

## Economic situation and concentration of arable crop partnerships in Hungary

### A magyarországi szántóföldi növénytermesztéssel foglalkozó társas vállalkozások gazdasági helyzete és koncentrációja

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#### ABSTRACT

The objective of this study is to evaluate the concentration and economic situation of Hungarian arable crop partnerships. Financial data of 853 Hungarian arable crop partnerships between 2015 and 2019 were used from the database of Emerging Market Information System (EMIS). The examined partnerships varied in farm size, in the sample with the largest proportion being micro-partnerships. Around 15% of the partnerships account for almost half of the total assets and net sales revenue of the sample and the concentration can be considered medium according to the Gini index, with a slight increase only in net sales revenue concentration from 2015 to 2019. According to the Return on Sales (ROS, 8.6%) and Return on Assets (ROA, 4.7%) indicators, the examined farms are profitable. In terms of fixed asset ratios, about half of the Hungarian arable farms have ratios between 40% and 60% and one third have ratios below 40%, indicating more outdated and obsolete assets. In addition, Hungarian arable farms have an average leverage ratio of 28%, meaning the farms financed most of their expenditure from their own resources. In terms of liquidity, almost 50% of the examined partnerships had excellent ( $2 \leq$ ) short-term liquidity, while about 30% had unfavourable ( $< 1$ ) short-term liquidity.

**Keywords:** arable crop production, financial indicators, efficiency, farm size, concentration

#### ABSZTRAKT

A tanulmány célja a szántóföldi növénytermesztéssel foglalkozó társas vállalkozások koncentrációjának és gazdasági helyzetének megítélése. Az EMIS adatbázisból származó 853 gazdaság pénzügyi adatait használtuk fel a 2015-2019-es időszakra vonatkozóan. A vizsgált vállalkozások üzemmérete eltérő volt, a legnagyobb részesedéssel mikrovállalkozások rendelkeztek. Az üzemek mintegy 15%-a adja a minta összesített tőkeösszegének és nettó árbevételének közel felét, amely koncentráció a Gini-index szerint közepes méretűnek tekinthető és csak az árbevétel esetében tapasztalható némi koncentrációnövekedés 2015-ről 2019-re. A ROS (8,6%) és ROA (4,7%) mutató szerint a vizsgált gazdaságok jövedelmezőek. A befektetett eszközarány tekintetében, amíg a hazai szántóföldi növénytermesztéssel foglalkozó üzemek mintegy fele 40-60%-os értékkel, addig mintegy egyharmada 40% alatti mutatóval jellemezhető, amely utóbbi esetében korszerűtlenebb és elavultabb eszközállományra utal. Ezenkívül a magyarországi szántóföldi növénytermesztéssel foglalkozó gazdaságok átlagosan 28%-os eladósodottsági mutatóval jellemezhetők, azaz a vállalkozások döntően saját forrásból finanszírozták kiadásait. Ami a likviditást illeti, a vizsgált cégek közel 50%-a kiváló ( $2 \leq$ ), míg mintegy 30%-a kedvezőtlen ( $< 1$ ) rövid távú fizetőképességgel rendelkezett.

**Kulcsszavak:** szántóföldi növénytermesztés, pénzügyi mutatók, hatékonyság, üzemméret, koncentráció

## INTRODUCTION

Today, agricultural sector faces many challenges. As the global population continues to grow, increasing the yield to be obtained per unit area has become a key issue. In this context, the focus on food security (Bedő and Láng, 2015; Cole et al., 2018; Ickowitz et al., 2019) should be even more important. At the same time, climate change is seen as a major factor influencing the increase in yields per hectare (Wang et al., 2018). In the case of wheat, it has already been examined – using some simulation models – that specific yields will decrease by about 6% if the global temperature increases by 1 °C (Asseng et al., 2015). According to Ray et al. (2015), a significant fraction (more than 30%) of global yield fluctuations may be due to changes in climatic conditions. Developing the efficiency of agricultural production plays a decisive role in terms of increasing profitability, international competitiveness, as well as improvement of environmental sustainability. These target areas could be expanded by advanced technology, automatization, digitalization, and complex application of the necessary expertise (Takácsné and Takács, 2016; Horn, 2018; Kirkaya, 2020; Szöllösi et al., 2021). Considering this, Rajczi et al. (2017) also emphasized the importance of professional knowledge in the agricultural sector.

The agricultural output of the EU-27 was 412 billion euro in 2020. Compared to the previous year the output value of Poland increased in the highest extent (+7.2%). In contrast, the output value increased, but at a slightly lower extent in Austria and Spain (+1.9%). In Hungary, this change of value indicated a 2.2% decrease in 2020 compared to 2019. The decline of production quantity could be explained by the unfavourable year of crop production (cereals and oil seeds) and horticulture (vegetables and fruits) (HCSO, 2021a).

In the European Union the production of wheat can decrease by 1% by 2030. However, import and export can expand in the following 10 years. The previous one can be increased by 15%, while the latter one can be grown by 17%. Regarding production quantity of maize can increase by 8% by 2030. The foreign trade can be

expanded in this situation also. The import could be increased by 13%, while the export could be grown by 33% (EC, 2020).

The Hungarian agriculture presented 4.1% of gross value added, 4.3% of investments and 4.6% of employment in 2020. The arable crop production has a determined role in the agriculture, and it gives 58% of gross output. Moreover, 67% of enterprises are engaged in this activity. In the recent period the available arable land per enterprise was increased, which indicated the growth of concentration (HCSO, 2021a).

Cereals were exported in one of the biggest quantity and highest value by Hungary in 2020. Its value increased by 26%, while its quantity grew by 32% from 2019 to 2020. These products also play a decisive role in terms of import. Regarding cereals the value of import increased by 6%, while the quantity grew by 8% (HCSO, 2021a). Wheat and maize are the most important cereals, while sunflower and rapeseed are the most significant industrial crops (HCSO, 2020). Therefore, the production area, average yield and price trends of these crops are presented for the last 20 years.

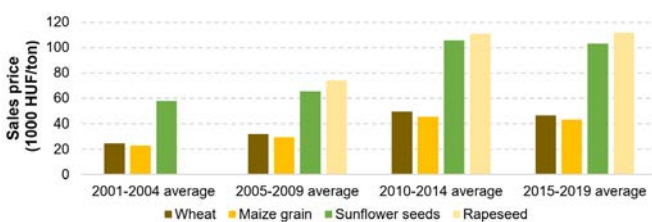
### **General background of Hungarian crop production**

For wheat, the harvested area shows a downward trend and there was no significant improvement in its average yield, either. In contrast, the harvested area of maize declined from 1.2 million to 1 million hectares between 2010 and 2015. During this period the average yield increased from 6.0 t/ha to 7.6 t/ha. The decline in the production area of these crops may be due to the establishment of organic target areas by the CAP, which has led to a 40% increase in the production area of fodder crops (especially alfalfa) in the last five years (HCSO, 2020).

In terms of average wheat yield, Hungary has average values compared to the European Union. Between 2010 and 2014, Hungary's yield was 0.8 tons per hectare lower than the EU average (5.0 t/ha). Looking at the average for 2015-2019, Hungary achieved a specific wheat yield (5.3 t/ha) similar to the EU average (5.4 t/ha). In contrast,

for maize, the average for the period 2010-2014 (6.0 t/ha) shows poorer yield, while the average for the period 2015-2019 shows that Hungary's average yield (7.6 t/ha) is considered to be average within the EU (HCSO, 2021b; FAOSTAT, 2021). The EU average yield between 2010-2014 and 2015-2019 was 8.2 t/ha (FAOSTAT, 2021). However, there was an increasing trend in Hungary between 2010 and 2019, which may be mainly related to the use of more modern technologies (Takácsné György et al., 2018).

In the case of sunflower and rapeseed, it is clear that both the area harvested and the yield per hectare show increase, averaged over the examined period. Compared to the EU averages (2010-2014 average: 2.8 t/ha; 2015-2019 average: 3.0 t/ha), it can be concluded that the average rapeseed yield in Hungary was in the medium range between 2010 and 2014 (2.6 t/ha) and between 2015 and 2019 (3.1 t/ha). As for sunflower production, the average yield in Hungary in 2010-2014 and 2015-2019 can be considered favourable compared to the EU data (FAOSTAT, 2021). In the last 20 years, the production area of sunflower has increased 1.5 times, while that of rapeseed has nearly tripled (HCSO, 2021b). In the case of rapeseed and sunflower, biofuel production may be behind this growing trend, as both crops are potentially important feedstocks (Fehér, 2017; Popp and Bai, 2018, Popp et al., 2018a).



Source: HCSO, 2021b

**Figure 1.** Sales price of wheat, maize, sunflower and rapeseed in Hungary (2001-2019)

The income situation of partnerships is determined by sales price of crops. The average sales prices of wheat and maize have not changed significantly over the last 10 years. However, the prices of these crops have almost doubled since the early 2000s. Sunflower prices have increased by 70-80% compared to the same period. The

purchase price for rapeseed is available from 2006. The average price for rapeseed during the last year is about 1.5 times the average for the period 2006-2009 (Figure 1). The upward price trend for rapeseed and sunflower is linked to an increase in demand (as a biofuel feedstock). Hungarian prices are mainly driven by prices on the international market (stock exchange). Wheat prices in the EU are forecast to be close to world prices, while for maize the difference between EU and world prices is expected to be larger. The world price is expected to increase at a lower rate than the EU price. EU maize prices could increase from 169 euro to 211 euro per ton between 2020 and 2030. Maize price on the world market could rise from 149 euro to 160 euro per ton (EC, 2019). The world market price is mainly influenced by economic growth/decline, closing stocks and oil prices (Oláh and Popp, 2018).

### Objectives

The objective of the study is to assess the concentration of arable crop partnerships in Hungary and to determine their profitability, capital structure and financial situation.

The article aims to answer the following questions:

- How does the economic size (based on total assets) of arable crop partnerships develop?
- How does the economic size (based on net sales revenue) of arable crop partnerships develop?
- What is the concentration of arable crop partnerships in Hungary?
- What are the noticed trends in the profitability of Hungarian arable crop partnerships?
- How does the capital structure (fixed assets and leverage) of Hungarian crop partnerships develop?
- How does the financial situation (liquidity) of Hungarian crop production partnerships develop?

### MATERIALS AND METHODS

Secondary data were used for the study. These data are taken from the HCSO, FAOSTAT and EMIS databases. The HCSO database contains data on arable crop production in Hungary and the FAOSTAT database contains data at the EU level.

The EMIS database, which was applied in a similar way to Fenyves et al. (2019, 2020), covered financial data of the Hungarian partnerships engaged in arable crop production. Efficiency indicators were calculated from the latter data, which were used to determine profitability, as well as capital structure and financial position.

The examined partnerships were filtered according to their main activity, which in this case covered farms engaged in the production of cereals (except rice), legumes and oilseeds (NACE<sup>1</sup>:0111; NAICS<sup>2</sup>:1111; 111130). In addition, this study also focuses on companies that provided valuable data each year during the period 2015-2019. A fixed asset ratio of at least 20% was also defined as a criterion, thus filtering out mixed farms (and consequent outliers in certain indicators) whose activity is more heavily involved in trade while production is the main activity. Our decision was based on statement of Apáti and Szöllösi (2018) and also on professional judgement. After filtering the database, the total number of partnerships analysed is 853.

Descriptive statistical methods (mean, relative standard deviation, median, intraclass distribution) were used in the research.

Regarding EMIS database the number of employee was not included. For this reason illustrating the economic size the Act XXXIV of 2004 was used, which defines the size categories of micro, small and medium-sized partnerships (Act XXXIV, 2004). In the present case, these three categories were applied, taking into account total assets and/or net sales revenue. To ensure that the intervals are properly defined, the values originally set in EUR have been converted into HUF on the basis of the average Hungarian National Bank (HNB, 2021) Euro exchange rate for the period 2015-2019 (314.94 HUF/EUR).

Consequently, micro-partnerships have a total assets or net sales revenue of less than 630 million HUF. For small partnerships the ceiling is 3.15 billion HUF for the

one of the points of reference. As for the classification of medium-sized partnerships, total assets of 13.5 billion HUF and a net sales revenue of 15.7 billion HUF were the highest value. Partnerships with respective values above these thresholds are classified as large corporations. However, no such partnerships were included in the database in the examined sector, therefore, this category was not used for the illustration of farms sizes.

Firstly, the categorization was used to illustrate the size categories of micro, small and medium-sized partnerships in order to classify the sharing based on total assets and net sales revenue separately. Two figures were created in order to illustrate and associate the farm size based on total assets and net sales revenue, separately. During the next step the classification was made by one of the two points (total assets or net sales revenue) to clarify and determine the actual distribution. However, during the tables about profitability, capital structure and financial situation the actual SME classification was not used. It was only used at the beginning of the analysis based on illustrating the different farm sizes by total assets or net sales revenue. The farm size was first defined based on the total assets, similarly to the study by Nguyen and Nguyen (2020) and Fenyves et al. (2020). Subsequently, changes in farm size were also evaluated on the basis of net sales revenue.

The concentration of partnerships was also examined by means of the Lorenz curve and the Gini index [1], based on the total assets and net sales revenue. The Lorenz curve represents cumulative relative total value as a function of the cumulative relative frequency (%) in a unit length square (Hunyadi and Vita, 2008). The Gini index measures the inequality among values of a frequency distribution. If there is perfect inequality, the value is 1 (Horváth and Kopányi, 2004).

$$G = \frac{\sum_i \sum_j |y_i - y_j|}{2n \sum_{i=1}^n y_i} \quad [1]$$

where  $y_i$  is the total assets or net sales revenue of partnership  $i$ , and there are  $n$  partnerships in the sample.

During the processing of basic data, indicators of profitability, assets and financial position were determined.

<sup>1</sup> Classification of Economic Activities in the European Community, Rev.2. (2008)

<sup>2</sup> North American Classification System (1111: Oilseed and Grain Farming; 111130: Dry Pea and Bean Farming)

The indicators ROS (Return on Sales) [2] and ROA (Return on Assets) [3] were used to assess profitability. The EBIT was used as a performance category in order to focus on the operations of the examined partnerships. The ROS was also applied by Maziarczyk (2020), while the ROA as a profitability indicator and the quick liquidity ratio [4] expressing the financial situation were applied by Malik et al. (2016). In addition, fixed asset ratio [5], as a capital structure indicator was also calculated. The leverage ratio [6] was also applied by Fenyves et al. (2020) evaluating the capital structure.

$$ROS = \frac{EBIT}{Net\ sales\ revenue} \times 100 \quad [2]$$

$$ROA = \frac{EBIT}{Total\ assets} \times 100 \quad [3]$$

$$Quick\ liquidity\ ratio = \frac{Current\ assets - Stocks}{Short\ term\ liabilities + Accrued\ charges\ and\ deferred\ income} \quad [4]$$

$$Fixed\ assets\ ratio = \frac{Fixed\ assets}{Total\ assets} \times 100 \quad [5]$$

$$Leverage\ ratio = \frac{Total\ assets - Equity}{Total\ assets} \times 100 \quad [6]$$

A correlation analysis was performed between the financial data (total assets and net sales revenue) determining farm size and the calculated efficiency indicators.

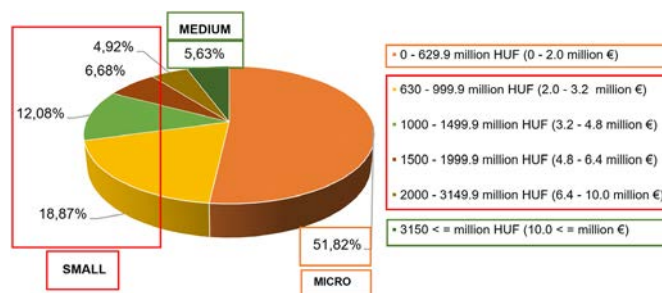
In addition to the findings and conclusions formulated in this paper, it is a limitation of the study that it was not possible to identify from the data of available annual accounts to what extent the examined partnerships do sales activity and to what extent these activities influence financial indicators. Therefore, it was not possible to exclude mixed farms completely from the analysis, which in some respects distorts the results obtained for crop production.

## RESULTS

### Economic size of Hungarian partnerships

Considering the Act XXXIV of 2004 (size categories of micro, small and medium-sized partnerships) in Hungary, Figures 2 and 3 show the distribution of the examined Hungarian partnerships by total assets and net sales revenue separately. However, this information is just a guidance how the partnerships can be classified as SMEs based on total assets and net sales revenue separately. Only one of the two points was taken into account in these figures.

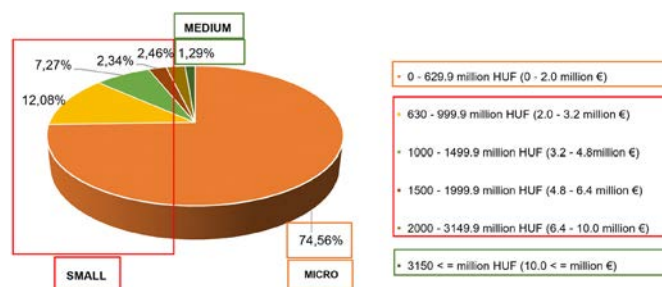
When the economic size was determined based on only the total assets, 52% of the examined farms can be categorised as micro-size. Regarding net sales revenue, on the other hand, 75% of the sample can be classified as the same category.



Source: own calculation based on EMIS (2020) data

**Figure 2.** Distribution of the number of examined partnerships by total assets (averaged over the period 2015-2019)

When the economic size was determined based on net sales revenue (Figure 3), 75% of the examined farms were considered to be micro-partnerships and almost a quarter were classified as small partnerships. In contrast, only 11 (1%) were medium-sized partnerships.



Source: own calculation based on EMIS (2020) data

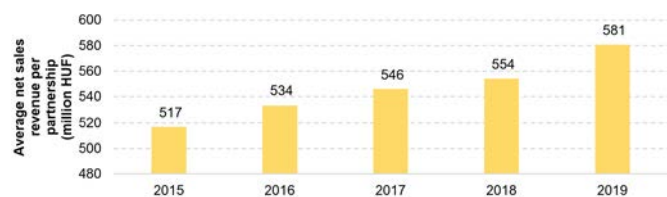
**Figure 3.** Distribution of the examined partnerships by net sales revenue (average over the period 2015-2019)

On average, Hungarian farms had total assets of 997 million HUF and net sales revenue of 546 million HUF over the 2015-2019 period (relative standard deviation: 122% and 118%).

The average net sales revenue of Hungarian farms shows an increasing trend (Figure 4), rising by 12% from 517 million HUF to 581 million HUF between 2015 and 2019. This may be mainly due to an increase in sales prices, as there is no significant change in average yields over the period 2015-2019. However, the increase in



average net sales revenue per partnerships may also reflect an increase in average farm size and consequently concentration.



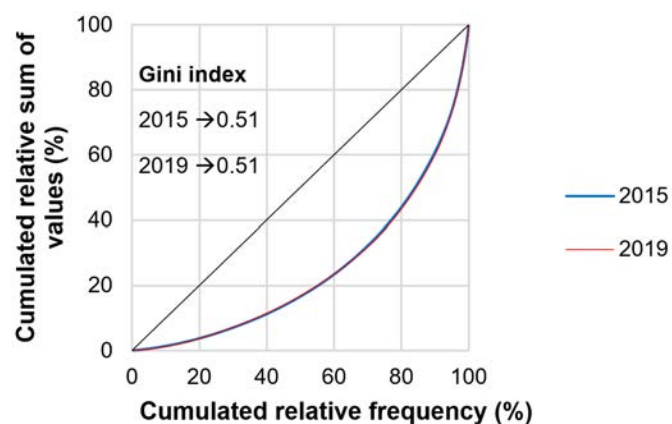
Source: own calculation based on EMIS (2020) data

**Figure 4.** Average net sales revenue per partnership

Considering the Act XXXIV of 2004 (size categories of micro, small and medium-sized partnerships) the actual classification and distribution was also made based on total assets or net sales revenue. As a result, in Hungary, the share of micro-partnerships engaged in arable crop production is higher (~51%) than that of small partnerships (~44%), based on the data from the 2015-2019 reporting period. Only around 5% of the examined farms can be classified in the highest category (medium-sized). However, during the following analysis (profitability, capital structure and financial situation) the efficiency was not judged via this distribution.

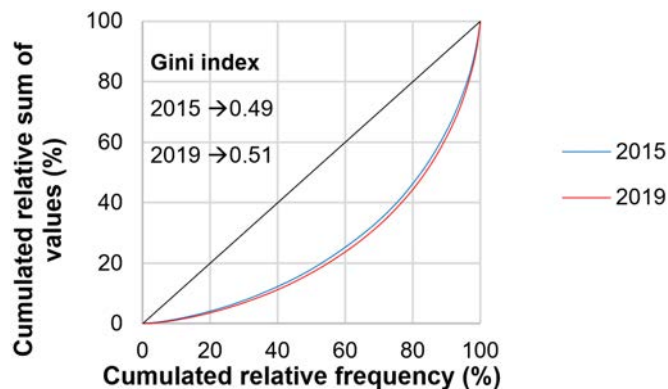
#### **Concentration of arable crop partnerships in Hungary**

The concentration of arable crop farms in Hungary is illustrated in Figures 5 and 6. In terms of concentration by total assets, almost 15% of the examined farms account for almost half of the total assets.



Source: own calculation based on EMIS (2020) data

**Figure 5.** Concentration of Hungarian partnerships by total assets



Source: own calculation based on EMIS (2020) data

**Figure 6.** Concentration of Hungarian partnerships by net sales revenue

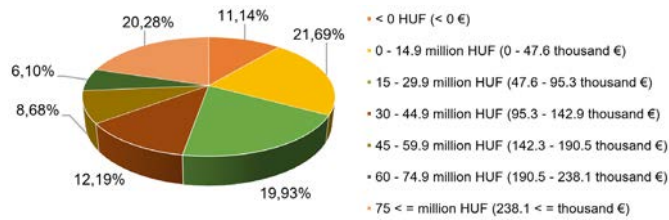
This shows, on the one hand, the concentration of total assets and, on the other hand, the significant fragmentation of partnerships in the sector. It can also be concluded that there is no change in the degree of concentration over the examined period. Overall, the degree of concentration by net sales revenue is similar to the previous pattern, with the difference that it has increased slightly from 2015 to 2019.

This concentration is also confirmed by the Gini index, which has a medium value in both cases. For assets, the value of the Gini index has not changed, while for net sales revenue it has increased from 0.49 in 2015 to 0.51 in 2019, which is too minor to bother.

#### **Trends in the EBIT and profitability of Hungarian partnerships**

On average micro partnerships have 19.8 million HUF (62.9 thousand €) EBIT, small partnerships have 60.9 million HUF (193.7 thousand €) EBIT and medium partnerships have 185.4 million HUF (588.6 thousand €) EBIT.

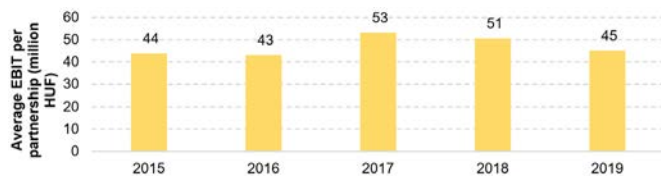
The share of unprofitable partnerships averaged over the period 2015-2019 is 11%, with partnerships with an EBIT below 15 million HUF (47.6 thousand €) accounting for one third of the examined sample. Farms with an EBIT between 15 and 75 million HUF (47.6 – 238.1 thousand €) account for almost 50% of the examined farms. The number of farms with the highest EBIT is 173, which represents about 22% of the sample (Figure 7).



Source: own calculation based on EMIS (2020) data

**Figure 7.** Distribution of the examined partnerships based on their EBIT (averaged over the period 2015-2019)

From 2015 to 2017, the average EBIT per partnerships increased. However, the opposite was the case in the subsequent years, despite the increasing trend in net sales revenue (Figure 8). This trend can be attributed to a decrease in EBIT-generating capacity, not to a decrease in farm size. However, for a more objective comparison, it is worth examining the tendency of particular profitability indicators (ROS, ROA).



Source: own calculation based on EMIS (2020) data

**Figure 8.** Average EBIT per partnerships

**Table 1.** ROS of partnerships (2015-2019)

Operating ROS (%)	Number of partnerships (pc)	Distribution (%)	Total assets per partnerships (1000 HUF)	Net sales revenue per partnerships (1000 HUF)
< 0	106	12.4	731 977	298 724
0 - 4.9	187	21.9	1 093 111	737 282
5 - 9.9	218	25.5	1 029 214	607 517
10 - 14.9	132	15.5	1 101 256	626 634
15 - 19.9	90	10.6	874 250	403 649
20 <	120	14.1	997 854	375 158
Total	853	100.0	996 671	546 352
Mean			8.63%	
Relative standard deviation			191%	
Median			8.21%	

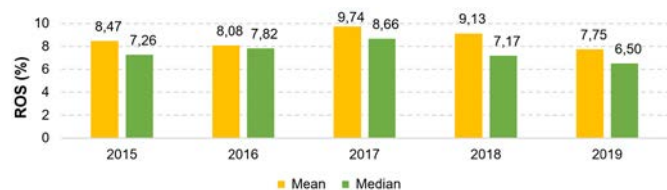
Source: own calculation based on EMIS (2020) data

The average ROS of the examined farms over the period 2015-2019 is 8.63% (Table 1). The median value (8.21%) is closer to it. Around half of the sample had a ROS of 0-10% over the examined period. These farms accounted for almost 50% of the total assets of the sample and about 60% of the total net sales revenue of the sample. On average, the most profitable farms (above 20% ROS) had almost 998 million HUF (3.2 million €) total assets and 375 million HUF (1.2 million €) net sales revenue.

The relationships between operating ROS and total assets ( $r=0.040$ ;  $P>0.05$ ) and between ROS and net sales revenue ( $r=0.045$ ;  $P>0.05$ ) were also examined. The obtained results show no significant correlation between any of these factors.

Figure 9 shows the year-on-year evolution of the mean and median of the ROS of the sample. Some farms had almost zero net sales revenue in 2018 and 2019 while making significant losses. Despite the fact that sales prices and, through them, realisable net sales revenue have increased over the examined period, there is no impact on profitability. From 2018 onwards, Hungarian arable crop partnerships have been able to produce at

continuously increasing costs each year, which has had a significant impact on the negative/unfavourable trend of EBIT.



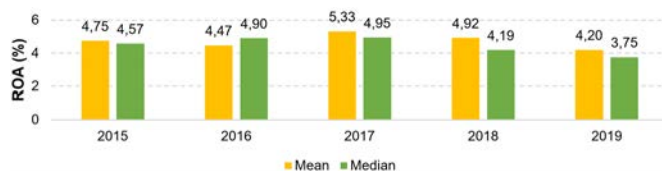
Source: own calculation based on EMIS (2020) data

**Figure 9.** ROS of the examined partnerships

The average ROA of the examined farms was 4.73% between 2015 and 2019 (Table 2). The median value was similar (4.85%) (Table 2). Nearly 80% of the examined farms had ROA values of 0-15%, accounting for 88% of total assets and 89% of net sales revenue. The proportion of farms with ROA above 20% was close to 3%, accounting for 1.5% of the sample's total assets and 2% of its net sales revenue.

Correlation analysis was used to assess the relationships between ROA and total assets ( $r=-0.060$ ;  $P>0.05$ ), as well as ROA and net sales revenue ( $r=0.001$ ;  $P>0.05$ ). The obtained results show no significant correlation between any of these factors.

The year-by-year descriptive statistics (mean, median) of the average ROA of the sample is shown in Figure 10. Similarly to ROS, the statistics show a downward trend in the evolution of return on assets from 2017 onwards.



Source: own calculation based on EMIS (2020) data

**Figure 10.** ROA of the examined partnerships

### **Capital structure and liquidity of Hungarian partnerships**

On average, the share of fixed assets in the capital structure of the sample is 51.8%, with a slightly lower median value (49.07%) (Table 3). Nearly half of the farms have a share of fixed assets between 40-60%, which represent 47% of the total assets value of the sample and 48% of its net sales revenue. On average, these partnerships have nearly 1 billion HUF (3.2 million €) total assets and 568 thousand HUF (1.8 million €) net sales revenue. Almost one third of the examined companies have a value below 40%.

**Table 2.** ROA of partnerships (2015-2019)

Operating ROS (%)	Number of partnerships (pc)	Distribution (%)	Total assets per partnerships (1000 HUF)	Net sales revenue per partnerships (1000 HUF)
< 0	99	11.6	806 081	326 702
0 - 4.9	334	39.2	1 201 268	645 718
5 - 9.9	270	31.7	977 108	552 492
10 - 14.9	102	12.0	808 888	504 877
15 - 19.9	26	3.0	389 723	314 204
20 <	22	2.6	576 200	417 516
Total	853	100.0	996 671	546 352
Mean			4.73%	
Relative standard deviation			175%	
Median			4.85%	

Source: own calculation based on EMIS (2020) data



**Table 3.** The share of fixed assets of partnerships (2015-2019)

Fixed assets per total assets (%)	Number of partnerships (pc)	Distribution (%)	Total assets per partnerships (1000 HUF)	Net sales revenue per partnerships (1000 HUF)
< 40	245	28.7	840 259	513 015
40 – 59.9	393	46.1	1 007 542	568 163
60 – 79.9	194	22.7	1 145 108	571 240
80 < =	21	2.5	1 246 777	297 187
Total	853	100.0	996 671	546 352
Mean			51.80%	
Relative standard deviation			29%	
Median			49.07%	

Source: own calculation based on EMIS (2020) data

However, partnerships with a value below 20% are not included in the study, as described in the methodology. The number of partnerships with fixed assets above 80% is 21, representing only 3% of total assets and 1% of net sales revenue.

The correlation between the ratio of fixed assets to the total assets and the ratio of fixed assets to net sales revenue was also examined. While in the former case there is a weak positive correlation ( $r=0.114$ ;  $P>0.05$ ), there was no correlation between the two latter variables ( $r=0.026$ ;  $P>0.05$ ).

The mean increased slightly from 2015 to 2019 (from 51.3% to 52.2%) and the median value increased by 2% over the examined period.

Table 4 shows the evolution of the leverage of the examined Hungarian partnerships. The average leverage ratio of these farms is 27.87% and the median value was 24.67%. Around 41% of farms have a value between 0% and 20%, i.e. a significant proportion of partnerships cover their total assets demand with low outstanding debt. At the same time, partnerships with debt levels between 20% and 40% account for 31% of the sample.

**Table 4.** The leverage ratio of partnerships (2015-2019)

Leverage ratio (%)	Number of partnerships (pc)	Distribution (%)	Total assets per partnerships (1000 HUF)	Net sales revenue per partnerships (1000 HUF)
0 – 19.9	348	40.8	1 034 041	518 710
20 – 39.9	262	30.7	1 087 665	618 943
40 – 59.9	152	17.8	926 660	534 939
60 – 69.9	42	4.9	686 050	519 520
70 < =	49	5.7	728 153	412 929
Total	853	100.0	996 671	546 352
Mean			27.87%	
Relative standard deviation			77%	
Median			24.67%	

Source: own calculation based on EMIS (2020) data

The proportion of farms with the worst leverage values, i.e. above 70%, is around 6% of the sample. However, these partnerships are smaller in size, i.e. they have lower total assets and net sales revenue than those with the most favourable values.

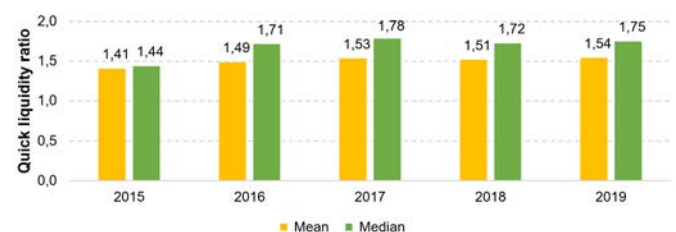
The correlation between leverage and total assets, as well as leverage ratio and net sales revenue was also examined. In the former case, a weak negative correlation ( $r=-0.068$ ;  $P<0.05$ ) was observed. This implies that an increase in assets, and hence in the farm size, is associated with higher levels of debt. As opposed to this, no significant correlation was found between the leverage ratio and net sales revenue ( $r=-0.032$ ;  $P>0.05$ ).

There were minimal differences between each year in the evolution of the leverage ratio of Hungarian arable crop farms. The lowest value was observed in 2017 (29.6%), while the highest was recorded in 2015 (32.7%).

The quick liquidity ratio was used to assess the short-term liquidity of farmers. The average quick liquidity ratio on the examined farms was 1.5 and the median was closer to this value (1.82) (Table 5). It should be highlighted that half of the examined farms have excellent liquidity values ( $2 \leq$ ), accounting for 45-47% of total assets and net sales revenue. The proportion of partnerships with liquidity between 1 and 2 is 22%, which can also be considered favourable. At the same time, one third

of partnerships have a value below 1, which is already considered unfavourable from the aspect of liquidity. These partnerships are slightly larger than those in other categories.

Correlation analysis was used to examine the relationships between the quick liquidity ratio and the total assets and the quick liquidity ratio and net sales revenue. The correlation between the quick liquidity ratio and the total assets is not significant ( $r=-0.024$ ;  $P>0.05$ ), while the correlation between the quick liquidity ratio and net sales revenue is weak and negative ( $r=-0.083$ ;  $P<0.05$ ).



Source: own calculation based on EMIS (2020) data

**Figure 11.** Quick liquidity ratio of the examined partnerships

Figure 11 shows the evolution of the quick liquidity ratio over time for the examined companies. The mean and median values for 2015-2019 are similar, ranging from 1-2, i.e. the examined farms usually do not have any short-term liquidity problems.

**Table 5.** Quick liquidity ratio of partnerships (2015-2019)

Quick liquidity ratio	Number of partnerships (pc)	Distribution (%)	Total assets per partnerships (1000 HUF)	Net sales revenue per partnerships (1000 HUF)
< 1	255	29.9	1 094 270	603 361
1 - 1.9	187	21.9	876 675	546 569
2 < =	411	48.2	990 714	510 883
Total	853	100.0	996 671	546 352
Mean			1.50	
Relative standard deviation			476%	
Median			1.82	

Source: own calculation based on EMIS (2020) data

## DISCUSSION

In recent years, the cost of the production has steadily increased. As Keszthelyi and Kis Csatóri (2019, 2020) report, one of the largest increases in 2017 and 2018 was observed in wage costs (11 and 13%). In addition, there were significant increases in insurance fees (by 12%) in 2017 and in land rent (by 16%) in 2018. For this reason getting subsidies are appreciated. The trends of EBIT are influenced not only by the net sales revenue of the products sold but also by subsidies. In more favourable circumstances, the share of area-based subsidy in income (in this case, the EBIT) can be as high as 73%. In the case of low specific yields of arable crop partnerships as a result of adverse weather conditions or other influencing factors, these subsidies are becoming even more significant, due to the income situation of farmers (Popp et al., 2018b). These factors affect the profitability ratios (ROS, ROA) and the quick liquidity ratio as well.

The correlation between the quick liquidity ratio and net sales revenue is weak and negative, which means short-term liquidity is less favourable as net sales revenue increases, i.e. as farm size increases. According to Tóth et al. (2019), the liquidity of Dél-Alföld Region ranged from 0.8 to 1.6 between 2013 and 2016, depending on the SME size, and there was a positive trend related to this indicator. However, our results are more favourable at the national level (ranging from 1 to 1.8).

According to Keszthelyi and Kis Csatóri (2020), investment climate was very favourable in 2018. In addition to the basic subsidies, partnerships also took advantage of the opportunities of the Rural Development Programme (HCA, 2015). As a result, there was a significant increase (+46%) in machinery investments. However, this upward trend is only slightly reflected in the evolution of the share of fixed assets. It should be noted, the very high fixed asset ratio (80%+) could be an indication of under-utilisation of capacity because of generating continuous fixed costs. For this reason, increasing capacity utilization is an important part of the economic analysis in order to decrease the average fixed costs (Apáti et al., 2018). In terms of net sales revenue, these partnerships have

lower net sales revenue, which could also show a lower capacity utilisation because of such a high fixed assets ratio could indicate more modern technology in order to achieve higher average yield per hectare. However, the average net sales revenue per partnership seems very low compared to other intra-classes (refers to lower capacity utilisation).

The significant correlation between the ratio of fixed assets and the total assets indicates that an increase in the total assets (and hence an increase in farm size) is slightly related to an increase in the ratio of fixed assets. Thus, the higher share of fixed assets is probably explained by newer, more modern technology.

Regarding leverage ratio there was a slight increase between 2017 and 2019, which can be attributed to an increase in investment, as they were mostly financed from investment loans in addition to subsidies (Keszthelyi and Kis Csatóri, 2020). Our results of the leverage ratio (almost 30%) are similar to results of Fenyves et al. (2020). In Poland and Slovakia, the values were higher, which indicates higher financing (40-60%) by external sources between 2015 and 2017 (Fenyves et al., 2020).

## CONCLUSION

In the examined period, Hungarian arable crop partnerships varied in size. The share of micro-partnerships engaged in arable crop production is higher (~51%) than that of small partnerships (~44%). Only around 5% of the examined farms can be classified in the highest category (medium-sized).

The Gini index indicates a medium concentration, with a very slight increase in net sales revenue over the examined period.

While net sales revenue per partnerships increased on average over the period 2015-2019, this was not the case for EBIT per partnerships. The examined partnerships produced profitable, although, capital efficiency deteriorates as assets increase.

Around half of the examined farms had a fixed asset ratio of between 40% and 60%, indicating a more modern level of technology than partnerships with a ratio of

between 20% and 30%. In addition, a fixed asset ratio that is too high – above 80% – is not favourable either, as it is a result of under-utilised capacity, which is also evidenced by the lower net sales revenue of these companies in relation to their assets. Results show that larger farm size means newer and higher quality technology.

The average leverage ratio of Hungarian partnerships is considered favourable and the examined partnerships mostly financed their expenditure from their own resources. Around 6% of the examined sample can be considered indebted (values above 70%). An increase in assets, and hence in farm size, is associated with higher levels of debt capital. However, this idea can be reversed, i.e. a higher level of debt capital makes it better and easier to expand the size of partnerships.

Almost half of the Hungarian farms had excellent short-term liquidity. In contrast, one third of the partnerships had unfavourable liquidity. As net sales revenue and, as a result, farm size increases, short-term liquidity decreases.

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