

Large crop farms and the contribution of agricultural products to their turnover achievement

Paula Stoicea^{1*}, Ion Certan², Elena Soare¹, Andreea Firatoiu¹, Iuliana Ignat Ramona¹ and Radu Madalin³

¹ Faculty of Management and Rural Development, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Boulevard, 011464, Bucharest, Romania;

² Research center for the study of the quality of agro-food products, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Boulevard, 011464, Bucharest, Romania;

³ Faculty of Agriculture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Boulevard, 011464, Bucharest, Romania.

*Corresponding author: stoicea.paula@managusamv.ro

Abstract

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The main economic objective of farms is to maximize turnover, being one of the main ways to increase profitability. The paper presents the implications of the agricultural products produced and utilized by a large crop farm on the turnover in the period 2019–2021, establishing at the same time, which of these crops are indicated to be included in the annual crop plan. The research method used is the Pareto method, which is an analysis focused on the study of a past period, which allows highlighting, according to a determined criterion, the most representative individuals from a population. The results showed that in each year of the period included in the study, the crops that contributed significantly to the turnover were: in 2019, winter winter wheat, followed by maize and rapeseed, in 2020, maize and rapeseed, and in 2021, maize and soybean.

Keywords: turnover, winter winter wheat, maize, rapeseed, soybean, crop farms

Introduction

The Common Agricultural Policy 2023–2027, is a modernized policy with a strong focus on results and performance (Planul National Strategic al României, 2023–2027). The performance of large crop farms can be highlighted by analyzing the turnover, which shows the volume of transactions evaluated at market prices or the total receipts made in a financial year (Paula Stoicea et al, 2022). This indicator is one of the most important, from the perspective of quantifying the economic performance of a farm, being also necessary to characterize its place within the activity sector of which it is a part of, its position on the market, as well as its ability to achieve a culture plan based on profitability (Paula

Stoicea et al, 2023). The analysis of turnover is essential for farms in Romania, because it highlights the value contribution of each agricultural product and traces the direction regarding the value attached to them through the prism of the performance attached to individual crops (Toma E. et al, 2023). Thus, the current analysis treats, by using the Pareto method (Kasprzak E. et al, 2001), the contribution of each agricultural product to the achievement of turnover, and by observing the analyzed phenomenon in the short term, based on some series of data provided by the large crop farm, the direction to follow regarding the optimal crop plan and the appropriate crop rotation in accordance with economic efficiency and profitability at the farm level is traced (Fendji, Jlek et al., 2021); (Paula Stoicea et al, 2011).

Materials and Methods

The analysis carried out was based on the Pareto law, also called the 20/80 rule or the Pareto method and which represents a way of diagnosing the activity of the analyzed farm starting from the turnover structure. This analysis is centered on the study of a past period which allows, in a simple way, the highlighting according to a determined criterion, of the most representative cultures within the annual culture plan. The traded products are those that contribute in different proportions to the turnover. The analysis of the theoretical curve allows the identification of three groups with specific characteristics in the total of manufactured or marketed products, as follows (Kasprzak E. et al, 2001).

Table 1. Product groups according to the ABC method

Products group	Characteristics	Type of products in the group
Group A	10–15% of the number of agricultural products sold represents 60–70% of the turnover	Products with a faster turnover and a lower variable and commercial cost margin
Group B	25–30% of the number of agricultural products sold represents the equivalent of 25–30% of the turnover	Products whose turnover and margins are close to the company's average
Group C	65–70% of the number of agricultural products sold represents 10–15% of the turnover	Products with low turnover but with a higher margin (the problems created are related to the launch of orders, supply and storage, their cost being higher than in the case of groups A and B)

The application of the ABC method involves going through the following stages (Kasprzak E. et al, 2001):

- Defining the object of the ABC study, respectively highlighting the agricultural products that bring the largest share in the turnover;

- Determining the theoretical areas, useful distribution only when these products contribute differently to the achievement of the turnover (Table 2).

- Determination of real ABC areas. The agricultural production made from the different crops included in the annual crop plan by the large crop farm contributes differently to

Table 2. The theoretical areas of the ABC method

Zones	% products	% turnover
Group A	10	60
Group B	40	30
Group C	50	10

the achievement of total income, considering that there are a number of factors that influence these productions differently, as it follows: agro-meteorological conditions, culture technologies, cultivated areas, irrigation, applied inputs etc. (Table 1).

In order to highlight the incomes made from different crops, they will be ordered in descending order, based on the contributions made by each crop in the turnover, later being determined later as a percentage. The actual distribution of products by significance groups will be made taking into account the previous determinations.

- Plotting the ABC concentration curve, highlights the extent to which each product contributes to achieving turnover, in real terms.

- The comparative analysis between the real and the theoretical situation, based on the Pareto method, is done by comparing the real situation with the theoretical one resulted from the calculations. The interpretation covers the following aspects:

- In the situation where the real curve is located below the theoretical one, the turnover achieved by the large crop farm is based on a small number of products;

- In the situation where the actual curve is above the theoretical one, the large crop farm must opt for a diversified crop plan.

Results and Discussions

Starting from the paradigm described by the Pareto method, practically it was found that 20% of the products contribute 80% to the formation of the turnover, 20% of the income from the sale of the products bring 80% of the profit margin and 20% of the suppliers of inputs supplies farms with 80% of the necessary stocks (Figure 1). These premises highlight that large crop farms can optimize their annual crop plan, in search of levers towards a sustainable agriculture (Stoicea, P. et al, 2023). The analysis of the decision-making process of the farmer studied regarding the crop plan was carried out, not only through the resource allocation chart or the design of the crop rotation, but also through the prism of the econom-

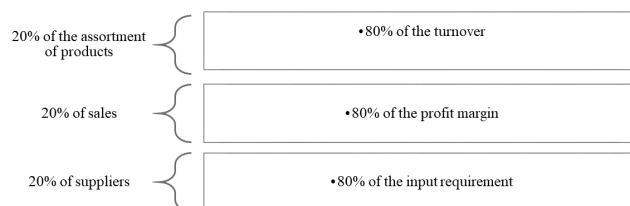


Fig. 1. Contribution of products in total sales and profit

ic, financial and commercial implications (Micu, M. M. et al, 2023). It is recommended to the farmer that the optimization of the crop plan should not be done once a year or per rotation, as is usually represented in the models, but should be a continuous process that combines design and adaptive activities (Dury J. et al, 2011). We also emphasize the importance of crop management, through the lens of turnover per agricultural product, which can become a primary factor of long-term strategies (Ursu A. et al, 2014). We maintain that it is essential to have a deep understanding of the contribution of each agricultural product to the achievement of the turnover, at the farm level, in the conditions of the change of the socio-economic context (inflation, the regulations of the Common Agricultural Policy in constant change, with an emphasis on performance and results, as well as climate changes). If we define the crop plan as the choice of the crops to be cultivated, by determining the cultivated areas and allocating them to the plots, then, in order to obtain favorable results, farmers are required to make sequential decisions, under the conditions of the multiple elements of their agricultural system, interchangeable in time (Jérôme Dury et al, 2013). The benefits of an appropriate crop diversification are measured in agronomic terms (productivity, soil quality, diseases and pests etc.), but also in economic terms (income, turnover, profit, profitability), and in the situation where a harvest is non-compliant for one of the cultivated species, it may become possible to ensure the income of the farmer by the other crops (Toma E. et al, 2023).

In the case of the analyzed large crop farm, the use of the Pareto method highlighted the contribution of each agricultural product to the turnover in the years 2019-2021, as follows:

Determining the parameters of the theoretical curve at the large crop farm analyzed by the Pareto method, as follows: in 2019, taking into account the crop plan, as well as the harvested productions, it was found that the winter wheat and maize crops had the largest share.

Rapeseed culture has a small share both in the total amount of products, but the incomes are significant in terms of the selling price, which is double that the one of maize. In 2020, analyzing the rotation and productions, as well as the selling price of the mentioned agricultural products, the

parameters of the Pareto curve were highlighted as follows: the maize crop holds the most significant weight in the total amount of products sold, followed by rapeseed, winter wheat, barley and oat, with small weights, both in quantity and value. In 2021, the maize crop brought the largest contribution to the turnover, with 49.46%, a situation due to irrigation, which led to an increase in production. Soybean (Adina Magdalena Iorga et al, 2023), although it represents only 13.47% of the total products sold, brought a contribution of 29.80% to the turnover, an aspect due to the triple price compared to that of maize. Winter wheat (Tudor V. C. et al, 2023) and barley are crops that have similar contributions to turnover, winter wheat 10.14% and barley 13.31% (Table 3).

To determine the real areas through the Pareto method, the share of the turnover of each product in the total sales and the cumulative shares were established, the results being the following: in 2019, it was highlighted that 36.44% of the turnover was achieved through the sale of winter winter wheat which represents 41.34% of the total amount of products sold.

The second most important product as a contribution to the turnover is maize, which contributed 44.11%, with the mention that the capitalization price is below that of winter winter wheat, which contributed 33.81% to the formation of the turnover. Rapeseed has an important percentage in the turnover, which, although it represents 13.66% of the total amount of products, was valued at a higher price than in the case of maize and winter winter wheat, contributing 28.26% to the formation of the turnover (Table 4).

As for 2020, the maize crop had the highest contribution to the turnover, with 49.46%, representing 71% of the total amount of products sold.

Rapeseed crop brought an important contribution, of 47.38% in turnover, although it represented only 25.19% of the quantity of products sold, in this case, the price is more than twice higher than that of maize, determining this situation. Being an unfavorable agricultural year for straw grains, in 2020, insignificant productions were recorded for the winter wheat crop, due to the drought, so the quantities sold were small, and the contribution to the turnover of 2.49%.

Barley and oats also have insignificant contributions to the turnover (Table 5).

Table 3. Theoretical curve by the Pareto method in the year 2019–2021

Agricultural year 2019			Agricultural year 2020			Agricultural year 2021		
Zones	% products	% turnover	Zones	% products	% turnover	Zones	% products	% turnover
Winter wheat	40	38	Maize	50	40	Maize	50	40
Maize	40	32	Rapeseed	25	35	Soybean	13	30
Rapeseed	15	22	Winter wheat	10	10	Barley	17	15
Soybean	5	8	Oat	5	7	Winter wheat	8	10
			Barley	10	8	Oat	2	5

Table 4. Share of the turnover of agricultural products capitalized in 2019

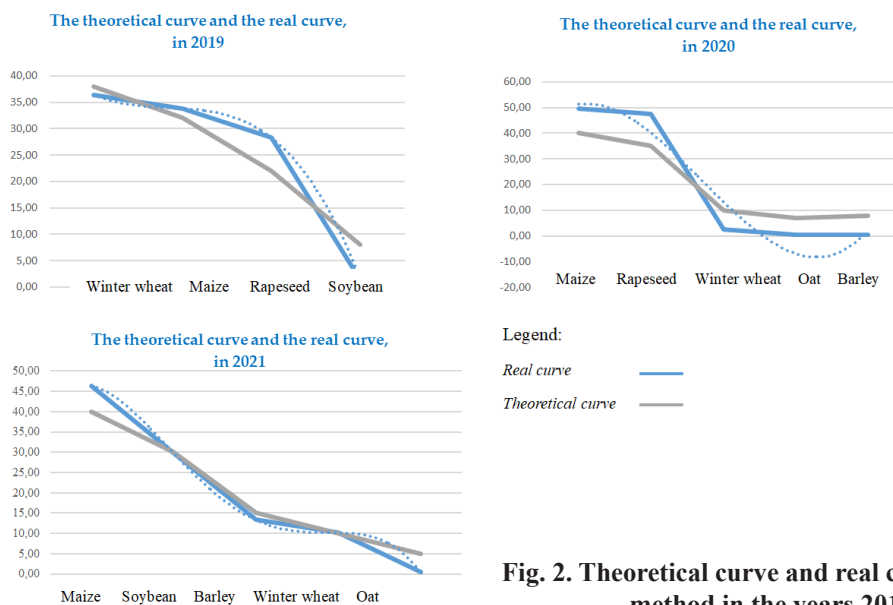
Type of product	Unit price (Ron/kg)	Sold quantity (kg)	% Quantity	% Cumulative quantities	Turnover (Ron)	% Turnover	% Cumulative turnover
Winter wheat	0.69	1.244.180	41.34	41	858.484.20	36.44	36.44
Maize	0.60	1.327.600	44.11	85	796.560.00	33.81	70.25
Rapeseed	1.62	411.026	13.66	99	665.862.12	28.26	98.51
Soybean	1.30	26.980	0.90	100	35.074.00	1.49	100.00
Total		3.009.786			2.355.980.32		

Table 5. Share of the turnover of agricultural products capitalized in 2020

Type of product	Unit price (Ron/kg)	Sold quantity (kg)	% Quantity	% Cumulative quantities	Turnover (Ron)	% Turnover	% Cumulative turnover
Maize	0.60	883.264	71.00	71.00	529.958.40	49.46	49.46
Rapeseed	1.62	313.375	25.19	96.19	507.667.50	47.38	96.83
Winter wheat	0.69	38.598	3.10	99.29	26.632.62	2.49	99.32
Oat	1.06	3.500	0.28	99.57	3.710.00	0.35	99.66
Barley	0.67	5.362	0.43	100.00	3.592.54	0.34	100.00
Total		1.244.099			1.071.561.06		

Table 6. Share of the turnover of agricultural products capitalized in 2021

Type of product	Unit price (Ron/kg)	Sold quantity (kg)	% Quantity	% Cumulative quantities	Turnover (Ron)	% Turnover	% Cumulative turnover
Maize	0.85	2.688.940	55.76	71.00	2.282.910.06	46.34	49.46
Soybean	2.26	649.500	13.47	69.22	1.467.870.00	29.80	76.14
Barley	0.77	857.380	17.78	87.00	655.895.70	13.31	89.45
Winter wheat	0.82	609.146	12.63	99.63	499.499.72	10.14	99.59
Oat	1.14	17.680	0.37	100.00	20.155.20	0.41	100.00
Total		4.822.646			4.926.330.68		

**Fig. 2. Theoretical curve and real curve by the Pareto method in the years 2019–2021**

This situation, in the year 2021, was as follows: the maize crop brought the highest contribution to the turnover, of 49.46%, this being a consequence of the fact that the large crop farm decided to introduce the irrigation system for maize and soybean crops, thus increasing yields. Soybean, although it represents only 13.47% of the total products sold, brought a contribution of 29.80% to the turnover, this being possible due to the almost triple price compared to that of maize.

Winter wheat and barley are crops that brought to the big crop farm a similar contribution: winter wheat crop, of 10.14% and barley of 13.31% (Table 6).

According to the real and theoretical curves, the following situation can be found: in 2019, the large share of the three agricultural products (winter wheat, maize and rapeseed) in the turnover, and the relatively small share that soybean had; in 2020, the large share of the two agricultural products (maize and rapeseed) in the turnover, the other straw crops (winter wheat, oat and barley) having very small and insignificant shares, and in 2021, maize had an important share in turnover, but also soybeans, while barley, winter wheat and oat had low intakes (Figure 2).

Conclusions

Analyzing the contributions of agricultural products to turnover using the Pareto method within a large crop farm in Romania, in the period 2019-2021, the following were highlighted: in 2019, crops that had the largest share in turnover were winter wheat, maize and rapeseed.

For the year 2020, maize and rapeseed brought the biggest contribution to the turnover, winter wheat, barley and oats having very small shares.

In 2021, maize had the largest share in the turnover, but an important contribution from soybean was observed, the reason being the introduction of irrigation to these two crops.

We recommend to the large crop farm the optimization of the annual crop plan depending on the results obtained by applying the Pareto method, the agrometeorological forecasts, the physiological needs of the plants, the technology that must be applied in accordance with the new approaches used at the European and world level that have at the center concerns about the impact of climate change (Lancu T. et al, 2022), but also about the sales market, demand and the capitalization price of different agricultural products (Adina Magdalena Iorga et al, 2023).

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