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STUDIES ON THE CORRELATION BETWEEN EXPLOITED AREAS ALONG CROP STRUCTURE AND THE MAIN ECONOMIC-FINANCIAL INDICATORS

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Abstract

The present paper addresses a topical issue for the agricultural production sector and it is based on an economic-financial indicators analysis for a series of 17 main agricultural crops. The practical research was carried out with information and data for 10 agricultural holdings in Iași County. They operate in the vegetable production sector and have a solid commercial representation on the national market. The main indicators used in the study are: crops and shared areas for each of the 10 analyzed units, considering the relevance of crops for the national economy and economic-financial indicators relevant for the design of the production activity: turnover, profit, employes number. The reference year for which the research was carried out is 2021. The work methodology mainly uses quantitative methods and descriptive analysis, with the processing and interpretation of data that have been organized in a design configured according to the specifics of the paper. In addition, qualitative information collected through interviews is used. The results of the paper indicate the relevance of basic agricultural crops for the performance of large enterprises.

Key words**:** *production, agriculture, profit, financial indicators analysis*

INTRODUCTION

Domestic agricultural production is a pillar of general interest with relevance for the agricultural sector's contribution to economic growth [8]. Agricultural policies, national and European, support and contribute to the enhancements of the agricultural production systems. For these reasons, an analysis of the efficiency and profitability of agricultural economic units and different crop categories is necessary.

This paper proposes a quantitative analysis that uses data and information collected from agricultural production units, from the database of the Ministry of Finance [5] that indicates the most representative economic-financial indicators and from other sources of official reporting. The basic purpose of the work is to identify which are the most suitable crops from the point of view of profitability and, consequently, to proceed with the optimization of the exploited area within the agricultural holdings focused on primary production.

The economic units on which the study was carried out belong to the category of medium-large enterprises, both in terms of economic size and cultivated agricultural area.

The topic of the dimensioning of agricultural units is a specific one for Romania, given that small agricultural economic units (under 1 ha.) have been the majority for over 20 years, as a result of the fragmentation of agricultural production lands. This aspect reflected negatively on the level of competitiveness of the Romanian agricultural sector.

At the European level, especially through the update and reconsideration of the Common Agricultural Policy (2023-2027) [3], the issue of sizing agricultural production units has become of major interest, taking into account the latest requirements to promote the most sustainable production systems. Both at the national and European level, policies, strategies and work tools are adopted aimed at streamlining the activity of agricultural production units, to support their profitability and achieve market interests. The Common Agricultural Policy is the agricultural policy of the European Union which purpose is on

the one hand the sustainable growth of agricultural productivity in order to ensure food security for Union citizens and on the other hand to ensure a reasonable standard of living for agricultural producers and rural residents. (Robu et al, 2018) [9], [1].

The new Common Agricultural Policy (CAP) is dedicated to the goal of making "EU agriculture fairer, greener and more result-oriented" (EC, CAP 2023) [3]. The main aspect promoted in this matter at the European level and adopted at the national level is the approach of an agriculture based on performance. From January 2023 Member States must report their achievements every year, so that the monitoring of competitiveness and performance is more rigorous and specific. Through the new CAP 2023-2027, nine new specific objectives were launched. (National Strategic Plan 2021-2027) [4]. Among them, increasing competitiveness and increasing the degree of association are the subject of study of this paper.

The argumentation for the choice of this topic is given by the fact that national agriculture, although with an increasing performance capacity, still faces the problem of sizing agricultural units, an aspect that can decrease the expected level of performance both at the national level and at European level. Through the obtained results, it is demonstrated that large-scale agricultural holdings are productive and financially efficient and support the national economy by cultivating basic agricultural products, including for food security.

At the national level, in 2021, the turnover of agricultural enterprises increased by more than 30%, but this increase requires an analysis in correlation with other influencing factors, such as: the agricultural crops practiced, the profile of the market, agricultural productivity, etc. (Crăciun, D., 2022) [2].

The data reported by the National Institute of Statistics, following the 2020 Agricultural Census, indicate a favorable situation for the progress of national agriculture; at the beginning of 2021, 12.8 million ha of agricultural land was used in Romania. Although the number of agricultural units decreased by about 25%, the average area of a holding increased by about 28% (4.42 ha. in 2020 compared to 3.45 ha. in 2010) [7].

The decrease in the number of small holdings favors the increase in the average size of large holdings. This aspect brings advantages both for agricultural productivity and for the efficiency of the agricultural units. Farms with a used agricultural area of less than 1 ha decreased in 10 years (from 2010 to 2020) by 24.2%. From the point of view of ownership, 44.6% of the used agricultural area is owned by those who exploit it. (NIS, 2022) [6].

MATERIALS AND METHODS

The methodological organization of this paper involved the construction and use of a database that includes 10 economic units from the agricultural production sector based in Iași County.

The reference year for the analysis is 2021. Justification for working with data for this year: although information on cultivated areas is available, with full reporting for 2022, reporting for the financial year 2022 is not yet available. Instead, for the year 2021, the economic-financial indicators are officially reported: turnover, net profit, number of employees.

For the analysis we used primary data in the form of the main economic indicators and primary data on the main crops and cultivated areas by each production unit. To these are added secondary data collected by interviewing entrepreneurs and representatives of the analyzed economic units.

In order to collect information and create the database, the most representative agricultural production units in Iași County were selected, based on their market position; data were collected from the Ministry of Finance and from the accounting reporting documents of the analyzed units. The protection of personal data determined the authors of the paper to use for the 10 economic units' attributes from 1 to 10 (U1-U10), without mentioning their names.

The necessary data were collected and selected as follows: from reference documents

regarding the cultivated areas and from financial-accounting documents regarding the values of the economic-financial indicators, the technical production capacities and the sizing of the main types of crops that were chosen. To these data fields, the authors added data taken from secondary sources of information, respectively from specialized literature and from reports of: Eurostat, the National Institute of Statistics, the Ministry of Agriculture and Rural Development. The collected data was organized for the purpose of processing and analysis, and later were interpreted to be able to achieve the objectives of the study.

The main economic-financial indicators were reorganized, grouped and processed considering the areas allocated to each of the available agricultural crops.

RESULTS AND DISCUSSIONS

A preliminary overview of the 10 agricultural holdings indicates that they have exploited areas with a total size between 248.55 ha and 1,910.51 ha, the average exploited area of the 10 units being 617.6 ha. The analyzed units are part of the category of large agricultural units. By analyzing the Payments and Intervention Agency for Agriculture (PIAA) declarations with the exploited areas of the 10 agricultural holdings in 2021, it was possible to centralize the areas of all studied agricultural units.

A first important aspect noted through the organization and processing of the data is that all the analyzed agricultural units are oriented towards the most efficient use of the available agricultural land for the purpose of exploitation through basic crops. The 17 essential crops for agricultural production and other forms of optimal land use are: corn, wheat, sunflower, canola, soybean, seed lot, safflower, lucerne, forage plants, permanent grassland, temporary grassland, barley, oats, hay, triticale, sugar beet and peas.

Table 1 indicates the size areas of the 17 crops, expressed in ha, as well as the share in the total cumulative cultivated areas of the 10 agricultural units studied.

Table 1. Distribution of agricultural crops on total cultivated areas in the 10 analyzed farms - ha and %

Crt.No.	Crop	Total - ha	Crop share %
1	Corn	1,661.66	26.90
2	Sunflower	1,418.54	22.97
3	Wheat	1,054.83	17.08
4	Rape	611.51	9.90
5	Lucerne	348.40	5.64
6	Seed lot	231.04	3.74
7	Sugar beet	227.92	3.69
8	Soybean	167.64	2.71
9	Permanent grasslands	145.61	2.36
10	Barley	129.68	2.10
11	Temporary grasslands	37.32	0.60
12	Oats	33.16	0.54
13	Green peas	32.13	0.52
14	Meadows	31.45	0.51
15	Triticale	21.53	0.35
16	Forage plants	12.16	0.20
17	Sainfoin	11.45	0.19
	TOTAL	**6,176.03**	**100.00**

Source: Authors processing of primary data.

Table 1 indicates the share of the areas of the 17 agricultural crops practiced by the 10 analyzed farms.

We proceeded to present, first, the total areas, summed up for the 10 analyzed units and the ordering according to the size of the cultivated areas, with the aim of highlighting the priority crops for the selected agricultural producers in Iași County, respectively to later correlate this information with those of financial nature. Thus, from the total of 6,176.03 ha. owned by the 10 farms analyzed, corn and sunflower crops account for half of the total cultivated area (49.87%).

Given that these are basic crops for the agricultural economy of a country, it is noted that the analyzed farms contribute to the national agricultural sector improvement. Together with the 3rd crop, wheat, the total cultivated area is about 67%, i.e., almost 2/3 of the total area. Given that wheat is also a basic agricultural crop, the orientation of large producers towards these strategic agricultural crops can be confirmed. Maize, sunflower and wheat, basic agricultural raw materials for the food industry and the agri-food sector, are the most representative crops for the farms located in Iași County. In this context, we hypothesize that the profitability and economic efficiency of these crops are also high. At the opposite pole, the least representative crops are fodder plants and sainfoin with a total area of only 24 ha,

respectively less than 0.5% (0.39%) of the total cultivated area.

Another form of data organization led to the generation of Table 2, which highlights the presence of the 17 crops included in the analysis, in each of the analyzed economic units. Thus, it was followed to what extent each crop is present in each of the 10 agricultural holdings. This grouping allows the specialization on certain crops to be highlighted, which is another factor supporting productivity and profitability.

Table 2. Distribution of agricultural crops on the 10 farms analyzed (ha)

Unit / crop	Maize	Sun-flower	Wheat	Rape seed	Lucerne	Seed lot
1	163.82	-	53.89	111	20.92	3.64
2	40.78	55.79	135.88	45.06	12.50	-
3	74.99	325.96	43.29	-	-	-
4	44.50	43.73	84.07	31.70	20	-
5	130.66	92.76	119.93	135.99	69.75	227.4
6	123.59	30.91	-	-	6.68	-
7	48.43	75.97	41.15	-	106.9	-
8	27.18	81.09	54.46	42.08	13.94	-
9	415.37	374.06	210.86	-	4.21	-
10	592.34	338.27	306.80	245.68	96.49	-
Total	1,661.66	1,418.54	1,054.83	611.51	384.40	231.04

Source: Authors processing of primary data.

A data reorganization with cultivated areas indicates that the most important crops, traditionally for Romanian agriculture, wheat, maize, sunflower are cultivated by almost all 10 agricultural holdings: maize in all 10 holdings, and wheat, sunflower and lucerne in 9 out of 10 holdings. From the size area point of view, even if lucerne is cultivated in 9 agricultural units, the area is very small, so it does not have a significant weight in the total cultivated areas (384.40 ha. or 5.64%), an aspect that can be correlated with the slow dynamics of the zootechnical sector. Rape is in a similar situation: it is cultivated in 7 out of 10 holdings, but it has a limited share (611.51 ha or 9.9%).

For the other crops, the situation turns out to be quite different compared to the basic crops, which supports the hypothesis that the basic crops are profitable and accepted in the economic production activity of large-scale agricultural units.

Thus, sugar beet, soy, barley are cultivated in only 3 holdings on small areas (of 130-230 ha. or about 2.5% of the total cultivated area).

Table 2. Distribution of agricultural crops on the 10 farms analyzed (ha)- Continued (part 2)

Unit/crop	Sugar beet	Soybean	Permanent grasslands	Barley	Oat	Temporary grasslands
1	-	-	-	3.02	9.59	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	20	-	0.52	-	-	-
5	-	-	101.6	80.02	23.57	37.32
6	-	21.74	6.33	46.64	-	-
7	41.58	-	1.14	-	-	-
8	-	22.13	4.70	-	-	-
9	-	-	31.32	-	-	-
10	166.34	123.77	-	-	-	-
Total	227.92	167.64	145.61	129.68	33.16	37.32

Source: Authors processing of primary data.

The permanent grasslands are owned by 6 agricultural holdings out of the 10, but on insignificant areas (of a maximum of 100 ha.) similarly to the situation of lucerne, considering the connection with the livestock sector.

Fo the crops in Table 2 (part 3) the situation is even more relevant in the sense of the absence of these crops (peas, meadow, triticale, forage plants, sainfoin) from most agricultural units. Only meadows are found in 3 holdings out of the 10 analyzed, but on a very small area (31.45 ha.). Peas, triticale and sainfoin are exploited in only 1 farm out of 10.

Table 2. Distribution of agricultural crops on the 10 farms analyzed (ha)- Continued (Part 3)

Unit	Peas	Meadow	Triticale	Forage plants	Sainfoin
1	-	-	-	-	-
2	-	3.47	-	-	-
3	-	-	-	-	-
4	-	4.03	-	-	-
5	-	23.95	-	-	11.45
6	-	-	21.53	-	-
7	-	-	-	-	-
8	-	-	-	3.47	-
9	-	-	-	-	-
10	32.1	-	-	8.69	-
Total	32.13	31.45	21.53	12.16	11.45

Source: Authors processing of primary data.

For a more suggestive representation of the agricultural crops related to the 10 farms, in 2021, we proceeded to a grouping by crop categories (Figure 1).

As can be seen from Figure 1, the most important areas are allocated to cereal crops, followed by oleaginous crops and seed lots. Arguments for the grouping of these categories of crops within the 10 agricultural holdings with a solid position on the market

are: the physical-geographical positioning in the Moldavian Plateau, the specific pedoclimatic conditions favorable to these crops, the advantages produced by the cultivation of seed lots, given that they have a very economic efficiency raised and supported by agricultural policies and strategies.

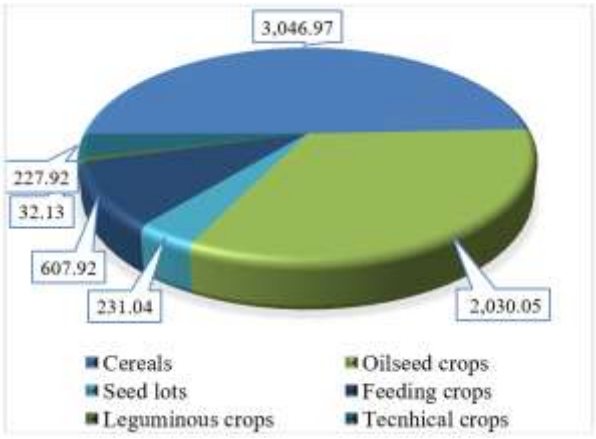

Fig. 1. Area share for every crop category of the 20 crops of all the 10 units - ha.
Source: Authors processing of primary data.

Thus, of the total exploited area of 6,176.03 ha., almost half (49%) are cereals, and 1/3 (33%) are oleaginous plants.
Current practices of sustainability assessments at farm level consider quantitative data and financial ratios [12]. Thus, another direction of analysis that has been carried out is the correlation of the exploited area with the number of employees, on the one hand, and the turnover of the unit with the profit, on the other hand.

Table 3. Analysis of the main size indicator (area exploited- ha) in correlation with a series of economic-financial indicators

Unit number	Exploited area 2021 (ha)	Employees (number)	Turnover (lei)	Profit (lei)
1	370.38	7	3,329,667	255,239
2	293.48	8	2,589,039	42,590
3	444.24	4	26,712,170	292,635
4	248.55	8	2,196,506	44,625
5	1,054.40	23	6,213,038	68,875
6	254.42	2	1,723,983	544,786
7	315.18	3	1,545,149	135,349
8	249.05	4	771,877	967,565
9	1,035.82	21	5,497,927	967,565
10	1,910.51	25	7,040,640	967,565
Total	**6,176.03**	-	-	-

Source: Authors processing of primary data.

Thus, we initially represented, in Table 3, the situation for each economic unit, starting from the exploited area and the main results expressed through the economic-financial indicators: the number of employees, the turnover and the profit. Even if such an approach is more relevant in the case of a much more complex analysis, over several calendar years, still even a situation for a single year (2021) can lead to relevant decision-making issues.
From the data presented in Table 4, it can be seen that the highest value of the profit per employee is registered within the units with a number of 2-4 employees. It can also be noted that the highest turnover per ha is recorded in the case of units with larger areas, of at least 400 ha. A very relevant piece of information for the proposed analysis is given by the correlation of turnover indicator with the number of employees indicator, economic indicators that are in a dependency relationship with the exploited area. Thus, it is found that the turnover increases in correlation with the cultivated area, respectively with the size of exploited ha. On the other hand, the estimated profitability is based on the whole system of measures related to capital investments, which are supposed to be carried out by proposed and specific deadlines [11].

Table 4. Correlation indicators between the exploited area, the number of employees and the turnover

Unit number	Turnover per employee	Turnover per used ha - lei	Profit per employee – lei	Profit per exploited ha – lei
1	475,667	8,990	36,463	689
2	323,630	8,822	5,324	145
3	6,678,043	60,130	73,159	659
4	274,563	8,837	5,578	180
5	270,132	5,892	2,995	65
6	861,992	6,776	272,393	2,141
7	515,050	4,902	45,116	429
8	192,969	3,099	241,891	3,885
9	261,806	5,308	46,075	934
10	281,626	3,685	38,703	506

Source: Authors processing of primary data.

A solution related to future decisions regarding ensuring the continuity of profitability is the expanding the exploited land areas by increasing, where possible the areas.

However, even if this is a technically-economically viable solution, socially and legally, the entrepreneurs of these holdings face a set of barriers, such as:
- the deficient mentality for progress, given the reluctance of the rural population, which are the owners of uncultivated or abandoned agricultural land, to sell the respective land;
- the aging population that refuses to sell, citing the aspect of the sentimental value of the land, or they consider keeping the land as a legacy for the next generations; other owners do not understand the economic value of the land;
- the bureaucracy, the rather high costs involved in a land sale process and the difficulty of the property transfer act represent other significant obstacles;
- from the legal point of view, in the context of a lack of any rigorous organization of the cadastral and agricultural land records, many owners do not have the updated documents of the land in the property or there are errors in the registration of these lands, especially due to notarial fault;
- other owners, out of convenience or lack of knowledge, do not proceed to land inheritances, so a desired sale, with the firm promise of obtaining a favorable price, is blocked or slowed down by the difficult updating of ownership documents; in this situation, conflicts also arise in the extended family, an aspect that can completely prevent the deed of sale.

Consequently, even if the entrepreneurs owning the holdings on which the present study was focused would be interested, economically and technically, in acquiring the advantages as a result of land purchases, they are forced to limit themselves to a surrogate activity, that of leasing of the lands. Thus, the goal of expanding the exploited areas and further increasing the productivity and profitability of large-scale agricultural enterprises can be achieved.

Proven a viable solution, in the short or even medium term, leasing also proves to be hampered by some aspects mentioned by the entrepreneurs interviewed in the field.

These difficulties boil down to:
- competition between agricultural companies that lease land, which makes the rates for leasing services increasingly high; under the conditions of considering the mode of operation of the competitive economy, this is an indication of the profitability of this field of interest - the cultivation of agricultural land with economically valuable plants and crops;
- under the conditions in which entrepreneurs invest in technology, in infrastructure, in improving the quality of land, etc., the value of these lands increases by default, an aspect speculated by the owners who either decide to sell it to other categories of investors, or put pressure in the form of conditioning by increasing the value of the lease, in the form of money or in the form of agricultural products; In addition, very few of the landlords who lease the land honestly express their satisfaction with the benefits obtained, most citing the "losses" they register as a result of the lease. A possible solution to compensate at least partially for these situations encountered in this sector would be creation of groups of producers or cooperatives in this sector can probably be one of the best solutions to increase the profitability of these farms, especially among subsistence and small or medium-sized ones [10].

CONCLUSIONS

Through this paper, it was possible to identify and highlight the connection between the direction of effective agricultural production support policies and the actual results of the economic activity and production in the reference agricultural holdings. In this way, the multifaceted analysis of the main economic efficiency indicators for the 10 agricultural units was carried out. The quantitative analysis, of descriptive order and data interpretation was conducted to support the aim of the paper. An addition was realized, with a secondary form of analysis, of qualitative order, based on the information gathered as a result of interviewing the representatives of the 10 agricultural units included in the study. The main synthetic results are concentrated as is follows:

- the ten agricultural units on which the analysis was carried out cultivate a total number of 17 crops, on a total area of over 6,000 ha.;
- a permanent concern of the units management is to expand the exploited areas, either by purchasing land or by leasing;
- the purchase of land has an insignificant contribution to the expansion of the exploited surfaces;
- the main way of expansion is taking over the lease, but even in this situation the agricultural units face certain problems;
- the seed lots opportunity emergence in recent years leads to a rise of the lease value perceived;
- the development of modern technology and investments in agricultural equipment supported, by the national and European financing programs is a major advantage for agricultural producers;
- starting from the number of employees correlated with the exploited area, it was found that the profit per employee is maximum, within the 10 units studied, at the units that have 2-4 employees;
- the decision-makers within the farms interviewed have the permanent goal of expanding the exploited surface, by purchasing land or leasing it from the owners.

Finally, it is proven that a complete analysis of efficiency and competitiveness for an enterprise, is adequately measured in order to make the best decisions for planning the next production, by correlating the technical indicators with the economic and financial ones. The large enterprises have demonstrated, after long waits in our country, their strategic role for economics and the market power, compared to subsistence farms. Investments, financing programs, the support offered by agricultural policies and the selflessness of large producers turned out to be the successful elements for supporting a solid agriculture, producing agricultural crops necessary to ensure food security and economic power.

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