

# STUDIES ON THE CURRENT STAGE OF THE INVESTMENTS MADE, FOR THE DEVELOPMENT OF STORAGE CAPACITIES OF FIELD CROPS PRODUCTION, THROUGH THE SUB-MEASURE 4.2 OF THE "NATIONAL PROGRAM FOR RURAL DEVELOPMENT 2014-2020", IN THE SOUTH-WEST REGION OLTENIA

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## ABSTRACT

The National Rural Development Program is a program coordinated by the Ministry of Agriculture and Rural Development, in consultation with the representatives of the organizations, organizations and social partners that have activity in this field and approved after mediations with the European Commission, being structured in measures aimed at supporting and developing rural area in Romania.

Sub-measure 4.2. - "Support for investment in the processing / marketing and / or development of agricultural products", falls within measure 4 - Investments in physical assets. This sub-measure aims to improve the competitiveness of primary producers by better integrating them into the agri-food chain through quality schemes, increasing the added value of agricultural products, promoting local markets, short supply circuits, producer groups and interprofessional organizations, facilitating diversification, setting up small businesses, and creating jobs.

This study aims to analyse the absorption of European funds in order to modernize the storage capacities, field crops production in the S-W Oltenia Region, in the period 2015-2017, their impact on the local economy.

In this paper, it is proposed to follow the dynamics of the financing of projects for the modernization of grain storage capacity by sub-measure 4.2, at the level of the South-West Oltenia Region, which have an eligible value of 8,521,062 €, and the public value is of 4,260,529 €, in relation to nationally funded projects with an eligible value of 105,057,929 €, and the public value of 55,435,303 €.

**Keywords:** storage capacity, arable land, field crops production, public funds, eligible funds.

## INTRODUCTION

The period 2015-2017 was characterised by a growing interest of the Romanian economic agents from agriculture in rebuilding and licensing a number of grain storage facilities. The interest of the Romanian farmers in developing the national seed storage capacity can be correlated with the government measures that supported this initiative from an economic point of view during the fiscal period 2007-2013, by means of the legislative regulations which have been recently issued by the Romanian officials, of the emergence of some government financial instruments meant to support the domestic

production of cereals and by complying with the Common Agriculture Policy (Stanciu, 2017).

Cereal grains are the basis of staple food in most of the developing nations, and account for the maximum postharvest losses on a calorific basis among all agricultural commodities. As much as 50%-60% cereal grains can be lost during the storage stage due only to the lack of technical inefficiency. Use of scientific storage methods can reduce these losses to as low as 1%-2% (Kumar and Kalita, 2017).

Temperature and humidity are the two important variables coupled to control the process and to preserve grain quality (Hammami et al., 2016).

During storage, economic losses due to reduction in quality and quantity of grains can become very significant. Grain loss is usually the result of its deterioration due to fungal contamination that can occur from pre harvest to post harvest stages (Mannaa and Kim, 2017).

Wheat (*Triticum aestivum*) is one of the main cereals consumed in the world and is very important for food security. Harvest time and storage may influence physical and physiological quality, and also the fungal incidence in the grains (Scariot et al., 2018).

EU funds are all financial and operative programs funded by the European Union, either in the Member States (Union Programs and instruments of the Cohesion, Agriculture and Fisheries Policies), or outside of them (pre-accession funds, other country programmes) (Andrlic et al., 2018).

An extremely important subject but often superficially approached nowadays, risk, has become a serious obstacle in the process of development and implementation of any investment project considering the fact that without the elaboration and implementation of a coherent program for an efficient way of managing risk, the intended measures won't be able to ensure protection against the negative consequences that might arise (Ion and Mocuta, 2018).

European Union has allocated important funds for the Romanian rural that account more than 8 billion Euro. The most important priorities are increasing competitiveness of the agro-food sector through investments, diversification of economy in the rural area as well as sustainable rural development (Sponte, 2018).

This money has helped raise living standards for those living in rural areas and contributed to the development of the rural economy and the whole rural space. In addition to direct investments through the NRDP, it also provided investment in services, utilities and encouraging all activities in rural areas. If only in agriculture, we can say that until now, 75,000 farmers have benefited from the funds allocated through the NRDP. The NRDP supported 2787 farms in the vegetal and animal sectors. In the rural area, 7.245 km of water supply

and sewerage network were built. The impact of the NRDP can also be measured through the prism of the 3,290 SMEs and non-agricultural ones.

Beneficiaries eligible for support under 4.2 Measure are authorized persons and legal entities registered under Romanian legislation as micro-enterprises, small and medium-sized enterprises (according to Recommendation (European Commission) No 361/2003) and other enterprises (Ministry of Agriculture and Rural Development, 2013).

## MATERIAL AND METHODS

In this paper, a statistical study was carried out to highlight the investments made under Submeasure 4.2. of the NRDP for the study period 2015-2017, regarding the projects financed for the development of storage capacity for field crops production in the counties of Dolj, Gorj, Mehedinți, Olt, Vâlcea that make up the development region South-West Oltenia.

Thus, the situation of the authorized deposits in the counties of Oltenia, the total number of selected projects, the total value of the selected projects and the public value of the projects selected in Oltenia are analysed.

Several correlations have been made, such as between the total storage capacity and the total arable land area of each county in this area. Also, a correlation was made between the total number of storage areas and the agricultural area, but also between the number of storage spaces and the total capacity of the storage spaces made through this sub-measure at this level.

A survey is made, referring to the total agricultural area related to the eligible value of the projects financed for the development of storage capacities, during the period 2015-2017, by polynomial functions. The results were processed statistically and presented in tabular and graphic form.

The methodology used for the elaboration of this paper is quantitative, represented by the secondary analysis of the data extracted from the national and European reports on the state of absorption of structural funds: Ministry of European Funds, Government of

Romania. Thus, the following types of documents were studied:

(1) Reports on the state of absorption of Structural and Cohesion Funds, on each Operational Program, Ministry of European Funds;

(2) Reporting on the status of submission and approval of projects, signing financing contracts and making payments to beneficiaries, - Authority for the Coordination of Structural Instruments (ACSI);

(3) Official Statements and Notices - Ministry of European Funds and Government of Romania.

The short-term objective of restructuring the Romanian agriculture lies in the rapid growth of agricultural production to meet consumption requirements of the population and decrease imports of agricultural products. The main long-term goal is to develop agriculture as a whole, to make it able to maximize the use of available human and material resources for best achieving its main functions, and to practice a modern, high performance agriculture system, well inserted in the European general development (Vasile et al., 2011).

This study uses the following indicators: storage capacity value, arable land value, public investment value (non-reimbursable). The value of the storage capacity in relation to the arable surface and the value of the public investment reported on the arable surface at Oltenia level were calculated using the formulas:

$$S_{cp} = \frac{\sum_{i=1}^n V_{sc}}{N_{cf}}$$

$S_{cp}$  - Storage capacity reported to the cropfields hectares;

$V_{sc}$  - The value of storage capacity;

$N_{cf}$  - Fieldcrops surface;

$N$  - Number of projects ranging from 1 to 4.

$$I_{cp} = \frac{\sum_{i=1}^n V_{pi}}{N_{cf}}$$

$I_{cp}$  - Public investment reported to the crop field;

$V_{pi}$  - The value public investment;

$N_{cf}$  - Fieldcrops surface ;

$N$  - Number of projects ranging from 1 to 4.

To highlight the correlation between **arable area and eligible value** we used:

- the Equation for the correlation coefficient:

$$r = \frac{\sum (x_i - \bar{X})(y_i - \bar{Y})}{\sqrt{(\sum (x_i - \bar{X})^2)(\sum (y_i - \bar{Y})^2)}}$$

where  $\bar{X}$  and  $\bar{Y}$  - are the averages for samples, AVERAGE (matrix1) and AVERAGE (matrix2);

- form linear and polynomial function of second degree:

Linear – linear model (simple regression):

$y = a + bx$ ;

Polynomial - the 2<sup>nd</sup> order polynomial model:  $y = a_0 + a_1x^1 + a_2x^2$ .

## RESULTS AND DISCUSSION

Like the other development regions, the South-West Development Region does not have administrative powers, its main functions being the coordination of regional development projects and the absorption of funds from the European Union. It consists of 5 counties: Dolj, Gorj, Mehedinți, Olt and Vâlcea, which form 82.4% from the Oltenia Historical Region. It ranks 7<sup>th</sup> among the regions of the country, with 1,797,633 hectares, representing 12.32% of the national agricultural area. In the SW Oltenia region there are 872,508 ha of forests, representing 12.83% of the national average, these being managed by the Forestry Directorates or belonging to the individual owners. (<http://www.dolj.insse.ro/cmsdolj/rw/pages/index.ro.do>).

The cereals are stored in authorized premises, which must ensure compliance with the conditions of storage, reception, storage and delivery to quality indices according to contracts, for marketing and / or processing for human consumption, animal feed and industrialization.

In recent times, farming turns into a more and more complicated business that requires in-depth technological knowledge, as well as certain management skills and continuously updated market information (Stefanescu et al., 2011).

The importance of storage - Although the storage space has increased in recent years, farmers claim that it is not enough now because of the imbalance of property on storage. Thus, although the storage facilities have increased strongly and seem sufficient to store all of Romania's cereal production, in fact, most of the warehouses belong to the traders and only a small part of the producers.

In the category of measures that the farmer

can take before storage are those related to cleaning the storage space, sanitation, repair, where necessary. For proper hygiene, it is recommended to apply broad spectrum insect acaricides applied by gas, spraying or aerosols. In order to improve fumigation effectiveness and address phosphine resistance concerns, fumigant concentrations and movement in a grain storage silo need to be understood (Plumier et al., 2018).

An alternative to fumigants and insecticides for controlling stored-product insects in empty grain storage bins prior to filling is heat treatment, in which the temperature is quickly raised to a minimum of 50 degrees C and held there for 2-4 h (Tilley et al., 2007).

The state of regional distribution of approved and funded projects as well as total arable land, the number of grain storage units and technical plants, the total storage capacity of cereals and technical plants are presented in the tables below.

Table 1. Situation of storage capacity and arable land in Oltenia

County	Year	Number of storage spaces	Total storage capacity (t)	Number of storage spaces	Total storage capacity (t)	Arable land* (ha)
		2015		2017		
Dolj		198	478,872	224	1,173,433	478,872
Gorj		23	79,850	26	35,700	79,850
Mehedinți		39	143,595	51	152,338	143,595
Olt		110	364,933	124	714,636	364,933
Vâlcea		25	66,273	18	64,090	66,273
South-West Oltenia		395	1,133,523	443	2,140,197	1,133,523

\*<http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table> (20.10.2018)

At the S-W Oltenia Region level, we notice an evolution in terms of the number of storage spaces, relative to the total arable area in this area. If, in 2015, the S-W Oltenia Region had a total of 395 storage sites with a quantity of 1,857,189 t in 2017, the number of storage facilities increased to 443, with a storage quantity of 2,140,197 t reported by on the total arable land of Oltenia of 1,133,523 hectares (Table 1).

Dolj county is the area with the largest arable area in this region, being 478,872 ha, in 2015 having 198 storage spaces with a storage capacity of 967,165 t, and in 2017 increasing to 224 spaces storage, with a

storage capacity of 1,173,433 t. In hierarchical order, the county of Olt has an area of 364,933 ha, which in the year 2015 had 110 storage spaces with 672,076 t and in 2017 the storage space increased to 124 with a storage capacity of 714,636 t.

Mehedinți county, ranked No. 3 at the regional level, in terms of total arable land worth 143,595 ha, which in 2015 had 39 storage spaces with a storage capacity of 111,518 t, and in the year 2017 reaches 51 storage spaces with a storage capacity of 152,338 t. Gorj county is located, with a total arable surface of 79,850 ha, which in 2015 has a number of storage spaces of 23, with a

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storage capacity of 34,540 t, and in 2017 the number of storage spaces reaches 26 with a storage capacity of 35,700 t. Regarding the Vâlcea county, with a total arable surface of 66,273 ha, there is a decrease of the storage areas, which in the year 2015 were 25, with a storage capacity of 71,890 t, and in 2017 the number of spaces storage is lowered to 18, with a storage capacity of 64,090 t (Table 1).

Using linear and polynomial formulas,

several correlations are made between the number of storage spaces, the total storage capacity and the arable land surface in the counties of S-W Oltenia.

By applying the equation for the correlation coefficient, the result was  $r=0.990$ , a value close to 1.00, where it appears that there is a correlation between the total capacity of the storage areas and the arable land area in the counties of the S-W Oltenia Region (Table 2).

Table 2. The value of correlations in Oltenia Region

Correlation	r	R <sup>2</sup> – Linear function	R <sup>2</sup> – Polynomial function grade 2
Total storage capacity - Arable land	0.990	0.981	0.995
Number of storage spaces - Arable Land	0.979	0.959	0.994
Number of storage spaces - Total storage capacity	0.992	0.985	0.988
Arable land - Eligible investment value	0.970	0.942	0.999

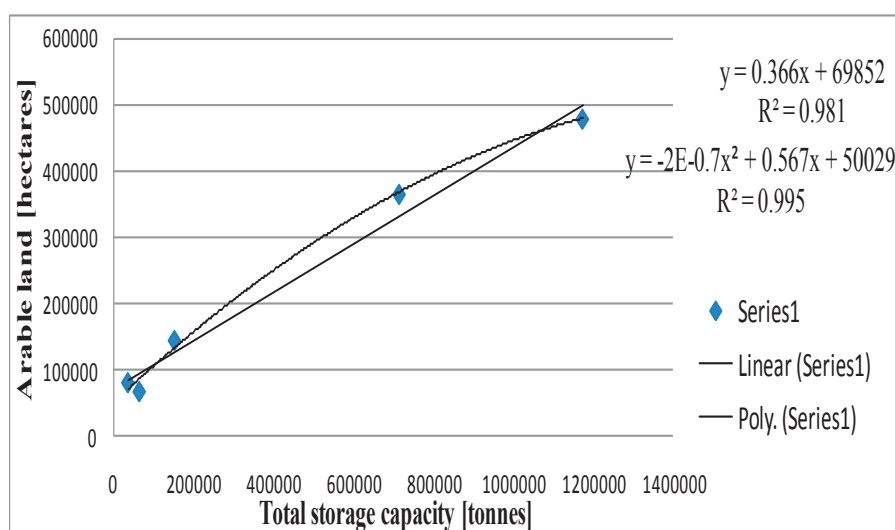


Figure 1. Correlation between total storage capacity and arable land

Applying the linear function ( $y = 0.366x + 69852$ ) and the second order polynomial function ( $y = -2E -0.7x^2 + 0.567x + 50029$ ) we obtain the results presented above (Figure 1).

Since the results by applying the linear

function ( $R^2=0.981$ ) and the second degree polynomial function ( $R^2=0.995$ ) are approximately equal to 1.00 we can say that there is a direct correlation between the total capacity of the storage areas and the arable land in the counties of the S-W Oltenia.

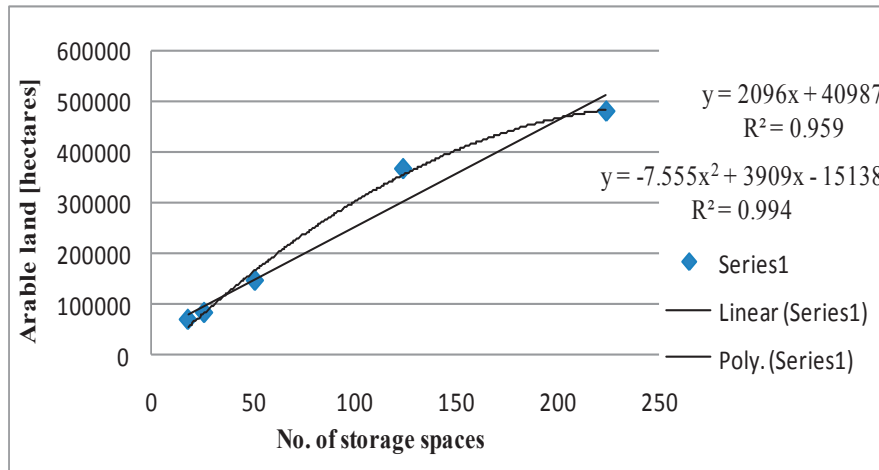


Figure 2. Correlation between the number of storage areas and arable land

By applying the equation for the correlation coefficient, the result was  $r=0.979$ , a value close to 1.00, where it appears that there is a correlation between the number of storage areas and the arable land in the counties of the S-W Oltenia Region (Table 2).

Applying the linear function ( $y = 2096x + 40987$ ) and the second order polynomial

function ( $y = -7.555x^2 + 3909x - 15138$ ) we obtain the results presented above (Figure 2).

Since the results by applying the linear function ( $R^2=0.959$ ) and the second degree polynomial function ( $R^2=0.994$ ) are approximately equal to 1.00 we can say that there is a direct correlation between the number of storage spaces and the arable land in the counties of the S-W Oltenia Region.

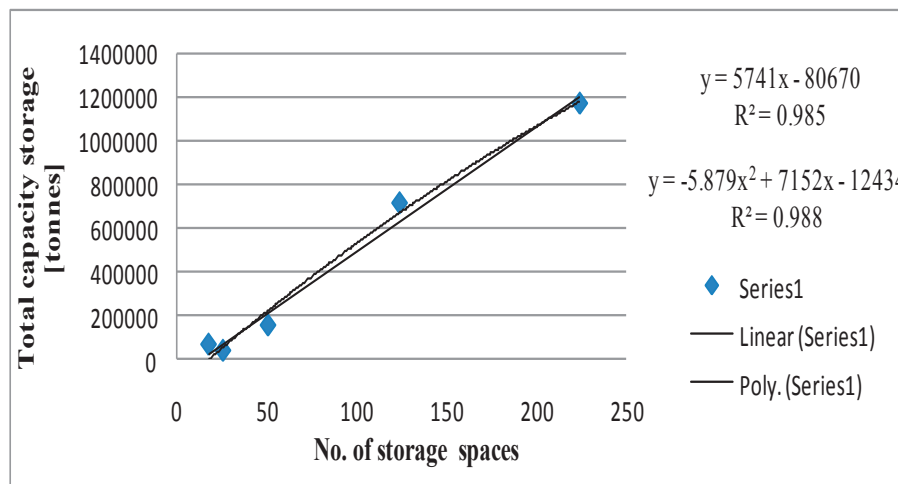


Figure 3. Correlation between the number of storage spaces and the total storage capacity

By applying the equation for the correlation coefficient, the result was  $r=0.992$ , a value close to 1.00 where it appears that there is a correlation between the number of storage spaces and the total capacity of the storage areas in the counties of the S-W Oltenia Region (Table 2).

Applying the linear function ( $y = 5741x - 80670$ ) and the second order polynomial

function ( $y = -5.879x^2 + 7152x - 12434$ ) we obtain the results presented above (Figure 3).

Since the results by applying the linear function ( $R^2=0.985$ ) and the second degree polynomial function ( $R^2=0.988$ ) are approximately equal to 1.00, we can say that there is a direct correlation between the number of storage spaces and the arable land in the counties of the S-W Oltenia Region.

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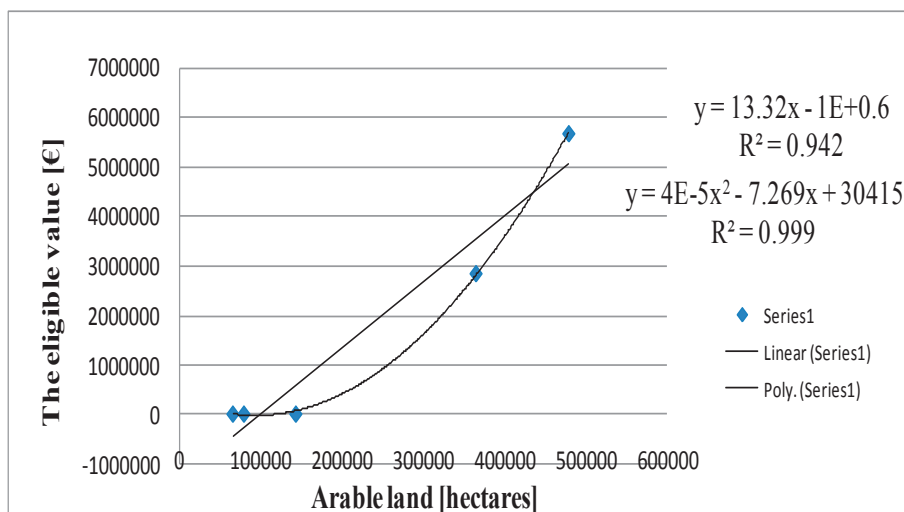


Figure 4. Correlation between arable land and eligible value

By applying the equation for the correlation coefficient, the result was  $r=0.970$ , a value close to 1.00 where it appears that there is a correlation between the arable land and the eligible value of the projects in the counties of the S-W Oltenia Region (Table 2).

Applying the linear function ( $y = 13.32x - 1E + 0.6$ ) and the second order polynomial

function ( $y = 4E-5x^2 - 7.269x + 30415$ ) we obtain the results presented above (Figure 4).

Since the results by applying the linear function ( $R^2=0.942$ ) and the second degree polynomial function ( $R^2=0.999$ ) are approximately equal to 1.00, we can say that there is a direct correlation between the arable land and the eligible value of the projects in the counties of the S-W Oltenia.

Table 3. Number of projects funded in Oltenia and at national level

Year	County					Total Region	Total National
	Dolj	Gorj	Mehedinți	Olt	Vâlcea		
2015	0	0	0	0	0	0	3
2016	2	0	0	0	0	2	30
2017	1	0	0	1	0	2	44
Total	3	0	0	1	0	4	74

We observe that in the Oltenia Region, through sub-measure 4.2, between 2015-2017, 4 projects were financed, representing 5.41% of the total number of projects financed at national level so far (74 projects), which represents very little in relation to the agricultural potential of the region, and the total number of storage areas, which are insufficient in relation to the surface and the obtained productions (Table 3).

Of the 4 projects, 3 were funded in Dolj County, two in 2016 and one in 2017, respectively one in Olt county in 2017, and in the counties of Gorj, Mehedinți and Vâlcea

there were no projects funded by the NRDP 2014-2020.

The total value of the selected projects in the S-W Oltenia Region is 8,521,062 €, representing the eligible value (8.11% by national level), and the public value being 4,260,529 €, projects financed in the period 2015-2017 (Table 4).

The total value of projects selected at national level is of 105,057,929 €, representing the eligible value, and the public value of 55,435,303 € was financed in the period 2015-2017 (Table 4).

Table 4. The total value of the selected projects in the S-W Oltenia Region (€)

Arable land Year	Value	Dolj		Gorj		Mehedinți		Olt		Vâlcea		Total V.e.	Total V.p.	Total V.e. national	Total V.p. national
	-	478,872		79,850		143,595		364,933		66,273		-	-		
2015	E	0		0		0		0		0		0		9,284,866	
	P		0	0		0		0		0		0			8,088,250
2016	E	4,954,444		0		0		0		0		4,954,444		32,848,961	
	P		2,477,221	0		0		0		0		2,477,221		17,931,460	
2017	E	722,811		0		0		2,843,807		0		3,566,618		62,924,102	
	P		361,405	0		0		1,421,903		0		1,783,308		29,415,593	
Total	E	5,677,255		0		0		2,843,807		0		8,521,062		105,057,929	
	P		2,838,626	0		0		1,421,903		0		4,260,529		55,435,303	

V.p. – public value; V.e. – eligible value; P – public value; E – eligible value;

It is noticed that in counties where European funds have been drawn up, for the development of storage capacities, there are Dolj and Olt counties. Surprisingly, in the counties of Gorj, Mehedinți and Vâlcea, there is no project funded by European funds (Table 4), because the size of the holding is a fairly important factor, and in the case of small farms the investment is not justified.

Household are in a manner of speaking small motors for a national economy and for the consumption in particular. In most cases, the way a household is managed and its basic characteristics can reflect the economic processes that occur in a specific moment in the financial and economic context and are a great measurement unit for the real standard of living within a country (Cruțeru, 2018).

From the analysis of the public data and the field investigation, in 2012 there were 511 identified agricultural cooperatives and cooperative companies operating in Romania (Bercu et al., 2014).

It can be said that the most important advantage of the farmers' association in the

form of the agricultural cooperative is for the possibility of negotiating a better price of the products for the national and international marketing. Romania is a grain-exporting country, and in recent years has seen quite a big evolution in agri-food trade with EU member states as well as third countries.

In the period 2007-2016, both cereal export and import value increased, accounting for € 2,097.2 Million export and for € 591.1 Million import (Popescu et al., 2018). The storage capacity in arable area in the SV Oltenia Region is 1.88 t/ha, and each county has the following values: Dolj - 2.45 t/ha, Gorj - 0.44 t/ha, Mehedinți - 1.06 t/ha, Olt - 1.95 t/ha, Vâlcea - 0.96 t/ha (Table 5).

The investments (eligible wave) reported on the arable land in the S-V Oltenia Region are 7.51 €/ha, only in the counties of Dolj - 11.85 €/ha and Olt - 7.79 €/ha (Table 5).

There is a very small storage average in the counties of Gorj (0.44 t/ha), Vâlcea (0.96 t/ha), Mehedinți (1.06 t/ha), these being the counties where no European money has been invested.

Table 5. Storage capacity related to arable land and Investments reported on arable land

County	Storage capacity (t)	Arable land (ha)	Storage capacity/ arable land (t/ha)	Projects No.	Investments (eligible value) [€]	Investments (eligible value)/ arable land [€/ha]
Dolj	1,173,433	478,872	2.45	3	5,677,255	11.85
Gorj	35,700	79,850	0.44	0	0	0
Mehedinți	152,338	143,595	1.06	0	0	0
Olt	714,636	364,933	1.95	1	2,843,807	7.79
Vâlcea	64,090	66,273	0.96	0	0	0
Total S-W Oltenia	2,140,197	1,133,523	1.88	4	8,521,062	7.51



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Although the storage average in Oltenia is 1.88 t/ha and the investment average (eligible wave) is 7.51 €/ha, in the current context of new technologies and yields, it is necessary to increase the storage capacity of cereals and technical plants. European funds are sufficient, but they are not accessed by farmers, the reasons being lack of information, reluctance to associate farmers. It is worth noting that the household storage facilities are not taken into account, considering only the authorized areas of farmers and traders.

### CONCLUSIONS

The total storage capacity for the field crops production in Oltenia is 2,140,197 t, and the arable land is 1,133,523 ha, obtaining a storage average of 1.88 t/ha, therefore Oltenia does not have enough storage spaces of the harvests.

We observe an evolution in terms of number of storage spaces, relative to the total arable area in this area. If, in 2015, the South-West Oltenia Region had a total of 395 storage sites with 1,857,189 t in 2017, the number of storage facilities increased to 443, with a storage quantity of 2,140,197 t, reported from the total arable surface of Oltenia of 1,133,523 ha. This increase in the number of storage areas was mostly made by farmers' own investments.

At the level of the South-West Oltenia Region, under sub-measure 4.2 "Support for investment in the processing / marketing and / or development of agricultural products", during the period 2015-2017, 4 projects for development of storage capacities were financed, representing 5.41% of the total number of projects financed at national level so far (74 projects), in the field of storage capacity modernization, and the value of 4 projects is 8,521,062 € (8.11% by national level), reported on the arable surface of Oltenia, an average of 7.51 €/ha, which exist only in the counties of Dolj - 11.85 €/ha and Olt - 7.79 €/ha.

The eligible value of the projects financed in the South-West Oltenia Region

is 8,521,062 €, and the public value is 4,260,529 €. Although Oltenia has a fairly large agricultural area (1,113,523 ha), the projects submitted are few, compared to the national situation, where the eligible value of the projects is worth 105,057,929 €, and a public value of 55,435,303 €.

It is concluded that there is a correlation between the agricultural area and the eligible value being shown by the correlation coefficient ( $r=0.970$ ), but also by the linear function ( $R^2=0.942$ ) and the second degree polynomial function ( $R^2=0.999$ ).

In the current context of new technologies and yields, it is necessary to increase the storage capacities of field crops, European funds exist, but they are not accessed by farmers, the reasons being lack of information of farmers, reluctance to associate farmers or they consider that they do not need it.

### REFERENCES

- Andrlic, B., Sostar, M., Bodegrajac, T., 2018. *Impact of E.U. Funding on rural and regional development management*. Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Development, 18: 17-20.
- Bercu, F., Botanoiu, D., Tudor, V., Alecu, E., 2018. *Analysis of modern agricultural cooperatives activity in Romania*. Romanian Agricultural Research, 31: 367-375.
- Cruceru, Corina, 2018, *Households in Romania and their relation with the economic growth: study case for 2010-2016*. Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Development, 18: 149-154.
- Hammami, F., Ben Mabrouk, S., Mami A., 2016. *Modelling and simulation of heat exchange and moisture content in a cereal storage silo*. Mathematical and Computer Modelling of Dynamical Systems, 22: 217-220.
- Ion, Robert-Anton V., Mocuta, Dorina Nicoleta, 2018. *Risk management, a more efficient absorption method for the european structural and investment funds*. Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Development, 18: 247-254.
- Kumar, D., Kalita, P., 2017. *Reducing Postharvest Losses during Storage of Grain Crops to Strengthen Food Security in Developing Countries*. Foods, 6.
- Mannaa, M., Kim, K.D., 2017. *Influence of Temperature and Water Activity on Deleterious*

- Fungi and Mycotoxin Production during Grain Storage*. Mycobiology, 45: 240-254.
- Plumier, B.M., Maier, D.E., 2018. *Sensitivity analysis of a fumigant movement and loss model for bulk stored grain to predict effects of environmental conditions and operational variables on fumigation efficacy*. Journal of Stored Products Research, 78: 18-26.
- Popescu, Agatha., Dinu, T.A., Stoian, E., 2018. *The comparative efficiency in Romania's foreign trade with cereals, 2006-2007*. Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Development, 18: 371-383.
- Scariot, M.A., Radunz, L.L., Dionello, R.G., Toni, J.R., Mossi, A.J., Reichert, F.W., 2018. *Quality of wheat grains harvested with different moisture contents and stored in hermetic and conventional system*. Journal of Stored Production, 75: 29-34.
- Sponte, Maria, 2018. *Measures to support agriculture in the period 2014-2020*. Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Development, 18: 441-444.
- Stanciu, S., 2017. *An Analysis of the Romanian Storage Capacity for Seed Production*. Sustainable Economic Growth, Education Excellence, and Innovation Management Through Vision 2020, I-VII: 1200-1207.
- Stefanescu, S.L., Steriu, S., Dumitrascu, M., 2011. *Training centers network for agricultural advice in Romania*. Romanian Agricultural Research, 28: 271-276.
- Tilley, D.R., Casada, M.E., Arthur, F.H., 2007. *Heat treatment for disinfestations of empty grain storage bins*. Journal of Stored Products Research, 43: 221-228.
- Vasile, E., Balan, M., Mitran, D., Croitoru, I., 2011. *The restructuring of Romanian agriculture*. Romanian Agricultural Research, 28: 263-270.
- [https://portal.afir.info/Uploads/GHIDUL%20Solicitantului/PNDR2020/Standarde\\_de\\_ferma/Sisteme%20pentru%20depozitarea%20furajelor\\_by%20EC\\_WEB.pdf](https://portal.afir.info/Uploads/GHIDUL%20Solicitantului/PNDR2020/Standarde_de_ferma/Sisteme%20pentru%20depozitarea%20furajelor_by%20EC_WEB.pdf)
- <http://www.dolj.insse.ro/cmsdolj/rw/pages/index.ro.do>
- <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table>