania, but also the national average. It can be seen from the graph that the latter is at the level of 2,264 kilograms per hectare. Of the eight development regions, four have an average yield per hectare below this threshold, and four of the regions exceed this national average. Among the regions with a lower average level of production, the North-East region stands out, with the largest gap between its yield and the national yield, the average rapeseed production in this region being 1,793 kilograms per hectare, lower than the average with 20.8%. Among the regions with an average level of production per hectare higher than the national average, the West region stands out, with an average yield of rapeseed cultivation of 2,771 kilograms per hectare, with a surplus of 507 kilograms compared to the national average, respectively with 22.4%.

In order to determine whether there are significant differences between the average yield per hectare in the case of the leading regions for this indicator and the national average, the statistical analysis on the comparison of averages by testing the hypotheses using the t test was used. The yields recorded in the first two development regions were compared with the average yield at national level, in order to determine whether there is a statistically significant difference between these variables.

Table 1. Testing of average wheat yields between the first two regions and the national average

	Average production South-Muntenia
Mean	4934.714286
Variance	329090.5714
Observations	7
Hypothesized Mean Difference	4749
df	6
t Stat	0.856518233
P(T<=t) one-tail	0.212296253
t Critical one-tail	1.943180281
P(T<=t) two-tail	0.424592505
t Critical two-tail	2.446911851

	Average production West
Mean	4797.25
Variance	419678.9
Observations	4
Hypothesized Mean Difference	4749
df	3
t Stat	0.14896
P(T<=t) one-tail	0.445518
t Critical one-tail	2.353363
P(T<=t) two-tail	0.891035
t Critical two-tail	3.182446

Source: own processing using MS Excel

The first two regions to record the highest average yield per hectare of wheat were the Southern region and the Western region. Thus, the recorded yield was compared with the national average yield. Following the testing of the hypothesis, according to which, in the mentioned regions, the yield is statistically significantly different than the national average, from table 1 it can be seen that this hypothesis is rejected, registering a level of the statistical parameter t (t State) below the critical threshold (t Critical) in both cases and the significance level is above the minimum accepted threshold of 0.05. Therefore, it can be stated that the higher average yield per hectare in the two regions does not differ significantly from the national average.

Table 2. Testing of average barley yields between the first two regions and the national average

	Average production South-Muntenia
Mean	4732.857
Variance	473609.5
Observations	7
Hypothesized Mean Difference	4702
df	6
t Stat	0.11863
P(T<=t) one-tail	0.45472
t Critical one-tail	1.94318
P(T<=t) two-tail	0.909441
t Critical two-tail	2.446912

	Average production Southwest
Mean	4376.6
Variance	150866.3
Observations	5
Hypothesized Mean Difference	4702
df	4
t Stat	-1.8733
P(T<=t) one-tail	0.067159
t Critical one-tail	2.131847
P(T<=t) two-tail	0.134318
t Critical two-tail	2.776445

Source: own processing using MS Excel

The first two regions with the highest average yield per hectare for barley cultivation were the South region and the South-West region. Thus, the recorded yield was compared with the national average yield. Following the testing of the hypothesis, according to which, in the mentioned regions, the yield is statistically significantly different than the national average, from table 1 it can be seen that this hypothesis is rejected, registering a level of the statistical parameter t (t State) below the critical threshold (t Critical) in both cases and the significance level is above the minimum accepted threshold of 0.05. Therefore, it can be stated that the higher average yield per hectare in the two regions does not differ significantly from the national average.

Table 3. Testing the average yields for rapeseed between the first two regions and the national average

	Average production Center
Mean	2401.833333
Variance	129339.3667
Observations	6
Hypothesized Mean Difference	2264
df	5
t Stat	0.938781493
P(T<=t) one-tail	0.195471414
t Critical one-tail	2.015048373
P(T<=t) two-tail	0.390942829
t Critical two-tail	2.570581836

	Average production West
Mean	2817.5
Variance	82143
Observations	4
Hypothesized Mean Difference	2264
df	3
t Stat	3.862445
P(T<=t) one-tail	0.015341
t Critical one-tail	2.353363
P(T<=t) two-tail	0.030682
t Critical two-tail	3.182446

Source: own processing using MS Excel

The first two regions with the highest average yield per hectare for rapeseed were the Center region and the West region. Thus, the recorded yield was compared with the national average yield. Following the testing of the hypothesis, according to which, in the mentioned regions, the yield is statistically significantly different than the national average, from table 1 it can be seen that this hypothesis is rejected in the case of the Center region, registering a level of statistical parameter t (t State) below the critical threshold (t Critical), and the significance level is above the minimum accepted threshold of 0.05. Therefore, it can be stated that the higher average yield per hectare in the Center region does not differ significantly from the national average. Instead, analyzing the West region and the yield obtained in this area, it can be seen that the statistical parameter t (t Stat = 3.86) is higher than the critical level (t Critical = 2.35), and the significance level (p value = 0.015) is lower than the maximum accepted threshold of 0.05, therefore it can be seen that in the Western region the level of average yield per hectare differs statistically significantly from the national average.

Analyzing the factors that can influence this significant difference between the average yield per hectare at national level and the yield in the West region, for rapeseed, we can identify the main factors influencing agriculture in Romania, namely rainfall and average temperature. The latter indicator did not show different values in this region compared to the national average or compared to other regions, but analyzing the level of precipitation can be seen differences in the West region compared to other regions, in the period (months) when this rapeseed requires an additional supply of water (April-May), so it can be considered that this difference in yield may be due to this. (World climate guide).

CONCLUSIONS

In this paper we wanted to analyze the average yields per hectare for the main autumn crops and identify any significant differences between development regions, compared to the national average. After studying the average yields per hectare, for the three selected crops (wheat, barley and rapeseed) the following can be found: for cereals the areas where average yields per hectare were almost coincided, both for wheat and barley, the highest production was registered in the South-Muntenia region, and the second region was in the western part of the country, respectively the Western region for wheat cultivation and the South-Western region for barley cultivation. Regarding the average production per hectare of rapeseed, the region with the highest potential was the West region, followed by the Center. At the opposite pole, there is a similarity for all three crops, respectively the lowest level of yield is recorded in the North-East region. Among the main reasons that may explain this phenomenon, considers that two of them are essential, namely the limitation or low level of resources, on the one hand agricultural resources, especially soil, less fertile, in these areas, but also financial resources, being a less developed region from an economic point of view, and on the other hand there is also pressure from the meteorological conditions, as it is known in this region the temperature being lower.

Comparing the average level of yield at the national level with the yields recorded in the first two development regions, it was found that there were no significant differences between these regions and the national average for wheat and barley crops. However, analyzing the rapeseed crop, there was a significant difference between the level of average production per hectare in the Western region and the national average yield. This statistically significant difference was explained by the fact that in April-May there was a higher level of precipitation in this area compared to other areas of the country, and these precipitations occurred at the right time to increase the yield in the stage of plant development. Comparing the national average yield for rapeseed, with the one registered for the second development region according to the average production, respectively the Center region, there were no significant differences.

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MAIN SOURCES OF SUBSIDY IN AGRICULTURE

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Summary: *Agriculture is a risky and often expensive activity, where due to unpredictable weather conditions, crops may suffer and implicitly farm yields and incomes that may be significantly affected. The paper presents the main sources of subsidies used in agriculture, as well as the role they played in changing areas, production and selling prices of agricultural products. Direct payments through: single area payment scheme, redistributive payment, payment for young farmers, scheme for small farmers, greening payment, coupled support and Transitional National Aid contributed to farm support. The data used in this study come from APIA, and for their analysis the methods of quantitative and qualitative data analysis were used.*

Keywords: *financing, agriculture, sources of financing, direct payments, transitional national aid*

JEL*:* *Q14, Q18*

INTRODUCTION

Financing is of particular importance for farmers' activities, both for business development through European funds, bank loans, but also to cover any losses caused by adverse weather conditions through direct payments granted under Pillar I of the Common Agricultural Policy. Direct payments also have an additional role to play in contributing to the sustainable management of natural resources.

According to the dex definition, financing is "the allocation of funds from private sources, from the state budget or from international bodies and institutions, for the purpose of setting up and running an enterprise, body or for the implementation of an economic policy".

One of the most important sources of funding is direct payments, which come from the European Agricultural Guarantee Fund (EAGF), created at European Union level, and at national level is coordinated by the Payments and Intervention Agency for Agriculture (APIA). These payments have the role: regulation and support of agricultural markets, granting direct payments to farmers, information and promotion of agricultural products on the internal market of the EU, but also the financial contribution of the EU. to the program to encourage the consumption of fruits and vegetables in schools.

In the 2014-2020 programming period, the main payment schemes that are granted to Romanian farmers are:

The single area payment scheme represents the granting of a single payment per eligible hectare declared by the farmer, totally decoupled from production. The amount of the single area payment shall be calculated by dividing the annual ceiling allocated to the scheme by the total number of eligible hectares declared at national level in that year. SAPS does not provide for payment entitlements - the support is paid only on the basis of eligible hectares declared by farmers, and the level is the same for all hectares in the country.

The redistributive payment is an annual payment to farmers who are entitled to the single area payment and is gradually granted for the first 30 ha of the agricultural holding, regardless of its area. In the case of a transfer of a holding between two farmers, it shall be granted for the total area resulting from the transfer, without exceeding the payment for the maximum area for which it is granted.

The scheme for young farmers refers to the provision of an annual payment to young farmers who are entitled to the single area payment and who are established for the first time on an agricultural

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holding as their chief managers and are at most 40 years of age in year of submission of the application. This payment is granted to farmers for a maximum period of five years.

The small farmer is defined as that farmer who submits a single payment application in 2015 and is eligible for the single area payment scheme entitled to an annual payment of up to EUR 1,250, depending on the area and / or number of eligible animals which he owns on the holding, is automatically included in the simplified scheme for small farmers.

Accessing this simplified scheme for small farmers has been done since 2015, for a period of no more than 5 years, with the possibility of withdrawal in any of the next four years.

The greening payment is granted to farmers who apply practices such as crop diversification, maintenance of existing permanent pastures and the presence of an area of ecological interest on the agricultural area, depending on the specifics of the farm and / or crop structure.

Coupled support benefits active farmers who must meet the general conditions for granting payments to which are added the conditions specific to each type of support. Coupled support is provided in the vegetable sector to active farmers: soybeans, alfalfa, peas, beans, hemp, rice, potato seeds, hops, sugar beet, tomatoes grown in the field, cucumbers grown in the field, vegetables grown in greenhouses and solariums (tomatoes, cucumbers, peppers, cabbage, eggplant) and fruits (plums, apples, cherries and sour cherries, apricots and greens).

MATERIALS AND METHODS

The analyzed data comes from the Agency for Payments and Interventions for Agriculture, following the written request for data on area payment, redistributive payment, payment for young farmers and payment for the environment for the period 2014-2020. Thus, these data were analyzed using the quantitative and qualitative method, by calculating the main statistical indicators such as: minimum, maximum, average, standard deviation, coefficient of variation.

The arithmetic mean or mean value of a series of values is the ratio of the sum of the values of the series to their number.

$$\overline{X} = \frac{x_1 + x_2 + \dots\dots\dots x_n}{n} = m$$

The standard deviation is expressed using the same unit of measurement as the values in the series considered and is a very accurate indicator of the spread of the series.

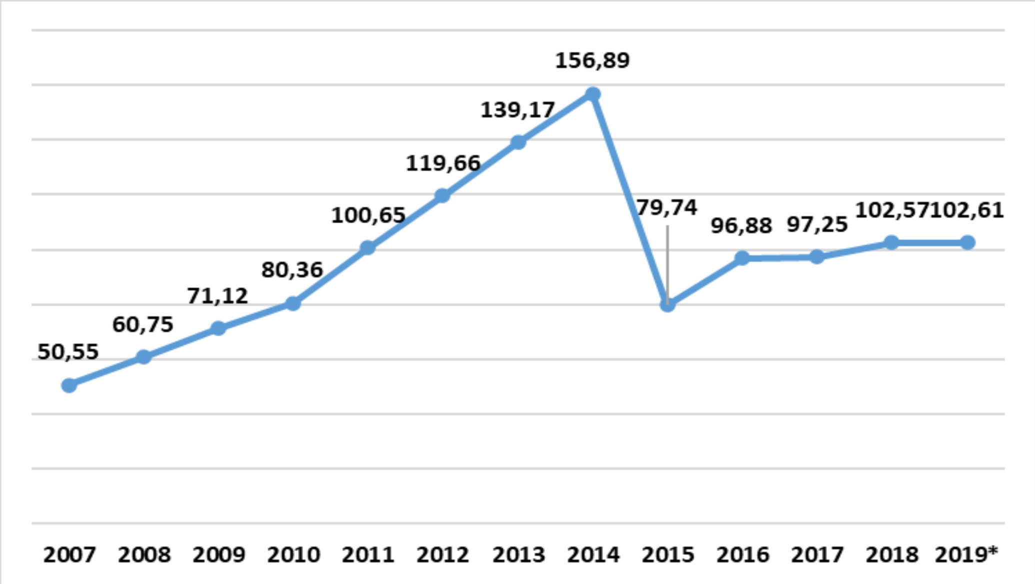
$$\sigma = \sqrt{D} \text{ sau } \sigma = \sqrt{\frac{(x_1 - \overline{X})^2 + (x_2 - \overline{X})^2 + \dots\dots + (x_n - \overline{X})^2}{n-1}}$$

The coefficient of variation represents the ratio between the standard deviation and the average, when the average is different from 0, and the expression is made in percentages.

$$C.V. = \frac{\sigma}{\overline{X}}$$

RESULTS AND DISCUSSIONS

Agriculture is often a high-risk activity. Crops can be destroyed due to extreme weather conditions, such as drought or floods, which leads to production and thus a reduction in farmers' incomes. Therefore, direct payments are meant to help farmers, being a safe source of income for them.



Source: APIA processed data 27.09.2020;

Figure 1. Evolution of the amount granted for the single area payment scheme in the period 2007-2019 (year of application) (euro / ha)

Analyzing the evolution of the amount granted under the single area payment scheme (S.A.P.S.), there is an increase in its value from 2007 to 2014, from 50.55 euro / ha to 156 euro / ha. The year 2014 puts an end to the first CAP program in which Romania participated, once it joined the European Union in 2007, together with Bulgaria. The current CAP program 2014-2020 promoted the reduction of farmers' dependence on subsidies, wanting to gradually reduce this support for them, so that in 2014-2020 the amount granted per ha was much lower (Fig. 1.).

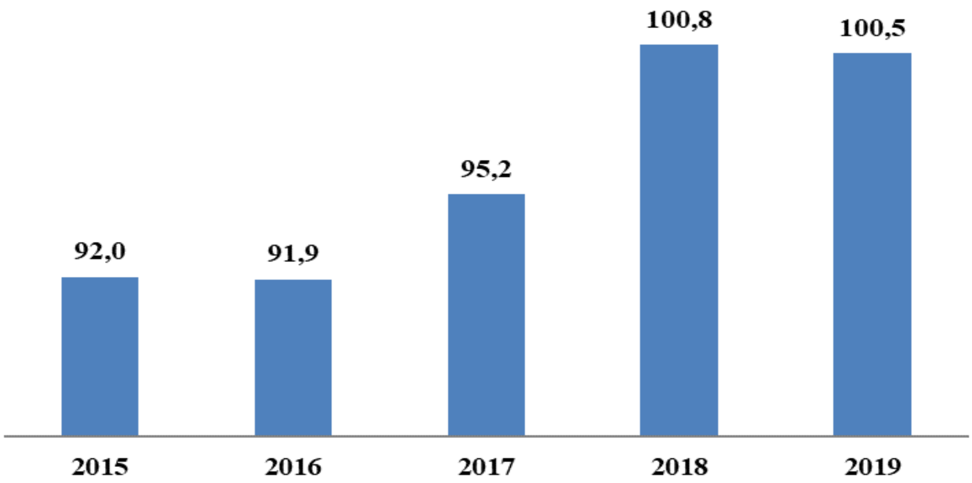
Table 1. Main statistical indicators related to the single area payment scheme in the period 2014-2019

Specification	Years					
	2014	2015	2016	2017	2018	2019
No. beneficiaries (thousands)	1012,3	875,0	843,4	830,3	815,7	794,6
Amount (thousand euros)	1354891,7	709225,2	869802,0	897729,7	957612,9	968865,9
Quantum (euro/ha)	156,89	79,74	96,88	97,25	102,57	102,6
Area for which payment was granted (thousand ha)	8635,9	8894,2	8978,1	9231,2	9336,2	9443,1
The size of the average holding that benefited from this support	8,5	10,2	10,6	11,1	11,4	11,9
The main statistical indicators	**Min**	**Max**	**Average**	**Annual rhythm**	**Standard deviation**	**C.V.**
	794,6	1012,3	861,9	-4,7	78,5	9,1
	709225,2	1354891,7	959687,9	-6,5	214906,7	22,4
	97,3	102,6	100,8	-8,1	3,1	3,1
	8635,9	9443,1	9086,5	1,8	304,0	3,3
	8,5	11,9	10,6	6,9	1,2	11,2

Source: APIA processed data 27.09.2020;

There is a decrease in the number of farmers who benefited from the single area payment scheme, which from 1.01 million beneficiaries, in 2014 there was a decrease of 21.5%, reaching in 2019 to 794, 6 thousand beneficiaries. Also, the annual rate has negative values of 4.7%. This can be explained by the measures that have been taken to reduce the fragmentation of agricultural holdings, both by direct payment measures and by measures related to investments in agriculture (National Rural Development Program), which have encouraged farms that took over other holdings (Table 1.).

It should be noted that by determining the average farm that benefited from this type of support, there is an increase, such as from 8.5 hectares in 2014 (the last year in which subsidies were granted through the 2007-2014 programming period) to 11.9 hectares in 2019 (Table 1.).

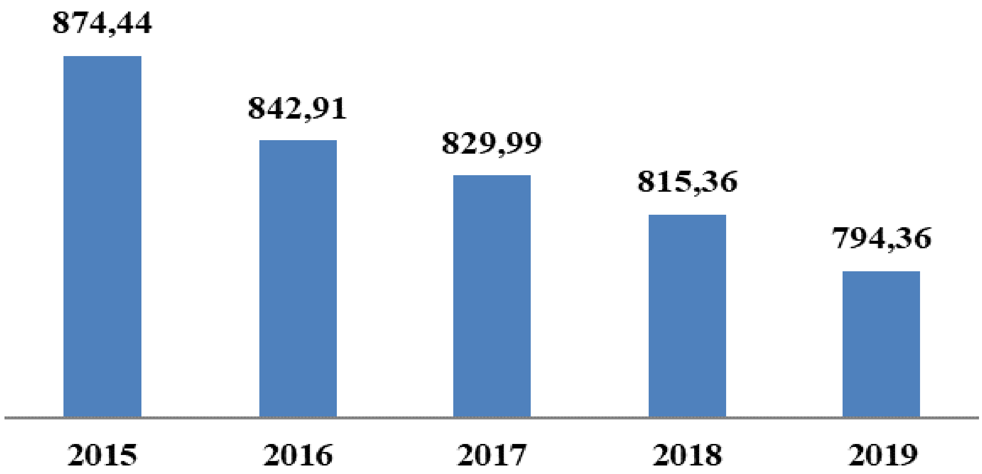


Source: APIA processed data 27.09.2020;

Figure 2. The amount allocated for the granting of the redistributive payment in the period 2015-2019

There is an upward trend in the amount allocated for the redistributive payment, so that in 2015 the total value allocated to the redistributive payment was 92 million euros, and in 2019 to be over 100 million euros (Figure 2.) .

Also, the number of farmers who benefited from the redistributive payment is decreasing from 874.44 thousand farmers in 2015, to 794.36 thousand farmers in 2019, representing a decrease of approximately 9% (Figure 3.).



Source: APIA processed data 27.09.2020;

Figure 3. Evolution of the number of farmers who benefited from the redistributive payment in the period 2015-2019

There is a slight difference in values between the number of farmers who benefited from SAPS and the number of farmers who benefited from the redistributive payment, so that in 2015 the difference between the two types of payments was 532 beneficiaries, and in 2019 of 190 beneficiaries. Starting from the premise that in case of a farm transfer made between two farmers, the redistributive payment will be granted for the total area resulting from the transfer, so in this situation this aspect can represent the number of transactions made between farmers regarding agricultural land.

Table 2. Main statistical indicators regarding the payment for young farmers in the period 2015-2019

Specification		Years				
		2015	2016	2017	2018	2019
No. beneficiaries (thousands)		45,512	45,738	46,668	58,864	59,238
Amount (thousand euros)		9480,742	11737,14	12878,2	17195,17	22238,06
Quantum (euro/ha)		19,93	22,87	24,31	25,84	31,25
Area for which payment was granted (thousand ha)		475,7	513,2	529,7	665,4	711,6
The size of the average holding that benefited from this support		10,45	11,22	11,35	11,30	12,01
The main statistical indicators	Min	Max	Average	Annual rhythm	Standard deviation	C.V.
	45,5	59,2	51,2	6,8	7,2	14,0
	9480,7	22238,1	14705,9	23,8	5059,3	34,4
	19,9	25,8	22,9	11,9	4,2	18,3
	475,7	711,6	579,1	10,6	103,1	17,8
	10,5	12,0	11,3	3,5	0,6	4,9

Source: APIA processed data 27.09.2020;

Regarding the number of beneficiaries of payments for young farmers, there is an increase in their number from 45.5 thousand beneficiaries to 59.2 thousand beneficiaries in 2019, representing an increase of 30%. Also, the annual rate has positive values of 6.8%, and the coefficient of variation has a value of 14% (Table 2.).

And in the case of the average farm that benefited from this support, there is a significant increase from 10.45 hectares in 2015 to 12.01 hectares in 2019, representing an increase of 14%. At the same time, the annual rate has a value of 3.5%, and the coefficient of variation has a value of 4.9%.

The share of beneficiaries of payments for young farmers out of the total number of farmers who benefited from SAPS shows significant increases from one year to another. Thus, at the level of 2019, their share of the total is 7.5%, compared to 2015, when their share was 5.2%. And in the case of the area for which support was granted for young farmers shows a significant increase, so that in 2019, their share of total SAPS beneficiaries, has a value of 7.5%, compared to 5.3% recorded in 2015 (Table 2.).

Table 3. Main statistical indicators regarding the payment for greening in the period 2015-2019

Specification		Years				
		2015	2016	2017	2018	2019
No. beneficiaries (thousands)		874,0	843,1	830,1	815,6	794,5
Amount (thousand euros)		508778,2	511958,9	527194,0	541576,8	558505,4
Quantum (euro/ha)		59,12	57,37	57,17	58,24	59,32
Area for which payment was granted (thousand ha)		8605,9	8923,8	9221,5	9299,1	9415,1
The size of the average holding that benefited from this support		9,85	10,58	11,11	11,40	11,85
The main statistical indicators	Min	Max	Average	Annual rhythm	Standard deviation	C.V.
	794,5	874,0	831,5	-2,4	29,9	3,6
	508778,2	558505,4	529602,6	2,4	20793,7	3,9
	57,2	59,3	58,2	0,1	1,0	1,7
	8605,9	9415,1	9093,1	2,3	327,4	3,6
	9,8	11,9	11,0	4,7	0,8	7,1

Source: APIA processed data 27.09.2020;

Regarding the number of beneficiaries who opted for the payment for greening in the period 2015-2019, there is a decreasing trend, so that from 874 thousand beneficiaries in 2015 to 794.5 thousand beneficiaries in 2019 (Table 3.). Although the amount allocated for this type of support tends to increase, and the amount also shows that the number of beneficiaries decreases, which can be determined by the fact that farmers do not find a market at an appropriate price for the crops they grow. choose for diversification.

CONCLUSIONS AND RECOMMENDATIONS

Analyzing these data on the number of beneficiaries, the amount allocated, the amount, the area for which the payment was granted and the average size of holdings according to the different types of direct payments granted through Pillar I, such as: single area payment scheme, redistributive payment , the payment for young farmers and the payment on greening, we can see that these types of payments have played an important role in the evolution of agriculture in Romania, so that most of them have fulfilled the role for which they were designed.

One of the main purposes for which these types of payments were introduced was to reduce the fragmentation of agricultural land, so that the result of these measures is reflected in the number of SAPS beneficiaries, which decreased, as well as the size of the average farm that benefited from this. support that tends to increase.

Therefore, an increase in the number of young farmers can be attributed to measures aimed at the transfer of holdings between generations, with the role of rejuvenating among generations of farmers, both through direct support for this category of farmers, as well as through the measures established for accessing European funds, in which young farmers are favored. The result of this measure can be seen by increasing the share of the number of young farmers in the total beneficiaries paid per area.

The amount allocated for the payment for greening tends to increase, and the amount also so that it is noted that the number of beneficiaries decreases, which can be determined by the fact that farmers have difficulties in the market at an appropriate price for the crops they grow. choose for diversification. Although this type of support encourages crop diversification, in order to protect arable land, so by providing crop rotation by cultivating legumes can ensure the necessary nitrogen from the soil.

These measures have seriously contributed to the development of Romanian agriculture, but these forms of support will have to continue in the new programming period, so that the effects are visible. At the same time, a form of support that should be implemented in the new programming period should target family farms.

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ANALYSIS OF SHEEP AND GOAT MILK PRODUCTION BY DEVELOPMENT REGIONS AND FORMS OF PROPERTY IN THE PERIOD 2010-2018

MANOLACHE ALEXANDRA MARINA[1]

Abstract: *This paper proposes the analysis of forms of ownership (total, private sector, individual farms), for the eight development regions for sheep and goat milk. This paper is based on the analysis of statistical data from a quantitative and qualitative point of view, highlighting the contribution of each development region and the evolution of sheep and goat milk production in the period 2010-2018. At the end, a comparison will be made with the level of production depending on the change of ownership structure, in order to determine the correct sample according to its ownership form. Given the importance of milk both as a product in human nutrition and the role it plays in the economies of EU member states, the milk and dairy market has been and is one of the common markets, which has been dealt with extensively by regulations. it could become a globally competitive market.*

Keywords: *milk, evolution, production, sheep and goat*

JEL classification: *E20, Q10*

INTRODUCTION

Given the importance of milk both as a product in human nutrition and the role it plays in the economies of EU member states, the market for milk and dairy products has been and is one of the common markets, which has been subject to numerous regulations, for to be able to become a competitive market worldwide. The milk sector is the leading sector of European agricultural production, in terms of value representing approximately 14% of its value.

The dairy industry in the European Union is famous for the quality of its products, not only for its famous cheese but also for a wide range of yoghurts, cream and ice cream.

The European Union is a major player in the world dairy market, being the leading exporter for many dairy products, especially cheese. Internationally, the "milk and dairy products" sector is probably one of the most distorted agricultural sectors. Many developed countries provide subsidies to producers, which encourage overproduction. In addition, tariff barriers are high in both developed and developing countries to protect competition from the dairy sector.

MATERIAL AND METHODS

This paper analyzes the forms of ownership (total, private sector, individual farms), for the eight development regions for sheep and goat milk. With the help of statistical data, from a quantitative and qualitative point of view, we highlight the evolution of sheep and goat milk production, but also the identification of the contribution of each development region in the analysis period. At the end of this paper, a comparison was made with the level of production depending on the change of ownership structure, in order to identify the correct sample according to its ownership.

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RESULTS AND DISCUSSIONS

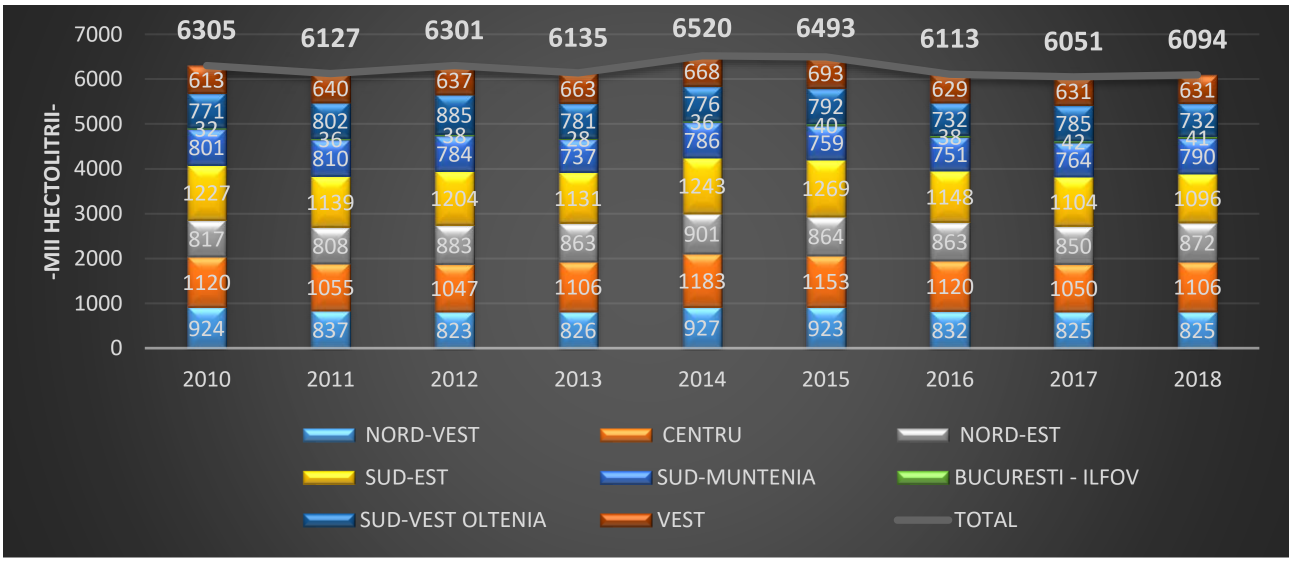
Table 1 . Evolution of sheep and goat milk production by development regions and forms of ownership

CATEGORII DE PRODUSE	FORME DE PROPRIETATE	REGIUNI	U.M.	2010	2011	2012	2013	2014	2015	2016	2017	2018
LAPTE OAIE SI CAPRA	Total	NORD-VEST	Mii hectolitri	924	837	823	826	927	923	832	825	825
		CENTRU		1120	1055	1047	1106	1183	1153	1120	1050	1106
		NORD-EST		817	808	883	863	901	864	863	850	872
		SUD-EST		1227	1139	1204	1131	1243	1269	1148	1104	1096
		SUD-MUNTENIA		801	810	784	737	786	759	751	764	790
		BUCURESTI - ILFOV		32	36	38	28	36	40	38	42	41
		SUD-VEST OLTENIA		771	802	885	781	776	792	732	785	732
		VEST		613	640	637	663	668	693	629	631	631
		TOTAL		**6305**	**6127**	**6301**	**6135**	**6520**	**6493**	**6113**	**6051**	**6094**
	Sector Privat	NORD-VEST	Mii hectolitri	924	836	823	824	926	922	832	825	825
		CENTRU		1120	1054	1047	1105	1183	1153	1119	1050	1106
		NORD-EST		816	807	880	862	898	861	861	848	870
		SUD-EST		1226	1137	1204	1130	1243	1268	1147	1103	1096
		SUD-MUNTENIA		801	810	783	737	786	758	751	764	790
		BUCURESTI - ILFOV		32	36	38	28	35	40	38	42	41
		SUD-VEST OLTENIA		771	802	885	781	776	792	731	785	732
		VEST		613	640	637	663	668	693	629	630	630
		TOTAL		**6303**	**6122**	**6297**	**6130**	**6515**	**6487**	**6108**	**6047**	**6089**
	Exploatatii agricole individuale	NORD-VEST	Mii hectolitri	923	832	812	813	911	910	822	813	820
		CENTRU		1116	1041	1043	1099	1172	1144	1105	1037	1093
		NORD-EST		812	788	858	842	881	845	844	830	847
		SUD-EST		1217	1123	1192	1121	1226	1255	1132	1090	1083
		SUD-MUNTENIA		792	800	777	730	781	751	745	756	785
		BUCURESTI - ILFOV		31	36	38	28	35	40	38	42	41
		SUD-VEST OLTENIA		767	799	881	780	775	790	730	784	731
		VEST		611	632	634	660	666	690	626	627	628
		TOTAL		**6269**	**6051**	**6235**	**6073**	**6447**	**6425**	**6042**	**5979**	**6027**

Source: INS

From the table above, it appears that the South-East development region, on total form of ownership, registered the highest average of 1173.4 (thousand hectoliters), followed by the form of private sector ownership, also in the region The south-eastern average was 1172.7 (thousand hectoliters) and the rate of this region registered a minus of 1.40%, the lowest average is in the Bucharest-Ilfov region of 36.8 (thousand hectoliters). Analyzing the individual agricultural holdings, in the analysis period 2010-2018, also in the South-East development region, an average of 1159.9 (thousand hectoliters) was registered, and the rate having a value of minus 1.45%.

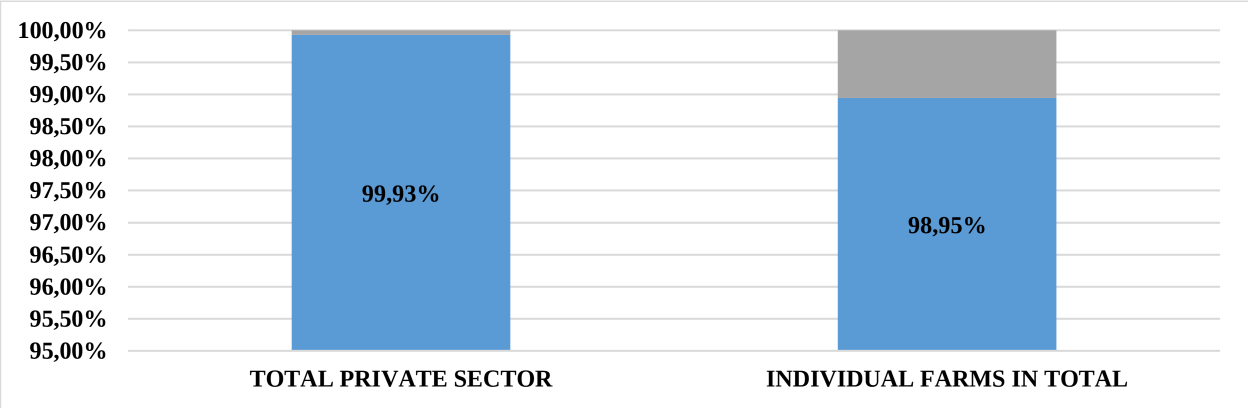
Figure 1. Dynamics of sheep and goat milk production regardless of the form of ownership



Source: INS, own calculations

In Figure 1, the dynamics of sheep and goat milk production show that in 2014, the South-East region contributed the most in total ownership, with the highest average production of 1243 (thousand hectoliters), the rate of total ownership is (-0.42%) and the lowest production is recorded in 2017, in the region of Bucharest-Ilfov 42 (thousand hectoliters), here being found the highest rate of 3.15 %.

Figure 2. Share of average milk production by ownership



Source: INS, own calculations

Figure 2, of the total milk production, in the private sector in total is obtained 99.93% of it, and if we analyze the individual farms in total, they record a share of sheep and goat milk production of the total production of 98 , 95% (average from the analysis period 2010-2018).

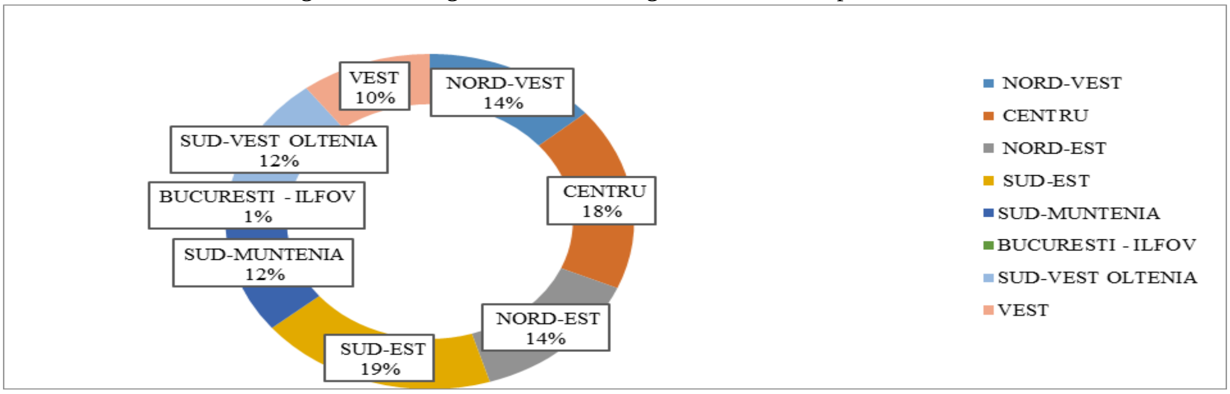
Table 2. Average share of regions, for the three forms of ownership

SPECIE	REGIUNE	FORME DE PROPRIETATE	2010	2011	2012	2013	2014	2015	2016	2017
LAPTE OAIE SI CAPRA	Regiunea NORD-VEST	Total	14.7%	13.7%	13.1%	13.5%	14.2%	14.2%	13.6%	13.6%
		Sector privat	14.7%	13.7%	13.1%	13.4%	14.2%	14.2%	13.6%	13.6%
		Expl. Individuale	14.7%	13.7%	13.0%	13.4%	14.1%	14.2%	13.6%	13.6%
	Regiunea CENTRU	Total	17.8%	17.2%	16.6%	18.0%	18.1%	17.8%	18.3%	17.4%
		Sector privat	17.8%	17.2%	16.6%	18.0%	18.2%	17.8%	18.3%	17.4%
		Expl. Individuale	17.8%	17.2%	16.7%	18.1%	18.2%	17.8%	18.3%	17.3%
	Regiunea NORD-EST	Total	13.0%	13.2%	14.0%	14.1%	13.8%	13.3%	14.1%	14.0%
		Sector privat	12.9%	13.2%	14.0%	14.1%	13.8%	13.3%	14.1%	14.0%
		Expl. Individuale	13.0%	13.0%	13.8%	13.9%	13.7%	13.2%	14.0%	13.9%
	Regiunea SUD-EST	Total	19.5%	18.6%	19.1%	18.4%	19.1%	19.5%	18.8%	18.2%
		Sector privat	19.5%	18.6%	19.1%	18.4%	19.1%	19.5%	18.8%	18.2%
		Expl. Individuale	19.4%	18.6%	19.1%	18.5%	19.0%	19.5%	18.7%	18.2%
	Regiunea SUD-MUNTENIA	Total	12.7%	13.2%	12.4%	12.0%	12.1%	11.7%	12.3%	12.6%
		Sector privat	12.7%	13.2%	12.4%	12.0%	12.1%	11.7%	12.3%	12.6%
		Expl. Individuale	12.6%	13.2%	12.5%	12.0%	12.1%	11.7%	12.3%	12.6%
	Regiunea BUCURESTI - ILFOV	Total	0.5%	0.6%	0.6%	0.5%	0.6%	0.6%	0.6%	0.7%
		Sector privat	0.5%	0.6%	0.6%	0.5%	0.5%	0.6%	0.6%	0.7%
		Expl. Individuale	0.5%	0.6%	0.6%	0.5%	0.5%	0.6%	0.6%	0.7%
	Regiunea SUD-VEST OLTENIA	Total	12.2%	13.1%	14.0%	12.7%	11.9%	12.2%	12.0%	13.0%
		Sector privat	12.2%	13.1%	14.1%	12.7%	11.9%	12.2%	12.0%	13.0%
		Expl. Individuale	12.2%	13.2%	14.1%	12.8%	12.0%	12.3%	12.1%	13.1%
	Regiunea VEST	Total	9.7%	10.4%	10.1%	10.8%	10.2%	10.7%	10.3%	10.4%
		Sector privat	9.7%	10.5%	10.1%	10.8%	10.3%	10.7%	10.3%	10.4%
		Expl. Individuale	9.7%	10.4%	10.2%	10.9%	10.3%	10.7%	10.4%	10.5%

Source: INS, own calculations

In Table 2, for the three forms of ownership (Total, private sector, individual holdings), we note that of the entire analysis period 2010-2018, the South-East region recorded the highest shares, and the lowest share was recorded. in the Bucharest-Ilfov region.

Figure 3. Average share of each region in total milk production

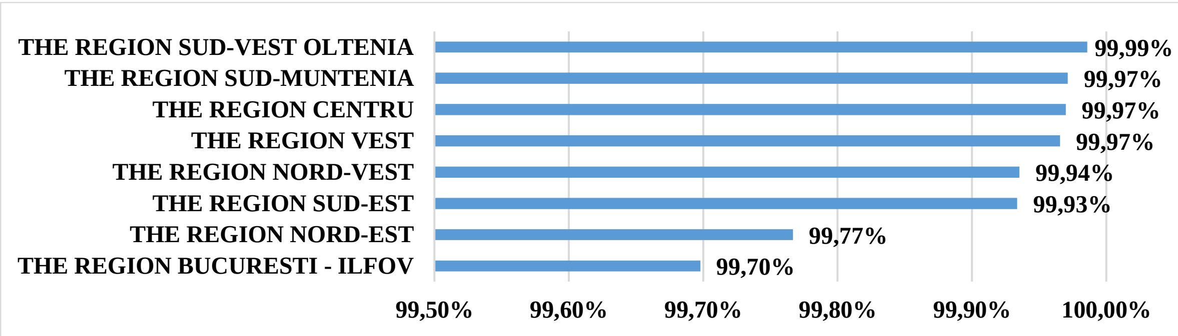


Source: INS, own calculations

In Figure 3, in total regardless of the form of ownership, milk production is structured as follows by development regions:

• South-East region, with the highest share of (19%), Center region (18%), North-West region (14%), North-East region (14%), South-Muntenia region (12%) , the South-West Oltenia region (12%), followed by the West region (10%), and the lowest share was noticed in the Bucharest-Ilfov region (1%).

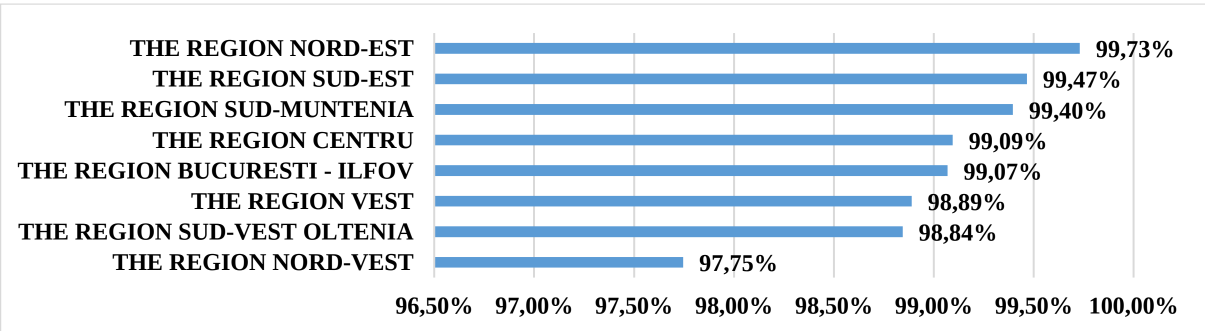
Figure 4. Share of the total private sector by development regions in sheep and goat milk production



Source: INS, own calculations

Figure 4, to the share of the private sector in total by development regions in sheep and goat milk production, it is noted that in the South-West Oltenia region was registered the highest share of 99.99%, and the lowest share was in the Bucharest-Ilfov region of 99.70%.

Figure 5. Share of individual farms in total milk production, by development regions



Source: INS, own calculations

Figure 5, the share of individual farms in total milk production, by development regions, shows that the North-East region has the highest share of 99.73%, and the North-West region has the lowest share (97.75%) of the total milk production for the eight development regions analyzed.

CONCLUSIONS

Of the eight development regions analyzed, for the three forms of ownership, from the analysis period 2010-2018, from the comparison made at the production level depending on the change of ownership structure, the correct sample is structured as follows: (Total, sector private, individual holdings).

Sheep's and goat's milk is a valuable product, used in our country for high quality cheese preparations, much appreciated by consumers. Compared to cow's milk, it has a higher nutritional value due to its chemical composition: it contains 5-6% protein and 6-8% fat. In Europe, the countries that consume the most sheep's milk are: France, Greece, Bulgaria, Romania.

World milk production has not kept pace with world population growth. The decline in world per capita milk production is the result of lower production in developed countries, while per capita milk production increased slightly in developing countries over the same period.

Unlike developed countries, where milk production tends to increase as a result of increasing per capita yields, in developing countries the increase in production is mainly due to the increase in the number of dairy cows and the number of farms. and not productivity growth

Decrease in cow's milk consumption in the European Union

Various campaigns against the consumption of animal products, including dairy products, have put pressure on European consumers, who have largely given up on these products, citing health, ethical or environmental reasons. Lactose intolerance has also been considered among the increasingly serious concerns affecting consumption.

According to official estimates, in the last ten years, the consumption of cow's milk per capita has decreased by almost 5 liters. This decline was only partially offset by very large purchases of alternative beverages, such as soy (+ 0.8 kg / capita in 10 years). In the next decade, the downward trend is expected to continue at the same pace, reaching in 2026 an annual consumption of 53.8 kg of dairy products per capita. In contrast, there is a trend towards a stabilization of yogurt consumption, while cream consumption should continue to increase slowly, although it is not enough to compensate for the decrease in milk consumption, according to analysts in the field.

In conclusion, although dairy herds have decreased, European farms are more productive due to investments in genetics and animal feeding schemes. The EU milk market is currently in a fairly favorable situation. The average price of milk in the EU in January 2014 was 40.03 c / kg, ie 17% higher than in January 2013, representing the highest average price of milk ever recorded (statistics since 1977).

This upward trend has also been observed with regard to the price of dairy products, although the price of butter has been under some pressure since the beginning of 2014. So far, strong global demand has helped to keep prices firm. However, a price adjustment should not be ruled out, given the increase in milk production noted by the main exporters.

Medium-term forecasts for milk and milk products are favorable for both the world market and the internal market. Global demand remains dynamic, especially in emerging economies. Despite the slowdown in economic growth, dairy products play an important role in people's diets, given the higher proportion of middle-class households.

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STUDY REGARDING THE SIZE AND PROFILE OF FARM HOLDINGS

BRATULESCU (MANOLACHE) ALEXANDRA MARINA[1]

Abstract: *Agricultural land and other agricultural production resources are distributed on farms of different types and shapes. They also differ in the size of the resources held, with special reference to the area and / or the number of animals. The production results depend, of course, on the volume of resources, as well as on the way in which they are valued, although their low degree of concentration, in the case of family farms, makes the exploitation process more difficult. This paper is based on the analysis of statistical data from a quantitative and qualitative point of view, highlighting the determination of the degree of uniformity, the number of agricultural holdings and their size at regional level.*

Keywords: *agricultural holdings, size, area, regional*

JEL classification: *A10,Q10*

INTRODUCTION

Agricultural land and other agricultural production resources are distributed on farms of different types and shapes. They also differ by the size of the resources held, with special reference to the area and / or the number of animals. The production results depend, of course, on the volume of resources, as well as on the way in which they are valued, although the low degree of their concentration, in the case of family farms, complicates the exploitation process.

The approach, from both angles, leads to the use of two concepts: the size (physical) and the size (economic dimension) of agricultural holdings. The second concept tends to become dominant in the conditions of intensifying agriculture and achieving integration at the level of some agricultural holdings, although the approach of their dimensional conditions, from different countries, is found in the literature.

The concept of "professional" exploitation is used in the European Union. A professional holding is defined as a holding large enough to provide a main activity to the operator and a sufficient income level to meet the needs of his family.

Size includes the relationship to a number of elements:

• the area or number of animals raised (ie the physical size of the holding);

• the level of production intensity (some branches and crops are more intensive due to their specificity, giving higher productions per hectare; the intensity can be amplified by capital investments);

• the management exercised in each holding, taking into account its propagated effects on the economic performance of any unit;

• the way of managing the production factors, with reference, especially, to their allocation and combination;

• the level of prices of agricultural and agri-food products, which determines the size of turnover;

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• integration of agricultural activities with processing; by processing some agricultural products, value is added, which increases the proportions of the size.

MATERIAL AND METHODS

In this paper we want to analyze the size and profile of agricultural holdings in Romania. Next, the physical dimension of agricultural holdings in our country was analyzed, both from a structural point of view, by development regions, and from the point of view of dynamics.

Thus, with the help of data provided by the National Institute of Statistics through the latest Structural Surveys in Agriculture (ASA 2013 and ASA 2016) it was possible to perform this comparative analysis between development regions and between farms over the 3 years.

RESULTS AND DISCUSSIONS

Table 1. Agricultural area by legal status of agricultural holdings by development regions in 2013 (hectares)

Development regions	Individual farms	Authorized natural persons, individual enterprises, family enterprises	Total
NORTHWEST	1273990.49	64091.37	**1338081.86**
CENTER	1097505.85	32346.21	**1129852.06**
NORTH EAST	1229786.36	70193.58	**1299979.94**
SOUTH EAST	808845.79	167401.76	**976247.55**
BUCHAREST-ILFOV	22147.1	1213.31	**23360.41**
SOUTH MOUNTAIN	913283.88	112402.72	**1025686.6**
SOUTH - WEST OLTENIA	1141930.68	33051.67	**1174982.35**
WEST	778933.14	47097.54	**826030.68**
TOTAL	6746625.44	524381.94	**7271007.38**

Source: Structural Purchase in Agriculture (A.S.A) 2013

The data presented in table 1 show that out of the total agricultural area of Romania in 2013 of 7,271 thousand hectares, individual agricultural holdings had a share of 92.8%, the difference of 7.2% representing the area related to PFAs, enterprises individual and family.

By development regions, the highest shares for individual farms belonged to the South-West and Central regions, respectively 97, 2% and 97.1%, with the lowest shares being in the South-Muntgenia regions (89%) and Southeast (82.8%).

Table 2. Share of agricultural holdings by development regions (%)

Development regions	Individual farms	Authorized natural persons, individual enterprises, family enterprises	Total
NORTHWEST	18.9%	12.2%	**18.4%**
CENTER	16.3%	6.2%	**15.5%**
NORTH EAST	18.2%	13.4%	**17.9%**
SOUTH EAST	12.0%	31.9%	**13.4%**
BUCHAREST-ILFOV	0.3%	0.2%	**0.3%**
SOUTH MOUNTAIN	13.5%	21.4%	**14.1%**
SOUTH - WEST OLTENIA	16.9%	6.3%	**16.2%**
WEST	11.5%	9.0%	**11.4%**
TOTAL	100	100	**100**

Source: Structural Purchase in Agriculture (A.S.A) 2013

Regarding the share of areas occupied by the categories of agricultural holdings, we note that in 2013 the highest shares of individual agricultural holdings were reported in the North West and North East regions (18.9% and 18.2%), the most low shares being registered in the regions.e West and Bucharest-Ilfov (11.5% and 0.3%).

If we refer to the agricultural representations represented by PFAs, individual and family enterprises, on the first positions were located the South-East and South-Muntenia regions (with weights of 31.9% and 21.4%), and in the last Centru and Bucharest-Ilfov regional positions (with shares of 6.2% and 0.2%).

Table 3. Agricultural area by legal status of agricultural holdings by development regions in 2016 - hectares

Development regions	Individual farms	Authorized natural persons, individual enterprises, family enterprises	Total
NORTHWEST	1158429.61	86247.54	**1244677.15**
CENTER	952690.09	38765.44	**991455.53**
NORTH EAST	1140868.47	65001.94	**1205870.41**
SOUTH EAST	683249.5	211031.3	**894280.8**
BUCHAREST-ILFOV	20679.96	32.3	**20712.26**
SOUTH MOUNTAIN	782217.43	107371.58	**889589.01**
SOUTH - WEST OLTENIA	934394.87	33803.9	**968198.77**
WEST	666148.67	45323.49	**711472.16**
TOTAL	**6338678.6**	**587577.49**	**6926256.09**

Source: Structural Purchase in Agriculture (A.S.A) 2016

Compared to the situation in 2013, we note that in 2016, at a total agricultural area of 6,926 thousand hectares (lower by 4.8%), individual farms were 91.5% (a decrease of 1.3%) , committing at the same time to the area owned by PFA, individual enterprises and family businesses. The development regions of Bucharest-Ilfov and South-West Oltenia registered the highest shares for individual agricultural holdings (99.8% and 96.5%), at the opposite pole being the same regions South Muntenia and South East (87.9 % and South East 76.4%).

Table 4. Share of agricultural holdings by development regions (%)

Development regions	Individual farms	Authorized natural persons, individual enterprises, family enterprises	Total
NORTHWEST	18.3%	14.7%	18.0%
CENTER	15.0%	6.6%	14.3%
NORTH EAST	18.0%	11.1%	17.4%
SOUTH EAST	10.8%	35.9%	12.9%
BUCHAREST-ILFOV	0.3%	0.01%	0.3%
SOUTH MOUNTAIN	12.3%	18.3%	12.8%
SOUTH - WEST OLTENIA	14.7%	5.8%	14.0%
WEST	10.5%	7.7%	10.3%
TOTAL	**100**	**100**	100

Source: Structural Purchase in Agriculture (A.S.A) 2016

At the level of 2016, for individual agricultural holdings both the first and last places were occupied by the same development regions mentioned in 2013. Regarding PFAs, as well as individual and family enterprises, the highest shares were recorded. in the South East and South Muntenia regions (35.9% and 18.3%), and the last two positions belonged to the South West Oltenia and Bucharest-Ilfov development regions (5.8% and 0.01%).

Table 5. Agricultural holdings, utilized agricultural area and utilized agricultural area returned on average to one agricultural holding, development regions 2013

Development regions	Total agricultural holdings (number)	Agricultural holdings that used agricultural area (number)	Agricultural area used (hectares)	Agricultural area used on a holding (hectares)
NORTHWEST	499857	497714	1783184	3.57
CENTER	358471	350857	1693990	4.73
NORTH EAST	754533	742127	1937081	2.57
SOUTH EAST	433043	424478	2092496	4.83
BUCHAREST-ILFOV	25316	23757	75572.66	2.99
SOUTH MOUNTAIN	753585	732890	2250949	2.99
SOUTH - WEST OLTENIA	557850	548220	1574195	2.82
WEST	247001	243722	1648382	6.67
TOTAL	**3629656**	**3563765**	**13055850**	**3.6**

Source: Structural Purchase in Agriculture (A.S.A) 2013

Of the 3,630 thousand agricultural holdings in the country in 2013, the North East and South Muntenia development regions had the highest shares (20.8% and 20.7%), the lowest percentages being reported in the regions West and Bucharest- Ilfov (6.8% and 0.7%).

The situation is similar in 2016, with small differences between the regions presented above and the fact that the total number of farms is lower by 5.7% compared to 2013. Regarding the agricultural holdings that used the agricultural area, it is noted that In the two years of analysis, their number, expressed as a percentage, is very close to that of the total holdings, thus maintaining the positions held by the different development regions.

Table 6. Agricultural holdings, utilized agricultural area and used agricultural area that returned on average on an agricultural holding, development regions 2016

Development regions	Total agricultural holdings (number)	Agricultural holdings that used agricultural area (number)	Agricultural area used (hectares)	Agricultural area used on a holding (hectares)
NORTHWEST	478490	475485	1783215	3.73
CENTER	330953	323388	1512476	4.57
NORTH EAST	720242	708442	1909254	2.65
SOUTH EAST	410215	394361	2064806	5.03
BUCHAREST-ILFOV	21022	20121	64277.05	3.06
SOUTH MOUNTAIN	694664	669044	2114709	3.04
SOUTH - WEST OLTENIA	539545	528861	1479931	2.74
WEST	226895	222483	1573869	6.94
TOTAL	**3422026**	**3342185**	**12502535**	**3.65**

Source: Structural Purchase in Agriculture (A.S.A) 2016

From the analysis of the agricultural area used, it results that in 2013 and 2016, the South-Muntenia and South-East development regions occupied the first positions (by 17.3% - 16.9% and 16% - 16.5%) South-West Oltenia and Bucharest-Ilfov, standing out with the smallest areas in the country (12% - 11.8% and 0.6% - 0.5%).

A reference indicator in the field, the agricultural area used on a farm registered in Romania an average of 3.6 - 3.65 hectares in the two years of analysis, highlighting the West and Center development regions (6.67-6, 97 hectares and 4.73-4.57 hectares), the smallest areas being registered in the North-East and South-West Oltenia regions (2.57-2.65 hectares and 2.82-2.74 hectares).

CONCLUSION

The size of an agricultural holding is mainly represented by the land area or the number of animals kept. It is expressed in physical quantities (hectares, animal heads). In a broader sense, the size is also represented by the technical apparatus of production and the labor force used. From an economic point of view, it is of some size, able to provide conditions for the development of other existing resources and a certain level of income. It is unanimously accepted that a larger size favors an increase in the use of labor, fixed and working capital, etc., having, in the conditions of commercial agriculture, direct and beneficial consequences on the economic and social viability of farms. farm.

The concept of "professional" exploitation is used in the European Union. A professional holding is defined as a holding large enough to provide a main activity to the operator and a sufficient income level to meet the needs of his family.

The issue of the size of agricultural units is an element of "structural policy", and will retain the attention and concerns of agricultural policy makers, producers, various entrepreneurs who invest in agricultural business, and is related to the transition to a practice of oriented agriculture. moreover, to the market.

Even if we estimate the units according to result indicators, the "field of production" of each cannot be neglected, given the influence it has on their absolute size. It is true, however, that under the mentioned conditions - intensification and integration at the unit level - the magnitude of the results becomes, for the most part, the effect of such processes. In view of this, it appears natural that the size should be regarded as specific to the holding directly producing agricultural (not agri-food) products or, as the case may be, to the subdivisions of an undertaking.

The dimensional structures in our agriculture vary depending on the type of farm and even its shape. After the application of the mentioned law, changes took place not only regarding the type of holdings, but also the size of those that continued to exist, in one form or another, and the newly constituted ones present various dimensional characteristics.

If we refer to joint-stock agricultural companies, the known conditions in which former state-owned agricultural enterprises arose and operated (see ownership), which allowed frequent roundings and disassemblies and, implicitly, changes in size, led to the formation of units and subunits with different areas and, respectively, herds of animals, but of large scale, although there were, from this point of view, more or less significant differences between them.

Among the factors that acted, in that period, on their size, we mention: profile and specialization; natural-economic area; the production technology practiced; the level of technical endowment and the efficiency of the technical means, etc.

Thus, the size of enterprises and farms where large crops (cereals, technical plants, etc.) were practiced was larger than that found in the case of the same units and subunits in fruit, viticulture or vegetable cultivation, mainly due to the different level of intensity that , in the latter case, it greatly amplifies the proportions of the production activity, its inclusion in the managerial process being more difficult or impossible in the conditions of large dimensions, but also the influence of other factors, such as, for example, lower degree of mechanization. , higher consumption of manual labor in the mentioned branches.

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GENERATIONAL RENEWAL IN AGRICULTURE - BIBLIOMETRIC ANALYSIS

BĂDAN (VOICILĂ) DANIELA NICOLETA[1]

Abstract: *In recent decades, the number of young farmers has declined in most developed countries. This issue has been debated and recognized by scientists and policy makers. Despite all the support measures implemented at European level and abroad, young farmers continue to face barriers that prevent both the establishment and consolidation of the agricultural holdings taken over. All these existing policy support measures for young farmers are seen as triggers and determinants in the process of renewing generations of farmers. The main purpose of this study is to examine the existing situation of research conducted at European level and outside its borders on the generational renewal of farmers. During the paper, a bibliometric analysis of the research papers registered in the Web of Science database was performed, starting from the previously proposed topic. The analysis software used was VOSviewer, thus creating a descriptive part of the stored information, presenting an overview of the proposed research topic by viewing the connections created. This study reveals that this topic has been comprehensively studied in recent years in various fields.*

Keywords: *generational renewal, young farmers, bibliometric analysis*

Jel Classification: *Q01, Q18*

INTRODUCTION

Generational renewal in agriculture is a continuing concern for decision-makers in the European Union, with research increasing over the last decade but not leading to an efficient and satisfactory outcome for all Member States. This concern for "generational renewal" means the successive retirement of older farmers and their replacement with young farmers who have a vision for the future and the development of farms, this action being considered necessary and essential for the progress of the agricultural sector. (Rovny, 2016).

The need for a non-flow of young farmers in European agriculture was also discussed by Zagata and Sutherland (2015) 2, in agriculture if production efficiency has increased, it will lead to economic development. A number of studies agree with this statement that shows that there is a link between young farmers and higher productivity (efficiency) (Howley et al., 2012).It was found that there is a link between young farmers and the increase of environmental measures on the farm (farm). Siebert et al. (2006) state that young farmers are better educated and tend to apply agro-ecological conditions at farm level. Analyzing the European reports, within the European Union it can be seen that the number of older farmers is higher than that of young farmers, this fact can be attributed to general societal trends. Hennessy and Rehman, (2007), argue that entry into the agricultural sector is often the result of the transfer of land by a relative, leading to the generational transfer of the farm. Lobley et al. (2010) state that without generational renewal "the risk is that the cornerstone of agriculture, businesses in these countries will not be able to meet national expectations and global expectations" (p. 60) with serious implications for the sector as a whole.

Family farms have a high percentage in European Union agriculture, and intra-family succession is the most common type of generational renewal. Generational renewal is a broader concept that is being debated both at European and global level.

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MATERIAL AND METHOD

In order to examine the current situation of research carried out at European level and outside its borders, regarding the generational renewal of farmers, a bibliometric analysis of the research papers recorded on this topic was performed.

Bibliometrics is the statistical analysis of written publications (books or articles). It is used to obtain quantitative analyzes of the academic literature [3]. It is a commonly used method to identify development in a particular field [4, 13].

The data from the literature used in this study were downloaded from the Web of Science with the theme of the proposed topic, the renewal of generations of farmers. To define the search, some expressions / words have been established that characterize the proposed topic such as: farm succession, young farmers, renewal generation, which are found in the topic (title, abstract, author keywords and Plus keywords) in the time interval 2000- 2020 (November). A total of 288 works met the selection criteria.

An essential procedure in bibliometrics is data mapping. This map can represent the situation and the state of development [1]. There is a lot of software for bibliometric analysis. The software used for the analysis is VOSviewer. Eck and Waltman are the ones who started the development of this free software, which has a very function strong analysis of co-occurrence and of co-citations [10].

The paper presents annual trends, top journals, keyword distribution, highly cited articles, co-author status and the most influential magazines and authors.

RESULTS AND DISCUSSIONS

Taking into account the database generated after meeting the selection criteria imposed on the Web of Science, it was found that analyzing by type of document, the most common type of document is the article (215), representing 74.65% of all publications. In second place is the revised works (68), with a proportion of 23.31%. There are also other types of documents, including Reviews (8), Early Access Papers (3), Book Review (2), Editorial Material (2). In table no.1 you can see the number of records and the proportions of different types of documents.

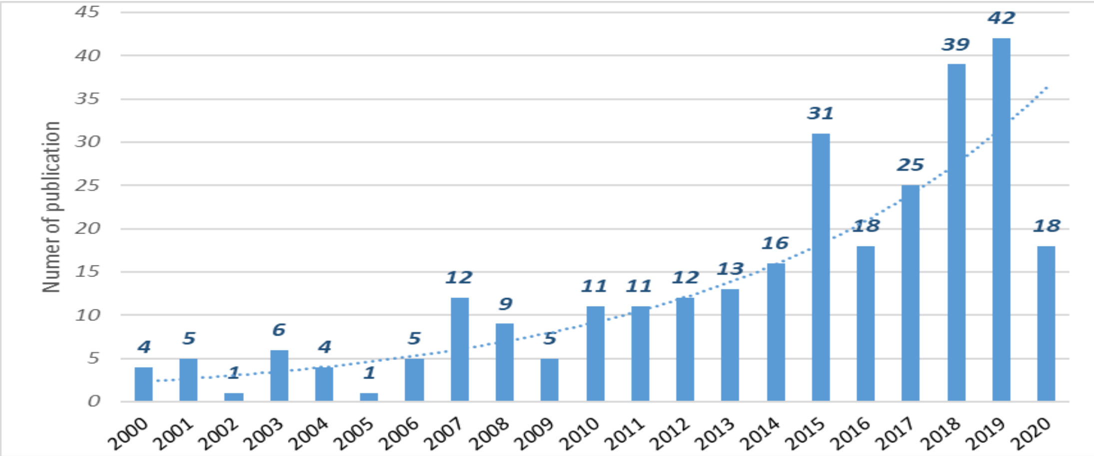
Table 1. Number of document records by type

Type of documents	Record	% from total
Article	215	74,65%
Proceedings paper	68	23,61%
Review	8	2,78%
Early access	3	1,04%
Book review	2	0,69%
Editorial material	2	0,69%
Correction	1	0,35%
Meeting abstract	1	0,35%
Retractes publication	1	0,35%
Total	288	100,00%

Source: data processed from the Web of Science database

Figure no. 1 shows the annual trend of publications related to the subject studied, the renewal of generations of farmers, in the period 2000-2020 (November). In the first 6 years after 2000, the number of publications was less than 6, the growth trend being registered since 2007, when the interest and concern towards this subject increased, namely the decreasing tendency of the rural population, the migration of young people to its urban environment is accentuated but also the shortage of workers in the agricultural sector. After 2010, more and more researchers started researching in this field. This has led to a jump in the number of publications, to a maximum of 42 in 2019.

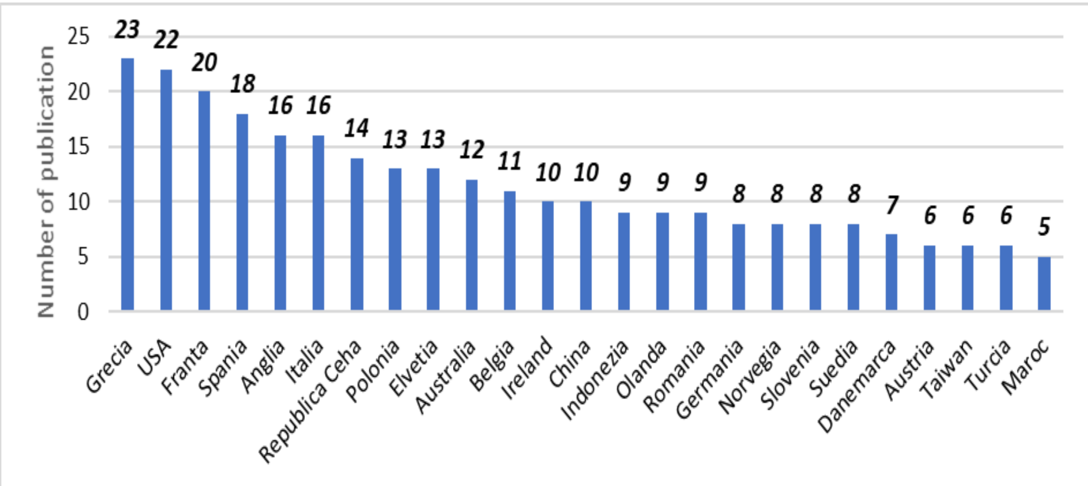
Figure 1. The annual trends related publications.



Source: data processed from the Web of Science database

Analyzing the research works in terms of publications belonging to a country, it was observed that during the period 200-2020 (November) the country with the largest number of publications was Greece, with 23 publications, followed by the USA with 22 publications, France and Spain with 20 publications and 18 publications, respectively. The countries with the most publications are those in Europe, this topic on generational exchange but also the concern for the future of agriculture being two of the main concerns of European researchers, but also of the U.E. On the last place is Morocco with 5 publications and Turkey with 6 publications.

Figure 2. Evolution of publications by country



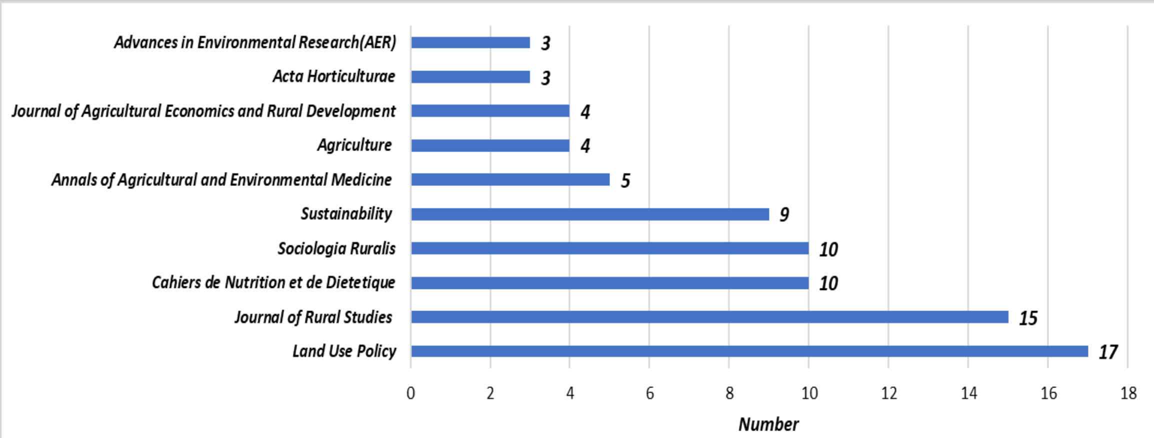
Source: data processed from the Web of Science database

Analyzing the distribution of works according to the journals in which they are published, the 288 publications were published in 153 specialized journals.

No more than 2 papers were published in over 137 journals, representing over 87.58% of the total journals. In the first top 10 journals were published 80 research papers, representing a share of 27.7% of the total.

The Journal of Land Use Policy recorded the largest number of publications, a total of 17 papers, followed by the Journal of Rural Studies with 15 papers. In the figure below (fig no.3) are found the top 10 Journals that recorded a greater number of 3 published works.

Figure 3. The top 10 journals -related publications

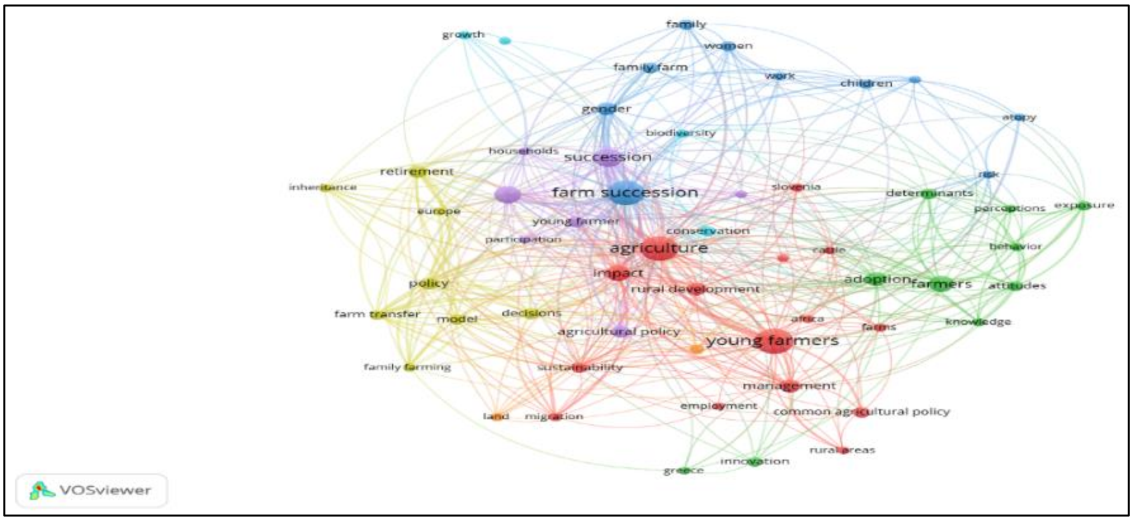


Source: data processed from the Web of Science database

Next, the content of the papers was studied by analyzing the distribution of keywords. The keywords on the coincidence network map, using the VosViewer software, were generated in numbers of 10. The view map shows the keyword density and the keyword history view. The co-emergence of keywords can effectively reflect research hotspots in the disciplines, providing ancillary support for scientific research.

Taking into account all the 288 publications belonging to the studied topic (renewal of generations of farmers), we obtained 1358 keywords. Of these, 56 keywords appeared at least 5 times. In figure no. 4 you can see the size of the nodes and the words, they represent the weights of the nodes. The larger the size of the node and the word, the more important it is. The distance between two nodes reflects the connection between the two nodes. if the distance is shorter, then the relationship is stronger. The line between two keywords is that they appeared together. Nodes of the same color belong to a cluster.

Figura 4. Keywords co-occurrence network -related publications



Source: data processing using VosViewer software

The analysis software, VOSviewer, divided the keywords of the research publications into 7 clusters. The most common keyword is "young farmers" (49). Other high frequency keywords they include 'farm succession' (46), 'agriculture' (46) and 'succession' (27).

The power of the connection between two nodes refers to the frequency of co-occurrence. It can be used as a quantitative index to describe the relationship between two nodes [7].

The total link strength of a node is the sum of the strengths of that node over all other nodes. The node, "young farmers", has a strong link to the following keywords such as "agriculture", "common agricultural policy", "rural development", "sustainability" and "management". In table no. 2 shows the top 10 keywords, with their frequencies and link strengths.

Table 2. The top 10 keywords -related publications.

Rank	Keywords	Frequency	Total Link Strength
1	Agriculture	46	117
2	Farm succesion	46	96
3	Succesion	27	86
4	Young farmers	49	79
5	Impact	19	75
6	Family farms	23	70
7	Policy	11	48
8	Retirement	12	46
9	Adoption	15	43
10	Farmers	21	43

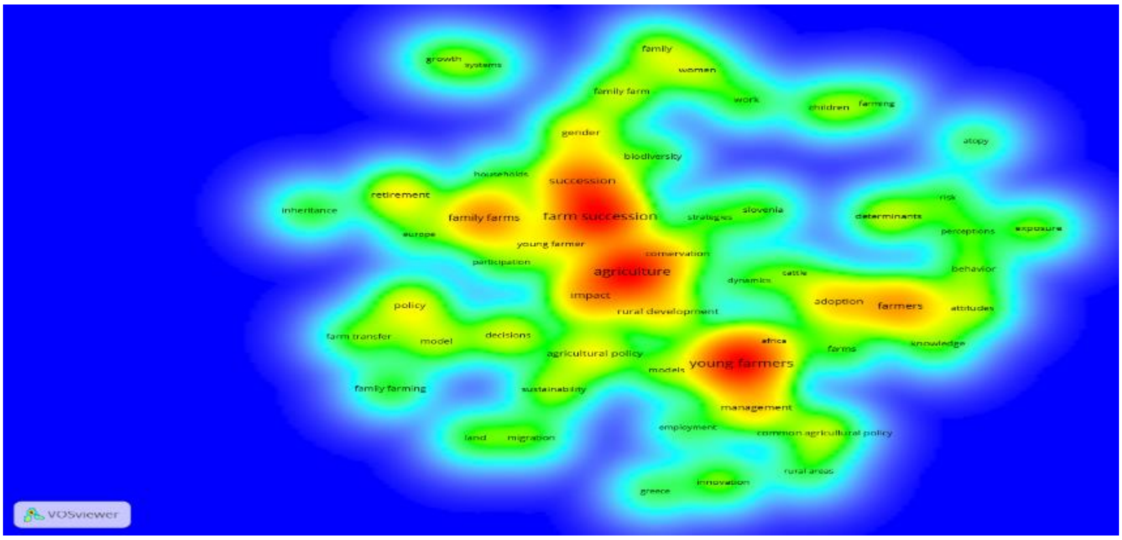
Source: data processed from the Web of Science database

With the help of VOSviewer, the density visualization was also made (Figure no. 5). Each node in your keyword density has a color that is based on the density of the elements in that nodeThe color of a node depends on the number of items in the vicinity of the node. In the red area are represented the words that appear most frequently, and in the green area are represented the least common words.

Density views are useful for understanding the overall structure of a map and for drawing attention to the most important areas on the map.

In figure no.5, you can see the focus of the study research. "Young farmers", "farm succession" and "agriculture" are the basic keywords in this study.

Figure 5. Keywords density visualization map -related publications



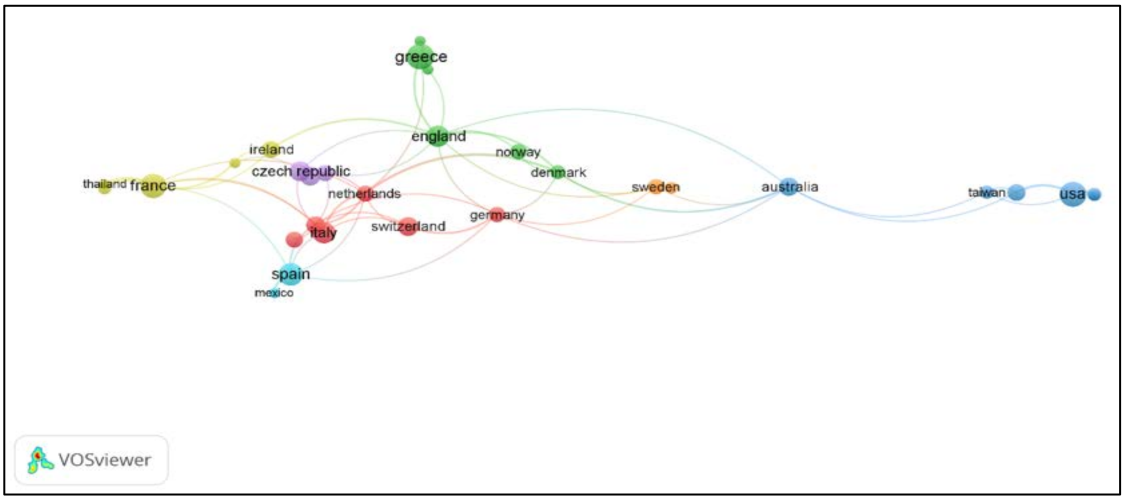
Source: data processing using VosViewer software

Analyzing the frequency of co-authors depending on the country, we can see the degree of relationship between countries and countries with the greatest interest in studying this issue such as the renewal of the generation of farmers.

Figure no. 6 shows that the map shows different colors that indicate the diversification of research directions. Large nodes represent the countries that have a special interest in the topic we studied, and the connections between nodes represent the cooperative relations between institutes.

In the figure below (fig no.6) it can be seen that the nodes showing the red connection line indicate that the studies conducted in Europe are multiple, the relations between employees being close, but the geographical advantage is not the main factor that can influence the cooperation relationship.

Figure 6 The country co-authorship network -related publications



Source: data processing using VosViewer software

In the case of the most influential papers published on the studied topic (renewal of the generation of farmers) were identified the first 10 scientific papers that recorded the most citations. In table no. 3 are presented the works with the most citations.

The first place with 131 citations is occupied by the work written by Styger, E et al. (2007). The paper written by Portengen L et al (2002) occupies the second position with 118 citations.

Table 3. The top 10 papers with the most citations

Nr. crt.	Authors	Article Title	Publication Year	Journal Abbreviation	Citari all data base
1	Styger, E; Rakotondramasy, HM; Pfeffer, MJ; Fernandes, ECM; Bates, DM	Influence of slash-and-burn farming practices on fallow succession and land degradation in the rainforest region of Madagascar	2007	AGR ECOSYST ENVIRON	131
2	Portengen, L; Sigsgaard, T; Omland, O; Hjort, C; Heederik, D; Doekes, G	Low prevalence of atopy in young Danish farmers and farming students born and raised on a farm	2002	CLIN EXP ALLERGY	118
3	Negri, V	Landraces in central Italy: where and why they are conserved and perspectives for their on-farm conservation	2003	GENET RESOUR CROP EV	76
4	Smit, LAM; Bongers, SIM; Ruven, HJT; Rijkers, GT; Wouters, IM; Heederik, D; Omland, O; Sigsgaard, T	Atopy and new-onset asthma in young Danish farmers and CD14, TLR2, and TLR4 genetic polymorphisms: a nested case-control study	2007	CLIN EXP ALLERGY	73
5	Zagata, L; Sutherland, LA	Deconstructing the 'young farmer problem in Europe': Towards a research agenda	2015	J RURAL STUD	72
6	Calus, M; Van Huylenbroeck, G; Van Lierde, D	The relationship between farm succession and farm assets on Belgian farms	2008	SOCIOL RURALIS	64
7	Sanchez-Zamora, P; Gallardo-Cobos, R; Cena-Delgado, F	Rural areas face the economic crisis: Analyzing the determinants of successful territorial dynamics	2014	J RURAL STUD	64

8	Panagos, P; Imeson, A; Meusburger, K; Borrelli, P; Poesen, J; Alewell, C	Soil Conservation in Europe: Wish or Reality?	2016	LAND DEGRAD DEV	57
9	Fischer, H; Burton, RJF	Understanding Farm Succession as Socially Constructed Endogenous Cycles	2014	SOCIOL RURALIS	53
10	Zimmermann, A; Heckelei, T; Dominguez, IP	Modelling farm structural change for integrated ex-ante assessment: review of methods and determinants	2009	ENVIRON SCI POLICY	53

Source: Web of Science database

In fifth place is the work written by Azgatal and Sutheland (2015); this referring to the first and second pillars of the CAP (EU), upport for generational exchange in agriculture but also the presentation of endogenous factors that have a connection with the economic potential of farms.

The economic size and the surface of the farm, as well as the characteristics of the managers, (especially the level of education) proved to be more important in taking over and developing the farms.

The paper “The relationship between farm succession and farm assets on Belgian farm”, written by CalusM et al (2015) ranks 6th with 64 citations. This paper highlights the fact that the lower assets of the farm can influence its future trajectory, implicitly of the generational exchange. Farmers anticipate the possibilities of transfer to their younger predecessors, by adapting farm management.

CONCLUSIONS

The study presents a bibliometric analysis of publications related to the generational renewal of farmers, in the period 2000-2020. Some interesting results were observed regarding the publications related to this topic. First of all, their number showed an increasing trend during the period under study, and their number accentuated after 2007, reaching a maximum of 49 publications in 2019. European countries are those that predominate in published research catch the generational exchange, being a broad and interesting topic. Regarding the main journals in which the papers are published, it was observed that the Journal with the largest number of publications is Land Use Policy, with a total of 17 papers, followed by the Journal of Rural Studies with 15 papers.

Through the analysis of the keywords, we found that "young farmers", "succession farm", but also agriculture are central points that have strong links with different factors that can determine or influence their evolution "management", "gender". ,, impact ,, ,, policy ,, etc.

By studying these characteristics it can be revealed that this topic has been studied comprehensively in recent years in various fields.

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EU ORGANIC AGRICULTURE - AN OVERVIEW OF LATEST LEGISLATIVE FRAMEWORK

Steliana RODINO[1]

Abstract: *For the next decade, one of the objectives of the recently released EU's strategy "Farm to Fork" is to reach a target of 25% in organic food and farming in the EU agriculture. For this target to be accomplished, the overall EU organic area should be increased, by complying with the regulations in force. This paper is an overview of the new set of regulations that will come into force by the beginning of the next year. Starting with 01 January 2022 new organic regulation will apply to all EU states. The latest European Union (EU) rules on organic production and labelling of organic products was adopted on 30 May 2018, by the European Parliament and the Council (2018). The future framework for organic farming is expected to harmonize and simplify the standards for all EU and non-EU farmers marketing their products across Europe. In the same time, it will prevent unfair trade practices while consumer trust in organic production will increase. The entire supply chain will have to comply with the organic measures and a wider list of products are covered. The certification process was also taken into account, enhancing an easier process for the small farmers.*

Keywords: *farm to fork, organic agriculture, regulations*

JEL classification: *L50, Q01, O13*

INTRODUCTION

Organic crop production uses cropping practices and crops that improve soil stability and biodiversity, increase or maintain the amount of organic matter in the soil, and prevent compaction and erosion. "Organic Agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects" (IFOAM). The objectives of organic agriculture are reached by employing agronomic, biological, and mechanical methods instead of synthetic materials (FAO).

Unlike practices used in conventional agriculture, which are often based on targeted short-term solutions (eg. application of a soluble fertilizer or herbicide), organic systems use a different strategic approach, which is based on long-term solutions (preventive, rather than reactive) at the systems level (Watson et al. 2002).

Organic farming has progressively developed from a rather outlying and isolated concept to a central social matter. It is is also a movement: A response to society's health and environmental expectations, a proposal for changes for the intensification of agriculture.

The present European and worldwide strategies for agriculture demonstrate that organic agriculture is the best approach for protecting the environment, maintaining biodiversity, assure animal welfare and providing healthy and nutritive food.

Since the first initiative toward organic farming, in early 1920 by Rudolf Steiner, organic agriculture has evolved from biodynamic principles to new streams of initiatives based on ethical and ecological principles, being initiated an alternative mode of agricultural production and a commitment for future generations health.

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Starting from farm until it reaches the fork, the goal of organic farmers is to employ inputs (feedstuffs, fertilizers, plant protection products) and apply processing methods to safeguard the nutritional qualities present in raw materials throughout all stages of production.

GENERAL CONTEXT

The cornerstone of regulatory framework for European organic agriculture originates back in 1991, staring with EU Reg No. 2092/91, revised in 1999. Later on, in 2004, The European Commission adopted the first Action Plan for Organic Food and Farming and continued with EC Reg 834/2007 and 889/2008 regarding organic production.

Organic production means complying with the rules of organic farming. These rules are designed to promote environmental protection, maintain Europe's biodiversity and build consumer confidence in organic products.

Certified organic products are recognizable by the "Eurofeuille" logo, for European level, and specific national logo, developed by each country (Figure 1.). This label guarantees consumers compliance with the specifications throughout the supply chain.

a) b)

Figure 1. a) The European logo for certified organic products. b) Romanian logo for ecological products

Framing EU organic production is established by a number of rules and regulations governing the production, distribution and marketing of organic food.

Given the experience gained for the application of Regulation (EC) no. 834/2007 by Regulation 889/2008 and the analysis of the industrialized agriculture Regulation (EC) no. 834 will be repealed and replaced from 1 January 2022 by the new Regulation (EC) no. 2018/848.

Regulation (EU) 2018/848 of 30 May 2018 on organic production and labeling of organic products was officially released on 14 June 2018. Therefore, initially, organic farmers will have had a couple of years to comply with the new legislation. Meanwhile the coming into force of the regulation has beed postponed to 2022, giving the organic producers an extra 12 months for compliance. However, products produced in accordance with the current organic Regulation (EC) No. 834/2007 before 1 January 2022 may be placed on the market after that date until stocks are exhausted.

THE MAIN CHANGES COMPARED TO THE PREVIOUS LEGISLATION

Application area

With regard to the new regulation, there are three categories of products that can be certified organic (Figure 2).

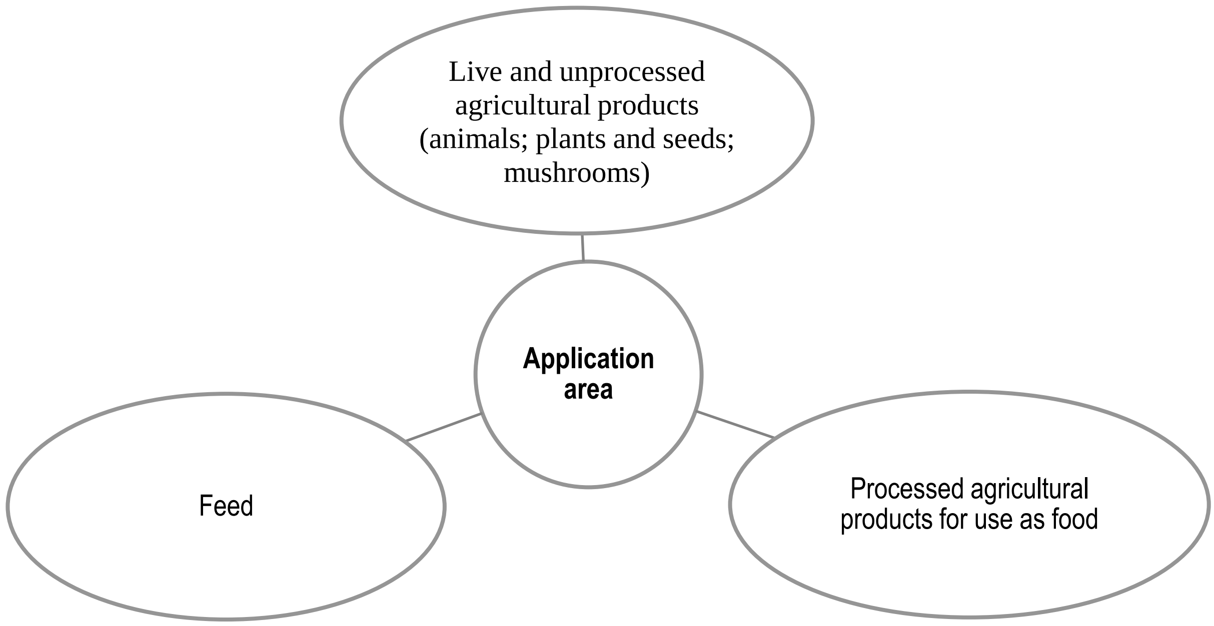

Figure 2. Application area of EC Reg 848/2018

The novelty of this Regulation is the introduction of a list of specific products which are not clearly covered by the three categories specified in the scope, but which can be further certified. New products that are included in the scope of this regulation and will be eligible for the organic agriculture certification are as follows.

- yeast used as food or feed;
- maté, sweet corn, vine leaves, palm kernels, hop buds and other edible parts of plants and products obtained from them;
- sea salt and other types of salt used for food and feed;
- silkworm donuts from which yarns can be removed;
- natural gums and resins;
- beeswax;
- essential oils;
- corks made of natural cork, not crowded and without any binders;
- cotton, not carded and combed;
- wool, not carded and combed;
- raw hides and skins;
- traditional herbal preparations.

Goals and key points

The new EU regulation sets additional targets for organic farming. Protecting the climate, making a significant contribution to a non-toxic environment and promoting local production and short distribution channels are now new goals pursued by organic farming. It should be noted that the objective of producing high quality products has been removed from this new regulation.

Production rules

Details **of production rules are also reinforced** and more accurate definition of soil farming practices is presented. Above-ground cultivation methods are still prohibited and the concept of soil soil-related crop cultivation' is clarified: production is obtained in living soil, in connection with the subsoil and bedrock.

Therefore, the use of demarcated bed is no longer compliant with organic agriculture rules. The Member States in which this practice had been allowed, namely Finland, Denmark and Sweden will have a generous period pf time, until 2030, to move towards other methods.

In the same time, hydroponic production, is prohibited.

Regionality of supplies for livestock

The **regionality of feed supplies** was extended. Starting with 1 January 2023 the proportion of food required from the farm itself or other organic farms in the region, in animal feed is being increased as follows: from 20 to 30% for monogastric farms and from 60 to 70% for herbivorous farms.

Group certification

Introduction a group certification for small producers in the EU is a novelty of the regulation. It is setting up the framework for the creation of a group certification system for small farmers. The goal is to enable access in this production system for small producers facing issues on individual certification costs and heavy administrative constraints, by allowing them to pool these costs. The conditions that must be met by each member for being recognized as a group of operators, are as follows:

- ✓ having an individual cost of certification of more than 2% of the turnover or standard output of organic production;
- ✓ having annual turnover of organic production of maximum EUR 25 000 or standard output of organic production of EUR 15 000 per year;
- ✓ having a farm of up to 5 ha, 0,5 ha in case of greenhouse or 15 ha in the case of permanent grasslands,
- ✓ having production activities close to each other.

The rules that apply to the group of operators as a whole are:

- ✓ having a joint commercialization system for final products obtained within the group
- ✓ the group will be established as a common legal law entity.
- ✓ having established a system for internal controls which is performed by observing a documented set of control activities and procedures.

However, the proposed cooperative or producer group in the new regulation is limited to 1000 members, and individual farm size to five hectares.

Targeted control system

Aiming to warrant fair competition for farmers while preventing fraud and maintaining consumer trust, another key point is that **Physical inspection of operators** will be done with an annual frequency. Organic famers and operators will be verified for their compliance verification at least once a year.

However, exceptions to this rule are allowed under certain conditions, on the basis of a risk analysis. If an operator did not reveal a failure of the compliance rules for at least three consecutive years of annual checks and have a low probability of non-compliance based on the risk analysis, physical control may be put off for a period of up to 24 months. On the other hand, in the case of repeated irregularities, on the spot controls will be intensified.

Import rules

Regarding third countries (outside EU), **transition from the current equivalency recognition to compliance recognition** is set up. This means that producers in third countries will have to comply with the same set of rules as the ones from the EU territory. The import compliance is aimed to monitor and certify imported products.

An exception remains for imported products from third countries with which the European Union has signed a trade agreement that recognizes the equivalence in terms of regulation and control system with the European Union. These include Canada, the United States, Japan, Tunisia and New Zealand.

Objective and principles

Besides the previous objectives and principles set for organic agriculture, a few new issues are being tackled (figure 3).

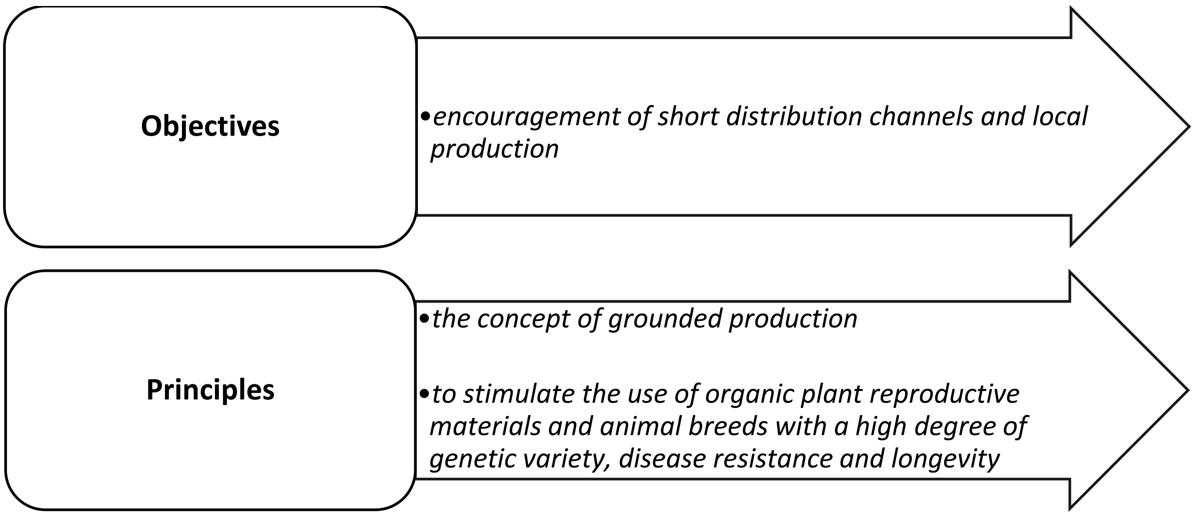

Figure 3. Newly added objectives and principles in the EU organic regulation.

CONCLUSION

Halve the use of plant protection products, promote organic farming, place almost a third of the EU's land and seas under protection: these are the European Commission desiderates for defending biodiversity and quality food.

For the next decade, one of the objectives of the recently released EU's strategy "Farm to Fork" is to reach a target of 25% in organic food and farming in the EU agriculture. According to the latest Eurostat figures, dating back to 2018, only Austria is close to this level, with the EU average being 7.5%. For this quarter target to be accomplished, the overall EU organic area should be increased, by complying with the regulations in force. The farm to fork plan will focus on three main areas:

- ✓ boosting demand for organic products while maintaining consumer confidence;
- ✓ encourage acreage growth in the EU;
- ✓ strengthen the role of organic production in the fight against climate change and biodiversity loss.

The main changes expected with the implementation of the new organic regulations:

- ✓ expanding the range of certified organic products;
- ✓ a more targeted control system;
- ✓ robust import rules;
- ✓ clear and reliable labelling: the consumer is informed, with the European logo, of the origin of agricultural raw materials, including the regional case and the identity of the supervisory body;
- ✓ maintaining the link to the soil ground
- ✓ the creation of a "group certification" for helping small producers to achieve certification

The derogations that are permanent under current reglementation will be provisional in the new framework. Farmers will have access to non-organic inputs only for a limited timeline, and only if these are not available as organic. The available quantity of organic seed and young animals will be open acces published in national databases.

ACKNOWLEDGEMENTS this work was finaced by Project ADER 23.1.1/2019

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THE COMPARATIVE ANALYSIS OF THE CARBON STOCKING POTENTIAL BY THE EUROPEAN AGRICULTURAL AND FORESTRY SYSTEMS

TOMA CAMELIA[1]

Abstract: *The goal of the present paper resides in the comparative analysis of the statistical FAOSTAT data and information in the last 25 years, for the EU countries and other European countries, completed with data and information from the well known literature and from webographics, refering to the multi-functionality, evolution, dynamics and importance of the potential of grasslands and forests as reservoirs of carbon absorbtion and stocking from the greenhouse gases, respectively atmosphere CO2, and its stocking into organic carbon from the soil and from the live bio-mass of the forestry vegetation. In the paper, we made a short summary of the natural and artificial processes, biological, physical, and chemical ones, to which the researchers are working experimentally for the capture and stocking of the atmosphre carbon from the natural or anthropic emissions in agriculture, industry, transports or circular economy. Data and information utilized have evidenced that the cultivated land areas and some zones with peatlands are big transmitters of CO2. At Europe Continent's level and by geographical regions, we can see that in the period 1995-2017/2018 there diminished the permanent grasslands and that only in the Scandinavian states and in the Russian Federation these ones inccreased their areas. In dynamics, the area of the European forests increased by almost 2%, but it could have increased by another 7 %, if they had not been destroyed in fires, their highest share being produced in the Russian Federation (96%). Nevertheless, half of the live forest bio-mass quantity owned is to be found in the Russian Federation, which is champion by the area owned, being four times bigger than the rest of the European states. With all this, the carbon from the live forest bio-mass per area unit is the biggest in the forests in the West and East of the continent, the rest of the regions and the Russian Federation havving a value of the indicator almost equal to average.*

Key words: *permanent grasslands, forests, CO2 emissions, soil, live bio-mass*

JEL Classification: *O13, O52, Q23,, Q24, Q54, R11*

INTRODUCTION

In order to limit the global heating of the Planet to 1.5 Celsius degrees, considered a safe threshold from the point of view of the Intergovernmental Group for Climate Changes (IPPC/GISC), it is essential to reach to the neutrality of the carbon dioxide emissions up to 2050 year.

This objective is set also in the Agreement from Paris for the climate (COP21) in December 2015, which was signed by 195 countries, inclluding by the EU.

United Nations Organisation launched at the COP25 meeting in Madrid a Framework Convention for Climate Changes, within which, the European Council launched European Green Deal.

The agreement provides an ”European climate law”, a juridical framework to reach the objective of CO2 emissions reductionand proposes itself to make Europe neutral from the climate point of view until 2050.

Article 4 from the Paris Agreement provides: *”...., the parts are proposing themselves to reach as soon as possible the global maximum value of greenhouse gas emissions .... And then take measures to rapidly reduce it according the best available scientific knowledge in order to obtain a balance between the anthropic emissions through sources and absorbtions through absorbants of the greenhouse gases in the second half of this century ....”*[2]

European Green Deal or the European Ecological Pact has in view 7 action zones at the level of public policies to reach the neutrality of CO2 until 2050 year:

-Biodiversity; Agriculture; Clean energy; Sustainable Mobility, Industry, Constructios; Polution elimination.

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[2] https://www.europarl.europa.eu/news/ro/headlines/priorities/schimbarile-climatice/20200618STO81513

MATERIAL AND METHOD

Neutrality of dioxide carbon emissions means net zero emissions, which means all greenhouse gases emissions at world level will have to be counterbalanced through sequestration of carbon dioxide.

The long term, absorbants are the soils of certain agricultural and forestry systems, the forests' biomass and the oceans. According to estimations these natural absorbants are sequestering between între 9.5 and 11 Gt CO2 per year, while the global emissions in 2019 reached to 38 Gt.[3]

Up to the present, no absorbent- natural or artificial – is able to eliminate enough carbon dioxide in order to fight with the global heating. There were proposed different methods based on *biological*[4]*, physical*[5] *and chemical processes* [6].

Among the ***biological natural and artificial processes*** proposed to be newly created or improved and extended, we can enumerate: Peatlands and ameliorated moors; Afforestation of new areas; Urban silviculture; Restoration of the humid tropical zones; Agriculture, agriculture of carbon, bamboo agriculture; Stocking of the carbon at a bigger depth in the land; Fertilization with iron and/or urea of the oceans; Creation of farms to crop and process sea algae etc.

The physical processes reside in different methods experimented to capture by the biomass of the carbon dioxide from thermo-centrals; deposit of carbon dioxide in oceans by injecting liquified gases at high pressures on the bottom of oceans or in place of oil field, and salt depleted, with a stocking capacity estimated from 675 up to 10000 Gt CO2.

The chemical processes reside in the mineral carbonation, chemical methods, new technologies in the cement industry and of other construction materials, which could produce materials with absorbtion of CO2 qualities; utilization of chemical substances cleaning the air while chemical reactions etc.

The financial costs and energy consumptions for the implementation at global level are until present real obstacles, the projects remaining for the moment in the phase of laboratory or punctual experimental at low scale.

Nevertheless, the danger of global heating over the limits admited is determining the states, governments, and science people in the whole world to search and experiment new solutions, such that the future gives us hopes, that at least the emissions produced by the anthropic activities diminish themselves, if natural processes cannot be stopped at Planet level.

The goal of the present paper resides in the comparative analysis of statistical FAOSTAT data and information in the last 25 years, for the states of European continent, completed with data and information from the well known literature and from webography, refering to the importance and potential of the grasslands and forests as reservoirs for absorbing and stocking of the carbon from the greenhouse gases, respectively CO2 atmosphere and organic carbon in the soil.

RESULTS AND DISCUSSIONS

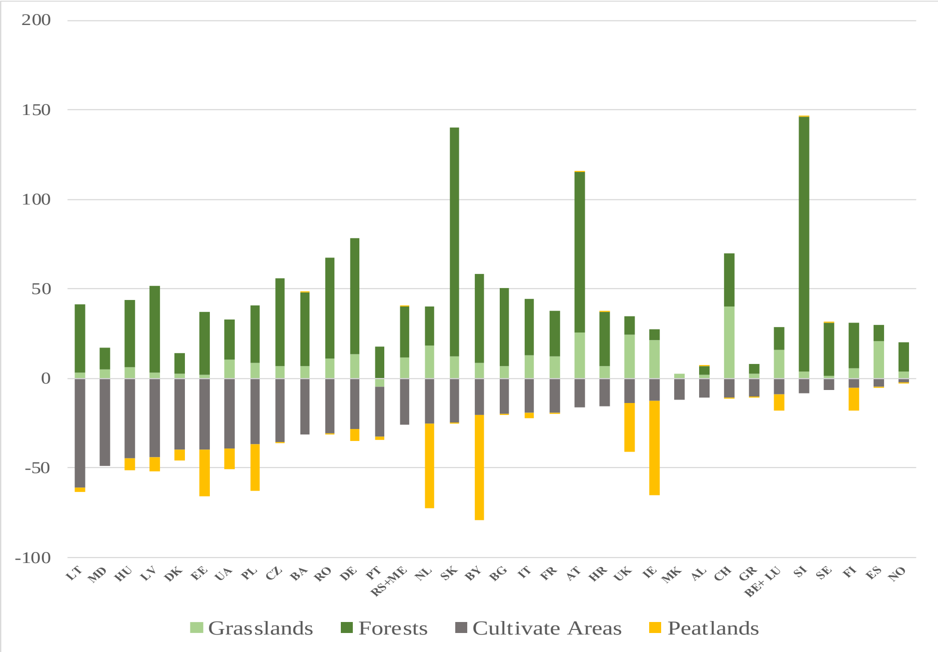
As we mentioned above, one of the main absorbants of CO2 is the **soil.**

"Two thirds of the terestrial carbon is averagely to be found, in the first 10-20 cm depth from the surface of the soil (soil and roots), being a much more protected part agains de-composition (it is estimated 1500 Gt of C organic world widde).

The C reserve situated under the soil in the forests, permanent grasslands and other eco-systems in the mountain zones remains almost intact, as much as the eco-system does not suffer transformations.

[3] Neier, H et all, 2018, "International Climat Negotiations – Issues at stake in view of the COP 24 UN Climate Change Conference in Katowice and beyond", study requested by the ENVI committee.
[4] https://ro.qaz.wiki/wiki/Carbon_sequestration
[5] ibidem
[6] ibidem

There are big differences between the arable soils, the soils of the grasslands and those of the forestry areas, as regards their capacity to deposit the carbon. (Figure1)



Source : Lanssens et all., 2005, cited by Huyghe, C., et all, 2014, author's processings

Figure 1. Structure of cumulative carbon balances specific for each European country, by the sequestering sources (+) /loss (-) (g. C/sq.m /year in the soil**)**

In case of grasslands there are: permanent covering; zones with roots containing big quantities of nitrogen and organic carbon; a longer period of growing and photosynthesis; bigger water retention; possibility of grazers presence (more emissions of different greenhouse gases); more organic substance (roots) etc.

The arable lands cropped are recognised by their specific character: plants cropped annualy; crops rotations and perturbing the soil's life; mechanical and manual works of the soil; acceleration of the process of soil compaction by the heavy machines within the conventional technological works; the smoothing of the fertilizers, mainly the nitrogen and potasium; errosion produced by water and wind.

Permanent grasslands. On area of pastures and hayfields, the first 10 centimeters depth from the underground level are important for the levels of organic Carbon. When there are made works on the soils of the grasslands for their turning into arable soils, in the first years after conversion it is lost almost half of the C reserve. Transformation of an arable soil into grassland, needs more than 50 years to come back to the same level of the organic Carbon content from a permanent grassland. Different researchers demonstrated clearly that the first 10 cm from the underground of a grassland contains a percentage almost double of C in comparison with the arable soil." (Carlier, L., et all, 2009)

In the last century, in many European regions, the grassland management have suffered important modifications, through giving up to the traditional model from the previous centuries.

The authors of a paper (Huyghe, C. et all, 2014) bring to attention the fact that intensification of the grasslands utilization through the high supply of chemical fertilizers, the frequent defforestations, the seeding of grasslands or their conversion into arable lands lead to major changes in West of Europe, and at present, they are a real concern for the new states Members from the East of Europe, which are not willing to repeat the past errors of those in the West.

Together with the intensificaton and/or abandonment of grasslands, reduction of the area threatens all aspects of European biodiversity: the genetical diversity, landscapes, and especially, the functions afferent to the eco-system.

Grasslans are offering many functions to the eco-system of which many are linked to the soil ecosystem and to the role which they have in balancing the greenhouse gases and the reduction of soil errosion and pollution. (Table 1)

Table 1. Multi-functionality of grasslands

Type of grassland	Practices	Biodiver-sity	Effect upon the landscape	Water quality	Prevention of soil errosion	Carbon sequestration	Yield quality
Annual fodders	1	*	*	*	*	*	*
	2	*	*	**	*/**	*	*
Temporary grassland	3	*	**	*/**	**	**	**
	4	*/**	**	***	***	**	***
Permanent grasslands	3	**	***	**	**	***	**
	4	***	***	***	***	***	***
Grasslands with ecological value	5	*/***	****	***	***	****	****

*Note : 1 = Corn without crop rotation; 2 =corn with crop rotation ; 3 = intensive management; 4= rational fertilization; 5 = wet or dry pastures; * small impact; **** big impact.*

Source: Sarzeaud et al., 2008, French Livestock Institute (2007), cited by Huyghe et al., 2014

Also, natural and semi-natural grasslands are supplying services to the eco-system, as well as goods and benefits, as:

-they supply fodder products for animal raise; they are stocking water and recharge aquifers with edible water, having a purifying role through retaining pollutants; it results clean water, fresh air and clean soil;

-from cultural point of view, they offer to the eco-system: parameters of environment and are agricultural and archeological patrimony, distinctive species and habitats, grazing for rare animal species and regulate the genetical diversity of the plants;

- offer much ecological knowledge and instruction zones, the society benefits of physycal and psychological health, social cohesion, leisure and tourism, bilogical research basis etc.;

-ecosystem benefits by the climate regulation through GES sequestration and stocking of organic carbon in soil, avoiding climate perturbation.

In the last 25 years, at the level of the European continent (without Russian Federation[7]), we can observe a reduction of the areas with permanent grasslands by 10.5 mill. Ha, (12%)., reduction of which, half was produced in the South region, and the other half is divided between West and East regions, equally.

The South Region has lost over one fifth of the own areas with grasslands (5.8 mill. Ha), which led to a huge loss (22%) of the stock of organic carbon in the soil, acumulated in the 23 years. Only in the states of the North region it was produced an increase by 4% of the grasslands' area and an increase of the Carbon retained in the soil by 3%.

Also, the regions in the East and West of Europe were affected, beside the cumulated loss of area (24%) of grasslands, but also a diminution by 23% of the total orgnic carbon stock in the soil.

One of the most important causes of affecting the European pastures it seems to be the drought which appears most frequent lately, with more and more hot years and the South states are

[7] The statistical analysis in table 2 and in figure 1 was made without including Russian Federation and some very small states as area, only from size considerents of extreme data, which distort the graphic representation.

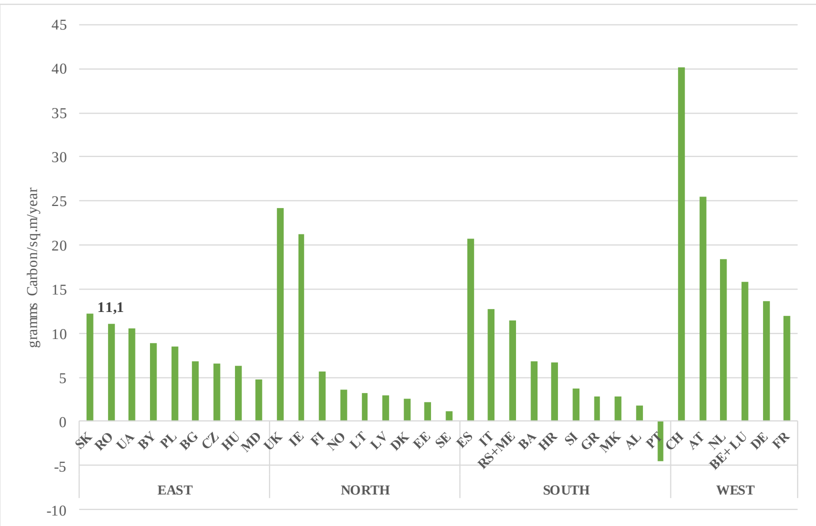
confronted, except drought also with the presence of the arid and calcareous soils etc. In the drought years, in some states, the balance is viceversa, such as, pastures can become transmitters of greenhouse effect gases(GEG). (Table 2)

Table 2. Evolution of permanent grasslands area and the balance (stock) of Carbon in the period 1995-2017, in Europe and by geographical regions

Regions of Europe	Permanent grasslands Mill. Ha		Permanent grasslands	Emissions – absorbtions equiv.CO2	Permanent grasslands	Carbon stock, equiv.CO2
	1995	2017	2017/1995* 100-100 (%)	2017/1995 *100 -100 (%)	2017-1995 mil. ha	2017-1995 mii. tone
North	17.3	17.9	4	Abs +3	0.7	Abs+123
West	20.3	17.9	-12	-12	-2.5	Abs-340
East	24.6	21.7	-12	-11	-2.9	Abs-261
South	27.4	21.7	-21	-22	-5.8	Abs-744
Total Europe*)	**89.7**	**79.2**	**-12**	**-10**	**-10.5**	**Abs-1253**
Russian Fed.	87.0	92.0	2.6	Emis. +0.2	5.0	Emis. + 0.63
TOTALEurope	**176.7**	**171.2**	**-3.1**		**-5.5**	**Abs. -1252**

**) Witout Russian Federation*
Source: FAOSTAT, 2019, author's processings

Following the studies made by the researchers in the field (Huyghe, C., 2014), the quantity of organic carbon stocked in the soil (COS), calculated in grams/year per square meter of grasslands in different European country, puts into evidence a very big variability infunction of: latitude and altitude, temperatures and rainfalls, types of soil, composition of live vegetal bio-mass, systems of maintenance and exploitation etc. (Figure 2)



Source : Lanssens et all., 2005, citat de Huyghe, C., et all, 2014, author's processings
Figure 2. Balance of Carbon (absorbtions – emissions) specific for each European country, grouped by geographical regions (g C/sq.m /year of **pastures)**

The biggest quantities of carbon stocked in the soil (COS) were determined by the pastures in Switzerland (40 g), Austria (25 g), United Kingdom (24 g), Ireland and Spain each with 21 g, Netherlands, Belgium and Luxembourg (16-18 g), Germany, Italy, Slovakia and France (12-13 g), Serbia, Montenegro, Romania and Ukraine (11 g) and the other states under 10 grams. Only Portugal had a loss of COS of 4.5 g/sq.m /year.

Directing principles of the Eu strategy for forests and forestry sector are the following:

- sustainable administration of forests and their multifunctional role, which could permit the supply of many goods and services in a balanced manner and to guarantee the forests' protection;

- efficient utilization of resources, in view of optimizing the contribution of the forests and forrestry sector to the sustainable development, to the creation and multiplication of jobs;

- responsability towards forests at world level in order to promote the sustainable production and consumption of forestry products.

Science people are saying that the re-forestation and a better administration of the forests can ensure 18% of the reduction in the climate changes until 2030. But studies can be divided.

”While the young forests are tending to absorb more carbon in general, as the density of the young trees is higher, the absorbtion rate of carbon of a tree is accelerating as it gets older. This means that the forests made of high trees and old- as tropical and temperate forests on the Coast of Pacific in North America- are some of the biggest carbon deposits of the Planet.

But when the forests are exploited, their huge carbon deposits are wasted rapidly.

Researchers are asking the exploitation and processing industry for wood to help the climate changes by doubling the age of harvest of the trees from 40 to 80 years old and tell the governmental agencies which are administrating forests to impose their own restrictions at harvesting.”[8]

In the last 25 years, in Europe (without Russian Federation) the area of forest lands increased by 11.7 mill. ha (6.2%). (Table 3)

Table l 3. Evolution of forestry land areas and the balance (stock) of Carbon in the period 1995-2017, in Europe and by geographical regions

Regions of Europe	Forestry land areas Mill. Ha		Forestry land areas	(Emissions – bsorbtions) echiv.CO2	Forestry land areas	Stock of Carbon, equiv.CO2
	1995	2017	2017/1995* 100-100 (%)	2017/1995 * 100 -100 (%)	2017-1995 mill. ha	2017-1995 mill. To.
North	73.8	75.2	1.9	-35.4	1.4	Abs.-41,1
West	32.3	34.8	7.8	30.3	2.5	Abs.+34,4
East	42.8	45.7	6.7	-23.1	2.9	Abs.-40,5
South	40.2	45.1	12.1	-23.6	4.9	Abs.-28,2
Total Europe without Russian F.	189.1	200.8	6.2	-14.4	11.7	Abs.-75,4
Russian Federation	809.1	815.3	0.8	abs +273	6.2	Abs.+93
Total Europe	**998.2**	**1016.1**	**1.8**		**17.9**	
Forest fires cumulated 95-2017					76.1	
d.c. Russian Fed.					*73.0*	
Europe- Russian Fed.					*0.90*	

Source: FAOSTAT 2020, author’s calculations

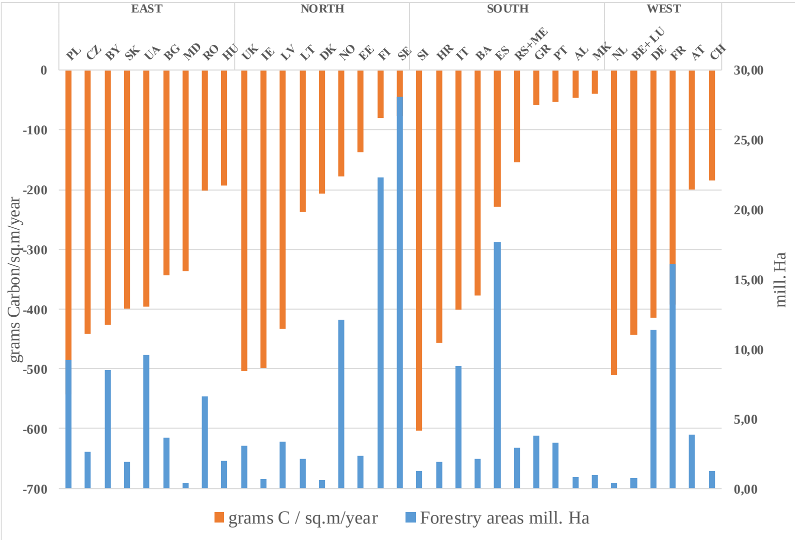
But, the total quantity of carbon stocked, existent in the year 2017, was with over 75 mill. tones equiv.CO2 smaller, reprezenting in dynamics a decrease by 14.4% towards the year 1995.

By geographical regions, it is to be remarked the West region with an increase of the Carbon stock by 34.4 mill. tones equiv.CO_2, but in the regions North and East, stocks were smaller by 40 mill. tones of carbon opposed to the year 1995.

Analysing the FAOSTAT data regarding the areas with forests destroyed in fires, cumulated in 23 years, we can see that the present area with forests should have been by 7% bigger, (76.1 mill. ha). The greatest loss of forestry area was registered in the Russian Federation (96%), and 4% were forests destroyed by fires in the rest of the Continent.

Analysing the quality of the forestry soils through the content stocked by carbon/sq.m /year, we can observe, also, very big variabilities. (Figure 3)

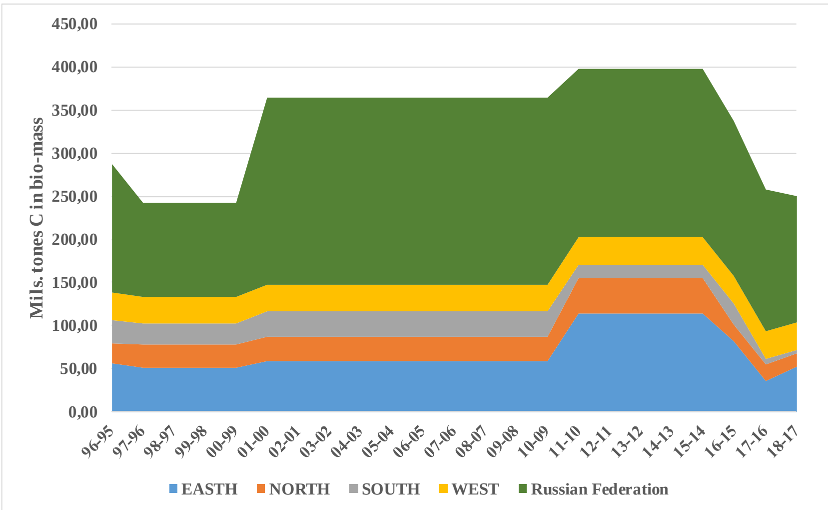
[8]https://news.mongabay.com/2019/05/tall-and-old-or-dense-and-young-which-kind-of-forest-is-better-for-the-climate/?fbclid=IwAR2kSt7liwpVIShTcPw_TnSz4Ozky5ZvFacesI9-j3B9YL_br0_8ruxWrU4



Source : Lanssens et all., 2005, cited by Huyghe, C., et all, 2014, author's processings

Figure3. Area of forestry land owned by the states of Europe and balance (stock)of emissions-absorbtions by grams C/ sq.m/year, grouped by geographical zones of the Continent

It is observed that, the states with the biggest forestry areas in Europe, after the Russian Federation, are Sweden and Finland, scandinavian states which compensate absorbtion of CO2 emissions, not through the sequesteres content in the soil (70-80 g C/sq.m /year), but through the size of owned forestry lands, of 28 and respectively 22 mill. ha.



Source: FAOSTAT, 2020, author's processings

Figure 4. Evolution of annual increase in carbon- sequestered in European forestry live bio-mass in the period 1995-2018, gouped by geographical zones and in Russian Federation

Evolution of the annual increase of C stocked in live bio-mass (1 t C = 1 m^3 of wood) followed the same trend in all regions of the continent, but with different shares. (Figure 4)

From the data processed and analysed, in the year 1995, on Europe Continent, the quantity of Carbon in live forestry biomass was estimated at 46,3 billion of tones, to which were added in the last 23 years, 7.7 billion tones of Carbon. From these, 54% were stocked by the forests of the Russian Federation, the area of which is 4 times bigger than the forests of the rest of Europe, followed by the regions in the East by 20%, the North and West, by 9% and region South by 7%.

The average density of carbon in forestry live mass at 1000 hectares of European forest incresed in the period 1995-2018 from 46 to 53 thousand tones C, the forests in the East and West of Europe being on first place in 2018 year, each with 93 thousand tones C/1000 ha, and the other regions, North, South and Russian Federation situating themselves close to the European average, respectively, 49, 54 and 50 thousand tones C/1000 ha.

CONCLUSIONS

In the analysed period (1995-2017/2018), we can observe that at the level of the European Continent, the biggest reservoirs of carbon, forests and permanent grasslands, have a distribution, intensity and capacity for absorbtion of Carbon in the soil and in live biomass very varied, in function of latitude and altitude, temperatures and rainfalls, types of soil, composition of the live vegetal biomass, systems of maintenance and exploitation etc.

The areas with grasslands have suffered important diminutions, mainly in the states in the South, East and West of Europe, because of the years more frequently with severe droughts, as well as other anthropic causes (abandonment, conversion, overexploitation, soil erosion, etc.), but it was compensated with an increase of the area enlargement with over 50% in Russian Federation and in the states in Northern Europe, which benefited of better climate conditions.

The forestry areas have known an increase dynamics towards 1995 by 2 % at the level of whole continent, but have registered cumulate losses because of fires (7%), which, in case they had not occured, could have increased forestry areas by 9 %. The growth potential has also been diminished due to intensive exploitation of wood, diseases and pests and drying of trees due to frequent pedological droughts.

From the point of view of the carbon content in live biomass per area unit, the forests in the East and West of Europe are situated on first place, and the rest of regions, inclusively the Russian Federation, are registering values of the indicator close to the Continent's average .

Let us hope, that the new"European law of the climate", within the"European Green Deal" will impose to the member states a legal framework to be respected for the reaching of the objective of reducing the CO2 emissions and that it will reach the target to make Europe neutral from the climate point of view until 2050.

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ACCESS TO WATER AND SPACE IN ROMANIAN FRESHWATER AQUACULTURE

Erzsebet OLARIU[1]

Abstract: *Aquaculture falls within the scope of the Common Fisheries Policy (CFP) using the advantage of common market organization and financial measures as in integral part of this policy. Despite all these advantages, the results obtained from European aquaculture did not live up to expectations. Given that it is necessary to protect aquatic resources in the wild, aquaculture presents a viable alternative, especially with regard to the favorable social aspect by creating jobs. The European Commission, after consultation, identifies four priority guidelines for achieving sustainable aquaculture: reducing the complexities of administrative procedures, facilitating access to space through coordinated spatial planning, increasing the competitiveness of the sector, supporting the conditions of fair competition. In terms of spatial planning the asking is to elaborate maps with spatial planning and find areas where other activities and aquaculture may coexist. This paper studies how access to space in aquaculture in Romania is works.*

Key words: *aquaculture, space, sustainable, competitiveness.*

Clasificare JEL: *Q22, Q15, Q24, Q01.*

INTRODUCTION

The branches of the fisheries sector are fishing, aquaculture, fish processing, and the marketing of fish, including products resulting from processing. According to GD 545/2010 on the organization, structure and operation of the National Agency for Fisheries and Aquaculture - NAFA develops national strategies and specific regulations in the field of aquaculture. According to GEO 23/2008 on fishing and aquaculture with subsequent amendments and completions, aquaculture has as object the growth and cultivation of aquatic organisms and has as unit the fish arrangement. According to data from the National Agency for Fisheries and Aquaculture in Romania, the area related to fisheries in production in 2019 was 80091 ha with 969 licenses and registered in the Register of Aquaculture Units. In the work Erzsebet Olariu, The economic efficiency of Romanian aquaculture in terms of resource use, presented at International Conference Competitiveness of Agro-Food and Environmental Economy, Bucharest, 2020 was presented the history, the legal regime from 1989 to 2019 and the amount of land related to aquaculture. In the work Erzsebet Olariu, The need of clarity of information which are the basis of the evidence for the state-owned land in Romania, presented at International Conference on Business Excellence 2020 it was shown that there are overlaps in records, between state ownership and administrative-territorial units, between the right of administration of state institutions, which is clarified, but requires time and resources. This paper investigates the way in which the access to the lands afferent to the fish arrangements on the Romanian territory is realized.

MATERIALS AND METHODS

The qualitative research method was used. As a methodology, the examination of data was used, using documents provided by NAFA, legislative documents, as well as direct observation of procedures and activities, field findings of facts.

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RESULTS AND DISCUSSIONS

The fish farms according to GEO 23/2008 is represented by

Representation of the fishing farms	Description
Helesteu	Fish pool performed by excavation
Pond	Fish pool made by damming a valley
Artificial breeding station	
Floating cages	Floating installation
Accumulation lakes	Where aquaculture can be practiced
Other installations	
Fishery assets	Constructions specific to aquaculture

In the Register of Aquaculture Units at the level of 2019, the land areas of 80,091 ha corresponding to the 969 licenses are divided:

Number of licenses granted	Type of fish farms	Area related to licenses - ha
728	farm	72,835
241	nursery	7,256

Source: NAFA

According to the data presented in the paper Erzsebet Olariu, The economic efficiency of Romanian aquaculture in terms of resource use, CAFEE 2020 in 1989 the land area on which fish farms were located were 105,000 ha of which 61,400 ha were coordinated by the Fish Production and Industrialization Center, 43,9 ha located on the territory of the Danube Delta were in coordination with the Danube Delta Power Plant. The 61,400 ha after passing through several state institutions in 2009 end up in the administration of NAFA. The 43,900 ha of which about 39,500 ha pass into the administration of the Danube Delta Biosphere Reserves and about 4,400 ha pass into the administration of the Tulcea County Council and the Local Councils in the area. Of the 43,900 ha in 2019, about 20,500 ha were used for fishing purposes, the difference in land being used for cultivating cereals, pastures or they were invaded by reed vegetation.

As property types regarding the lands afferent to the fish arrangements at the level of 2019, there is the state property, mostly in the administration of NAFA or National Administrations Romanian Waters -NARW, the property of the administrative-territorial units and the private property different from that of the state.

In the paper Erzsebet Olariu, The need for clarity of information which are the basis of the evidence for the state-owned land in Romania, presented at ICBE 2020 showed that in 2019 there are still litigious situations, unfinished restitutions from a procedural point of view, there are overlaps in records between the ownership of the state and of the administrative-territorial units, between the land administration right of the state institutions.

Due to the difficult development of the cadastral and tabulation processes, the high costs of measurements, but also the fact that several property titles were issued on the same land administered by the state, there is no complete evidence of the heritage arranged in aquaculture. Many litigations are still in the courts, these aspects making it impossible to register the land in the land register. The lack of a clear record of all aquaculture facilities and areas that can be used for aquaculture, complicates the process of sizing financial support for the development of aquaculture in areas and fish species that can provide the best financial, social and environmental results.[2] Regarding the areas managed by National Agency for Fisheries and Aquaculture , the situation is as follows: 31,189 ha are areas in operation, and 27,998 ha are non-leased areas. Romania also has an important fishing potential represented by the accumulation lakes. These large areas are managed by ANAR, but the ATU's are still managed. More than 20,000 hectares of reservoirs are suitable for aquaculture, and are or can be used for extensive and semi-intensive aquaculture. At the same time, from the studies

[2]PSNMA 2014 - 2020 Cap. 1.1.2.

and data resulting from the multi-annual research on the most important accumulation lakes that have favorable characteristics for the development of aquaculture, a total area of 17,426 ha has been identified in which floating aquaculture can be developed. The maximum recommended area to be used for aquaculture in floating pond system is a maximum of 10% of the total area, respectively 1,743 ha. The management by various state institutions or by ATU of the land related to aquaculture, the transfer of use being regulated by different normative acts, creates uncertainty regarding the rights of users in the medium and long term, necessary to justify the investments to be made.

Legal regulations on the environment, access to space and water:

Access	Normative act
Environment- Environmental Protection Agency- Environmental authorization	Order no.1798 / 2007 and Order no.1171 / 2018
Space- National Agency for Fisheries and Aquac. Space- National Administrations Romanian Waters	Order no. 533/2019 and Order no.1093 / 365/2017
Space-Administrative-territorial units	GEO no. 57/2019
Water – National Administrations Romanian Waters - Authorization for safe operation of dams	Order no.118 / 2002
Water - National Administrations Romanian Waters - Water management authorization	Order no. 891/2019
Aquaculture License - National Agency for Fisheries and Aquaculture	Order no. 332/2008

In order to achieve the objectives of these regulations, different conditions and validity terms are provided.

According to data from the official website of the European Union Aquaculture Fisheries (@europa.eu), in 2019 at European level almost 20% of total fish production was provided by aquaculture, a percentage that has remained constant in recent years while global fish production in aquaculture has increased by 7%. One of the priority areas for action set by the European Commission on aquaculture is to improve access to space and water, in order to increase fish production at European level. In Romania, the quantity of fish for consumption obtained from aquaculture, at the level of 2019, was 12,848 tons, according to the data estimated until this date, representing about 45% of the total fish production in Romania. From the point of view of cultivated species, the aquaculture of 2019 is still dominated by the units that practice the cultivation of cyprinid species, some in combination with predatory species (catfish, pikeperch, etc.) followed by trout trout dominated by rainbow trout.

On 19 December 2019, the European Commission presented the European Green Pact, a plan to transform the EU economy into a sustainable economy. Its goal is for Europe to become the first climate-neutral continent by 2050. This goal is possible by turning climate and environmental challenges into opportunities and achieving a just and inclusive transition for all. As part of this process, the European Commission adopted on 20 May 2020 the EU Biodiversity Strategy and the Farm to Consumer Strategy. The two strategies aim to integrate biodiversity considerations into the EU's overall economic growth strategy while ensuring a healthy, fair and environmentally friendly food system. The two strategies are mutually reinforcing, bringing together nature, farmers, businesses and consumers to create a sustainable and competitive future while contributing to economic recovery. At the same time, they are designed to support and strengthen the resilience of our societies to future pandemics and threats such as climate impact, forest fires, food insecurity or disease outbreaks, including by supporting more sustainable practices for agriculture, fisheries and aquaculture and by addressing protection. wild species of fauna and flora.

CONCLUSIONS

Currently in Romania is not fully resolved cadastral records and tabulation of land owned by the state and owned by administrative-territorial units, which has prevented the possibility of using European funds and created difficulties for fish farms to meet market requirements. Differences between aquaculture and agricultural policies, led to the transformation of the lands of some aquaculture farms into arable land, motivated by the aid received as agri-environment payments. The double taxation provided by the Fiscal Code for the concessioned lands, namely the royalty and the local tax, created dissatisfaction among the producers. Obtaining all the necessary documents to function as a producer in aquaculture is difficult and time consuming.

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DETERMINANTS FACTORS OF AGRICULTURE IN THE DANUBE DELTA AREA

RUXANDRA – EUGENIA POP [1]

Abstract: *An efficient agriculture is a basic branch of a strong economic system, regardless of the country referred to. All the more we can say this in the case of Romania, taking into account the fact that our country enjoys favorable climatic and pedological conditions for the practice of agriculture, at a high level of productivity. Agriculture is a widely debated topic both in specialized papers, published internationally and domestically, and in various national or European research projects. This is also the case of the project included in the Horizon 2020 program, COASTAL-Collaborative Land-Sea Integration Platform, financed by financing contract number 773782, in which agriculture is treated as a reference economic activity of the Danube Delta coastal area, along with rural tourism. In this paper are analyzed factors that have been delimited by specialists and operators in the field as determinants for specific agriculture in the Danube Delta area.*

Key words: *COASTAL project, Tulcea county, agriculture, rural development*

Jel classification: *Q15, Q57*

INTRODUCTION

Within the COASTAL project, funded by the Horizon 2020 program, a series of workshops were held, with different themes that reflect the economic activities of interest in the area, such as agriculture, rural tourism and rural development. All these activities are connected with activities related to the marine area, such as aquaculture or fishing. Thus, the workshop on agriculture was synthesized the opinions and perceptions of stakeholders in the field, such as farmers, representatives of local authorities, representatives of MADR, representatives of NGOs, representatives of SMEs or associations. The workshops included free discussions on the topics mentioned above, starting from five key words: water, lifestyle, climate, environmental challenges, population, policies and infrastructure. Starting from these, different variables have emerged that contribute to a greater or lesser extent to the development of agriculture in the Danube Delta area, as well as the main problems faced by locals, referring in particular to the complex bureaucracy, poorly developed infrastructure, especially water infrastructure, insufficient labor force, poorly developed logistics of farms, farmers' attitude towards the concept of association. Also, as opportunities were identified competitive advantages regarding prices, the presence of profile consultants, the possibility to access European funds or start-up programs.

Starting from all this, in this paper we will analyze various variables of interest, such as: farmers' cooperation, legislation, integrated production, irrigation, animal husbandry, labor, population and others, referring to Tulcea County.

MATERIALS AND METHODS

The following main working methods will be used to perform this paper:

- dissemination of existing information in the specialized, domestic and international literature of interest;
- quantitative and comparative analysis of statistical data provided by the National Institute of Statistics on both the agricultural sector in Tulcea County (average yields recorded in main crops, average fruit production, livestock, agri-environment indicators), as well as data on social components affecting the agricultural sector in the ibteres area for the project.

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RESULTS AND DISCUSSION

Following the analysis of the existing data on the website of the National Institute of Statistics, we can draw an overview of the agricultural sector of Tulcea County, relating it to the South East region of the country.

Regarding the average productions registered for the main crops cultivated in our country, on the territory of Tulcea county, we centralize the data obtained in table 1, between 2015 and 2019.

Table 1 – Average production registered at the main crops, at the level of Tulcea county and at the level of the South-East Region (kg / hectare)

Region/County	***2015***	***2016***	***2017***	***2018***	***2019***	***Average value***
Grain cereals						
South East Region	*3462*	*4024*	*5206*	*6162*	*5117*	***4794,2***
Tulcea County	*3428*	*3715*	*5019*	*5728*	*3580*	***4294***
Percentage Tulcea County(%)	***99,02***	***92,32***	***96,41***	***92,96***	***69,96***	***89,57***
Wheat and rye						
South East Region	*3701*	*4201*	*5057*	*5093*	*4568*	***4524***
Tulcea County	*3618*	*4063*	*4704*	*4587*	*3710*	***4156,4***
Percentage Tulcea County(%)	***97,76***	***96,72***	***93,02***	***90,06***	***81,22***	***91,43***
Barley						
South East Region	*3335*	*4015*	*4230*	*4473*	*4213*	***4053,2***
Tulcea County	*3328*	*3617*	*4231*	*3975*	*3409*	***3722***
Percentage Tulcea County(%)	***99,79***	***90,09***	***100,02***	***88,87***	***80,92***	***91,58***
Oat						
South East Region	*1944*	*2085*	*2335*	*2366*	*2378*	***2221,6***
Tulcea County	*1666*	*2001*	*2130*	*2163*	*2074*	***2006,8***
Percentage Tulcea County(%)	***85,70***	***95,97***	***91,22***	***91,42***	***87,22***	***90,33***
Corn grain						
South East Region	*3313*	*3939*	*5859*	*7991*	*6012*	***5422,8***
Tulcea County	*3067*	*3232*	*6345*	*8820*	*3573*	***5007,4***
Percentage Tulcea County(%)	***92,57***	***82,05***	***108,29***	***110,37***	***59,43***	***92,34***
Beans						
South East Region	*1098*	*1064*	*1384*	*1387*	*1186*	***1223,8***
Tulcea County	*1019*	*714*	*1071*	*1072*	*961*	***967,4***
Percentage Tulcea County(%)	***92,81***	***67,11***	***77,38***	***77,29***	***81,03***	***79,05***
Sun flower						
South East Region	*1641*	*1908*	*2999*	*3166*	*2622*	***2467,2***
Tulcea County	*1541*	*1809*	*2772*	*3451*	*2156*	***2345,8***
Percentage Tulcea County(%)	***93,91***	***94,81***	***92,43***	***109,00***	***82,23***	***95,08***
Rape						
South East Region	*2469*	*2634*	*2554*	*2360*	*1980*	***2399,4***
Tulcea County	*2423*	*2790*	*2461*	*2232*	*1468*	***2274,8***
Percentage Tulcea County(%)	***98,14***	***105,92***	***96,36***	***94,58***	***74,14***	***94,81***
Linen for oil						
South East Region	*1641*	*1650*	*1610*	*1719*	*1300*	***1584***
Tulcea County	*1573*	*1501*	*1589*	*1602*	*1129*	***1578,8***
Percentage Tulcea County(%)	***95,86***	***90,97***	***98,70***	***93,19***	***86,85***	***93,36***

Potatoes - total						
South East Region	*10996*	*10294*	*16479*	*15688*	*14224*	***13536,2***
Tulcea County	*8681*	*5845*	*18596*	*16352*	*14920*	***12878,8***
Percentage Tulcea County(%)	***78,95***	***56,78***	***112,85***	***104,23***	***104,89***	***95,14***
Tomatoes						
South East Region	*20193*	*22168*	*21340*	*22924*	*21752*	***21675,4***
Tulcea County	*11838*	*8841*	*9540*	*10323*	*10070*	***10122,4***
Percentage Tulcea County(%)	***58,62***	***39,88***	***44,70***	***45,03***	***46,29***	***46,70***
Onion						
South East Region	*12842*	*12384*	*12624*	*11516*	*11763*	***12225,8***
Tulcea County	*11591*	*10255*	*11001*	*9749*	*9443*	***10407,8***
Percentage Tulcea County(%)	***90,26***	***82,81***	***87,14***	***84,66***	***80,28***	***85,13***
Dried garlic						
South East Region	*5490*	*4941*	*5371*	*5687*	*5434*	***5384,6***
Tulcea County	*4131*	*3218*	*3765*	*4908*	*4811*	***4166,6***
Percentage Tulcea County(%)	***75,25***	***65,13***	***70,10***	***86,30***	***88,54***	***77,38***
Cabbage						
South East Region	*21851*	*19480*	*20996*	*23156*	*21802*	***21457***
Tulcea County	*18563*	*13840*	*14851*	*18506*	*17561*	***16664,2***
Percentage Tulcea County(%)	***84,95***	***71,05***	***70,73***	***79,92***	***80,55***	***77,66***
Pepper						
South East Region	*12212*	*12104*	*13572*	*14378*	*13083*	***13069,8***
Tulcea County	*8560*	*6660*	*9424*	*10642*	*10150*	***9087,2***
Percentage Tulcea County(%)	***70,09***	***55,02***	***69,44***	***74,02***	***77,58***	***69,53***

Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

Thus, we note that, in the analyzed period 2015-2019, the average production per hectare, in most of the analyzed crops was characterized by a generally increasing trend, with slight decreases recorded in 2019. We also note that in terms of agricultural, Tulcea county is an important county for the South-East of the country, taking as a reference the average production per hectare, which in most cases reaches the yields achieved in the entire region. Lower average yields compared to those recorded in the region are found in tomatoes, potatoes and peppers, and higher in all types of cereals, rape and sunflower.

In table 2, we present similarly to table 1, the average production recorded for fruits, taking as interval the period 2015-2019.

Table 2 – Average production registered at the main fruits, at the level of Tulcea county and at the level of the South-East Region (kg /tree)

Region/County	***2015***	***2016***	***2017***	***2018***	***2019***	***Average value***
Total fruits						
South East Region	*16*	*15*	*13*	*22*	*19*	***17,00***
Tulcea County	*10*	*16*	*17*	*19*	*24*	***17,20***
Percentage Tulcea County(%)	***62,50***	***106,67***	***130,77***	***86,36***	***126,32***	***102,52***
Plums						
South East Region	*16*	*14*	*12*	*25*	*22*	***17,80***
Tulcea County	*10*	*14*	*16*	*28*	*33*	***20,20***
Percentage Tulcea County(%)	***62,50***	***100***	***133,33***	***112***	***150***	***113,48***
Apples						

South East Region	*19*	*16*	*12*	*21*	*19*	***17,80***
Tulcea County	*19*	*18*	*17*	*31*	*24*	***20,20***
Percentage Tulcea County(%)	***100***	***112,5***	***141,66***	***147,61***	***126,31***	***125,28***
Pears						
South East Region	*17*	*18*	*14*	*18*	*16*	***16,60***
Tulcea County	*15*	*17*	*27*	*28*	*23*	***22***
Percentage Tulcea County(%)	***88,24***	***94,44***	***192,86***	***155,56***	***143,75***	***132,53***
Peaches						
South East Region	*14*	*14*	*14*	*16*	*10*	***13,60***
Tulcea County	*21*	*21*	*19*	*7*	*21*	***17,80***
Percentage Tulcea County(%)	***150***	***150***	***135,71***	***43,75***	***210***	***130,88***
Nectarines						
South East Region	*10*	*24*	*39*	*14*	*14*	***20,20***
Tulcea County	*21*	*22*	*21*	*21*	*21*	***21,20***
Percentage Tulcea County(%)	***210***	***82,05***	***108,29***	***110,37***	***59,43***	***114,03***
Cherry and sour cherries						
South East Region	*15*	*15*	*12*	*17*	*14*	***14,60***
Tulcea County	*5*	*14*	*10*	*6*	*19*	***10,80***
Percentage Tulcea County(%)	***33,33***	***93,33***	***83,33***	***35,29***	***135,71***	***73,97***
Apricots						
South East Region	*11*	*15*	*16*	*16*	*13*	***14,20***
Tulcea County	*1*	*14*	*14*	*3*	*18*	***10***
Percentage Tulcea County (%)	***9,09***	***93,33***	***87,50***	***18,75***	***138,46***	***70,42***
Nuts						
South East Region	*19*	*20*	*23*	*29*	*25*	***23,20***
Tulcea County	*21*	*27*	*32*	*27*	*12*	***23,80***
Percentage Tulcea County(%)	***110,53***	***135,00***	***139,13***	***93,10***	***48,00***	***102,59***

Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

The yield trend obtained for fruit production between 2015 and 2019 is increasing in the case of plums and walnuts, and decreasing in the case of peaches and nectarines. At the total level of yields recorded in fruit production, we notice that at the regional level the yields improved slightly, while at the county level, the positive changes are much more significant, in the sense that in 2015 the yield was around 10 kg of fruit / tree, and in 2019, it registers the value of 24 kg of fruit / tree. In most of the cases, the yields registered on the territory of the county are higher than those registered at the level of the region, except for apricots, cherries and sour cherries.

Regarding the livestock sector in the South-East region of the country and Tulcea County, following the analysis of statistical data, table 3 is presented.

Table 3 – Livestock numbers per 100 hectares, in Tulcea County and in the South-East Region (number/100 hectare)

Region/County	***2015***	***2016***	***2017***	***2018***	***2019***	***Average value***
Cattles						
South East Region	11,1	10,7	11,1	11,1	10,5	10,9
Tulcea County	10,7	9,8	10,8	11,4	10,9	10,72
Percentage Tulcea County (%)	96,40	91,59	97,30	102,70	103,81	98,35
Cows, buffaloes and heifers						
South East Region	6,2	6,5	6,7	6,8	6,2	6,48
Tulcea County	4,8	5,2	5,2	5,5	4,9	5,12

Percentage Tulcea County (%)	77,42	80,00	77,61	80,88	79,03	79,01
Swine						
South East Region	42	40,7	41,3	26,2	27,5	35,54
Tulcea County	39	35,7	36,7	6,9	5	24,66
Percentage Tulcea County (%)	92,86	87,71	88,86	26,34	18,18	69,39
Sows						
South East Region	3,5	3,8	3,6	2,2	2	3,02
Tulcea County	4,4	4	3,8	0,5	0,5	2,64
Percentage Tulcea County (%)	125,71	105,26	105,56	22,73	25,00	87,42
Sheep and goats						
South East Region	134,4	140,2	148,7	161,7	157,6	148,52
Tulcea County	70,6	71,9	74,3	75,6	75,7	73,62
Percentage Tulcea County (%)	52,53	51,28	49,97	46,75	48,03	49,57
Sheep and goats						
South East Region	68,1	70,6	72,8	74,7	79,5	73,14
Tulcea County	104,1	118,7	122,3	132,5	124	120,32
Percentage Tulcea County (%)	152,86	118,70	122,30	132,50	124,00	130,07

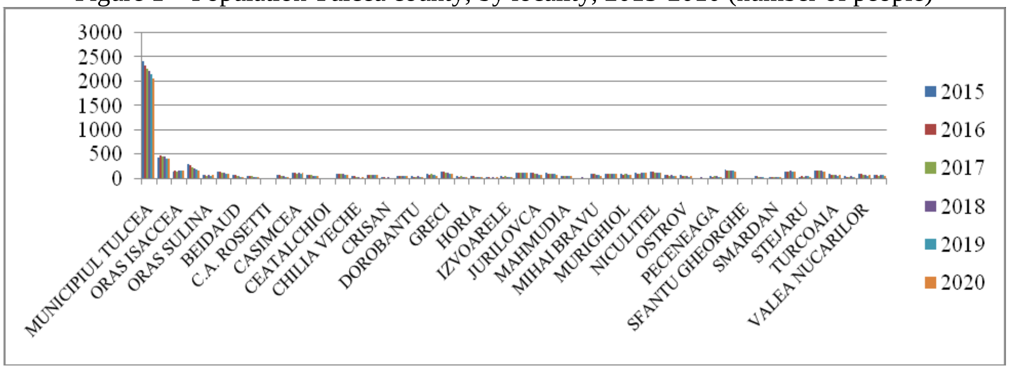
Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

Referring to the number of livestock per 100 hectares, we note that, in the case of breeding sows, sheep and goats, yields are higher than those recorded in the entire region. There were no significant changes in the analyzed time interval, although there is a slight downward trend in the number of animals per 100 hectares.

Regarding the influencing factors of agriculture, in this paper they are grouped into demographic, economic and social factors (population, active population, number of unemployed), technical and technological (fleet of tractors and agricultural machinery, land area), health or education infrastructure.

In figure 1, the population residing in Tulcea County is presented, depending on the locality, in the reference time interval 2015 - 2020.

Figure 1 – Population Tulcea county, by locality, 2015-2010 (number of people)

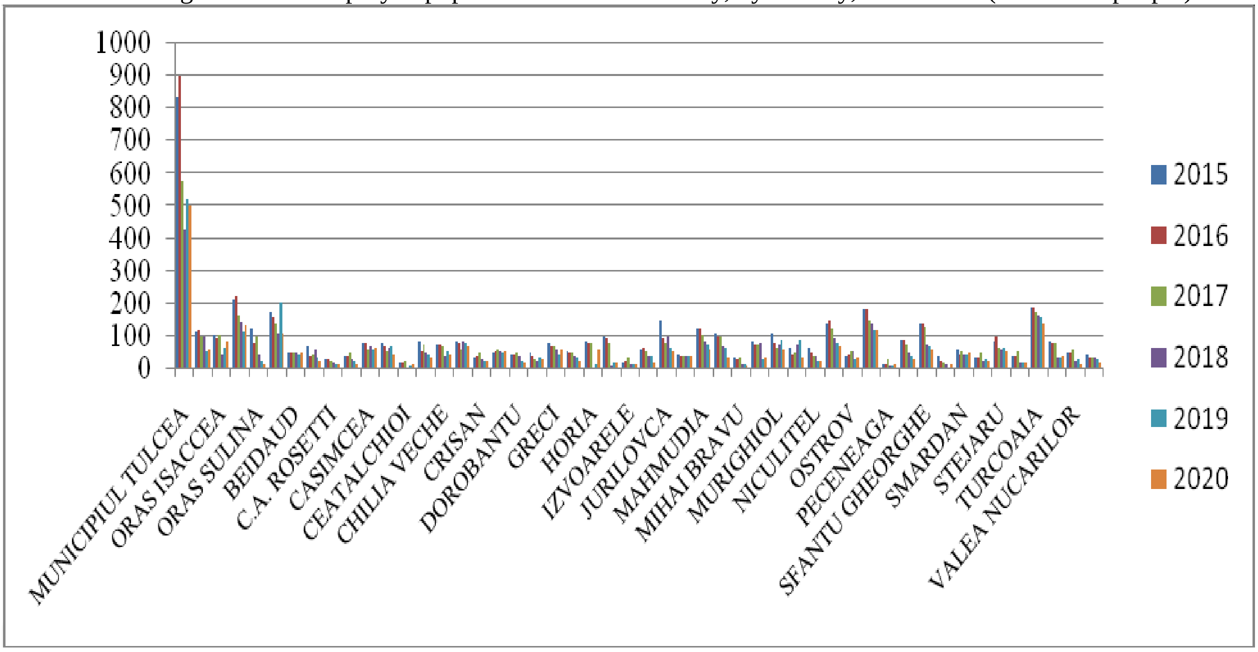


Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

Thus, the localities with the highest population in Tulcea County are Tulcea (Municipality), Babadag, Macin, Issacea. It is observed that, at county level, the population decreased, in 2015 it numbered 2421 people, and in 2020, 2074 people. Changes in the negative direction at the ends of the range are present in most localities, except for localities such as Issacea, Ceatalchioi, Daeni and Stejaru.

Figure 2 presents the number of unemployed registered with domicile in Tulcea County, depending on the locality.

Figure 2 – Unemployed population in Tulcea county, by locality, 2015-2010 (number of people)

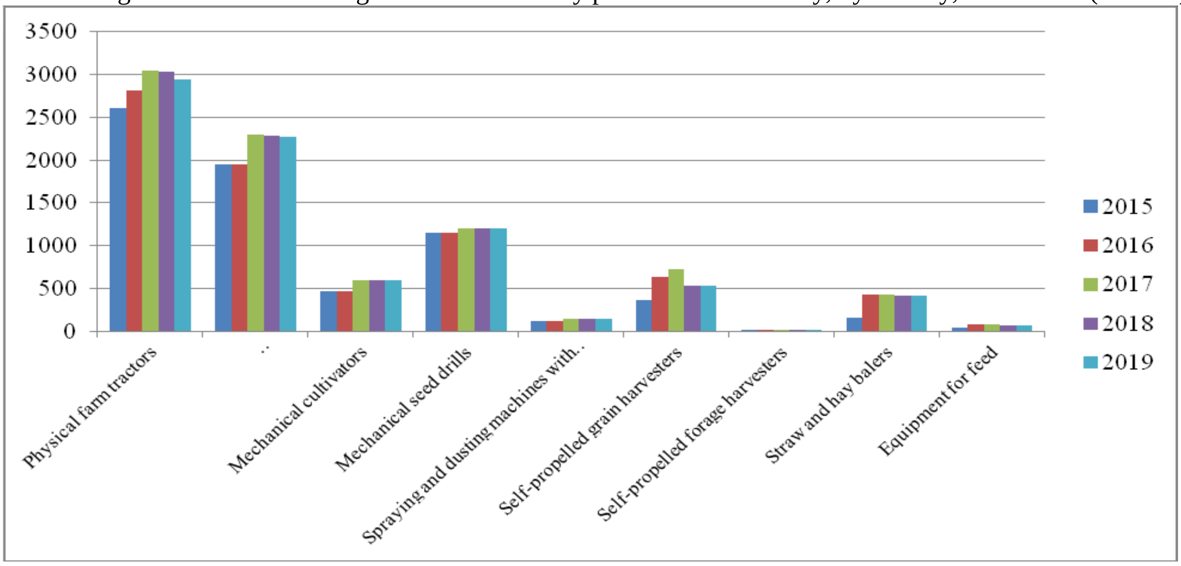


Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

Thus, we encounter a difficult situation of the inhabitants of Tulcea County. According to statistical data, it is observed that in Tulcea County, the share of unemployed is 42.82% in 2020, a percentage decreasing compared to 2015, when the share of the unemployed population reached 67.95%. However, the number of unemployed is very high.

Technological and technical factors are also factors of major influence for the level of agriculture in our country, implicitly for Tulcea County. In this sense, the number of tractors and agricultural machines that make up the fleet of domestic agricultural machinery will be analyzed. This is how figure 3 appears, which includes the number of machines from 2015-2019.

Figure 3 - Tractor and agricultural machinery park in Tulcea county, by locality, 2015-2019 (number)



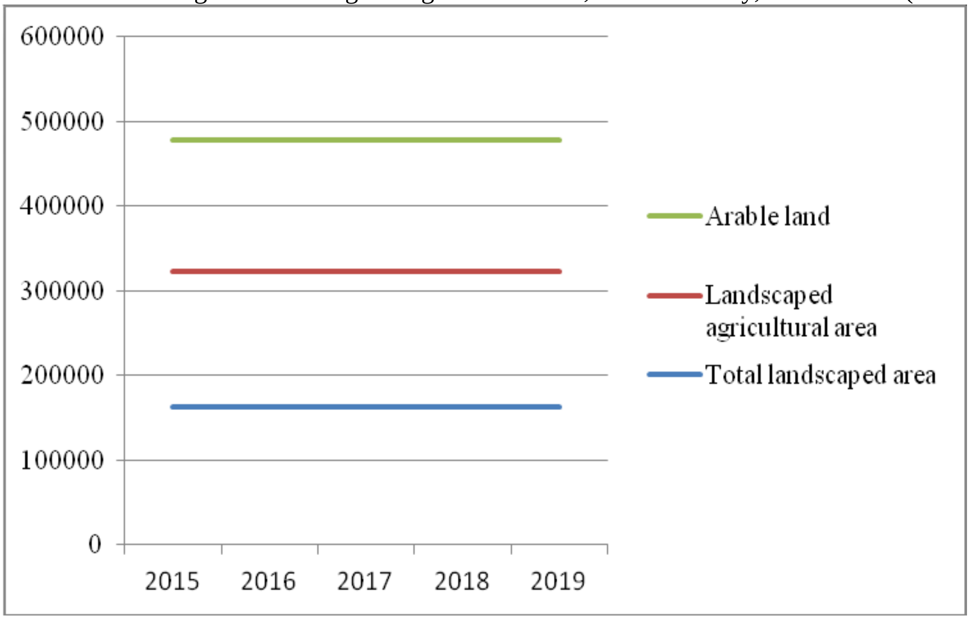
Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

There is an improvement at all categories of machinery and equipment, taking as reference the ends of the range 2015 - 2019, which is reflected in the average yields per hectare, the main crops in our country, but also the average fruit production recorded in the same interval. An explanation and at the same time a solution in this sense can be constituted by accessing the

European funds and the forms of non-reimbursable financial aid granted through the PNDR by the farmers in order to modernize the agricultural exploitations.

Another influencing factor of agriculture in the area of Tulcea County is represented by land improvements, arrangements made for irrigation, presented in Figure 4 of this paper.

Figure 4 - Land areas with irrigation and irrigated agricultural area, Tulcea County, 2015 - 2019 (hectares)



Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

During the analyzed interval, 2015 - 2019, constant values of the surfaces on which improvements were made were registered, through the arrangement of irrigations. Referring to the size of the improved areas found on the territory of Tulcea County, we can say that their share in the total profile areas within the region varies between 13.66% and 14.16%, depending on the specific areas, agricultural or arable. The weights remain constant in the period 2015-2019, due to the constancy of statistical values.

An influencing factor for the level of registered agricultural productions is represented by the quantity of chemical and natural fertilizers used in agriculture. Table 4 summarizes the statistical data on the above mentioned aspect, in the time interval 2015-2019.

Table 4 – Quantity of fertilizers used in agriculture, in Tulcea county, 2015 - 2019 (tons of active substance)

Type	*2015*	*2016*	*2017*	*2018*	*2019*
Chemical	5493	6052	6491	4456	4270
Nitrous	3296	3566	3948	2188	2092
Phosphatic	2111	2406	2440	2173	2102
Potash	86	80	103	95	76
Natural			4334	4340	49
TOTAL	10986	12104	17316	13252	8589

Source: database data processing INSSE, http://statistici.insse.ro:8077/tempo-online/

The largest amount of fertilizers was applied in 2017, followed by 2018, the trend being after 2017 descending to all categories of applied fertilizers. Greater differences are found in natural fertilizers.

CONCLUSIONS

The present paper aimed to analyze some factors determining the agricultural yield registered in Tulcea County, factors that influence the level of average agricultural production in the main crops in our country and the main types of fruits, as well as factors that influence the livestock sector, in this case the number of animals per 100 hectares. These previously mentioned factors have been mentioned over time, both in the local literature and in the various workshops organized together with stakeholders in the field, within the COASTAL project (Horizon 2020 program).

In the first part of the paper were presented the statistical data published by the National Institute of Statistics, regarding the average productions. Analyzing them, we noticed the fact that the agricultural sector of Tulcea County has seen improvements in the last period of time, more precisely the interval 2015 - 2019, 2020. We also notice that whether we refer to cereals, oilseeds, vegetables or fruits, the yields obtained on the territory of Tulcea county it is very close to the yields obtained at the level of the entire region, referring to the South-East Region, in some cases it even exceeding them. This shows the potential and necessity of investing in agricultural development and rural development, in general, of Tulcea County, trying as much as possible to revive it in all areas of interest of economic activity, referring to agriculture, rural tourism, agrotourism and others. . Homologous, the same can be said about the number of animals that amounts to 100 hectares of land, this being representative for the entire region.

In the second part of the paper were analyzed from a statistical point of view economic, demographic, technological and technical factors characteristic of Tulcea County. Thus, we can conclude the following:

- the population of Tulcea county is characterized by a decreasing trend, due to phenomena such as the aging of the population or its migration; the only localities on whose territory no negative changes were registered are Issacea, Ceatalchioi, Daeni and Stejaru;
- regarding the share of the unemployed within Tulcea county, it is high, being on average at the level of 42.82% in 2020, a percentage that decreased, if we take into account the value of the number of unemployed, when the number it reached a percentage of 60% of the total population;
- regarding the share of the unemployed within Tulcea county, it is high, being on average at the level of 42.82% in 2020, a percentage that decreased, if we take into account the value of the number of unemployed, when the number it reached a percentage of 60% of the total population;
- regarding the endowments of agricultural holdings, referring to all categories of machinery and equipment, taking as reference the ends of the period 2015 - 2019, we notice that their number has increased constantly, a possible cause being access to various forms of non-reimbursable financial support. to entrepreneurial farmers or other beneficiaries; the surface of the improved lands, through their irrigation, remained constant during the years 2015-2019, and the amount of fertilizers applied is decreasing.

Thus, after discussions with stakeholders in the field, following the analysis of statistics and literature, we can conclude that one of the biggest threats, problems facing the agricultural sector in Tulcea County is the lack of labor. However, the number of unemployed is declining, still standing at an extremely high rate of 42% of the county's population. Of course, this is also due to education, health infrastructure, job availability, seasonal nature of jobs, low incomes obtained from the provision of services compared to the level in other counties or even other countries, lack of skilled labor It is recommended that entrepreneurs and local authorities implement European programs and not only modernization and development in the community of Tulcea County, in order to develop the most important link, namely the man, the inhabitant of the Danube Delta, in this case.

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STRUCTURE AND PERFORMANCE OF THE INTERNATIONAL AGRI-FOOD TRADE – A COMPARATIVE ANALYSIS IN THE NEW MEMBER STATES

GAVRILESCU CAMELIA[1]

Abstract: *In the post-accession period, a common feature of the international agri-food trade of the new Member States was a significant increase in the volume and value of export and import flows, thus contributing to the increase in intra- and extra-Community trade. Despite these increases in total trade flows, only four of the 13 new Member States managed to record trade surpluses. This paper analyzes changes in the structure, volume, value and geographical orientation of international agri-food trade of these states, and trade performance is analyzed in terms of trade balance indicators (structure and value).*

Keywords: *agri-food trade, NMS (New Member States), trade balance*

JEL Classification: F14, Q17

INTRODUCTION

The latest EU enlargements (2004 - EU-25, 2007 - EU-27, 2013 - EU-28) have had a significant positive impact on EU agri-food trade. The value of trade has increased in real terms, keeping the EU in the top players in the world agri-food market. For all the new member states, the accession to the EU represented an extraordinary opportunity, and for Romania it meant an unprecedented expansion of its agri-food trade. The severe sanitary-veterinary and quality requirements that condition the presence on the Single Market and on international markets have been an essential incentive for the alignment of food production standards, including for new investments in processing companies in the field.

In the last two decades, which cover the pre-accession and post-accession periods, the trade policies, geographical orientation and structure of Romania's agri-food exports and imports have changed significantly. Imbalances between the actors of the agri-food supply chains have led to the emergence of areas of polarization of power in the market, and, inevitably, to important dysfunctions in the functioning of supply chains.

The expansion of Romanian trade, although very significant, was uneven in terms of exports and imports, fueling a constantly negative agri-food trade balance (with a brief exception in 2013-2014). The analysis by product groups and as a geographical orientation of trade shows significant deficits in commodities (meat, dairy products, vegetables, fruits), partially offset by significant surpluses in basic agricultural products (cereals, oilseeds), which translates into an inadequate trade structure: export of raw materials and import of processed products.

This paper aims to analyze the changes in the structure, volume, value and geographical orientation of Romania's international agri-food trade compared to some of the new neighboring Member States, as well as former countries with a centrally planned economy: Bulgaria, Czech Republic, Hungary and Poland. These elements significantly influence the presence and competitiveness of the products of the five countries studied on the EU and international markets, as well as the evolution of trade between them, taking into account that all were members of COMECON until 1991 (at the dissolution of the organization), then members of CEFTA since 1992 (Poland, Czech Republic and Hungary), respectively from 1997 (Romania) and 1999 (Bulgaria). Exit from CEFTA coincided for each of these five countries with entry into the EU.

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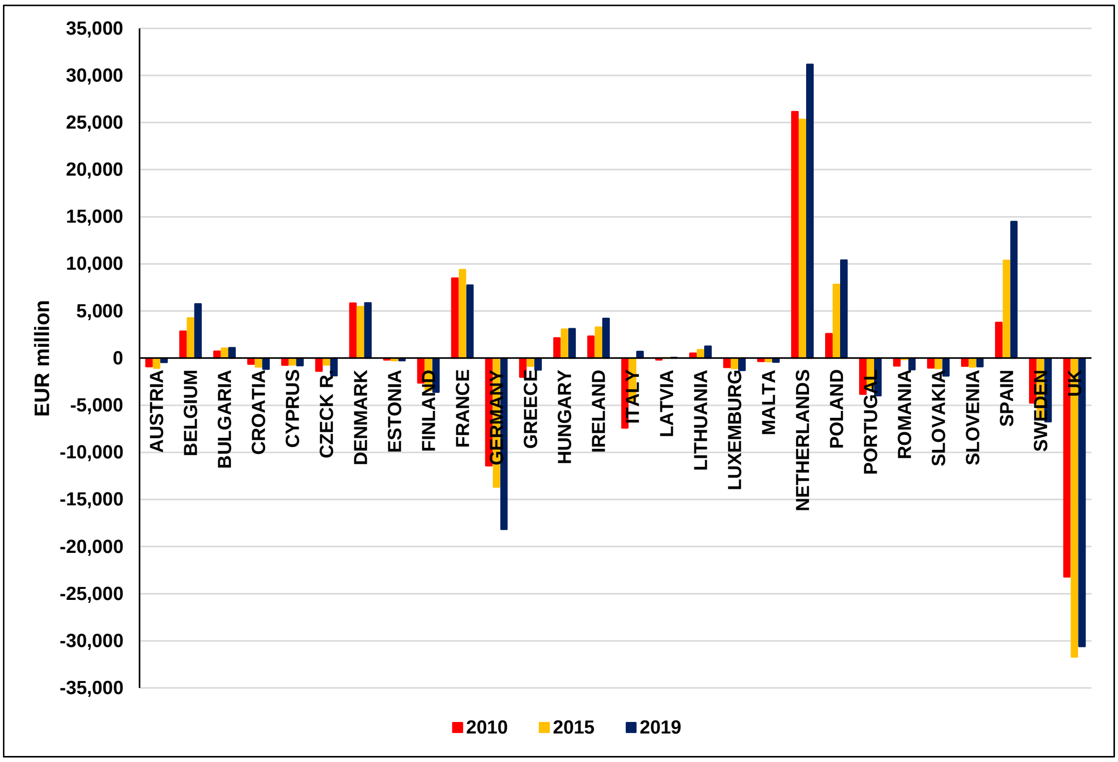
MATERIAL AND METHOD

In this paper, the analysis was made on agri-food trade flows: the value of imports and exports, and the structure by product groups of exports, imports and agri-food trade balance. For calculations, data from Comext (EU-specific trade database), included in Eurostat (HS classification, chapters 01-24) at 2 digits, were used.

RESULTS AND DISCUSSIONS

The analysis of the agri-food trade balance of EU Member States shows that in the last decade, only 10 countries have positive balances: Belgium, Bulgaria, Denmark, France, Hungary, Ireland, Lithuania, the Netherlands, Poland and Spain. (figure 1). Of these, the Netherlands stands out, with a trade surplus exceeding 30 billion euros (in 2019), double that of the next ranked (Spain). Romania is in the group of countries with agri-food trade deficit (over -2 billion euros in 2019), but far from the countries with maximum deficit - Great Britain (over -30 billion euros), respectively Germany (over -15 billion euros) all in 2019.

Figure 1 – Agri-food trade balance in EU Member States

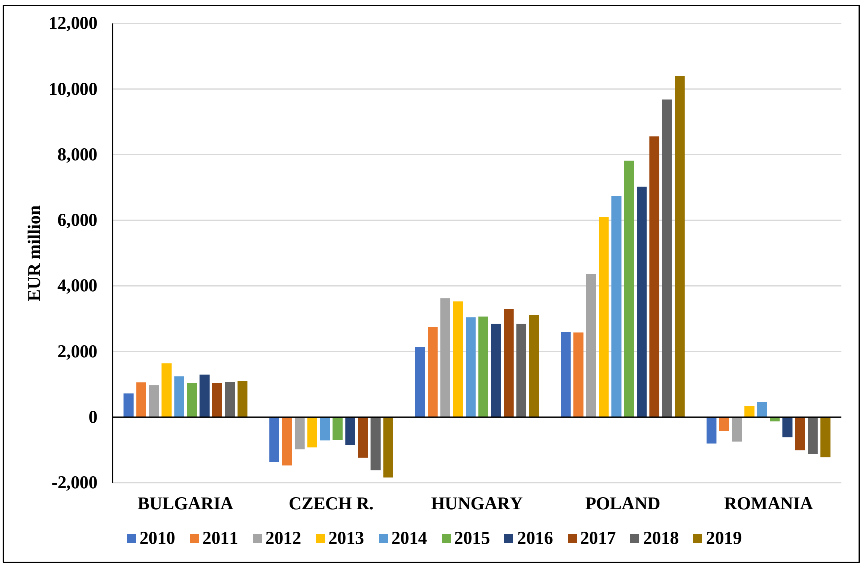


Source: calculations using Comext data

It is noteworthy that of the 13 countries that have joined the EU since 2004, only Bulgaria, Hungary, Lithuania and Poland have agri-food trade surpluses. The value of surpluses varied between 2000 and 2019 in the case of Bulgaria and Hungary (Figure 2). The surplus steadily increased in the case of Poland, while the Czech Republic and Romania showed somewhat similar variations in the trade deficit: the deficit gradually declined in the post-crisis period (2010-2015), only to increase again accentuated starting with 2016 and reaching maximum values in 2019.

Table 1 shows the dynamics of agri-food trade in the 5 new Member States studied. Compared to the last year before accession (fixed base), it is observed that Romanian exports showed the largest expansion (an increase of 8.4 times in 2019 as compared to 2006), followed by Poland, with an increase of 7.9 of the value of exports.

Figure 2 – Agri-food trade balance in 5 New Member States



Source: calculations using Comext data

Table 1 - Agri-food trade dynamics in 5 New Member States (as compared to the last pre-accession year = 1)

	2003	2006	2010	2015	2019
Romania export		1	3.6	6.9	**8.4**
Romania export		1	1.6	2.5	**3.5**
Bulgaria export		1	2.5	3.6	4.6
Bulgaria import		1	2.1	3.0	4.1
Czech R. export	1	1.8	2.7	4.8	5.0
Czech R. import	1	1.6	2.3	3.3	3.9
Hungary export	1	1.3	2.1	2.8	3.3
Hungary import	1	1.9	2.5	3.3	4.3
Poland export	1	2.2	3.4	6.0	7.9
Poland import	1	1.8	3.1	4.5	5.9

Source: calculations using Comext data

Regarding the value of imports, they increased only 3.5 times (the growth index was the lowest in the case of Romania, the lowest index among the 5 analyzed countries). Although the export growth index was much more than double the import growth index, the agri-food trade balance remained continuously negative (with a very short exception, 2013-2014).

At the time of joining the EU, Romania had a non-competitive agri-food sector, from a structural and production point of view. Romania's international trade, both general and agri-food, was also uncompetitive compared to other EU Member States, both old Member States (EU-15) and new Member States (EU-13).

Foreign and domestic capital investments in the agricultural and food sectors, as well as those made through pre-accession programs (SAPARD) and post-accession programs (NRDP - National Rural Development Programs) have resulted in significant increases in terms of volume, efficiency, and quality of agricultural and food products.

Free access to the EU Single Market has favored Romanian exports and required raising the level of food quality and safety required by EU rules. Although Romanian products have encountered various non-tariff barriers (especially in the category of phytosanitary and sanitary-veterinary ones), exports increased spectacularly in the post-accession period. At the same time, free access to the EU Single Market has allowed unrestricted access of Community products to Romanian markets, putting pressure on less developed and less competitive domestic markets. Thus, Romanian products faced on the domestic markets a significant competition of imported products, in terms of prices (lower) and quality (higher and more diversified products). It is important to mention that there has been unfair competition from counterfeit products, which are sold at very low prices and which pose problems for Romanian producers who come to market with good quality products, but at prices that reflect the quality of raw materials and compliance with standards quality.

International trade in agri-food products reflects the efficiency and competitiveness of the domestic agri-food sector. There are a number of factors that have contributed to the increase in imports and the agri-food trade deficit.

Among the factors ***intrinsic*** to the sector, we should mention:

- Inadequate structure of the agricultural production sector: small farms, lack of association, poor ability to concentrate and capitalize.
- Fracturing of agri-food chains, throughout the production / collection / processing / sales chain.
- Unfavorable structure of agricultural production: the ratio between vegetable and animal production:
- Polarized structure of the food industry: the existence of very large processing enterprises, and at the opposite pole, small, local processing units - the area of medium-sized enterprises is very poorly represented.
- The development of modern retail (supermarkets and hypermarkets) meant the increase of imports, due to the lack of concentration of supply from Romanian agricultural producers.
- Lack of coherent, simple and favorable legislation for Romanian producers.

There are also a number of ***social and demographic factors*** which in turn have contributed to the increase in imports and the agri-food trade deficit:

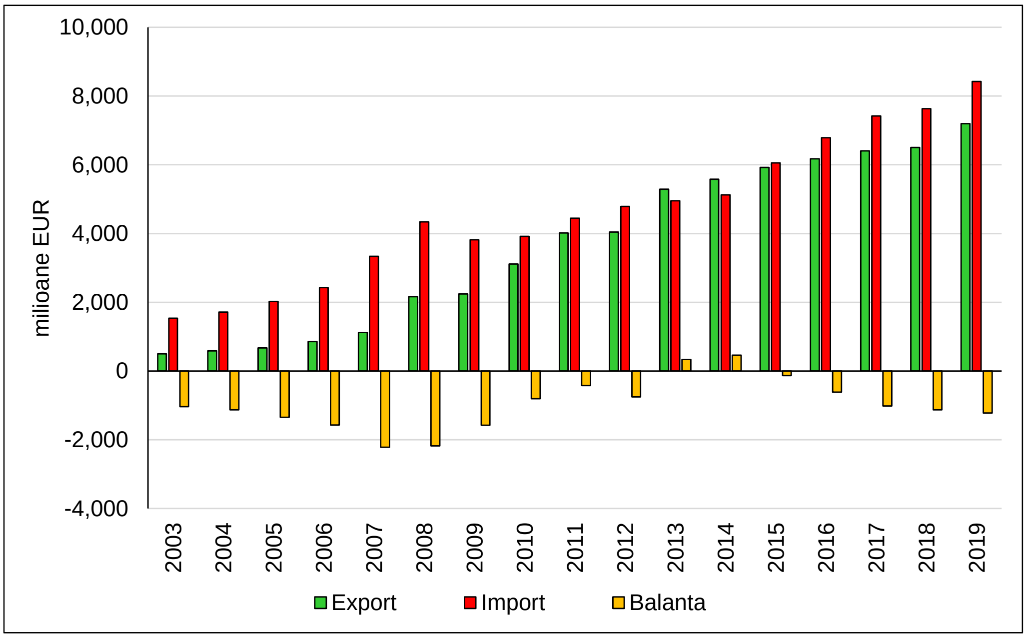
- Lack of professionalization of farmers and workers in agriculture and food industry.
- Changing in the pattern of food consumption: with the increase in household income, access to information and mobility of people, consumer demand has diversified, and refined, as increased demand for high quality products.
- De facto decline in the active and employed population in agriculture: starting from a poorly developed infrastructure and continuing with the perceived lack of opportunities in rural areas, we have witnessed in the last two decades an important phenomenon of migration (to urban) and emigration (to developed countries in the EU) of the young population (of the active age groups). To this is added the phenomenon of aging rural population.
- The increase in demand for agri-food products is also a consequence of the increase in the population's income, as well as the decrease in VAT on food products.

Figure 3 shows an overview of the total agri-food trade of Romania in the period 2003-2019. There is a steady upward trend in both the value of exports and imports. The maximum values of the trade deficit were recorded in the first two years after accession (2007-2008), when we witnessed a process of adaptation to the new "rules of the game"; similar phenomena occurred in the other new Member States immediately after their accession to the EU.

By separating the agri-food trade by major destinations / origins, the image changes. Thus, one can see that in trade with the EU, the balance has been constantly negative (over 500 million euros per year). In relation to non-EU countries, since 2010, the balance has been consistently positive. This is due to the penetration of the Mediterranean and Middle East markets, where Romania exports large quantities of cereals, oilseeds and live animals, partially compensating the trade deficit registered on the relationship with the EU (Gavrilescu et al., 2017; Gavrilescu, 2018).

Exports are mainly oriented towards the EU (their share varied between 60-79%); in the last 7 years they stabilized, around an average of approx. 66% (figure 4).

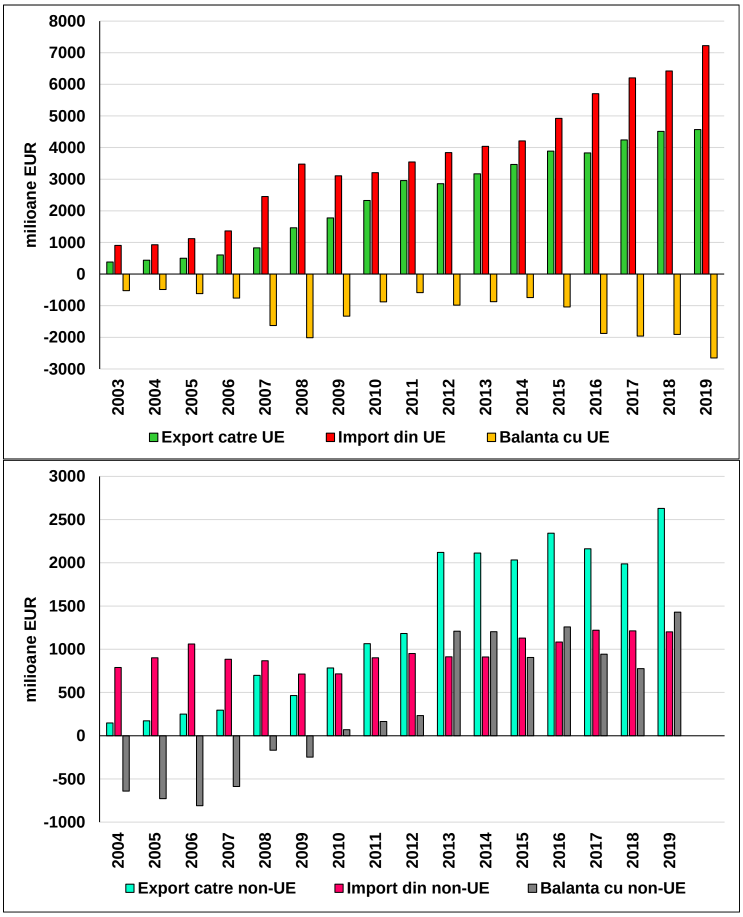
Figure 3 – Romanian total agri-food trade (2003-2019)



Source: calculations using Comext data

On the other hand, due to the principle of Community preference, the EU is the main source of imports; if before accession the share of EU imports was around 55%, after accession it increased and stabilized somewhere between 80-86% (figure 4).

Figure 4 – Romania: agri-food trade with EU and non-EU countries



Source: calculations using Comext data

In order to understand and analyze in comparison the results of the Romanian agri-food trade with those of the other (selected) new Member States, we cannot limit ourselves only to the commercial values, but we must also have an image of their agri-food sector. Table 2 presents a selection of relevant indicators for the 5 states analyzed.

Table 2 – Selected indicators – comparison among the 5 analyzed Countries

Item	Year	Bulgaria	Czech R.	Hungary	Poland	Romania
Population (1000 persons)	2019	7,000	10,649	9,772	37,972	19,414
GVA in agriculture, forestry and fishing (% of total GVA)	2019	3.7	2.1	4.1	2.5	4.5
No. of agricultural holdings, o.w.	2016	202,720	26,530	430,000	1,410,700	3,422,030
UAA < 5 ha (%)	2016	82.7	18.7	81.4	54.3	91.8
Average area per holding (ha UAA)	2016	22.0	130.2	10.9	10.2	3.7
Agriculture in % of total employment	2019	6.5	2.6	4.7	9.0	19.1
General trade balance (EUR million)	2019	2,078	13,421	5,287	27,816	-8,615
Agri-food trade balance (EUR million)	2019	1,165	-1,921	3,129	10,241	-1,183
Crop output (% of total)	2019	74.9	59.2	61.0	47.6	77.0
Animal output (% of total)	2019	25.1	40.8	39.0	52.4	23.0

Source: ec.europa – country factsheets

It should be noted first that Romania has by far the largest number of farms, not only among the 5 countries, but throughout the EU. Thus, it results in a very small average size of the farm (3.7 ha), compared to Hungary and Poland (which have an average area almost 3 times larger). We also see the largest share of small farms (less than 5 ha); Bulgaria and Hungary have a similar structure in this respect. The very large share of the population employed in agriculture should be emphasized: 19.1% in Romania, compared to 4.7% in Hungary, 6.5% in Bulgaria and 9% in Poland.

The ratio between vegetable and animal production in Romania is similar to that in Bulgaria, both countries having a predominantly vegetable (cereal) orientation of agricultural production. The largest share of animal production in Poland and Hungary is found in their meat exports.

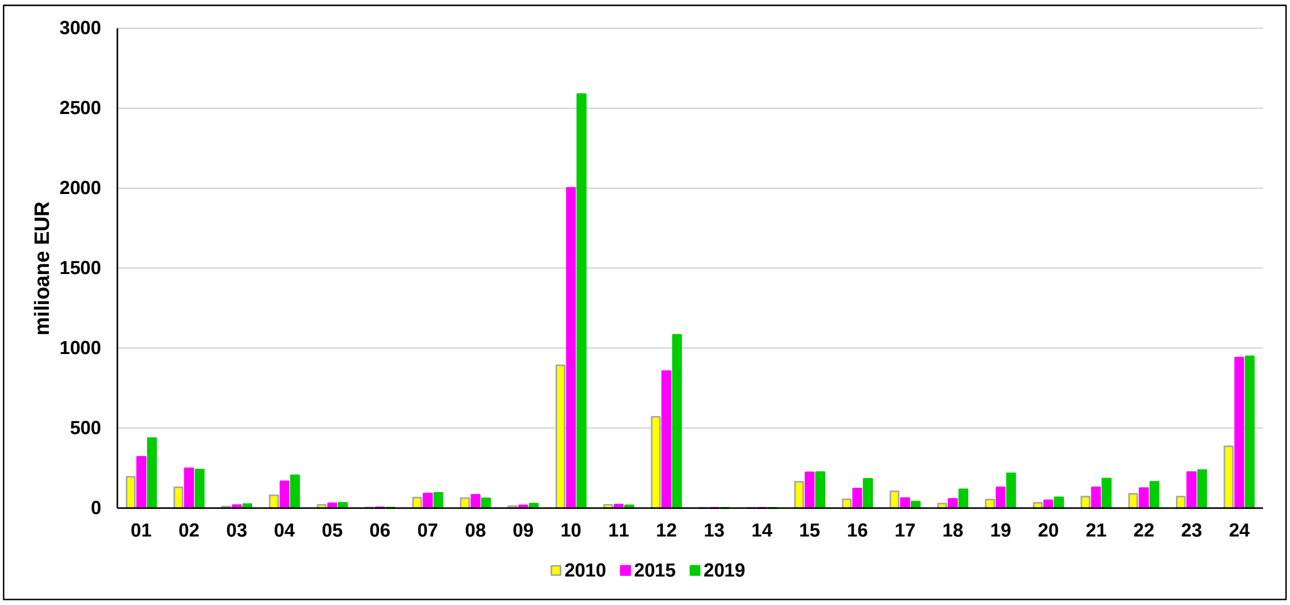
In terms of general trade, Romania is the only country analyzed that has a negative overall balance. In the agri-food trade, Bulgaria, Hungary and Poland have positive balances, while Czech Republic and Romania have negative balances.

Analyzing the structure of agri-food exports by product groups, it is observed in the case of Romania an accentuated imbalance between the product groups: massive exports of cereals (HS-10), oilseeds (HS-12), tobacco products (HS-24) and live animals (HS-01) (figure 5).

Figure 6 shows the export structures of Bulgaria and the Czech Republic, and Figure 7 shows the exports of Hungary and Poland.

Bulgaria is also a major exporter of cereals and oilseeds, while the Czech Republic has a much more diversified structure: predominant dairy products (HS-04) and food industry products (HS 15-24).

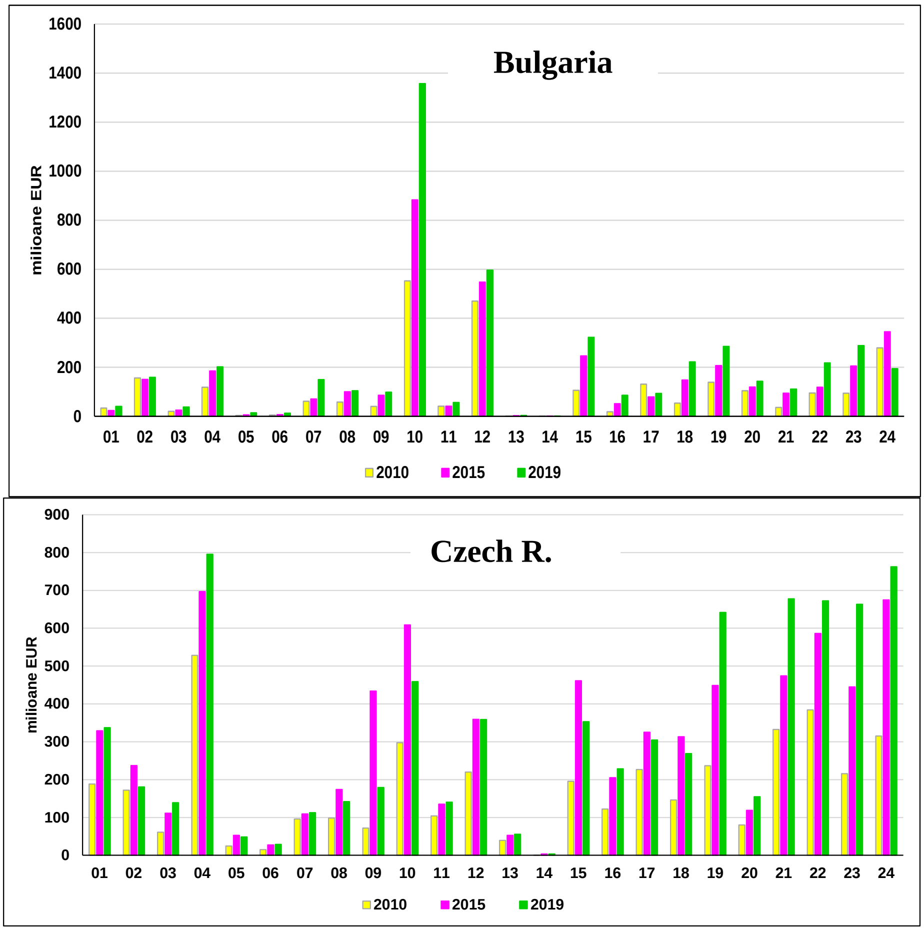
Figure 5 – Structure of the Romanian agri-food exports by product groups



Notes: chapters 01-24 in Combined Nomenclature (which include all agri-food products): **01-live animals**; 02-meat & offal; 03-fish & seafood; 04-milk, dairy products, eggs & honey; 05-other animal products; 06-live plants; 07-vegetables; 08-fruit; 09-coffee, tea & spices; **10-cereals**; 11-products of the milling industry; **12-oilseeds**; 13-lacs, gums & resins; 14-other crop products; 15-oils & fats; 16-meat & fish preparations; 17-sugar & confectionery products; 18-cocoa & cocoa products; 19-bakery & pastry products; 20-vegetables & fruit preparations; 21-miscellaneous food preparations; 22-beverages; 23-animal feed; **24-tobacco & tobacco products**.

Source: calculations using Comext data

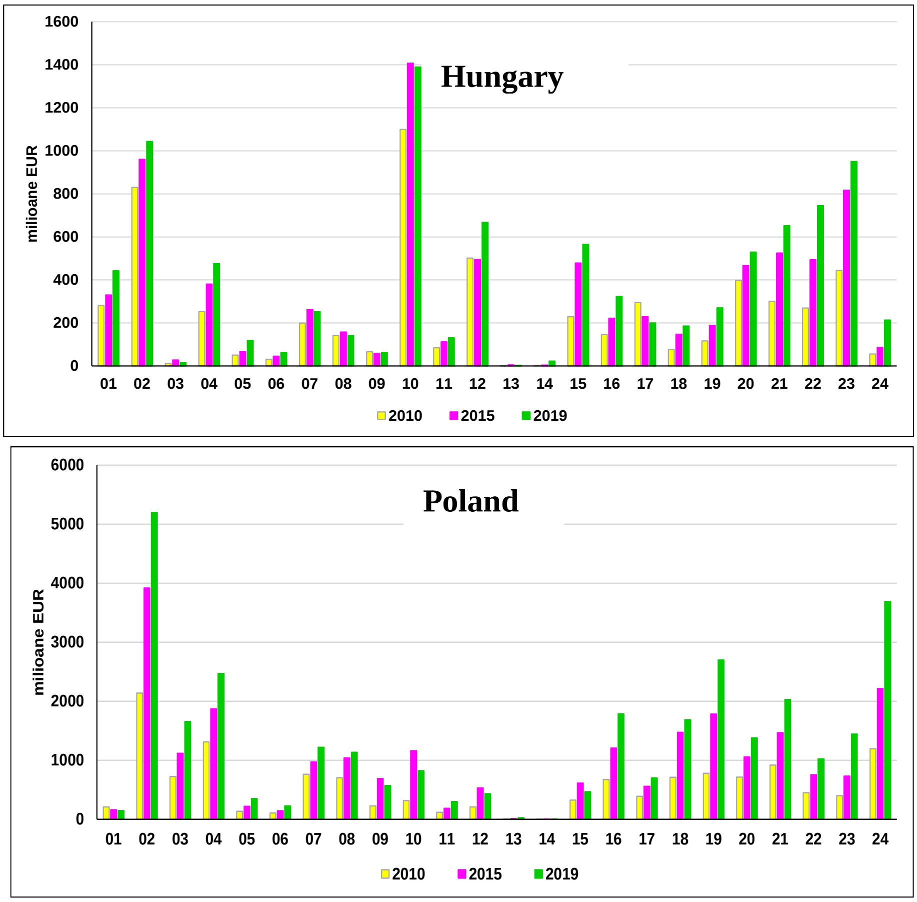
Figure 6 – Structure of the Bulgarian and Czech agri-food exports by product groups



Source: calculations using Comext data

Notes: idem figure 5

Figure 7 - Structure of the Hungarian and Polish agri-food exports by product groups



Source: calculations using Comext data

Notes: idem figure 5

Hungary is also an exporter of cereals, but also mass-exports products of animal origin: meat (HS-02), dairy products (HS-04), and processed products: canned vegetables and fruits (HS-20), various food preparations (HS-21) and wines (HS-22).

Poland's exports have a completely different structure: animal products predominate: meat (HS-02), fish (HS-03), dairy products (HS-04), and a wide range of processed products (HS 16-24). There are low exports of cereals and oilseeds.

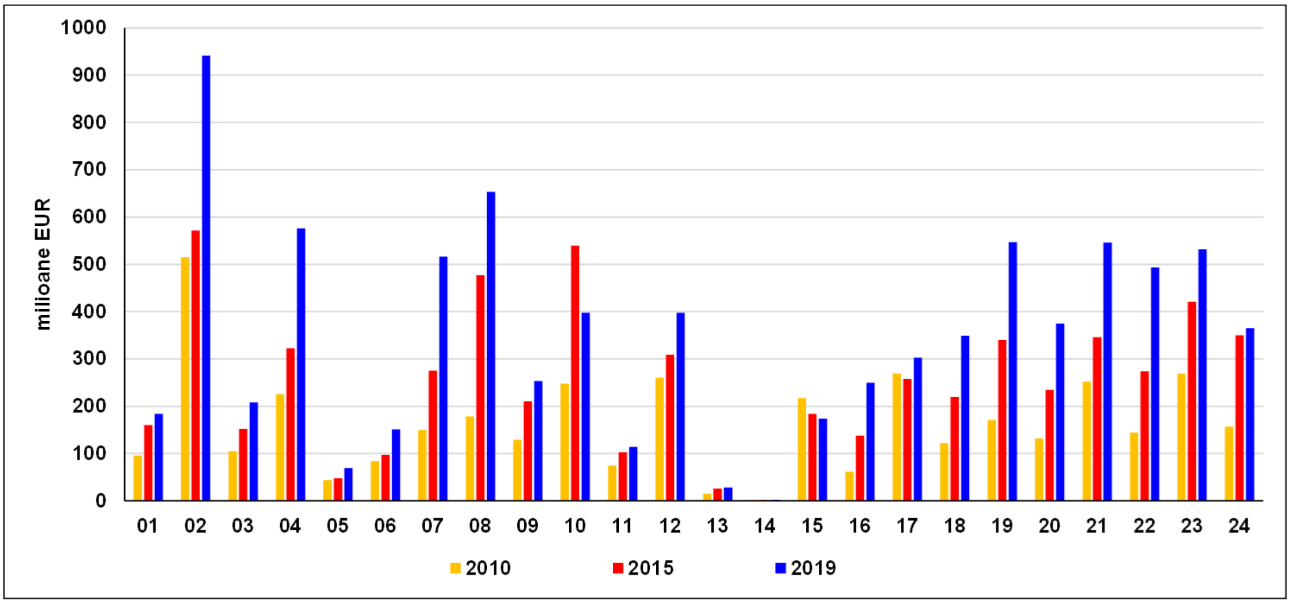
The structure of Romanian agri-food imports is much more diversified (figure 8). Imports of meat (HS-02), dairy products (HS-04), vegetables (HS-07), fruits (HS-08) predominate. Significant imports of processed products (HS-15-24) are also recorded: bakery and pastry products (HS-19), canned vegetables and fruits (HS-20), various food preparations (HS-21), beverages (HS - 22) and animal feed (HS-23), including soybean meal and pet food.

Bulgarian and Czech imports have relatively similar structures (Figure 9), with a high share of processed products, but also significant imports of meat (HS-02) and dairy products (HS-04).

Hungary and Poland also have similar import structures (Figure 10). In the case of all 5 countries, the presence of a very diverse range of imported products is observed as a common feature, as opposed to exports which are generally much more concentrated on a narrower range of products.

It should be noted that all 5 countries have high values of imports fruit and negative balances, but these results come from the high value of imports of Mediterranean (especially citrus) and tropical (mainly bananas) fruits.

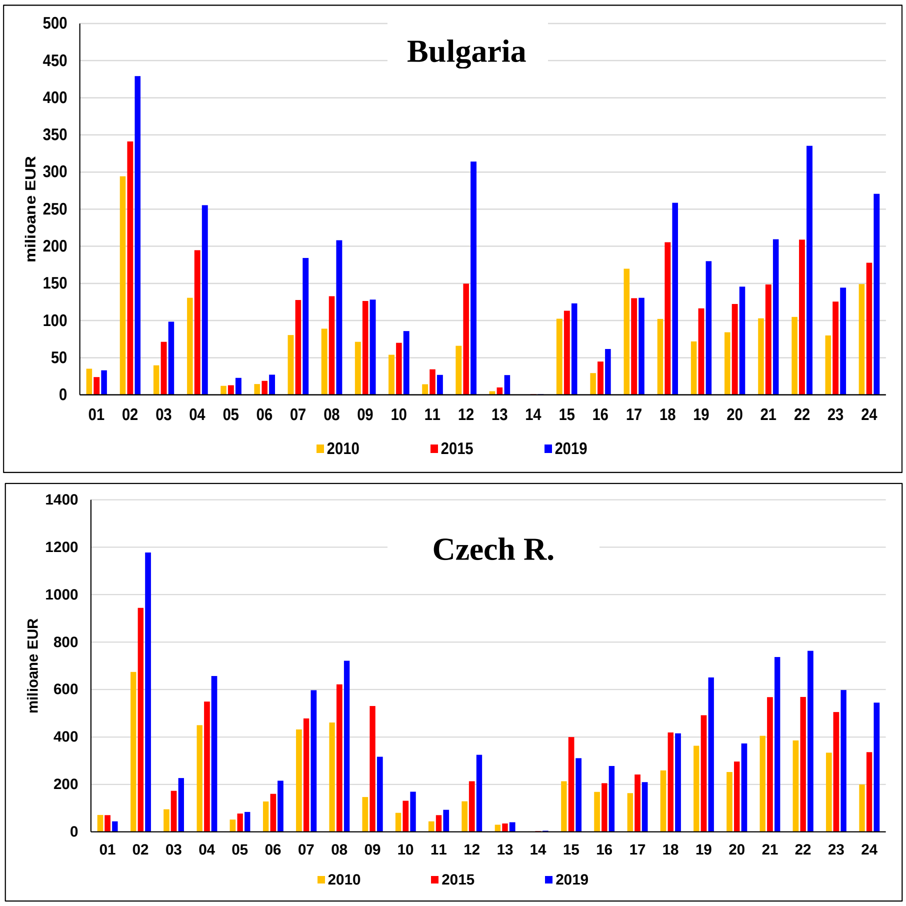
Figure 8 - Structure of the Romanian agri-food imports by product groups



Notes: chapters 01-24 in Combined Nomenclature (which include all agri-food products): 01-live animals; 02-meat & offal; 03-fish & seafood; 04-milk, dairy products, eggs & honey; 05-other animal products; 06-live plants; 07-vegetables; 08-fruit; 09-coffee, tea & spices; 10-cereals; 11-products of the milling industry; 12-oilseeds; 13-lacs, gums & resins; 14-other crop products; 15-oils & fats; 16-meat & fish preparations; 17-sugar & confectionery products; 18-cocoa & cocoa products; 19-bakery & pastry products; 20-vegetables & fruit preparations; 21-miscellaneous food preparations; 22-beverages; 23-animal feed; 24-tobacco & tobacco products.

Source: calculations using Comext data

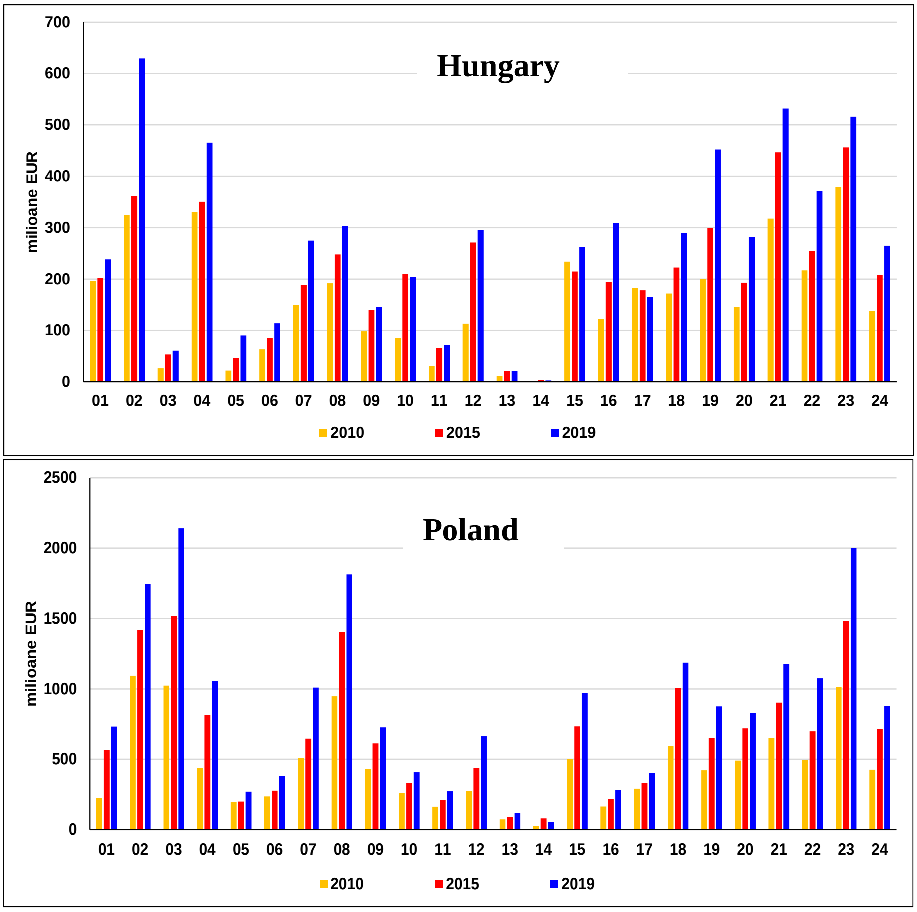
Figure 9 - Structure of the Bulgarian and Czech agri-food imports by product groups



Source: calculations using Comext data

Notes: idem figure 5

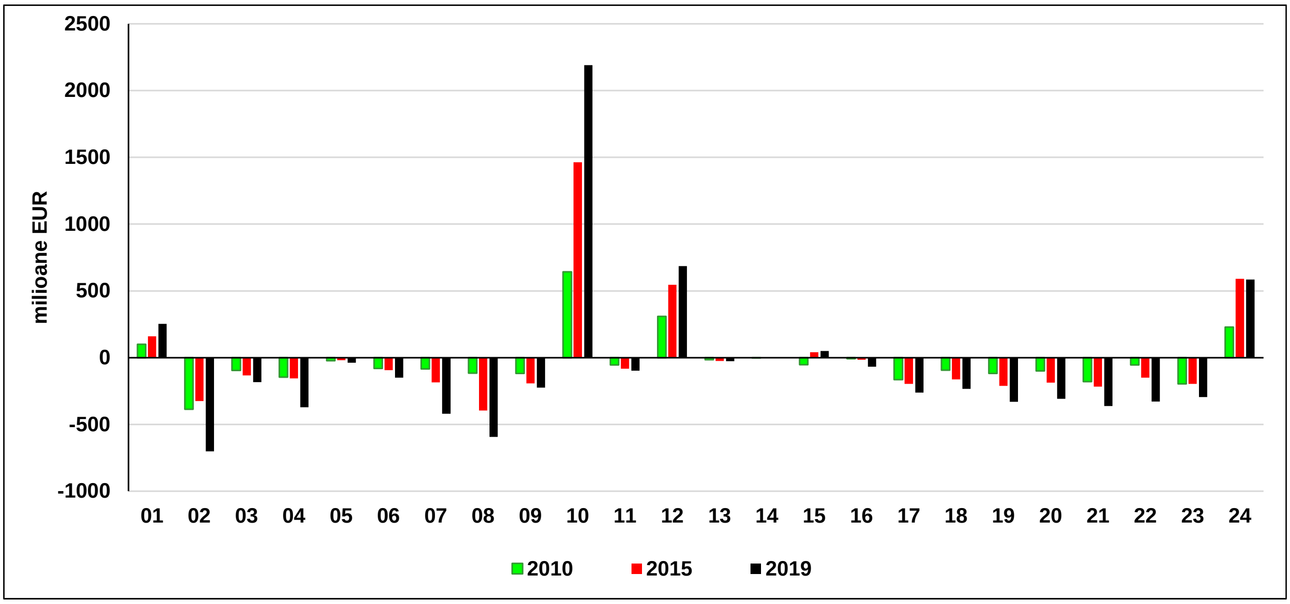
Figure 10 Structure of the Hungarian and Polish agri-food imports by product groups



Source: calculations using Comext data

Notes: idem figure 5

Figure 11 – Structure of the Romanian agri-food trade balance by product groups



Notes: chapters 01-24 in Combined Nomenclature (which include all agri-food products): 01-live animals; 02-meat & offal; 03-fish & seafood; 04-milk, dairy products, eggs & honey; 05-other animal products; 06-live plants; 07-vegetables; 08-fruit; 09-coffee, tea & spices; 10-cereals; 11-products of the milling industry; 12-oilseeds; 13-lacs, gums & resins; 14-other crop products; 15-oils & fats; 16-meat & fish preparations; 17-sugar & confectionery products; 18-cocoa & cocoa products; 19-bakery & pastry products; 20-vegetables & fruit preparations; 21-miscellaneous food preparations; 22-beverages; 23-animal feed; 24-tobacco & tobacco products.

Source: calculations using Comext data

For Romania (2019), there are 4 groups of products with a significant trade surplus: cereals (HS-10), over EUR 2.3 billion; oilseeds (HS-12), EUR 686 billion; tobacco and tobacco products (HS-24) (EUR 584 million) and live animals (EUR 253 million) (Table 3). Cumulatively, they represent over 70% of the total value of Romanian agri-food exports. This very high concentration of exports on a small group of products is unfavorable due to the vulnerability to fluctuations in international markets.

Out of 24 groups of agri-food products, Romania shows trade deficits in 19 groups, compared to only 9 groups in the case of Hungary, 11 groups in Poland, 14 groups in the Czech Republic and 16 in the case of Bulgaria.

For Romania, the largest deficits occur in meat (HS-02) (over 700 million euros), fruits (HS-08) (over 590 million euros), vegetables (EUR 420 million), dairy products (EUR 370 million), food preparations (HS-21) (EUR 362 million). Significant deficits (over 200 million euros) are observed for most processed products.

Table 3 –Agri-food trade balance by product groups (2019) – comparison (EUR million)

HS code	Product group	Bulgaria	Czech R.	Hungary	Poland	Romania
1	Live animals	7,78	292,95	203,94	-583,94	252,99
2	Meat	-269,90	-997,10	414,56	3,453,12	-701,09
3	Fish	-60,10	-87,59	-44,93	-486,00	-183,46
4	Milk & dairy	-53,52	138,87	11,18	1,413,91	-370,60
5	Other animal products	-8,00	-35,07	27,92	81,49	-37,11
6	Live plants	-14,53	-186,84	-51,89	-152,45	-148,78
7	Vegetables	-34,89	-484,20	-22,25	209,02	-420,26
8	Fruit	-103,81	-579,20	-161,29	-678,89	-592,62
9	Coffee & tea	-29,57	-137,35	-82,50	-153,51	-224,98
10	Cereals	1271,16	289,97	1185,62	416,22	2190,80
11	Milling products	29,82	47,05	59,25	27,58	-96,84
12	Oilseeds	281,96	34,33	372,27	-230,57	686,37
13	Lacs & resins	-23,46	15,12	-18,05	-91,83	-26,85
14	Other crop products	-0,27	-1,78	20,09	-51,49	-0,48
15	Oils & fats	199,53	42,84	303,71	-505,30	50,60
16	Meat preparations	24,20	-49,17	13,71	1501,91	-66,80
17	Sugar & confectionery	-37,05	95,16	35,36	296,65	-262,04
18	Cocoa & products	-36,15	-146,98	-103,84	499,34	-232,98
19	Bakery & pastry prod.	105,41	-8,76	-182,12	1,822,72	-330,71
20	Vegetable & fruit preparations	-2,89	-218,10	247,16	548,80	-307,66
21	Food preparations	-98,07	-59,70	119,77	852,91	-362,05
22	Beverages	-116,96	-91,34	374,77	-52,18	-329,26
23	Animal feed	144,02	65,77	434,73	-559,49	-295,17
24	Tobacco & products	-76,04	217,54	-51,20	2,808,64	584,35
	Total agri-food products	**1098,67**	**-1843,59**	**3105,96**	**10.386,64**	**-1224,64**

Source: calculations using Comext data

CONCLUSIONS

In the post-accession period, all 5 analyzed countries (Bulgaria, the Czech Republic, Hungary, Poland and Romania) registered a significant expansion of their agri-food trade; of all, Romania registering the largest relative increase in the value of exports (of 8.5 times in 2019 compared to 2006).

In the agricultural sector, Romania has the lowest average farm area (3.7 ha) and the largest share of employment in agriculture (19.1%), both negatively influencing productivity and efficiency.

In the trade area, Romania and the Czech Republic show negative agri-food balances, while Bulgaria, Hungary and Poland have managed to maintain positive balances in the post-accession period.

Romania's exports are very concentrated - a narrow range of products (4 product groups account for 70% of total exports), which causes a significant vulnerability to disruption of international markets. Exports consist mainly of agricultural basic products (cereals, oilseeds, live animals). The range of imported agri-food products is much wider, a feature similar to the other analyzed countries.

Regarding the agri-food trade balance, Romania has an unbalanced structure; only 5 out of 24 product groups have a positive balance, compared to at least 8 groups in the other countries.

Romania is a net importer of basic products: meat, dairy products, vegetables, fruits, processed products, while: Hungary and Poland are net exporters of meat, Poland net exporter of vegetables, Czech Republic, Hungary and Poland net exporters of dairy products, Hungary and Poland net exporters of food and canned vegetables and fruits.

The future targets of Romania's agri-food trade should be: diversification of exports; reducing the share of processed products in imports and increasing it in exports; promoting exports of high quality products (PDO, PGI, TSG), organic products and high quality wines; reduction of staple food imports.

However, these targets cannot be achieved without major restructuring in the agricultural production sector and the food industry.

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