

## DYNAMICS OF FORMATION OF THE LABOUR MARKET AND EMPLOYMENT OF THE RURAL POPULATION OF UKRAINE: A CASE STUDY OF VINNYTSIA REGION

Volodymyr SARIOGLO<sup>1</sup>, Liudmyla LEVKOVSKA<sup>1</sup>, Tetiana KOTENKO<sup>1</sup>,  
Yuliia HOREMYKINA<sup>1</sup>, Olena DIDKIVSKA<sup>1</sup>, Mykhailo ROZBYTSKYI<sup>1</sup>,  
Tetiana SHMATKOVSKA<sup>2</sup>

<sup>1</sup>Institute of Demography and Quality of Life Problems of the National Academy of Sciences of Ukraine, 60 Taras Shevchenko blvd., 01032, Kyiv, Ukraine. Emails: sarioglo@idss.org.ua, levlv@ukr.net, tatyana@ukr.net, refer5718@gmail.com, o\_didkivska@ukr.net, rozbytskyi.m@gmail.com

<sup>2</sup>Lesya Ukrainka Volyn National University, Department of Accounting and Taxation, 28 Vynnychenko str., 43025, Lutsk, Ukraine. Email: shmatkovska2016@gmail.com

**Corresponding author:** shmatkovska2016@gmail.com

### Abstract

*In the article, we conducted a study of the dynamics of the formation of the labor market and employment of the rural population based on the materials of the Vinnytsia region of Ukraine. According to the results of the research, we found that the presence of fully functioning agricultural enterprises and the size of their main and variable production assets are the dominant factors influencing the employment of peasants in Ukraine. In addition, a rather powerful factor influencing the formation of employment indicators of the rural population is the dynamics of the growth of the number of personal peasant farms, which form a fairly significant share of the gross domestic product of the agricultural sector of Ukraine. In the article, we substantiated that the dominant type of employment in rural areas of the Vinnytsia region of Ukraine is personal farms. In the article, we substantiated that in rural areas of Vinnytsia region, the specific weight of such rural population in 2020 was 74.5% of the total number of employed persons. It is important that employment in peasant farms according to the current legislative field of Ukraine is not an officially registered form of employment, therefore the rural population working in this field actually forms the shadow sector of the economy.*

**Key words:** rural population, personal peasant farms, rural areas, labour market, employment

### INTRODUCTION

Modern approaches to the specifics of the formation of labor resources are marked by the need to take into account many factors affecting the labor market. At the same time, if we also evaluate the issue of ensuring the employment of the rural population of Ukraine, then in the complex this issue becomes especially relevant. In addition, the importance of these issues is determined by the role that agriculture plays in the structure of the national economy of Ukraine. The need to ensure the sustainable development of rural areas and the effective use of labour resources in this sector is strategically vital for the country's economic stability and social growth, especially in the period of hostilities

which affected the whole socio-economic system.

In practical terms, it is worth noting that one of the critical problems of sustainable development in rural regions of Ukraine is the need for more employment and economic activity in rural areas. This problem requires systematic government actions to increase productive employment since the development of individual regions and the country's overall economic growth depend on providing jobs and social protection for the rural population. At the same time, it is also essential to consider the dynamics of the formation of labour resources in connection with modern demographic trends, such as migration processes, changes in the distribution of the population by age groups, and the level of education and qualifications

of employees. This makes it possible to correctly identify the development potential of the regions and determine the need to implement measures to improve qualifications and functional adaptation of the workforce to the needs of the modern labour market. In addition, in connection with technological progress and the introduction of new management methods in agricultural production, there is a need for reorientation of the workforce and the formation of skills necessary for working with modern agricultural technologies.

The study of the problems of the dynamics of the formation of labour resources and employment of the rural population of Ukraine is actively revealed in modern scientific research. In particular, it is worth noting the works of such scientists and practitioners as M. Dziamulyhch [1-8], A. Popescu [10-23], M. Rudenko [24], T. Shmatkovska [25-26], O. Shubalyi [27] and R. Sodoma [28], who focus on the analysis of demographic processes, the level of employment in the agricultural sector, and ensuring the effectiveness of employment policy. It should be noted that the dominant direction of research in this aspect is the determination of the principles on the basis of which the goals of sustainable development of rural areas will be achieved, as well as the formation of strategies for their socio-economic development under existing resource limitations. However, the dynamic changes taking place in the labor market, as well as the impact of a number of destructive factors on it, forces us to look for new approaches to regulating the employment of the rural population.

Therefore, the study of issues related to the processes of quality formation of labor resources, as well as solving problems in the field of employment of the rural population of Ukraine, is marked by urgency, which is due to the need to develop strategies for the development of rural regions and solve important socio-economic problems of the rural population. The study case regards Vinnytsia region of Ukraine.

## MATERIALS AND METHODS

The rural population's employment rate is the ratio of the employed rural population of working age to the entire rural population of the specified age or the rural population according to the relevant socio-demographic characteristics, including those employed in personal peasant farms.

We set the value of the interval for grouping according to the formula:

$$h = \frac{x_{max} - x_{min}}{n}; \quad (1)$$

where:

$h$  – interval value;

$x_{max}$  – the maximum value of the grouping feature;

$x_{min}$  is the minimum value of the grouping feature.

To determine the interdependence between factor and performance indicators, economic-mathematical modelling using the equation of linear multiple regression was applied:

$$Y_x = a_0 + a_1x_1 + a_2x_2 \quad (2)$$

where:  $x_1, x_2$  – factor indicators.

In the presented study, the period is limited to 2020 because, starting from the following years, official statistical materials on the economic situation in Ukraine were closed for free access due to the hostilities in the country.

## RESULTS AND DISCUSSIONS

We grouped the districts of the Vinnytsia region of Ukraine according to the number of employed rural population. Based on the calculations, a grouping was carried out, according to which four groups of districts of the Vinnytsia region can be distinguished according to the level of employment of villagers. Accordingly, based on the calculated interval series, their distribution by employment level is presented in the following histogram (Fig. 1).

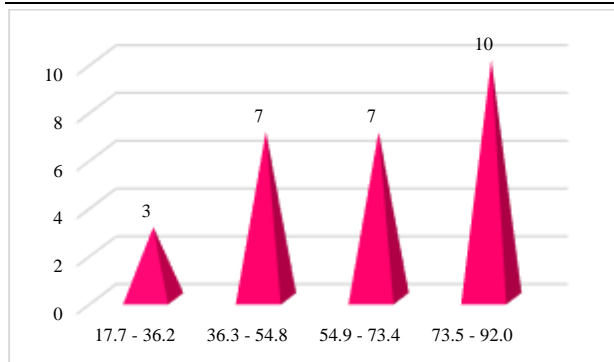


Fig. 1. Interval series of the distribution of districts of the Vinnytsia region of Ukraine by the rural population's employment level in 2020. Source: own development.

According to the nature of the placement of the districts of the Vinnytsia region of Ukraine on the graph (Fig. 1), it is possible to

distinguish their typical groups according to the formula:

$$n = 1 + 3.3221gN, \quad n \approx 4 \quad (3)$$

where: n – number of groups.

The value of the interval for grouping according to the formula is set:

$$h = \frac{x_{max} - x_{min}}{n} = \frac{92.0 - 17.7}{4} = 18.5$$

Based on the results of the calculations, we have developed a map of the grouping of districts of the Vinnytsia region of Ukraine according to the rural population's employment level in 2020 (Fig. 2).



Fig. 2. Cartogram according to the results of the grouping of districts of the Vinnytsia region of Ukraine in terms of the indicator of the level of employment of villagers in 2020, %. Source: own development.

According to the results of our analysis (Fig. 2), it was found that in the north and in the center of the region there is a higher level of employment of peasants. At the same time, in

the south of the Vinnytsia region of Ukraine, the level of employment is relatively low and fluctuates mainly in the range of 36.3 - 54.8%, only in the Yampil, Kryzhopil, and

Trostianets districts it reaches 54.9 - 73.4%. We have calculated the indicators of aggregated data of effective grouping by summing the individual investigated

characteristics by the number of districts of the Vinnytsia region of Ukraine, which comprise a separate group (Table 1).

Table 1. Results of the effective grouping of the districts of the Vinnytsia region of Ukraine in terms of the employment level of their rural population, 2020.

Indexes	Groups of districts according to the level of employment of the rural population				Total
	I	II	III	IV	
Limits of groups according to the level of employment of the rural population, %	17.7-36.2	36.3-54.8	54.9-73.4	73.5-92.0	X
Number of districts, units	3	7	7	10	27
Number of employed rural population, persons	6,529	59,960	92,961	133,898	293,347
The average registered number of employees employed in agricultural production, total number of persons	2,303	7,310	16,423	14,485	40,511
Produced gross agricultural products in comparative prices of 2012; thousand hryvnias	210,711	592,456	1,086,617	1,023,397	2,913,081
Agricultural land, thousand ha.	65.1	200.1	337.4	354.3	956.8
Number of enterprises, units	23	102	188	205	518
The cost of the primary means of production and working capital in agriculture, million hryvnias.	289.3	666.1	1,046	1,637.1	3,438.5

Source: own calculations are based on [29].

According to the grouping results, four main groups of districts were distinguished in terms of the rural population's employment level. The highest level of employment is observed in the districts belonging to the fourth group of Mohyliv-Podilskyi, Koziatin, Zhmerynka, Lypovets, Tyvriv, Tulchyn, Khmilnyk, Pohrebysche, and Haisyn. This is explained by the fact that there is the largest number of operating agricultural enterprises in these areas and the highest employment in personal peasant farms. In these districts, the employment rate 2020 was 92.0%, 91.8%, 89.1%, 88.9%, 84.7%, 82.1%, 81.7%, and 80.1%, respectively. 75.4%, 74.2%.

Based on the results of the research, we discovered and ascertained a rather dynamic development of rural employment in the studied region in Ukraine. In particular, in 2020, we identified certain trends regarding the reduction of employment of the rural population and the increase in the level of unemployment in the countryside.

According to the results of the analysis of the rural labor market at the regional level, we selected 10 districts of the Vinnytsia region of Ukraine, which, in our opinion, should be assigned to the fourth group, where mainly

agricultural enterprises prevail, as well as actively functioning peasant farms.

In addition, the villages of these districts are located not far from the district or regional centres; the villagers have permanent jobs thanks to the developed industry for processing livestock and plant products. In the rest of the villages, people earn money for paid work at regional centres or abroad.

The main factors that affect the rural population's employment must be wages, labour productivity, land security of the rural population, labour resources, gross domestic product production per employed person, social and cultural working conditions, etc.

In this regard, we determined these indicators' interdependence with the rural population's employment level. We revealed the close connection between them using the coefficient of determination. We established the dependence of the level of employment in rural areas on the labor productivity indicator by 4%, on the indicator of labor capital equipment by 14.96%, on the indicator of the number of operating agricultural enterprises by 39.7%, on the indicator of the cost of the main production assets and working capital in agricultural enterprises by 40.85%.

With the help of correlation analysis, the relationship between the level of employment of the rural population in the districts of the Vinnytsia region of Ukraine and the number of operating agricultural enterprises, the cost of primary production, and the working capital in the agricultural enterprises of the studied area were revealed.

For this, an economic-mathematical equation was used, with the help of which the interdependence between the level of employment of the rural population and two-factor characteristics was measured using a linear equation of multiple regression:

$$Y_x = a_0 + a_1x_1 + a_2x_2 \quad (5)$$

where:

$x_1$  – number of active agricultural enterprises, units

$x_2$  – the value of the main production assets and working capital in agricultural enterprises, UAH million.

Thus, the multiple regression equation we obtained has the form:

$$X_{yx1x2} = 4.98 + 0.11x_1 - 0.04x_2 \quad (6)$$

The regression coefficient shows how the rural population's employment level will change when the corresponding factor changes by one unit. Thus,  $a_1=0.11$  shows that when the number of operating agricultural enterprises in the district increases by one unit, the level of employment in the village increases by 11%, and when the cost of fixed and circulating production assets in agricultural enterprises decreases by 1 UAH, there will be an increase in the effective indicator by 4%. In addition to the regression equation, the relationship density is characterised by the correlation coefficient, which we determined by the formula:

$$R_{yx1x2}^2 = \sqrt{\frac{r_{yx1}^2 + r_{yx2}^2 - 2r_{yx1}r_{yx2}r_{x1x2}}{1 - r_{x1x2}^2}} = 0.708 \quad (7)$$

and the coefficient of determination:

$$D = R_{yx1x2}^2 \times 100\% = 0.708^2 \times 100\% = 50.2\%$$

.....(8)

The correlation coefficient and the coefficient of determination must characterise the density of dependence between the studied indicators and their degree of influence on the effective indicator - the rural population's employment level.

According to the results of the study, it was established that the specific weight of persons older than working age in the total number of employed rural population of the Vinnytsia region of Ukraine grew from 20.7% in 2013 to 24.6% in 2015, followed by a decline until 2018 and only from In 2019, a trend towards an increase in the specific weight of employed persons older than working age was outlined (Fig. 3).

We found that the dominant type of employment in rural areas of the Vinnytsia region of Ukraine is private farms (PF). In rural areas of the Vinnytsia region, the share of such rural population in 2020 was 74.5% of the total number of employed persons.

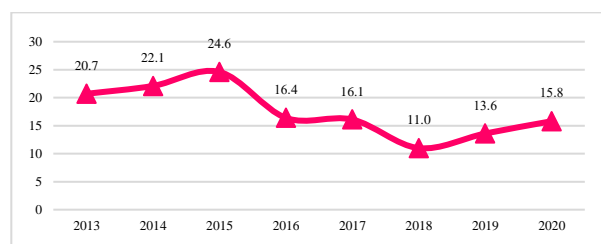


Fig. 3. The share of persons in the age group, older than working age, in the total number of employed rural population of the Vinnytsia region of Ukraine, 2013-2020, %

Source: own calculations.

It is important that employment in peasant farms according to the current legislative field of Ukraine is not an officially registered form of employment, therefore the rural population working in this field actually forms the shadow sector of the economy.

According to the Law of Ukraine «On Personal Peasant Households», members of personal peasant households belong to the employed population, provided that work for

them in this household is the main one. Suppose the work for them on this farm is additional [9]. In that case, the members of the peasant farms, after being released from the primary job, are given the status of unemployed and the benefits they enjoy while in this status. According to this method, shadow (unregistered) employment is distributed to the rural population under the following conditions:

- if work in personal peasant farms is not the main one and brings income;
- if employees who are registered as unemployed in the state employment service receive unemployment benefits but work on peasant farms voluntarily,

Also, it is necessary to determine which work in peasant farms is the main one and which is additional, which will provide an opportunity to keep records of those employed in peasant farms more clearly.

The current law needs to develop a precise mechanism for entry and exit from peasant farms because personal peasant farms are subject to accounting as a specific economic activity, not those who run such farms. At the same time, it should be noted that such accounting is aimed at obtaining statistical information and is not the legal factor with which the law connects the creation or termination of the activities of peasant farms. The central executive body should approve the procedure for accounting of peasant farms for statistics.

In addition, we believe that the Law of Ukraine, "On Personal Peasant Farming," is quite relevant for the rural population and requires revisions regarding the status of the employed population and its registration. Also, village councils (local self-government bodies) must register personal farms and people employed on these farms and give them the appropriate status [9].

Since there is no official statistical data on the number of people employed in the rural population on personal farms, we used a questionnaire to determine the number of people employed in the shadow economy, namely, in peasant farms.

The conducted questionnaire survey, which included respondents in a total number of 4

thousand rural population of working age in the Vinnytsia region of Ukraine, showed that 92 persons, or 2.3% of the surveyed respondents, are employed in peasant farms voluntarily, receiving income and 20 persons or 0.5 % have the status of unemployed and are engaged in managing their peasant farms. Suppose the level of unregistered (shadow) employment of 2.8% obtained from the questionnaire survey is extended to the total working-age rural population in the studied region. In that case, the total number of people employed in the shadow economy in the Vinnytsia region of Ukraine is 13.6 thousand.

It is essential that the methodology and program of conducting random surveys of the population on economic activity (labour force survey), developed by the recommendations of the International Labour Organization (ILO), are not sufficiently perfect in Ukraine.

In Ukraine, over many years, a system has been formed that causes overemployment of the population, especially the female rural population. Scientific studies testify to rural women's significant contribution to the agricultural sphere's social production.

In addition, the low level of pension provision for persons of retirement age encourages these people to work in personal peasant farms to obtain additional means of livelihood, primarily food. Therefore, the rural labour market is characterised by the labour of pensioners and teenagers, the economically inactive population, because most of this population is engaged in seasonal work while cultivating crops, harvesting, etc.

Most of the population is employed on personal peasant farms, where labour costs are for about 3 hours and 45 minutes. Daily, those working here can be considered employed in social production, and their employment level should be determined according to the methodology following Ukrainian legislation, considering the recommendations we have proposed.

Suppose the level of unregistered (shadow) employment in peasant farms is added to the general indicator determined by us for the districts of the Vinnytsia region of Ukraine. In that case, we will get the rural population's



general employment level according to the proposed methodology following domestic

legislation, considering unregistered (shadow) employment in peasant farms (Fig. 4).

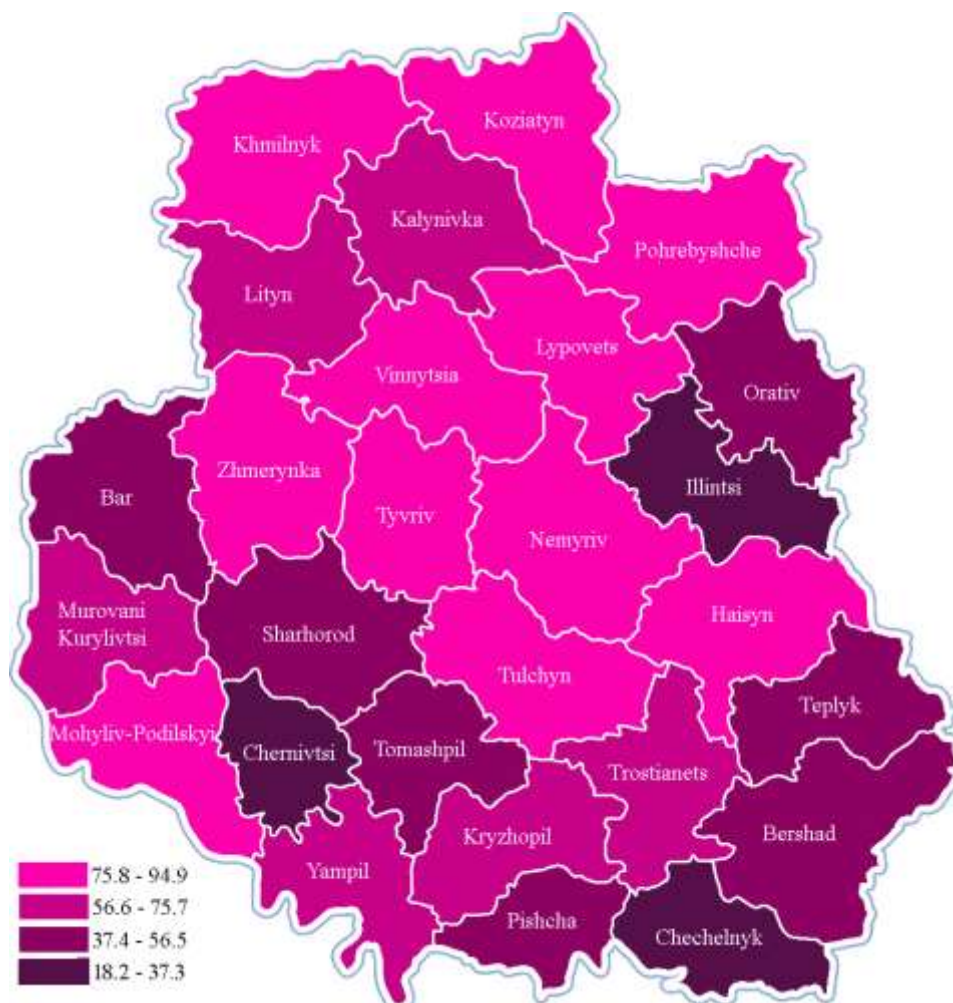


Fig. 4. Map of the grouping of districts of the Vinnytsia region of Ukraine according to the level of employment of the rural population in 2020, considering unregistered (shadow) employment in peasant farms  
Source: own development.

According to the results of the analysis of the cartogram we received (Fig. 4), it was established that the highest level of employment according to the proposed method is observed in the Mohyliv-Podilskyi district, where the level of unregistered (shadow) employment is 2.8%, in Koziatyn – 1.2%, and in Lypovets – 3%, Zhmerynka – 2.8%, Tulchyn – 2.0%, Tyvriv – 2.8%, Khmilnyk – 2.2%, and the lowest – in Illintsi, Chechelnyk, Chernivtsi districts, where the level of unregistered (shadow) employment respectively, it was 0.5%; 3.3%; 3.0%. The main reason is the hidden employment in the countryside in personal farms. At the same time, economic losses are losses for the state and the population since some

peasants employed in personal peasant farms hide their incomes, receiving unemployment benefits from the state and income from activities on their farms. Regardless of the method of determining the rural population's employment level, the most significant economic losses occur in the Illintsi and Sharhorod districts of the studied region. Thus, if in the Vinnytsia region of Ukraine, the level of employment in rural areas (in accordance with the current legislation of Ukraine) in 2020 was within the indicator of 70.3%, then this situation is due to employment in own peasant farms, where 42.9% of peasants are employed of the studied region of Ukraine.

## CONCLUSIONS

We found that the presence of fully functioning agricultural enterprises and the size of their main and circulating production assets are the dominant factors influencing the employment of peasants in Ukraine. In addition, a rather powerful factor influencing the formation of employment indicators of the rural population is the dynamics of the growth of the number of personal peasant farms, which form a fairly significant share of the gross domestic product of the agricultural sector of Ukraine.

Economic losses are the region's gross domestic product production losses, traced to the hidden (shadow) sector, which could produce more regional output.

Thus, the most significant economic losses are observed in areas with the lowest employment level. In areas with the highest level of employment, economic losses are the smallest, which ultimately negatively affects the value of the gross domestic product of each region.

In this regard, one of the main tasks of the socio-economic development of rural areas should be a socially effective policy regulating the employment of the rural population.

## REFERENCES

- [1]Dziamulych, M., Antoniuk, N., Tretyak, V., Rudenko, M., Solomnikov, I., Kytaichuk, T., Khomiuk, N., Shmatkovska, T., 2023, Financial security and economic safety as the basis for sustainable development of the region. AD ALTA: Journal of interdisciplinary research. Vol. 13(2), Special Issue XXXVII: 150-154.
- [2]Dziamulych, M., Hrytsenko, K., Krupka, I., Vyshyvana, B., Teslia, S., Tereshko, O., Fadyeyeva, I., 2022, Features of banks` liquidity management in the context of the introduction of the LCR ratio in Ukraine. AD ALTA: Journal of interdisciplinary research. Vol. 12(1). Special Issue XXVII: 148-152.
- [3]Dziamulych M., Krupka, I., Andruschak, Y., Petyk, M., Paslavaska, R., Grudzevych, Y., Martyniuk, R., 2022, Banking liquidity risk management in Ukraine based on the application of digital and information technologies. AD ALTA: Journal of interdisciplinary research, Vol. 12(2). Special Issue XXIX: 102-107.
- [4]Dziamulych, M., Krupka, I., Petyk, V., Zaplatynskyi, M., Korobchuk, T., Synenko, V., Avramchuk, L., 2023, Operational efficiency of Ukraine`s banking system during the war. AD ALTA: Journal of interdisciplinary research, Vol. 13(1). Special Issue XXXII: 164-168.
- [5]Dziamulych, M., Kulinich, T., Shmatkovska, Y., Moskovchuk, A., Rogach, S., Prosovyh, O. Talakh, V., 2022, Forecasting of economic indicators of agricultural enterprises activity in the system of ensuring their management on the basis of sustainable development: a case study of Ukraine. Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development". Vol. 22(1): 207-216.
- [6]Dziamulych, M., Myskovets, I., Zubko, A., Tereshchuk, O., Baidala, V., Voichuk, M., 2022, Formation of the natural resource economics in the system of environmental and economic security. AD ALTA: Journal of interdisciplinary research, Vol. 12(2). Special Issue XXX: 142-146.
- [7]Dziamulych M., Rogach, S., Shulha, O., Stupen, N., Tendyuk, A., Stryzheus, L., Bilochenko, A., 2023, Management of production resources of agricultural enterprises in Ukraine: a case study of Volyn region. Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development". 23(1): 179-188.
- [8]Dziamulych, M., Sarioglo, V., Kotenko, T., Didkivska, O., Korotkova, D., Talakh, T., Say, V., 2023, Differentiation of income and expenditures of households in the system of formation of the demographic situation in Ukraine. AD ALTA: Journal of interdisciplinary research. Vol. 13(2), Special Issue XXXV: 111-115.
- [9]On Personal Peasant Households : Law of Ukraine, 2003. <https://zakon.rada.gov.ua/laws/show/742-15>, Accessed on February 1, 2024.
- [10]Popescu A., 2013, Considerations on the Rural Population as a Resource of Labor Force in Romania. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, Vol. 13(3): 229-236.
- [11]Popescu A., 2013, Considerations on the main features of the agricultural population in the European Union, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, Vol. 13(4): 213-220.
- [12]Popescu A., 2015, Research on labour productivity in Romania's agriculture. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, Vol. 15(2): 271-280.
- [13]Popescu, A., 2016, Research on the concentration of tourist arrivals in Romania. Scientific Papers: Series Management, Economic Engineering in Agriculture and rural development, Vol. 16(1): 425-429.
- [14]Popescu, A., 2016, Research on the dynamics and territorial dispersion of the occupied population in Romania's tourism in the period 2007-2015. Scientific Papers: Series Management, Economic Engineering in Agriculture and rural development, Vol. 16(4): 279-288.



- [15]Popescu A., 2016, The position of tourist and agrotourist guesthouses in Romania's accommodation structures. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, Vol. 16(1): 417-424.
- [16]Popescu A., Condei R., 2015, Research on Romania's employment in agriculture and its position in the European Union, *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, Vol. 15(2): 281-289.
- [17]Popescu, A., Dinu, T. A., Stoian, E., 2019, Changes, trends and relationships between average income and consumption expenditures per household in Romania in the period 2007-2017. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*, Vol. 19(2): 363-374.
- [18]Popescu A., Dinu T. A., Stoian E., 2018, Demographic and economic changes characterizing the rural population in Romania. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, Vol. 18(2): 333-346.
- [19]Popescu, A., Dinu, T. A., Stoian, E., 2019, Efficiency of the agricultural land use in the European Union. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*. Vol. 19(3): 475-486.
- [20]Popescu, A., Dinu, T. A., Stoian, E., Serban, V. 2021, Efficiency of labor force use in the European Union's agriculture in the period 2011-2020. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*, Vol. 21(3): 659-672.
- [21]Popescu, A., Dinu, T. A., Stoian, E., Serban, V. 2022, Population occupied in agriculture and agricultural production value in Romania, 2008-2020. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*, Vol. 22(1): 503-514.
- [22]Popescu, A., Grigoras, M. A., 2011, Research concerning Rural versus Urban Population–Present and Prospect. *Scientific Papers: Series Management, Economic Engineering in Agriculture and rural development*, Vol. 11(2): 151-156.
- [23]Popescu, A., Tindeche, C., Marcuta, A., Marcuta, L., Hontus, A., Angelescu, C., 2021, Labor force in the European Union agriculture - traits and tendencies. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*, Vol. 21(2): 475-486.
- [24]Rudenko, M., Berezianko, T., Halysia, I., Dziamulych, M., Kravchenko, O., Krivorychko, V., 2022, International experience of capitalization of knowledge in terms of innovation economy. *Financial and Credit Activity Problems of Theory and Practice*. Vol. 4(51): 508–518.
- [25]Shmatkovska, T., Agres, O., Luchechko, Y., Korobchuk, L., Naumenko, N., Voichuk, M., Dziamulych, M., 2023, Realities and prospects of managing the development of agricultural business in Ukraine. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*. Vol. 23(4): 777-783.
- [26]Shmatkovska, T., Kulinich, T., Dziamulych, M., Rogach, S., Bilochenko, A., Serdiukova, O., 2022, Analysis of investment efficiency in the agricultural sector of Ukraine on the basis of sustainable development. *Scientific Papers Series "Management, Economic Engineering in Agriculture and Rural Development"*. Vol. 22(3): 649-657.
- [27]Shubalyi, O. M., Kosinskyi, P., Golyan, V., 2020, Economic simulation of the development of agriculture in Ukraine due to integrated use of natural resources and waste. *Bulgarian journal of agricultural science*. Vol 26(2): 323-331.
- [28]Sodoma R., Shmatkovska T., Dziamulych M., Vavdiuk, N., Kutsai, N., Polishchuk, V., 2021, Economic efficiency of the land resource management and agricultural land-use by agricultural producers. *Management Theory and Studies for Rural Business and Infrastructure Development*. Vol. 43(4): 524-535.
- [29]State Statistics Service of Ukraine, <http://www.ukrstat.gov.ua>, Accessed on February 1, 2024.

