Implementing the resource potential sustainability of small-scale agricultural entities in cooperative associations of Ukraine

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Abstract

The aim of the study is to study the functional features of peasant farms in Ukraine and the use of their resource potential, taking into account their regional characteristics and main trends in the Ukrainian economy. The article introduces the process of exploiting the resource potential of small-scale agricultural entities in Ukraine in terms of sustainable development. The materials of this article are important because of the economy of Ukraine, including the agricultural sector, should be developed by European-style innovations to accelerate the process of Ukraine's admission to the European Union. The theory of family-and-labor economy was used as a methodological basis of the research. To assess the influence of the basic components of the resource potential of farms on their operation efficiency, a standard Cobb-Douglas production function is applied. The research analyses trends of agricultural sustainable development in the EU (European Union) countries and Ukraine along with the factors determining the specific functioning of each sector. To study the regional functional features of farms, it was built a resultative image of the production function for the gross output of agricultural production in the clusters. The absolute dependence of the rating of the resource potential of farms on its production component is identified; the activity of peasant households is based on an intensification principle, on which well-being depends. An attempt to predict the economic activity of small-scale agricultural entities in Ukraine was made both for individual and cooperative entities. The research shows that in the case of active development of agricultural cooperatives, the influence of peasant farms on the na-

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tional food market, and well-being will be growing as well as the share of entities engaged in commodity production.

Key words: **peasant farms, sustainable development, gross output, resource potential, intensification principle, commodity production.**

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1. Introduction

The current stage of economic relations at the national and global level is characterized by the increasing importance of small-scale entities, where a particular role is given to family businesses. Moreover, in rural areas this category of small farmers performs not only economic but also social functions, solving the problem of employment and supporting the family welfare at an acceptable level (Chayanov, 1989; Chayanov, 1925; Chelyntsev, 1919; Chelyntsev, 1928; Kalchenko et al., 2019; Kalchenko, 2013; Matyushenko et al., 2018; Tyliszczak et al., 2010; Shcherbak et al., 2021). All of this is extremely important in the ongoing economic crisis observed in most EU (European Union) countries. In the economic realities of Ukraine, family forms of agricultural production (so-called peasant farms) occupy an important position in the strategic policy documents developed by state institutions and aimed at promoting sustainable development of regions and local communities (He et al., 2020; Hrynko et al., 2021). At the same time, the problem of ensuring the efficient use of labor, land, and property resources for this category of agricultural producers remains unsolved (Kalchenko et al., 2020; Karpenko et al., 2018; Kniazevych, 2021; Laiko et al., 2020; Makarov, 1927; Mazur, 2018; Olawui, 2018; Olebogeng and Gaanakgomo, 2018; Proskurnina et al., 2021).

One of the causes of the low efficiency of small-scale agricultural entities in Ukraine is the insufficient level of their consolidation. Their economic activity is chaotic, based on the principles of self-survival and minimal contact with representatives of the regional state institutions (Shtal et al., 2018). The practical implementation of the successful experience of European and other world countries in the development of family farms` well-being is complicated by fundamental differences in the structure of agrarians and their impact on the formation of the raw material market of agricultural goods in Ukraine. In this regard, studying the development prospects of the small-scale agricultural entities, taking into account their regional specifics, is an urgent need (Gumentyk et al., 2020; Nikolaenko et al., 2020; Pourshahabi et al., 2010; Reiff et al., 2018).

The specific functional features of small-scale farming in the current conditions have been discussed by S. Kalchenko (2019), A. Mazur et al. (2018), Olawuy, (2018), and F. Pourshahabi et al. (2010). Thus, S. Olawuy (2018) has highlighted the impact of Nigerian farms on national socio-economic relations in rural systems. His research showed the interrelation between the active update of technological support and machinery at farms and the status of regional food safety. The research of V.K. Zbarsky (2020) discussed the impact of socio-economic factors on the use of resource potential in small-scale agricultural entities in Ukraine. He particularly noted the need to consider the functional characteristics of family farms when evaluating their effectiveness. The studies of N. Makarov (1927), and T. Shanin (1973) et al. discuss theoretical and methodological aspects of family farms. The research of O.V. Chayanov (1989) has pointed to the fundamental differences in the organizational-economic structure of this category of agrarians. In addition, he coined the definition of "family-labor economy" to determine the persons whose activities rely on using their own resources. Studying the sustainable development prospects for this operation mode in the agrarian sector, O.V. Chayanov (1925) considered the formation of cooperatives as one of the priority ways to increase productivity.

Clusters as a form of integration of economic entities and a means of their grouping by sectoral, territorial, and other characteristics have been considered in the surveys of A. Kniazevych et al. (2021), K. Cheba (2015), O. Laiko et al. (2020). E. Rollnik-Sadowska and E. Dabrowska (2018) used cluster analysis to study the efficiency of the EU policy in the labor market. The research justified the need to develop an integrated technique for the assessment of the activities of state institutions in this sector of market infrastructure. K. Cheba (2015) studied the cluster development in the economies of the EU countries and Japan, focusing on its socio-economic value. In her study, she determined the main factors making for the effective operation of enterprises within clusters. Nevertheless, further research is required on theoretical and methodological aspects of assessing the efficiency of family farms. It includes the evaluation of exploitation efficiency of available resources, given the business-oriented vector of this sector (Hlavsa et al., 2020; Kapitonov and Vilks, 2022). The purpose of this research is to study the functional features of peasant farms in Ukraine and the use of their resource potential, taking into account their regional characteristics and main trends in the Ukrainian economy.

2. Materials and Methods

The theory of the family-and-labour economy was used as a methodological basis of the research. This scientific approach involves the assessment of activities of the studied

category of agrarians, given their socio-economic characteristics, the subjective evaluation of the results of their activity, and the impact of demography on the overall development process (Kairullaev et al., 2017; Fialko et al., 1994). A.M. Makarov (1927), analyzing the specific characteristics of using the resource potential in family-and-labor peasant farms, points to significant differences in the exploitation of the workforce. In particular, it was noted that the increase in labor costs is associated not only with the growing profitability of the production process but also with a subjective assessment of the needs for family well-being. According to the scientist, the use of funds in the rural economy depends on the level of social welfare in relevant regions along with general trends of their development (Kalenska et al., 2021; Yessenamanova et al., 2021).

It was emphasized that the studies of O. Karpenko et al. (2018) consider a pattern of the transport and logistics cluster as a means to increase the efficiency of business entities in the regions. To build this pattern, the authors have identified cluster productivity indicators, classifying them as follows: economic efficiency indicators; environmental efficiency indicators; innovation efficiency indicators; social efficiency indicators. To determine the dynamics of productivity indicators in the transport and logistics cluster, the following formula (1) is proposed:

$$f^t(x_{ij}) = g({d_{ij}}^1) \times x_{ij} + g({d_{ij}}^2) \times g({d_{ij}}^1)x_{ij} + g({d_{ij}}^3) \times g({d_{ij}}^2) \times g({d_{ij}}^1) \times x_{ij}, \quad (1)$$

where, $g({d_{ij}}^1)$ – is the function of the predicted value of the x_{ij} indicator growth coefficient for the year *t*, represented by a linear function in the case of a positive coefficient and by an inverse one for a negative coefficient (Karpenko et al., 2018; Prokopov et al., 1993). M. Reiff et al. (2018) propose to use the method of cluster analysis to assess the efficiency of agricultural production in the EU countries by the following indicators: export of agricultural raw materials; import of agricultural raw materials; crop production index; livestock production index; grain yield; dynamics of the added value of agriculture in the gross domestic product (GDP); dynamics of the added value of agriculture per employee. It should be noted that the method of cluster analysis has been applied in the Czech Republic for the integrated assessment of the farm's efficiency (Hloušková and Lekešová, 2020). This approach includes the analysis of production outputs per region according to the following integrated indicators:

– economic indicator;

– financial stability indicator;

– environmental indicator;

– social indicator.

The score was calculated and a comparative assessment of agricultural sustainability in the regions was made (Hloušková and Lekešová, 2020). To determine the influence of

resource exploitation efficiency on the management results, one should study the production function in small-scale agricultural entities. To analyze the relationship between labor and land resources, a production function with two variables is used. As a result, the production function takes the form (formula (2)) (Cobb and Douglas, 1928):

$$Q = f(Z; L), \tag{2}$$

where, Q – is the volume of gross agricultural out, million EUR; Z – is the size of agricultural lands, thousand ha; L – is the number of employees, thousand people.

The production function of agricultural output in the peasant farms belonging to different clusters is represented by the Cobb-Douglas (1928) function taking into account the specifics of the own resource base (formula (3)):

$$Q = A \times Z^{\alpha} \times L^{\beta}, \tag{3}$$

where, A – is the technological coefficient; α – is the production elasticity coefficient of gross output by the size of agricultural lands; β – is the production elasticity coefficient of gross output per number of employees; $\alpha + \beta$ – are the returns to the scale of production.

3. Results and Discussion

The dynamics of crop production in the EU countries show a general steadily increasing trend (Figure 1). After unfavorable nature and climate conditions of the year 2019, the European agrarians harvested 299.3 million tons which 9% exceeded the preceding year's indices.

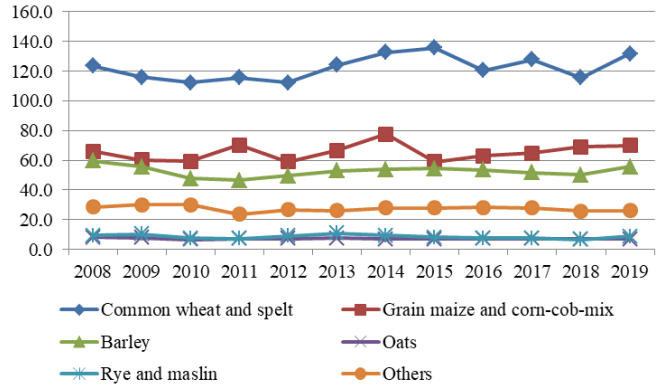

Figure 1. Dynamics of crop production in the EU countries

The main producers were France (24%), Germany (15%), Romany (10%), and Poland (9%). Among them, France, Germany, and Poland demonstrated the highest indices of production growth after the draught of 2018. One of the causes of this fact is an active national policy for the sustainable development of an agrarian industry in these countries as well as the promotion of effective farming management as an integral part of the competitive environment in the field of agricultural production and sales (Stotten, 2020; Tyliszczak et al., 2009).

The specific functioning of the family farms manufacturing agricultural products in Ukraine is mainly determined by the fact that this category of farms is not homogenous. Moreover, these farms, being the subjects of agrarian entrepreneurship according to the existing laws, do not play an essential role in the formation of the national market of agricultural raw materials (Novytska et al., 2020). The main positions are occupied by peasant farms of the consumption and consumption-commodity directions, defined by the state statistics institutions as households. A similar situation is observed in all branches of the agricultural production industry (Trusova et al., 2021; Trusova et al., 2020; Livestock…, 2020; Tonkha et al., 2020; Varchenko et al., 2018; Vinichenko et al, 2021).

The analysis of the dynamics of the sown areas in Ukraine shows that after transiting to a market economy, the share of this category of agrarians has considerably grown. It is especially noticeable in the cultivation of potatoes, vegetables, and gourds, where a corresponding index steadily exceeds 95% (Figure 2).

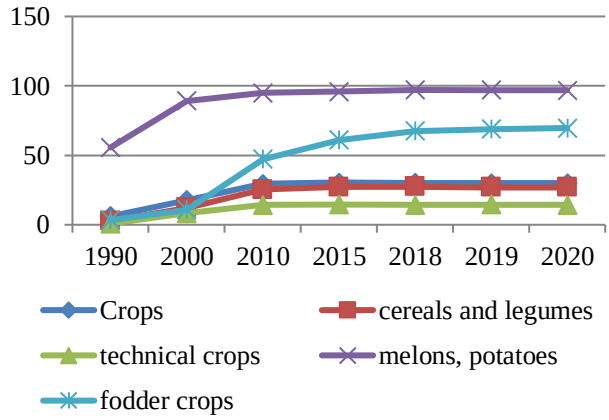

Figure 2. Dynamics of the share of households in the structure of sown areas of Ukraine

The share of this category of agrarians is significant in crops and technical cultures (mostly sunflower). In the first case, the percentage of households among land users ranges from 26 to 27%, and in the latter – it steadily exceeds 14%. Also, it should be

noted that in the total size of the sowed lands the share of households amounts to almost 30%, practically not changing during the last 10 years.

A similar situation is traced to livestock breeding. Some prevalence of large-scale manufacturers is observed only in poultry and pork production where breeding can be provided only within limited areas, and the final results could be accelerated at the expense of technological improvements (chemical admixtures to forage). In all directions of livestock breeding, the share of the population households exceeds 60% (Figure 3).

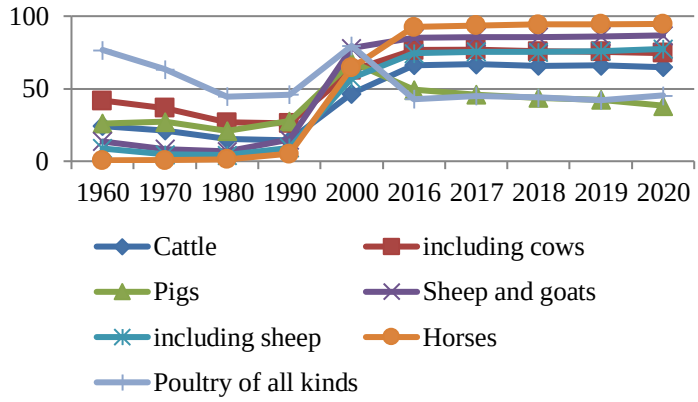

Figure 3. Dynamics of the share of households in the structure of conventional livestock population in Ukraine

The most important is the fact that in the total structure of the dairy cattle population, the share of this category of agrarians steadily remains at the level of 75%. In its turn, it allows claiming about a determining role of households in the formation of the national market of milk and dairy products. The presented facts show that the impact of peasant farms of a non-goods group on a national food market is quite significant. Meanwhile, the level of technical-technological support for their economic activity is unsatisfactory. These circumstances cause the necessity to study the specific features of exploitation of the available resources for all representatives of the category of peasant farms, belonging to both goods and consumption groups. Having studied the regional functional features of peasant farms with the use of the Excel analysis package software, a resultative equation of the production function of the gross output in clusters was received (Table 1).

Table 1. Cluster analysis of the regional distribution of different forms of agricultural production entities

No. of cluster and its	Cluster characteristics	Administrative

definition		regions in the cluster
No 1 – a large manufacturer of agricultural products, main producers are large enterprisers	The largest supplier of agricultural products, averagely provides over 25% of all gross agricultural output in the country for the past 5 years. The share of the small sector at the level of Ukraine is significant and amounts to 24%, although comprising only 47% of the total production volume compared with 53% of agricultural production of large enterprises.	Dnipropetrovsk, Kharkiv, Poltava, Vinnytsia
No 2 – a large supplier of agricultural products, with a powerful sector of large business	A large producer of agricultural products, with a share of 17% at the country level. The share of the small-scale entities at the level of Ukraine is insignificant – 12%, and in terms of competitive advantages of large businesses it makes their status auxiliary.	Cherkasy, Khmelnytskyi, Kyiv
No 3 – a large manufacturer of agricultural products, main producers are small-scale entities	Provides 17% of the gross agricultural output of Ukraine. The share of the small sector in the country is noticeable – 20%, giving to the cluster 62% of the gross agricultural output compared with 38% of the production from large agrarian enterprises.	Kheson, Kirovohrad, Lviv, Odesa
No 4 – a cluster with a powerful agricultural production, main producers are small-scale entities	Provides 11% of the gross agricultural output of Ukraine. The share of the small sector in Ukraine is 12%, however, within the cluster it has better competitive positions in agribusinesses of the regions, obtaining 60% of the gross agricultural output compared with 40% from large agrarian enterprises.	Mykolaiv, Zaporizhzhia, Zhytomyr
No 5 – a cluster with a powerful agricultural production, main producers are large enterprisers	Provides 15% of the gross agricultural production of Ukraine. The share of the small sector in Ukraine is insignificant and in terms of competitive advantages of large businesses it makes their status in the cluster auxiliary. It makes 46% of the gross agricultural production of the region.	Chernyhiv, Donetsk, Sumy, Ternopil
No 6 – a cluster with undeveloped manufacturing of agricultural products	Provides 6% of the gross agricultural output of Ukraine. The small sector makes up 8% of agricultural production in Ukraine and is the core of the cluster because provides 91% of the agrarian production of the region.	Chernivtsy, Zakarpatska, Luhansk
No 7 –a small supplier of agricultural products, main producers are small-scale entities	A small supplier of agricultural production, its share for the analysed period was 8% in Ukraine. The share of its small business in Ukraine is insignificant – 10%, however, it has a stable niche in a regional cluster, making up 71% of the agrarian production of the region.	Ivano-Frankivsk, Volyn, Rivne

The results of the calculations are given in Table 2. The analysis of the indicators shows that small-scale entities of almost all clusters have decreasing returns to the scale of the production. Such a situation is logical, because both factors are extensive and, according to the law of decreasing marginal productivity of the replaceable resource, have an insignificant scale of production that makes it impossible to work with effective returns during the long term.

Table 2. Production function of the gross agricultural output of small-scale entities in clusters

Cluster	Production function	Returns to scale	Correlation coefficient	R^2
Farms				
No. 1	$Q = 0.547 \cdot Z^{0.162} \cdot L^{0.388}$	0.55 (decreasing)	0.61	0.37
No. 2	$Q = 0.791 \cdot Z^{1.879} \cdot L^{-0.706}$	1.17 (increasing)	0.79	0.62
No. 3	$Q = 10.1 \cdot Z^{0.616} \cdot L^{-0.246}$	0.37 (decreasing)	0.84	0.71
No. 4	$Q = 0.085 \cdot Z^{0.435} \cdot L^{0.383}$	0.82 (decreasing)	0.93	0.87
No. 5	$Q = 5.02 \cdot Z^{0.374} \cdot L^{-0.073}$	0.3 (decreasing)	0.66	0.43
No. 6	$Q = 0.202 \cdot Z^{1.106} \cdot L^{-0.057}$	1.0 (constant)	0.84	0.71
No. 7	$Q = 3.082 \cdot Z^{0.772} \cdot L^{-0.268}$	0.5 (decreasing)	0.99	0.98
Households in rural areas				
No. 1	$Q = 1.43 \cdot Z^{0.225} \cdot L^{0.44}$	0.66 (decreasing)	0.51	0.26
No. 2	$Q = 0.079 \cdot Z^{0.054} \cdot L^{-0.89}$	0.94 (decreasing)	0.58	0.33
No. 3	$Q = 0.332 \cdot Z^{-0.018} \cdot L^{0.75}$	0.73 (creasing)	0.65	0.42
No. 4	$Q = 0.221 \cdot Z^{0.348} \cdot L^{0.83}$	1.2 (increasing)	0.78	0.60
No. 5	$Q = 3.81 \cdot Z^{0.401} \cdot L^{0.173}$	0.57 (decreasing)	0.58	0.34
No. 6	$Q = 14.645 \cdot Z^{1.477} \cdot L^{-0.724}$	0.75 (decreasing)	0.96	0.91
No. 7	$Q = 1169.9 \cdot Z^{0.395} \cdot L^{-0.554}$	-0.2 (decreasing)	0.69	0.48

Note: Q – the volume of the gross agricultural production, million EUR; Z – the size of agricultural lands, thousand ha; L – the number of employees, thousand people.

A family and labor lifestyle, as an integral element of the small-scale entities, is based on using the employment potential of nearly all categories of the rural population (working-age population outside working hours, retired people, housewives, disabled persons, teenagers). It increases the workload on villagers and reduces their free time.

This results in a negative elasticity coefficient of epy work factor, which demonstrates a decreasing trend of the production volume with an increasing unit of labor. All this is caused by a growing disillusionment in rural life, especially among youth and teenagers.

All this, in its turn, determines a low level of returns from the land factor in the small-scale agricultural entities, associated with the limited capacities of family physical work and the economical motivation of hired employees operating in a technically primitive household. The highest determination coefficient between the resultative and factor variables is seen in the 6th and 4th clusters. Since the determinant of the production function in these clusters for the period 2015-2020 was the most pronounced, it can be concluded that the small agribusiness sector of the 6th and 4th clusters are the best adapted to the modern requirements of competitive agriculture.

Therefore, for the qualitative assessment of the effective functioning of a small agribusiness sector, it is logical to focus further research on the small-scale agricultural entities within the borders of the 4th cluster that includes Zhytomyr, Zaporizhzhia, and

Mykolaiv regions. These entities belong to different natural climate zones – the forest zone (Zhytomyr Region) and the steppe zone (Zaporizhzhia and Mykolaiv regions). In the agrarian sector of Zhytomyr, Zaporizhzhia, and Mykolaiv regions, the small-scale agricultural entities play an important role in the production sphere, in the conservation and development of rural areas, and contribute to food safety in the regions. In this cluster, small business has become one of the mobile and competitive segments of the agrarian industry.

The efficiency of an agrarian sector of the regions is primarily manifested in the capability to satisfy the internal food requirements of the area in terms of the regional competitive advantages (production and resource potential). One of the tools for the integrated assessment of the competitiveness of small-scale agricultural entities in the 4th cluster is the rating analysis. To provide a rating assessment the matrixes of production and resource potential were built (Tables 3-4). For each indicator, the maximum value using it as a benchmark was chosen.

Table 3. The matrix of output data of the resource potential in a small-scale agribusiness sector of Ukraine, cluster No. 4 (average for the period 2015-2020)

Indicators	Farms			Agricultural households			Benchmark value in farms	Benchmark value in agricultural households
	Natural climate zones			Natural climate zones				
	Forest	Steppe		Forest	Steppe			
	Zhytomyr region	Zaporizhzhia region	Mykolaiv region	Zhytomyr region	Zaporizhzhia region	Mykolaiv region		
Livestock population, thousand heads	7.1	0.9	1.5	118.9	84.8	120.3	7.1	120.3
Including cows, thousand heads	3.2	0.3	0.8	73.3	51.2	69.4	3.2	73.3
Pigs, thousand heads	25.8	3.7	3.6	101.7	99.5	64.8	25.8	101.7
Sheep, goats, thousand heads	0.6	2.3	2.2	22.4	47.2	48.4	2.3	48.4
Poultry, thousand heads	79.1	10.6	11.4	6199	2876.5	2066.4	79.1	6199.0
Sown area,	256.1	300.5	263.2	254.2	508.8	526.4	300.5	526.4

thousand ha								
Sown area of crops and pulses, thousand ha	220.0	174.4	151.9	65.2	263.0	312.8	220.0	312.8
Sown area of sunflower, thousand ha	6.9	111.2	96.6	70.7	172.5	150.3	111.2	172.5
Sown area of potato, thousand ha	0.6	0.1	0.2	54.8	22.7	20.9	0.6	54.8
Sown area of vegetables, thousand ha	0.1	0.8	1.4	11.8	17.4	9.2	1.4	17.4
Sown area of fodder crops, thousand ha	15.7	2.7	3.1	30.3	27.0	29.8	15.7	30.3

Outputs of the matrix are standardized in Table 5 and Table 6 in relation to a conventional benchmark value of the indicator by the formula (4) (Kniazevych et al., 2021):

$$X = \frac{value\ of\ the\ indicator\ in\ the\ region}{benchmark\ value\ of\ the\ indicator}, \quad (4)$$

where, X – is the output of the matrix; benchmark us the highest value of the indicator at the cluster level.

The rating assessment of each region in cluster 5 is calculated by the formula (5) (Kniazevych et al., 2021):

$$r = \sqrt{(1 + x_1)^2 + (1 + x_2)^2 + \ldots + (1 + x_n)^2}, \quad (5)$$

where, r – is the rating value of the cluster region. The regions are ranked in accordance with the increased rating value. The highest rating is assigned to the region with the maximum value of comparative assessment (r-value).

Table 4. The matrix of output data of the production potential in a small-scale agribusiness sector of Ukraine, cluster No. 4 (average for the period 2015-2020)

Indicators	Farms			Agricultural households			Benchmark value in farms	Benchmark value in agricultural households
	Zhytomyr region	Zaporizhzhia region	Mykolaiv region	Zhytomyr region	Zaporizhzhia region	Mykolaiv region		

	Natural climate zones			Natural climate zones				
	forest	steppe		forest	steppe			
Gross harvest of crops and pulses, thousand tons	110.9	472.6	501.2	250.5	635.0	919.7	501.2	919.7
Gross harvest of sunflower, thousand tons	15.7	175.0	205.8	11.8	205.3	238.9	205.8	238.9
Gross harvest of potato, thousand tons	12.6	0.6	2.4	1193.5	264.0	228.9	12.6	1193.5
Gross harvest of vegetables, thousand tons	1.8	15.0	28.5	276.5	397.7	227.6	28.5	397.7
Gross harvest of fruit and berries, thousand tons	0.3	1.8	0.7	45.0	53.2	24.0	1.8	53.2
Yield of crops and pulses, hundredweight/ha	50.4	27.1	33.0	38.4	24.1	29.4	50.4	38.4
Yield of sunflower, hundredweight/ha	24.2	15.7	21.3	16.7	11.9	15.9	24.2	16.7
Yield of potato, hundredweight/ha	200.6	203.6	153.1	217.6	116.3	109.5	203.6	217.6
Yield of vegetables, hundredweight/ha	207.6	206.1	209.9	233.9	211.8	248.6	209.9	248.6
Yield of fruit and berries, hundredweight/ha	75.7	30.9	28.9	123.1	142.1	96.1	75.7	142.1
Meat produced (dressed weight), thousand tons	1.9	0.2	0.3	42.8	30.2	27.8	1.9	42.8
Milk, thousand tons	11.7	1.0	2.9	490.8	229.3	303.7	11.7	490.8
Eggs, million items	7.1	0.1	0.3	550.9	195.3	140.8	7.1	550.9
Yield of milk from one cow, hundredweight/ heads	36.6	33.3	36.3	47.0	44.8	43.8	36.6	47.0

The rating of the resource potential of farms in Ukraine in cluster 5 (formulas (6), (7), (8)):

$$r_{rp_{Zhytomyr\ farms}} = \sqrt{35.2786} = 5.94\ (first\ place); \quad (6)$$

$$r_{rp_{Zaporizhzhia\ farms}} = \sqrt{25.4483} = 5.04\ (third\ place); \quad (7)$$

$$r_{rp_{Mykolaiv\ farms}} = \sqrt{26.5637} = 5.15\ (second\ place). \quad (8)$$

Table 5. The matrix of standard coefficients of the resource potential in a small-scale agribusiness sector of Ukraine, cluster № 4 (average for the period 2015-2020)

Indicators	Farms			Agricultural households			Benchmark value
	Zhytomyr region	Zaporizhzhia region	Mykolaiv region	Zhytomyr region	Zaporizhzhia region	Mykolaiv region	
	Natural climate zones			Natural climate zones			

	forest	steppe		forest	steppe		
Livestock population, thousand heads	1	0.13	0.21	0.99	0.70	1	1
Including cows, thousand heads	1	0.14	0.14	1	0.70	0.95	1
Pigs, thousand heads	0.26	1	0.96	1	0.98	0.64	1
Sheep, goats, thousand heads	1	0.13	0.14	0.46	0.98	1	1
Poultry, thousand heads	0.85	1	0.88	1	0.46	0.33	1
Sown area, thousand ha	1	0.79	0.69	0.48	0.97	1	1
Sown area of crops and pulses, thousand ha	0.06	1	0.87	0.21	0.84	1	1
Sown area of sunflower, thousand ha	1	0.17	0.33	0.41	1	0.87	1
Sown area of potato, thousand ha	0.07	0.57	1	1	0.41	0.38	1
Sown area of vegetables, thousand ha	1	0.17	0.20	0.68	1	0.53	1
Sown area of fodder crops, thousand ha	1	0.09	0.25	1	0.89	0.98	1

The rating of the resource potential of agricultural households in Ukraine in cluster 5 (formulas (9), (10), (11)):

$$r_{rp_{Zhytomyr\ household}} = \sqrt{34.5567} = 5.88\ (third\ place); \quad (9)$$

$$r_{rp_{Zaporizhzhia\ household}} = \sqrt{36.7205} = 6.05\ (first\ place); \quad (10)$$

$$r_{rp_{Mykolaiv\ household}} = \sqrt{35.9236} = 5.99\ (second\ place). \quad (11)$$

The rating of the resource potential through a constituent of the production component in farms in Ukraine, cluster 5 (formulas (12), (13), (14)):

$$r_{GP_{Zhytomyr\ farms}} = \sqrt{45.0675} = 6.71\ (fists\ place); \quad (12)$$

$$r_{GP_{Zaporizhzhia\ farms}} = \sqrt{36.5791} = 6.06\ (third\ place); \quad (13)$$

$$r_{GP_{Mykolaiv\ farms}} = \sqrt{38.5218} = 6.21\ (sec\,o\,nd\ place). \quad (14)$$

The rating of the resource potential through a constituent of the production component in agricultural households in Ukraine, cluster 5 (formulas (15), (16), (17)):

$$r_{GP_{Zhytomyr\ household}} = \sqrt{48.2884} = 6.95\ (first\ place); \quad (15)$$

$$r_{GP_{Zaporizhzhia\ household}} = \sqrt{41.8585} = 6.47\ (second\ place); \quad (16)$$

$$r_{GP_{Mykolaiv\ household}} = \sqrt{40.6507} = 6.38\ (third\ place). \quad (17)$$

Table 6. The matrix of standard coefficients of the resource potential through a constituent of the production component in a small-scale agribusiness sector of Ukraine, cluster No. 4 (average for the period 2015-2020)

Indicator	Farms			Agricultural households			Benchmark value
	Zhytomyr region	Zaporizhzhia region	Mykolaiv region	Zhytomyr region	Zaporizhzhia region	Mykolaiv region	
	Nature climate zones			Nature climate zones			
	forest	steppe		forest	steppe		
Gross harvest of crops and pulses, thousand tons	0.22	0.94	1	0.27	0.69	1	1
Gross harvest of sunflower, thousand tons	0.08	0.85	1	0.05	0.86	1	1
Gross harvest of potato, thousand tons	1	0.05	0.19	1	0.22	0.19	1
Gross harvest of vegetables, thousand tons	0.06	0.53	1	0.70	1	0.57	1
Gross harvest of fruit and berries, thousand tons	0.17	1	0.39	0.85	1	0.45	1
Yield of crops and pulses, hundredweight/ha	1	0.54	0.65	1	0.63	0.77	1
Yield of sunflower, hundredweight/ha	1	0.65	0.88	1	0.71	0.95	1
Yield of potato, hundredweight/ha	0.99	1	0.75	1	0.53	0.50	1
Yield of vegetables, hundredweight/ha	0.99	0.98	1	0.94	0.85	1	1
Yield of fruit and berries, hundredweight/ha	1	0.41	0.38	0.87	1	0.68	1
Meat produced (dressed weight), thousand tons	1	0.11	0.16	1	0.71	0.65	1
Milk, thousand tons.	1	0.09	0.25	1	0.47	0.62	1
Eggs, mln items	1	0.01	0.04	1	0.35	0.26	1
Yield of milk from one cow, hundredweight/ind.	1	0.91	0.99	1	0.95	0.93	1

The summarized rating of the competitiveness of small-scale entities in cluster 5 (formulas (18), (19), (20)):

$$r_{Zhytomyr\ region} = \sqrt{45.0675 + 48.2884 + 35.2786 + 34.5567} = 12.77\ (first\ place); \quad (18)$$

$$r_{Zaporizhzhia\ region} = \sqrt{36.7205 + 41.8585 + 25.4483 + 36.5791} = 11.86\ (thirs\ place); \quad (19)$$

$$r_{Mykolaiv\ region} = \sqrt{38.5218 + 40.6507 + 26.5637 + 35.9236} = 11.90\ (sec\,o\,nd\ place). \quad (20)$$

Results of the comparative competitiveness assessment of small-scale entities of cluster 5 allow making the following conclusions. It is determined that the rating of the resource potential is absolutely dependent on its production component. In other words, the higher the level of resourcing in a farm, the higher the level of production. It acts as an extensive production law. Farms in the Zhytomyr region have the highest competitiveness rating farms in the Zaporizhzhia region have the lowest one. Agricultural households do not show such obvious competitiveness. Their activity is largely subjected to an intensive production law. Thus, the households in the Zhytomyr region, having the lowest rating of the resource potential, ensure the highest rank in their production component. Meanwhile, the households of the Zaporizhzhia and Mykolaiv region, having high ratings of resourcing in agribusiness, demonstrate inefficient resource productivity that weakens their competitive positions in the overall rating.

It analyzed the expected development of this segment of agricultural production on the condition of active sustainable development processes. The prediction followed three scenarios given the existing positions of family agricultural entities and the potential readiness of a certain group of consumption entities to become entrepreneurs. Indicators of activity were as follows: sizes of agricultural lands (crop production), livestock, and poultry population (livestock breeding). Primarily, potential opportunities for the functioning of peasant households as individual economical entities had been analyzed (Table 7).

Table 7. Assessment of development prospects of small-scale agricultural entities in Ukraine as individual economical subjects

Indicators	Actual data (2020)	Predicted data		
		Pessimistic scenario	Realistic scenario	Optimistic scenario
The share of small-scale agricultural entities in the size of agricultural lands, in total, %	46.19	47.21	52.34	54.42
Including				
Farms	16.26	18.23	26.72	31.41
Households	29.93	28.98	25.62	23.01
The share of small-scale agricultural entities in the population of livestock and poultry*, in total, %	55.09	56.33	58.51	63.06
Including				
Farms	3.25	4.02	5.23	7.02
Households	51.84	52.31	53.28	56.04

Note: * conventional individuals.

In crop production, the level of farm activities is predicted to exceed that in livestock breeding. It is expected that at the expense of the transition of part of households to

official entrepreneurship, the share of this category among the total number of land users will decrease by 6.92 points. In the livestock-raising industry, noticeable changes in the population structure could be expected only in the case of an optimistic scenario. However, the growth in this sphere is more realistic to achieve through the development of dairy farming, which is not in demand in agricultural enterprises. The pig-breeding is also promising, though its competitive operation requires a set of measures aimed at developing and implementing small farm models for different pig populations. As for poultry farming, national farmers are unable to compete effectively with the industrial production of eggs and poultry meat.

One of the problems that hinder the sustainable competitive development of small-scale agricultural entities is the insufficient level of logistical and technical-technological support for particular farms. Under the current conditions, crop production is largely performed with the use of rented agricultural machinery on leased lands. This allows farmers to reduce the costs associated with the maintenance of tractors, harvesters, and other equipment but deprives them of the opportunity to choose it on their own and control the general condition and depreciation (Dymytrov et al., 2021; Vinichenko et al., 2020; Tyliszczak et al., 2019).

In the livestock sector, the lack of adequate technical means and the low level of mechanization leads to a significant share of manual labor costs that negatively affects the competitiveness of products and reduces the motivation of rural youth to realize their ambitions in this industry. The latter accelerates the depopulation in villages. The current situation, when the majority of the conventional livestock population is concentrated in small-scale agricultural entities, is caused by the reluctance of agricultural enterprises to implement their own dairy livestock raising since it requires having pastures for cow grazing and solving the problem of forage. Also, in contrast to poultry and pig farming, dairy farming has a longer period of livestock maturation to reach the proper productive age (Hryschenko et al., 2011; Mel'nychuk et al., 2014; Tyliszczak et al., 2009).

Moreover, the consolidation of the resource potential of small-scale agricultural entities based on their local or regional community would contribute to a significant increase in their competitiveness. One of the most promising areas of such consolidation is the formation of cooperatives with the involvement of both farms and households. According to the Ukrainian laws (The Law of Ukraine № 1087-IV…, 2021; The Law of Ukraine № 1601-IX, 2021; The Law of Ukraine № 738-IX…, 2020), agricultural service cooperatives, which include individuals and legal entities, are non-profit in their status, and their purpose is to meet the needs of their members. Possible activities in such integrated entities include the processing, storage, and sale of products of the villagers, supplying them with information and consulting services, as well as addressing social

issues related to proper living standards (Gryshchenko et al., 2016; Tyliszczak et al., 2017).

Given the circumstances, the prospects for the functioning of small-scale agricultural entities in terms of their membership in cooperatives were predicted. The analysis was conducted according to optimistic, realistic, and pessimistic scenarios. The study took into account not only benefits from the implementation of a cooperative to consolidate the resource potential of the villagers but also their readiness to participate in the activities of the cooperatives and to change their own legal status (Zbarsky et al., 2020; Sobczak-Kupiec et al., 2018).

Therefore, it is predicted that under the pessimistic scenario, farms will be the most active in crop production. The share of agricultural lands in the overall structure of agrarians is expected to increase by 3 points compared with 0.3 points in households (Table 8). In addition, a further reduction in the share of the small commodity sector and a significant increase in the share of farms were expected. This process would be the result of the growing desire of active households to obtain the status of farms. As a result, under the optimistic scenario, the total share of small-scale agricultural entities among agricultural land users will increase by 15 points, the share of farms will increase by 17 points, whereas that of households will decrease by 2 points.

A slightly different situation is predicted in the livestock sector, where the activity of Ukrainian farms is quite low. This industry has been less attractive to them because it requires adequate facilities. That is why, in the case of intensive development of cooperatives in the field of livestock (dairy, pig breeding, etc.), domestic farmers will be more actively involved in this type of activity. However, that dairy farming will remain out of their attention, as it requires significant pasture areas. Therefore, it is expected that the main vector of entrepreneurial activity of farmers will be pig farming. As for households, the active cooperation with dairy enterprises by the foundation of sales cooperatives will encourage agrarians to expand their own dairy cattle. Thus, under the optimistic scenario, the share of small-scale agricultural entities in the overall structure of the conventional livestock population is projected to increase by 12 points, by 5 points for farms, and by 7 points for households.

Table 8. Assessment of development prospects of small-scale agricultural entities in the network of cooperatives

Indicators	Actual data (2020)	Predicted data		
		Pessimistic scenario	Realistic scenario	Optimistic scenario
The share of small-scale agricultural entities in the size of agricultural lands, in total, %	46.19	49.43	55.92	60.88
Including				

Farms	16.26	19.22	28.61	34.65
Households	29.93	30.21	27.31	26.23
The share of small-scale agricultural entities in the population of livestock and poultry*, in total, %	55.09	59.17	63.34	67.44
Including				
Farms	3.25	4.89	6.02	8.42
Households	51.84	54.28	57.32	59.02

Note: *conventional individuals.

Yet a number of issues need to be addressed so as to ensure the effective development of cooperatives based on rural farms. Among them, the appropriate awareness is one of the most important. Thus, A.V. Chayanov (1925) pointed out that rural economies should be fully informed of the range of opportunities provided by cooperatives, their functions, and activities. In modern conditions, when the socio-economic base of the world's leading countries grounds on a model of the post-industrial information society, the existence of awareness infrastructure is an integral part of the effective management of agricultural cooperatives (Basavegowda et al., 2015).

In this regard, it is especially important to ensure a permanent mutually beneficial cooperation of farmers with representatives of regional research and education centers. Training of experts, and development of scientifically justified models of different integrated entities is one of the conditions for the effective use of resource potential in small-scale agricultural entities' sustainability.

5. Conclusions

The article analyses the specific features of using the resource potential of small-scale agricultural family entities in Ukraine. It sheds light on the main trends of agricultural production in the EU countries and justifies the role of non-commodity peasant farms in the market of agricultural raw materials in Ukraine. The research indicates the need to analyze the efficiency of exploitation of the resource potential in different categories of peasant farms. For this purpose, the cluster analysis has been performed based on the production function. The main factors affecting the sustainable development of family farms in different regions of Ukraine are highlighted. The research points to the need of providing favorable conditions to reveal regional competitive advantages of peasant farms so as to increase the efficiency of their economic activities and whole well-being.

The results of the research will be further incorporated into the development and implementation of a regional program to facilitate the development of the peasant farms as a component in the network of agricultural production. The authors' assessments will be used by regional governmental institutions to predict the prospects for the future

development of the peasant farms and their impact on socio-economic relations in local communities.

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