ANALYSIS OF THE SCALE OF CAPITAL COSTS IN AGRICULTURE

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Abstract

The economic situation of farms is determined by high stocks, spatial concentration and seasonal production. The aim of the research is the analysis of capital structure and capital costs at the cooperative level, with the objectives: (1) analysis of capital structure in an agricultural cooperative; (2) analysis of capital costs in an agricultural cooperative. The research objectives were achieved using a case study of a group of agricultural producers. The case study was structured in two components: analysis of accounting data and focus group with managers, activities that were carried out in the first part of 2023 at the premises of the researched unit (as appropriate) and online. The average capital used in the surveyed agricultural units is 1,527.0 lei/ha. The dynamics of turnover from 568.6 lei/ha to express the variability of income specific to the crop sector of agriculture. The analysis of multiple correlations between the main indicators shows weak relationships for pairs of indicators: except for the coefficient of 0.46 between total capital of members and total income of the cooperative. The structure of capital used in the surveyed agricultural units is dominated by the category of agricultural machinery and equipment with a share of 43.1% followed by construction with 18.6% and land with a share of 13.5%. This structure tends to change in the future due to farmers' interest in storage facilities for primary agricultural products.

Key words: capital structure, cost of capital, agriculture, agricultural cooperative

Theories of factors of production are very important in economics. Quite simply, factors of production are the resources that are used to produce goods and services (Bin X., Sohail S. et al, 2009). Research on agricultural production has shown that it interacts with various biological and natural processes and is considered a rather complex type of economic activity. (Amrahov V., et al, 2022). Previous research on the quantification of capital in the agricultural sector has built a database that includes estimates for three components of agricultural capital (covering fixed capital in agriculture, livestock and tree stock), as well as measures of capital stock for production and the total economy (Vander Donckt M. *et al*, 2021)

Considering other factors that might also affect the performance of the agricultural sector, feedback from gross fixed capital formation, population growth rate and trade openness promote an increase in agricultural production, while infrastructure, human capital, government efficiency and regulatory quality reduce it (Ridwan L.I. *et al*, 2022).

Human capital plays an important role in modern agriculture. Difference in asset efficiency explains only half of the economic performance of agricultural farms, while the other half is based on human capital (Bazyli Czyżewski A.S., Kułyk P., 2021).

One of the most important determinants of economic performance in general and agriculture in particular is gross fixed capital formation (GFCF). This indicator reveals and anticipates significant increases in agricultural production because increasing the performance of machinery and equipment used in the production process implicitly leads to an increase in performance (Coca O. *et al*, 2023).

The economic situation of farms is driven by high stocks, spatial concentration and seasonal production. However, opportunity costs resulting from excessive non-interest bearing liquid assets also worsen farm economics. Profitability is low. Farm managers prefer the conservative approach to net working capital management. They aim to maintain surplus working capital. Therefore, the problem of determining the appropriate level of net working capital on farms in relation to their profitability seems to be one of the most important issues (Roma R-J., 2021). The economic dimension and the way of using capital is a primary condition of enterprise performance, which reveals the need to

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research the efficiency of the economy determined by it (Penu T., 2020).

Yihua W. and collaborators conducted US research based on the analysis of financial data of agricultural cooperatives for the period 2004-2014. The results showed a capital structure that combines equity with debt. Also, the size of cooperatives and the type of activity have a significant impact on their financing decisions, and agricultural cooperatives that are more financially stable generally use more equity than those facing financial difficulties (Yihua W., 2018). The topic of capital structure of agricultural farms was also presented in an article from Poland presenting research based on their financial data (2010-2016). The research identified several factors influencing the capital structure of agricultural enterprises in Poland: company size, profitability liquidity and risk factor (Adam K., Krzysztof F. *et al*, 2018).

The purpose of the research is to analyze the capital structure and capital costs of cooperatives, with the objectives: (1) analysis of capital structure in an agricultural cooperative; (2) analysis of capital costs in an agricultural cooperative.

Research with similar objectives carried out in the USA from 2003-2005 shows that the main factors influencing the capital structure of farms are: farm size, farm income and profit, type of crops or livestock raised, and degree of indebtedness (Mishra M. A., 2011).

The South-East development region of Romania has a predominant relief being the lowlands (Florea A.M., 2019). It is the second largest development region in terms of area (Benedek J., Lembcke A., 2017) and is one of the most attractive from a natural and tourist point of view (Joița O.-E., 2020). In terms of administrative organization, it comprises six counties: Brăila, Buzău, Constanța, Galați, Tulcea and Vrancea, and is made up of 33 cities (11 municipalities) and 339 communes comprising 1455 villages (Rusu (Vasile) R.C. *et. al*., 2020), the number of inhabitants will be 2361624 in 2022 (12.4% of Romania's population) (NSI). In terms of technical capital related to agricultural activities, the region has, according to the NSI, 20515 tractors (8.6% of the national total), 8897 mechanical seed drills (12.7% of the total) and 3357 self-propelled combine harvesters for harvesting cereals (12.59% of the total).

MATERIAL AND METHOD

The research objectives were achieved by using a case study of a group of agricultural producers (Pechlaner G., 2010; Zucchella A., 2019) in Galati County, which is part of the SE Development Region of Romania.

This agricultural cooperative, which was the subject of the research, organizes both purchases and sales of agricultural products. It has a centralized accounting and traceability system. It includes about. 10 members who produce wheat, rape, barley, maize, sunflower, barley, peas and mustard. These products are produced on a total area of more than 5,500 ha of which more than 70.0% is agricultural land for organic production. Its own identification data and that of its members have been protected as a consequence of their economic interests. The names provided in this article have been coded and the results show processed values that do not allow primary information to be known.

The case study was structured in two components: analysis of accounting data and focus group with managers, activities that were carried out in the first part of 2023 at the premises of the researched unit (as appropriate) and online.

The preliminary interview was predominantly qualitative in nature and was conducted face-to-face with managers at the cooperative members' premises. Its purpose was to establish farmers' perceptions of capital consumption on their own farm. The interview guide included semi-open and open-ended questions in which subjects were free to express their opinions regardless of the interviewer researchers' assumptions. (D'Amato D., 2020; Masurel E., 2004; Teuber R., 2011) The questions to which answers were requested had the following objectives: (1) subjects' opinion on the share of capital cost in the total cost of own farm products, (2) their perception on the extent to which the capital used is adequate for a successful farming activity, (3) the main problems encountered with regard to the use of fixed assets in the farming activity. The interviewers were agricultural researchers and the duration of the interview ranged from 30 to 60 minutes.

The information obtained was noted in the interview guide, completed in the debriefing stage and centralized in the survey report. The information processing was qualitative and the results were used in the following phases of the research: the drafting of the questionnaires and the organization of the focus group session.

Analysis of accounting documents involved the use of the following: list of depreciation of fixed assets and inventory items - 2023, trial balance - 2022, centralizer of loans and leases - 2023, financial-accounting balance sheets 2018-2022 (Adam K., Krzysztof F., Bartosz G., 2018; Yihua W., 2018).

The final information was processed in was carried out using IBM SPSS Statistics 29 Amos and Microsoft Office applications.

The focus group with cooperative managers was predominantly qualitative in nature and was conducted online on the Google Meet platform (https://meet.google.com). Its purpose was to identify participants' opinions on the results of the interview and questionnaire. The topics discussed in this session included: (1) the extent to which

research results are in line with the perspective of farm level managers, (2) future actions that should be taken to optimize capital consumption, (3) possible influences of geopolitical and environmental challenges on capital management in the future.

The participants of the focus group, 15 people, were the managers of the member farms of the cooperative, the president of the cooperative, three specialist researchers. They received in advance the preliminary results of the quantitative research in order to form their opinions, their own interpretations and to identify the influencing factors of the researched phenomena. The moderation guide for the focus group included: the purpose of the session, objectives, guiding questions, modalities of interaction, working procedures and how to organize resources (human and logistical resources). At the end of the discussions, 12 lists of opinions were drawn up for each objective researched and the participants selected the opinions with which they most agreed. The participants were given a restrictive number of 3 points for each list. The session lasted 2 hours, with two 10-minute breaks, and was moderated by a researcher specializing in agricultural economics and two other researchers specializing in agriculture, who recorded the in-formation and observed the behavior of the participants. After the conclusion of the discussions, the research team held a debriefing where the results associated with the observations were presented and the final results were credited (Chambers, S., 2007; Dey P.K., 2020; Domenech T., 2019)

Data analysis was carried out with Office Microsoft and SPSS 29 applications to determine the evolution of economic indicators and their relationships (Pearson coefficient).

Pearson multi-correlation analysis was performed to identify possible relationships between the economic indicators of the cooperative members and those specific to the cooperative (a) total assets, (b) current assets, (c) stocks, (d) receivables, (e) house and bank accounts, (f) advance expenses. (g) debts, (h) prepaid income, (i) total capital, (j) paid-in subscribed capital, (k) net turnover, (l) total income, (m) total expenditure, (n) gross profit, (o) net profit.

RESULTS AND DISCUSSIONS

The average amount of capital used in agricultural units was determined over a five-year period in order to identify certain trends and to establish possible correlations between capital and economic activity in general as expressed by balance sheet indicators (indicated from a to o in Table 1). It should be noted that the capital indicators do not include land capital because most of it is leased and because most of the farm owners own land as personal property and lease this land to the farms they own. This practice is justified by the fact that current tax rules make it difficult and inappropriate to pay for the capital brought into the economic unit.

The evolution of the average capital used in agricultural units (Figure 1.a) is, in the period 2018-2022, an average of 1,527.0 lei/ha with maximum values of 1,801.4 lei/ha in 2022 and minimum values of 955.8 lei/ha in 2019. This information reveals a reduction in capital in the second year surveyed. Managers members of the cooperative justify this dynamic in the focus group session by the fact that in the years prior to 2018 fewer investments were made and some of the older ones were depreciated, and they will make significant investments from 2020 onwards. The growth trend over the last three years seems to justify these statements. This period overlaps with the establishment of the cooperative and the increase in the volume of capital can be justified by the increase in financial creditworthiness in order to obtain loans.

On the other hand, the dynamics of turnover do not indicate an increase in the economic performance of the cooperative. During the period analyzed, this indicator has rather a downward trend.

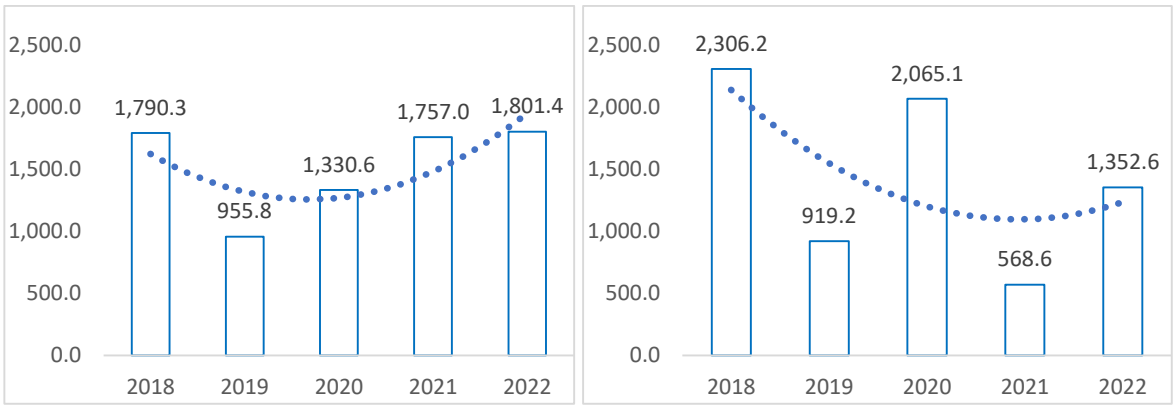

Figure 1 **Evolution of average capital employed in agricultural units (a) Evolution of average turnover (b) (lei/ha)**

The dynamics of the average turnover (figure 1.b) is an average of 1,442.3 lei/ha during the period analyzed, with maximum values of 2,306.2 lei/ha in 2018 and minimum values of 568.6 lei/ha in 2021. This phenomenon expresses, first of all, the variability of incomes specific to the crop sector of agriculture, variability given by natural factors and the economic situation. It is known that the price elasticity of primary agricultural products according to the local production obtained can no longer be an instrument to protect farmers' incomes. The global economy causes the supply of primary agricultural products to vary within tighter limits than local production (obviously) and under these conditions, the price of primary agricultural products does not compensate for production cuts at this level. So the variability of turnover and the downward trend cannot be correlated with the way farmers organize themselves in cooperatives. This is also a limitation of this research because a comparative analysis with other farms that are not organized in cooperatives could not be carried out.

The analysis of multiple correlations between the main indicators shows weak relationships (Pearson coefficient less than 0.3) for pairs of indicators: (Table 1) except for the coefficient of 0.46 between total capital of members and total income of the cooperative.

Table 1

Analysis of multiple correlations (%)

Indicators	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
a	0.16	0.24	0.29	0.33	**-0.39**	0.01	0.01	0.02	0.00	0.00	0.00	0.07	0.14	0.16	0.09
b	0.14	0.12	0.18	0.19	0.25	0.00	0.00	0.00	0.07	0.14	0.16	0.00	0.01	0.01	0.09
c	0.09	0.04	0.04	0.02	0.06	**0.34**	**-0.36**	0.06	0.00	0.01	0.01	0.00	0.00	0.00	0.01
d	0.04	0.07	0.14	0.16	0.17	0.09	0.12	0.16	0.00	0.00	0.00	0.29	0.34	0.38	0.00
e	0.01	0.00	0.01	0.01	0.02	0.09	0.12	0.12	0.29	0.34	0.36	0.01	0.09	0.12	0.09
f	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.09	0.12	0.06	0.09	0.12	0.01
g	0.18	0.29	**0.38**	**-0.36**	0.16	0.00	0.00	0.00	0.06	0.09	0.12	0.01	0.01	0.01	0.01
h	0.02	0.01	0.09	0.12	0.16	0.09	0.12	0.12	0.01	0.01	0.01	0.17	0.09	0.12	0.16
i	0.12	0.06	0.09	0.12	0.12	0.01	0.01	0.01	0.17	0.09	0.12	0.02	0.09	0.12	0.12
j	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.09	0.12	0.00	0.01	0.01	0.01
k	0.00	0.00	0.00	0.00	0.00	0.14	0.04	0.09	0.00	0.01	0.01	-0.08	0.00	0.00	0.00
l	0.15	0.06	0.14	0.04	0.09	0.18	0.22	0.17	**0.46**	0.00	0.00	0.16	0.09	0.12	0.12
m	0.23	0.13	0.18	0.22	0.17	0.14	0.16	0.15	0.16	0.09	0.12	0.12	0.01	0.01	0.01
n	0.12	0.13	0.14	0.16	0.15	0.00	0.00	0.00	0.12	0.01	0.01	0.01	0.00	0.00	0.00
o	0.00	0.09	0.12	0.16	0.09	0.12	0.12	0.01	0.01	0.00	0.00	0.00	0.14	0.04	0.09

Source: Own calculations

Other relatively relevant Pearson coefficients were: -0.39 between house and bank accounts at members and total assets of the cooperative; 0.34 between prepaid expenses at members and stocks at the cooperative; -0.36 between debts at members and stocks at the cooperative; 0.38 between stocks at members and debts at the cooperative; -0.36 between debts at members and debts at the cooperative. These values indicate a weak link between members' acquisition costs in relation to the volume of the cooperative's activity and members' additional income due to the more advantageous sale provided by the cooperative's activity.

The structure of capital employed in the surveyed agricultural units is dominated by the category of agricultural machinery and equipment with a share of 43.1% followed by construction with 18.6% and land with a share of 13.5%. The smallest shares of capital are held by the category "furniture and other" with 2.9% and the category computer applications with 4.2% (*Figure 2*).

The high share of agricultural machinery and equipment in total capital is specific to the agricultural sector and is justified by the growing interest in capitalizing on agriculture to improve technical and economic performance. In contrast, the share of construction can only be justified by the existence of warehouses for agricultural products and other productive buildings.

In the focus group session, managers state that they intend to significantly increase storage capacity given that there is a significant gap between the harvest and subsequent prices. On the other hand, the European Union provides non-reimbursable funds for such investments.

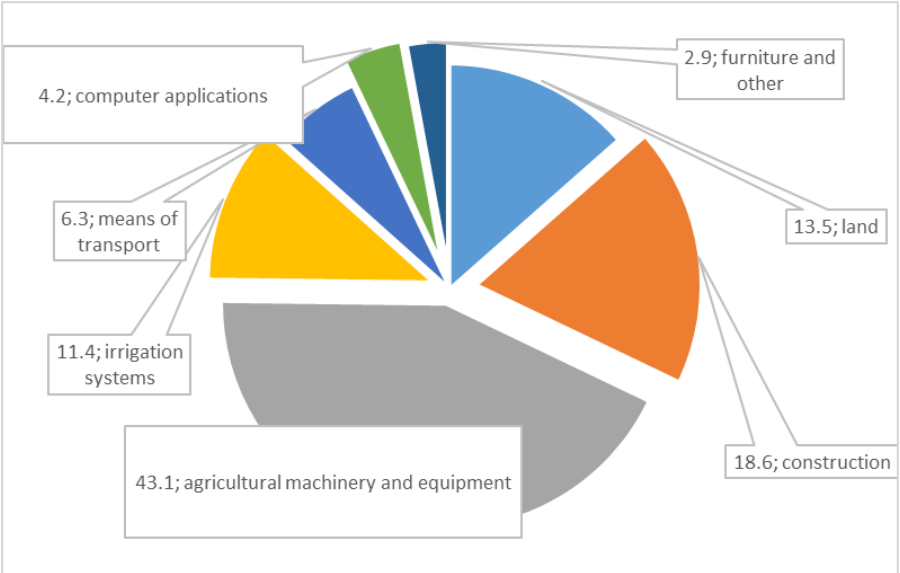

Figure 2 **Structure of capital employed (%)**

One of the limitations of the research presented in this article is the one-sided analysis of cooperative activity. Future research can carry out a comparative analysis between farms that are members of cooperatives and farms that are independent of the associative forms. The second limitation was the decision to deal with the issue of land fund in the integrity of the capital volume but analyses of the opportunity of using land fund in terms of their current price and the prospect of being purchased by farms would be necessary.

CONCLUSIONS

The average capital used in the surveyed agricultural units is 1,527.0 lei/ha. The dynamics of turnover from 568.6 lei/ha to 568.6 lei/ha expresses the variability of income specific to the crop sector of agriculture. The analysis of multiple correlations between the main indicators shows weak relationships for pairs of indicators: except for the coefficient of 0.46 between total capital of members and total income of the cooperative. The structure of capital used in the surveyed agricultural units is dominated by the category of agricultural machinery and equipment with a share of 43.1% followed by construction with 18.6% and land with a share of 13.5%. There is a justified expectation that this structure will change in the future with the interest that farmers declare in storage space for primary agricultural products.

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