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Employment and Labour Productivity in Agriculture – Evidence from Poland

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Abstract:

Purpose: *The objective of this article is to estimate potential surpluses of 'unproductive' employment in Polish agriculture and its potential 'optimum', assuming that optimal employment occurs when GVA per employee in this sector is equal to GVA per employee outside agriculture.*
Design/methodology/approach: *The article considers employment in Polish agriculture as a whole and in voivodeships in the context of labour productivity. The aim is to find the level of employment in agriculture at which GVA per employee in agriculture will be equal to GVA per employee outside agriculture. In the article, this is conventionally referred to as "optimal" employment. Surplus employment above this level is referred to as "unproductive" employment. The calculated level of employment has an economic dimension and does not take into account the actual demand for labour. It is therefore a reference point for formulating policies for the evolution of the sectoral structure of employment and not its goal in the strict sense.*
Findings: *The unproductive employment rate (UER) in agriculture estimated in the article averaged 63.5% in Poland, which means "unproductive" employment of 810,100 people and optimal employment of 466,300 people. Overemployment is higher in voivodeships where the average farm size is small and decreases as the average farm size increases. The process of increasing productivity in agriculture is therefore linked to a further reduction in employment and labour input and to the concentration of agricultural land use, which allows economies of scale to be exploited.*
Practical implications: *The process of land use concentration should be supported by promoting forms such as leasing, the creation of cooperatives and producer groups, and the use of agricultural services provided by specialised entities or technically better equipped farms. Such solutions enable economies of scale to be achieved, similar to those of larger farms, and reduce the technologically determined demand for labour. The freed-up labour can be used outside agriculture on a full-time or part-time basis, without necessarily giving up agriculture altogether. This is an opportunity to optimise labour input: during busy periods, it will help to reduce labour shortages, and during seasonal downtime, it will avoid labour wastage and generate income from outside agriculture.*
Originality/Value: *The contribution of the article stems from the definition of a reference point for agricultural, social and macroeconomic policies in terms of striving for cross-sectoral labour productivity balance, which helps to reduce income disparities between the agricultural and non-agricultural populations and facilitates the achievement of sustainable development goals. The article also shows the differences in this respect between the voivodeships studied*

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and points to the practical implications of this phenomenon.

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1. Introduction

Since Poland's accession to the European Union in 2004, Polish agriculture has undergone a process of adjustment and modernisation, which has enabled it to become a significant player on the European food market. These processes also affected the economic and social spheres. In the year of accession, the share of people employed in agriculture in Poland was 16.9% of the total number of people employed in the national economy. Only Romania (32.9%) and Bulgaria (20.7%) had a higher share (Eurostat, 2022).

The consequence of this situation was low labour productivity in agriculture, low farm incomes, underinvestment, and, somewhat paradoxically, less pressure on the natural environment resulting from reduced use of artificial fertilisers (Merta-Staszczak et al., 2017; Wageningen University and Research, 2019). In the following years, the share of employment in Polish agriculture decreased, but labour productivity remained significantly lower than in the industrial and service sectors (Polska Wieś, 2024).

The declining share of agriculture in employment was a consequence of social and economic changes. After the political and economic transformation in 1989-2002, Poland found itself in a relatively difficult economic situation, but it had a strong structural basis for rapid development in the following years (OECD, 2002).

Poland's accession to the European Union in 2004 provided a strong impulse for further change, opening up access to EU funds, enabling rapid growth in exports and allowing people to take up employment in other EU countries, which was particularly important in a situation of high unemployment. The image of the Polish countryside also changed dynamically. Funding from aid programmes and the Common

Agricultural Policy helped to modernise infrastructure in rural areas and improved the income situation of farmers and the equipment of farms.

Pawlak and Poczta (2025) highlight three main observations regarding the transformation of Polish agriculture after EU accession: a decline in agricultural employment, growing heterogeneity in productivity between small and large farms, and strong income differences related to farm size and mechanisation.

The problem of fragmented land use and strong regional diversity, largely a consequence of historical circumstances and the economic transformation of the 1990s, has not disappeared. The problem of excessive employment on individual farms also remains, including the tying up of significant labour resources on small farms that do not produce for sale (Polska Wieś, 2024).

Previous studies have shown that, due to institutional, economic and natural conditions, it is essentially impossible to increase production and added value on farms in a way that would solve the problem of income disparity between the agricultural and non-agricultural populations (Kołodziejczak, 2020a).

Therefore, opportunities should be sought to release surplus labour from farms by creating jobs outside agriculture and improving the competitive position of the rural population in the labour market in relation to other inhabitants of the country. Reducing surplus employment will not only help to reduce income disparities, but will also promote the modernisation of farms and the pursuit of sustainability in rural areas.

However, measures to release surplus labour from agriculture must be properly targeted and undertaken taking into account the specific characteristics of both the countryside as a whole and individual groups of its inhabitants (Kołodziejczak and Wysocki, 2015).

It is necessary to take into account at least the technological demand for labour in agriculture, the size and structure of demand for labour outside agriculture, including the availability of non-agricultural jobs for the agricultural population, and the social changes occurring in connection with the declining share of agriculture in the employment structure. In this context, the question arises as to the size of the labour surplus associated with agricultural holdings and the scale of demand for labour outside agriculture and its adaptation to the spatial distribution and other characteristics of the labour force released from agriculture.

The aim of this article is to estimate the potential surplus of "unproductive" employment in Polish agriculture and its potential "optimum", assuming that optimal employment occurs when the GVA per employee in this sector is equal to the GVA per employee outside agriculture. The contribution of the article stems from the definition of a reference point for agricultural, social and macroeconomic policies in terms of striving for cross-sectoral labour productivity balance, which helps to reduce

income disparities between the agricultural and non-agricultural populations and facilitates the achievement of sustainable development goals. The article also shows the differences in this respect between the voivodeships studied and points to the practical implications of this phenomenon.

2. Literature Review

Over the years, agriculture has been losing its importance in the income structure, which is consistent with the three-sector theory, according to which, with economic development and progress, the importance of agriculture and its share in gross value added (GVA) decline, first in favour of industry and then services (List, 1909; Fisher, 1939; Fourastié, 1954; Clark, 1957; Drejerska, 2018; Kołodziejczak, 2019).

Even with a fairly rapid decline in the share of agriculture in the employment structure, the different rates of change in the share of individual sectors in the GVA structure mean that inter-sectoral differences in labour productivity measured by GVA per employee are widening over time to the detriment of the weakest sector, i.e. agriculture (Kołodziejczak, 2025).

As a consequence, the income disparity between the agricultural population and the non-agricultural population is also increasing (Andersson and Palacio 2015; Katsushi and Bilal, 2018; Kołodziejczak, 2018; Kołodziejczak, 2020a). Long-term differences in labour productivity between economic sectors result, among other things, in the need to burden more productive sectors with the costs of mitigating the effects of this disparity, as part of the redistributive function of the public finance sector.

In simple terms, it can be assumed that low labour productivity has similar economic and social consequences to professional deactivation or unemployment. The added value not generated as a result is lost, as in the case of unemployment or economic inactivity, and the negative consequences of income disparity and financial constraints are borne by the more productive sectors through the redistributive function, which further slows down their development.

This is also disadvantageous from a social and environmental point of view, as reduced public funds hinder efforts to shape social and environmental governance in line with the principles of sustainability (European Commission, 2008; ILO, 2022).

In view of the above, it is important to determine the optimal level of employment in agriculture and the scale of surplus employment in this sector that could be released and absorbed by more productive sectors: industry and services. Understanding the concept of surplus employment, also known as hidden unemployment in agriculture, requires consideration of two points of view.

The first takes into account the actual situation, and in this sense, surplus employment in agriculture can be "current", i.e. determined in relation to existing agricultural

production conditions (the spatial structure of farms, the level of production and mechanisation, the development of the agricultural service sector, the state of rural infrastructure, etc.).

On the other hand, surplus employment may be "potential", the release of which from agriculture is economically desirable, but does not take into account the actual demand for labour. As it is usually greater than the "current" surplus, its release from agriculture depends on a change in production conditions towards a lower demand for labour (Frenkel, 2003; Kołodziejczak and Wysocki, 2015). Regardless of technological conditions, with relatively constant GVA generated in agriculture and limited possibilities for its increase, it is advantageous to achieve it with the lowest possible labour input (Kołodziejczak, 2025).

The history of research into surplus employment in Polish agriculture dates back to the interwar period, when it was referred to as ‘agricultural overpopulation’. This research focused mainly on estimating the number of redundant workers on farms, i.e. the ‘current’ surplus (Błąd, 2019). After 1989, research on this type of excessive employment in agriculture was conducted by Frenkel, based on data from the General Agricultural Census conducted in 1996.

The analysis was based on farm managers' responses to a question about the number of people working on the farm who could cease this work without harming agricultural production. Depending on the assumptions made, Frenkel estimated that the agricultural sector required a reduction in employment of between 6% and 28% of the initial level, amounting to approximately 4.3 million people (Frenkel, 2003).

The General Agricultural Census provided reliable information from across the country. Unfortunately, subsequent General Agricultural Censuses did not examine this phenomenon, so it was only possible to estimate the "current" surpluses on the basis of surveys conducted on smaller samples. Such an attempt was made, among others, by Agata Marcysiak and Adam Marcysiak (2009) on the basis of a sample of 75 farms located in the south-eastern part of the Mazowieckie voivodeship.

They estimated that the employment surpluses in the surveyed group of farms amounted to approximately 20%. Another attempt was made by Karwat-Woźniak (2015) on the basis of surveys conducted by IERiGŻ-PIB, who estimated the surplus employment in agriculture at approximately 16% of those working exclusively or mainly on farms, i.e. a total of approximately 0.5 million people in the country.

Attempts to examine the level of "potential" surplus employment in agriculture based on a comparison of the level of employment in agriculture in Poland and other European Union countries can be found in the works of Kołodziejczak and Wysocki (2015) and Kołodziejczak (2016; 2020b), where the employment surplus was estimated on the basis of a comparison of the share of agriculture in total employment in Poland and other European Union countries.

In the most rigorous variant of these studies, it amounted to over 66% of those employed in agriculture in the initial state, i.e. approximately 1.5 million people.

Due to its specific nature, agriculture is a sector in which low labour productivity is accompanied by seasonal surplus employment, especially in the winter months, and seasonal shortages during periods of peak field work, particularly during harvest time.

The demand for labour also varies between different areas of agricultural production (Kołodziejczak, 2025). Therefore, any estimates of surplus employment in agriculture cannot be treated directly as the size of the proposed reduction in agricultural employment. These are only reference points, helpful in formulating agricultural, economic and social policy assumptions.

3. Data Collection and Research Method

Data on employment by sector are taken from the Statistical Yearbook of Labour (GUS, 2023a), where they were compiled on the basis of the Labour Force Survey (LFS). Data on the employed refer to persons performing work that brings them remuneration or income.

The employed include: persons employed under an employment contract (employment contract, appointment, nomination, election or service relationship) and employers and self-employed persons, namely: owners, co-owners and tenants of individual agricultural holdings (including family members assisting them), owners and co-owners (including family members assisting them; excluding partners in companies who do not work in the company) of entities conducting business activity outside individual agricultural holdings, other self-employed persons, e.g. persons in liberal professions.

The following are also considered to be employed: persons performing outwork, intermediaries, members of agricultural production cooperatives (agricultural cooperatives and cooperatives established on their basis, as well as agricultural cooperatives), clergy performing pastoral duties.

In accordance with the LFS methodology, data on employed persons are provided without converting part-time employees into full-time employees, assuming the principle of one-time inclusion of these persons in their main place of work. Persons working in individual agriculture who produce agricultural products exclusively or mainly for their own needs are not included in the working population (GUS, 2023b).

Data on gross value added come from the Local Data Bank of the Central Statistical Office (GUS) (BDL, 2025), which compiles them in accordance with the principles of national accounts and the recommendations of the "European System of Accounts 2010 (ESA 2010)", introduced by Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national

and regional accounts in the European Union. Due to the one-year coverage of the analysis, the issue of changes in the prices of means of production and agricultural product prices was omitted.

The latest available data for 2022 was used to estimate surplus employment in agriculture. The calculations were performed using the unproductive employment rate (UER) (Kołodziejczak, 2025). It is based on the assumption that, given the relatively constant GVA generated in agriculture, improving labour productivity in this sector on an aggregate scale requires a reduction in employment so that the GVA generated in agriculture is shared among a smaller number of workers. The surplus employment in agriculture is therefore equal to the number of workers in excess of the "optimal" employment level, which occurs when labour productivity per worker is equal in agriculture and outside agriculture.

The level of optimal employment can therefore be estimated as the ratio of total GVA produced in agriculture to GVA per employee outside of agriculture (Kołodziejczak, 2025):

$$OEa = \frac{GVAa}{GVAisp}$$

where:
OEa – optimal employment in agriculture (employees)
GVAa – GVA in the agricultural sector

and:
GVAisp – GVA per employee in industry and services on average:

$$GVAisp = \frac{(GVAi + GVAs)}{Eis}$$

where:
GVAi – GVA in industry
GVAs – GVA in services
Eis – total employment in industry and services (employees)

The target share of agriculture in the employment structure can be determined as follows:

$$OEra = \frac{OEa}{Etotal} * 100$$

where:
OEra – optimal employment rate in agriculture (share of the total number of employees in the economy)
Etotal – total number of employees in the economy

Subtracting the optimal employment level in agriculture *OEa* from the initial employment level in agriculture *Ea*, we get the number of employees who would have to leave agriculture in order for the added value generated in this sector per employee to be the same as outside of agriculture:

$$UEa = Ea - OEa$$

where:
UEa – "unproductive" employment in agriculture

The share of "unproductive" employment *EUa* in initial employment in agriculture *Ea* can be calculated as:

$$UER = \frac{UEa}{Ea} * 100$$

where:
UER – "unproductive" employment rate in agriculture

4. Research Findings and Discussion

The origins of high employment in Polish agriculture:
The current shape of the Polish countryside and Polish agriculture is the result of their history and complex processes of change, starting from the period after Poland regained independence in 1918, the Polish-Soviet War (1919-1921), World War II (1939-1945) and subsequent agricultural reforms and political turmoil. The years of partition (1772-1918) shaped the Polish countryside as backward and poor, burdened with many social and economic problems and differing technologically, economically and socially depending on which partition it was located in (Russian, Prussian or Austro-Hungarian).

Land ownership was concentrated in the hands of a relatively small group of the population (the landed gentry), while rural areas were inhabited mainly by people who owned small agricultural plots or no land at all, and who were often illiterate and had no means of subsistence (Jezierski and Leszczyńska, 2010; Halamska, 2020; Polska wieś pod zaborami, 2022).

This state of affairs resulted from the maintenance of the property and social structure characteristic of the feudal system, in which for centuries the peasant population actually belonged to the landowner on terms similar to slavery or was burdened with the obligation to perform unpaid labour for the landowner ("peasant attachment to the land", serfdom). In order to improve the situation of the peasant population and curb the radicalisation of social sentiment in the countryside, in 1920, just two years after regaining independence, the Polish Parliament passed an agricultural reform act, which provided for the transfer of part of the agricultural land to the peasant population.

However, the provisions of the act were not implemented on a larger scale, as it was found to be unconstitutional. Another act on this matter was passed in 1925. By 1939, 58% of the reform had been implemented through the compulsory sale to buyers or the purchase by the state of land subject to parcelling. In total, approximately 20% of the land belonging to landowners was parceled out (Noniewicz, 2016; Pokoj, 2016; Jastrzębski, 2018; Błąd, 2019).

After World War II, pursuant to the decree on agricultural reform issued by the Polish Committee of National Liberation on 6 September 1944, it concerned the expropriation and parcelling of estates with an area of over 50 ha, and in some areas over 100 ha. In total, between 1944 and 1948, 9,707 estates (approx. 3.49 million hectares) were taken over for the purposes of agricultural reform. Of this number, 1.2 million hectares were parceled out among 387,000 peasant families (Jastrzębski, 2018).

According to the assumptions of this reform, the size of a private farm could not exceed 50 hectares, and in some areas 100 hectares. After the initial enfranchisement of the peasant population, the government, under pressure from the Soviet authorities, began the forced collectivisation of agriculture in Poland in order to concentrate land in production cooperatives and state farms. This was intended to help modernise and increase production, but above all, it was in line with the Soviet paradigm of eliminating private land ownership.

At the same time, industrialisation and the development of mining became the state's most important economic priority. The collectivisation process in Poland met with strong resistance from the agricultural population and, despite pressure from the authorities and various forms of repression, ended in failure (Lech, 2021; Rzecz Historyczna: Kolektywizacja polskiej wsi w PRL. Walka o ziemię, 2023).

However, individual farms suffered, as they were burdened with high taxes to the state and at the same time were cut off from modern technologies, which were reserved for state farms and production cooperatives. Despite this, in the 1970s, individual farms were significantly more efficient than state farms, even though they had four times worse technical equipment and three times less artificial fertilisers (Polskie rolnictwo w latach 70. XX wieku, 2024).

At the same time, significant social and economic changes were taking place. The developing industry created a demand for labour, and moving to the city was seen as social and cultural advancement. This prompted many, especially young, rural residents to leave their farms and seek a better life in the city. This relieved agriculture of some of its labour force, but the beneficial effect of this phenomenon was largely offset by high birth rates in rural areas.

At the same time, historically and culturally conditioned attachment to land ownership hampered the process of land concentration, just as it had halted collectivisation

somewhat earlier. As a result of the economic and political transformation after 1989, the demand for labour in industry declined and the previously unknown phenomenon of high unemployment emerged.

This halted the process of migration from rural areas to cities and even caused some people who had left the countryside to return after losing their jobs in industry, which in turn increased the scale of excessive, unproductive employment in agriculture. Small and underinvested farms thus absorbed part of the labour force released from industry and mining as a result of the transformation, protecting them from overt unemployment, but this did not lead to an increase in production or income on these farms (Kołodziejczak and Wysocki, 2015).

In the following years, the situation gradually improved as the national economy recovered from the shock of transformation. A milestone was Poland's accession to the European Union in 2004. The modernisation of agriculture and the increase in land concentration, resulting in a lower real demand for human labour, financed largely by the CAP and EU structural programmes, further stimulated the process of releasing labour resources from individual farming.

Thanks to a strong development impulse and the coexistence of the phenomenon of an increase in the total number of people employed in the national economy and a decrease in the number of people employed in agriculture, the share of this sector in the employment structure declined. This phenomenon was exacerbated by the opening of the labour markets of the European Union countries and the associated economic migration (reducing the size of the labour force on the domestic labour market) as well as demographic trends favouring the deactivation of the labour force and a reduction in its overall size.

This, together with growing domestic demand and exports, stimulated changes in the domestic labour market, which gradually became an "employee's market", unlike in previous years (especially during the economic transition), when, due to a shortage of jobs, it was an "employer's market" (Kołodziejczak, 2020b).

After 2004, the situation of the rural population in the labour market also gradually changed. The professional situation improved, especially for the population associated with agriculture, among whom unemployment and economic inactivity decreased. On the other hand, among the non-agricultural population, the processes of professional deactivation intensified, related to reaching retirement age or discouragement from long-term and ineffective job search (Kołodziejczak and Wysocki, 2015).

Research by Pawlak and Poczta (2025) showed that the effects of Poland's integration with the European Union were beneficial from the point of view of agriculture. In this regard, they mention, above all, a stable upward trend in agricultural production and the strengthening of links between farms and the agricultural market, an increase in the income of agricultural producers , and an increase in the volume and change in the

geographical structure of Polish trade in agri-food products following the adoption of the EU's Common Agricultural Policy.

However, the authors note that the improvement in income was mainly the result of subsidies received by agricultural producers. In 2022, subsidies for agricultural products amounted to PLN 3,164 million, which accounted for 4.74% of gross value added in agriculture, while the share of total subsidies in the income of agricultural entrepreneurs was 33.5%. This is a high value, but significantly lower than the average for 2010-2020, when it was 49.3% (GUS, 2023).

Such a large share of non-production sources in the income structure is a cause for concern, especially in view of the opening of the European market to products from Ukraine, which has very high production potential, and the planned agreements with Mercosur, Australia and the United States. All of the above-mentioned agreements facilitate access to the EU market for agricultural products from countries that achieve lower production costs thanks to greater land concentration and less stringent quality and environmental requirements, which puts Polish agriculture in a difficult competitive situation (Umowa UE-Mercosur – negatywne stanowisko resortu rolnictwa. 2024; Bryłka, 2025).

At the same time, the new shape of agricultural policy proposed from 2028 onwards places greater emphasis on the environment and climate, which entails the need for strict compliance with standards, including those relating to soil, water and biodiversity protection. Greater support for smaller farms and young farmers is also envisaged (Dopierała and Przepióra, 2025; Nowak, 2025). It is uncertain whether the implementation of these assumptions will result in an increase in the competitiveness of Polish agriculture and income from agricultural production.

The tightening of requirements is likely to increase costs and have a negative impact on crop yields, while support for smaller farms will delay the processes of land concentration and productivity growth. The reduction in payments to large farms, which was supposed to bring €86 billion in savings to the Common Agricultural Policy budget, has been met with protests and opposition (Dopierała and Przepióra, 2025; Katana, 2025).

Poland is among the leading European countries (behind France, Spain, Germany and Italy) in terms of the size of the planned pool of funds allocated to agricultural policy in 2028-2034, with funding of EUR 24.6 billion (Nowak, 2025). However, the lack of a clear link between the environmental objectives of agricultural policy and the pursuit of productivity growth, as well as market pressure from non-EU agricultural exporters, may result in Polish farms becoming even more dependent on financial transfers from public funds.

For those employed in agriculture, an alternative is to supplement their income from agricultural work with income from outside agriculture. Work outside agriculture is

the primary source of income for most rural residents (Polska Wieś, 2024). Chmielewska and Zegar in their report Polska Wieś 2024 (2024) state that between 2004 and 2022, the nominal *per capita* income of the rural population increased approximately 3.5 times, with the largest increase coming from self-employment outside of agriculture (5.1 times) and income from paid employment (4.9 times), and the smallest increase coming from agricultural activity (2.6 times) and social benefits (2.7 times).

During this period, the share of income from paid employment increased from 37% to 51%, from non-agricultural activities from 6% to 8%, while the share of income from social benefits (from 39% to 29%) and from agricultural activities (from 13% to 9%) decreased. As can be seen, these changes indicate a gradual marginalisation of agriculture in the income structure of the rural population, but they also have sources outside agriculture: the improvement in the overall economic situation in the country and suburbanisation around urban centres.

However, the declining importance of income from agriculture is also due to changes in the structure of the rural population. As the overall economic situation improved, there was an increase in the migration of wealthy people from cities to rural areas, who were employed in well-paid jobs in cities, represented the liberal professions or received benefits from the non-agricultural social security system (Polska Wieś, 2024).

This has been followed by a noticeable phenomenon of suburbanisation, especially in the vicinity of large urban centres, where housing estates have been built in areas formally classified as rural, populated by people migrating from urban centres but still deriving their income from sources related to those urban centres (Jadach-Sepioło and Legutko-Kobus, 2021; Sykała *et al.,* 2023).

Despite the passage of time, the structure of land ownership and use remains fragmented, although the average farm size increased from 6.20 ha in 2005 to 11.59 ha in 2024. However, this positive change does not reflect the differences between voivodeships. In 2024, the average size of an agricultural holding differed by as much as 19.31 ha between the voivodeships with the smallest and largest holdings (Małopolskie, 4.36 ha, and Lubuskie, 23.67 ha) (GUS, 2006).

Surplus employment in agriculture:
Table 1 presents employment and GVA in the Polish economy in 2022, broken down by voivodeship and sector. Total employment in the Polish economy amounted to 15,169,000 people, of which 8.4% were employed in agriculture, 21.4% in industry and 70.2% in the service sector. This structure shows the dominance of the service sector, which is characteristic of developed economies. At the same time, the share of agriculture in the employment structure is significantly higher than in Western European countries (Kołodziejczak, 2025).

In total, GVA in Poland amounted to PLN 2,766,246 million, of which 3.1% was generated in agriculture, 27.1% in industry and 69.7% in the service sector. There is therefore a clear imbalance to the detriment of agriculture between the shares of sectors in the employment structure and their shares in the value added structure.

Table 1. *Employment and GVA in economic sectors by voivodships in 2022*

VOIVODSHIPS	Total number of employees (000)	Share of sectors in total employment (%)			GVA total (millions of PLN)	Share of sectors in GVA creation (%)		
		Agriculture	Industry	Services		Agriculture	Industry	Services
POLAND	15169.0	8.4	21.4	70.2	2,766,246	3.1	27.1	69.7
Dolnośląskie	1160.3	4.2	24.0	71.8	230,943	1.3	34.0	64.7
Kujawsko-pomorskie	762.6	9.0	23.6	67.3	120506	5.0	29.4	65.6
Lubelskie	768.5	19.5	15.7	64.8	101971	6.5	21.2	72.3
Lubuskie	368.8	5.5	24.4	70.1	58,952	3.2	34.6	62.2
Łódzkie	1003.1	9.3	23.7	67.0	166,660	4.4	28.7	66.9
Małopolskie	1,435.4	10.4	18.6	71.0	221,644	1.2	22.8	76.0
Mazowieckie	2437.3	7.1	13.8	79.1	640,134	3.0	19.9	77.1
Opolskie	346.7	8.9	26.4	64.7	54,782	3.7	33.3	63.0
Podkarpackie	763.2	12.1	24.1	63.8	103,395	1.6	31.7	66.7
Podlaskie	435.0	19.0	17.5	63.5	62,581	8.6	23.1	68.2
Pomorskie	924.8	5.2	20.3	74.5	170802	2.3	30.3	67.4
Śląskie	1706.8	2.4	27.8	69.8	333,905	0.8	35.3	64.0
Świętokrzyskie	435.6	15.0	20.2	64.8	61696	4.9	26.9	68.2
Warmińsko-mazurskie	488.8	9.9	23.0	67.1	69,271	7.3	27.0	65.7
Wielkopolskie	1537.7	8.6	25.5	65.9	270,486	4.4	27.8	67.8
Zachodniopomorskie	594.3	5.7	20.3	73.9	98,519	4.0	23.6	72.4

Source: *Own study based on data from the GUS.*

Individual voivodeships differed in terms of employment and value added, as well as their sectoral structure (Table 1). The highest total employment and GVA were recorded in the Mazowieckie voivodeship, which clearly differed from other voivodeships in terms of economic potential. It was followed by the following voivodeships: Śląskie, Wielkopolskie, Małopolskie, Dolnośląskie, Łódzkie and Pomorskie. The lowest employment and GVA were recorded in the Opolskie, Lubuskie, Podlaskie, Świętokrzyskie, and Warmińsko-Mazurskie voivodeships. The voivodeships of Zachodniopomorskie, Kujawsko-Pomorskie, Podkarpackie, and Lubelskie had slightly greater economic potential.

Differences between voivodeships were also evident in terms of the share of sectors in the employment structure and gross value added (Table 1). The highest share of employment in agriculture was characteristic of the voivodeships located in the eastern and south-eastern parts of the country: Lublin (19.5%), Podlasie (19.0%), Świętokrzyskie (15.0%) and Podkarpackie (12.1%).

However, these voivodeships were not homogeneous in terms of the share of agriculture in the GVA structure. In Podlaskie voivodeship, this indicator was the highest in the country (8.6%), slightly lower in Lubelskie voivodeship (6.5%) and even lower in Świętokrzyskie voivodeship (4.9%). However, the value recorded in Podkarpackie voivodeship stood out clearly, where despite a high share in employment, agriculture generated only 1.6% of the economy's GVA.

This voivodeship was characterised by a relatively high share of industry in the GVA structure (31.7%), significantly higher than the other voivodeships in this group (from 21.2% to 26.9%). It is also worth noting the Małopolskie voivodeship, where agriculture accounted for 10.4% of total employment and only 1.2% of GVA.

The lowest share of agriculture in the employment structure was recorded in the Śląskie voivodeship (2.4%). The next voivodeship with the lowest share of agriculture in the employment structure had a value 1.8 percentage points higher (4.2%). Relatively low shares of agriculture in employment were also characteristic of the Pomorskie (5.2%), Lubuskie (5.5%) and Zachodniopomorskie (5.7%) voivodeships.

This is the result of a less dispersed structure of land ownership and use, resulting from the large share of state-owned farms during the People's Republic of Poland, whose resources were then managed by the Agricultural Property Agency of the State Treasury (currently the National Centre for Agricultural Support). The voivodeships in this group, located in the north-western part of the country (Pomorskie, Lubuskie, Zachodniopomorskie), are also characterised by a relatively high share of agriculture in the GVA structure (in terms of employment).

Table 2 presents the value added generated in agriculture (GVAap) and outside agriculture (GVAis) in 2022 per employee. The average GVAap in Poland was PLN 67,800, which accounted for 35.2% of GVAisp (PLN 192,900). The highest GVAap was recorded in the Zachodniopomorskie voivodeship (PLN 116,100), followed by the Mazowieckie voivodeship (PLN 112,600) and the Warmińsko-Mazurskie voivodeship (PLN 103,800), while the lowest was recorded in the Małopolskie voivodeship (PLN 17.7 thousand) and Podkarpackie (PLN 17.9 thousand).

In relation to the value added outside agriculture GVAisp, the relatively smallest disparity was recorded in the Warmińsko-mazurskie voivodeship, where GVAap amounted to 71.2% of GVAisp, and in the Zachodniopomorskie voivodeship, 68.8% of GVAisp. At the other end of the scale were the Małopolskie (10.4%) and Podkarpackie (11.8%) voivodeships.

Table 2. *Gross value added in agriculture (GVAa), per 1 person employed in agriculture (GVAap) and per 1 person employed outside agriculture (GVAisp) in 2022*

VOIVODSHIPS	GVAap (thousands of PLN)	GVAisp (thousands of PLN)	GVAap as % GVAisp
POLAND	67.8	192.9	35.2
Dolnośląskie	61.5	205.0	30.0
Kujawsko-pomorskie	87.7	165.0	53.1
Lubelskie	44.0	154.1	28.6
Lubuskie	94.2	163.7	57.6
Łódzkie	78.5	175.1	44.8
Małopolskie	17.7	170.2	10.4
Mazowieckie	112.6	274.1	41.1
Opolskie	66.0	167.0	39.5
Podkarpackie	17.9	151.7	11.8
Podlaskie	65.5	162.2	40.4
Pomorskie	83.5	190.2	43.9
Śląskie	61.9	198.9	31.1
Świętokrzyskie	46.3	158.4	29.2
Warmińsko-mazurskie	103.8	145.9	71.2
Wielkopolskie	90.9	183.9	49.4
Zachodniopomorskie	116.1	168.8	68.8

Source: *Own study based on data from the GUS.*

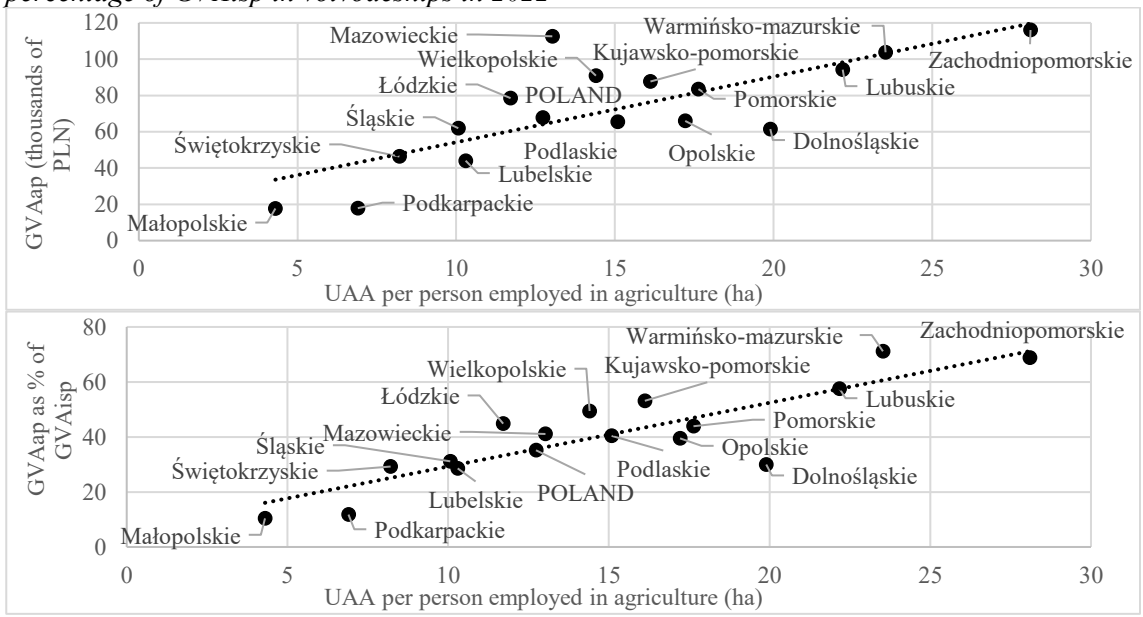
GVAap and the size of the disparity between GVAap and GVAisp are related to the area of agricultural land per person employed in agriculture (Figure 1). Voivodeships with higher GVAap also have a larger UAA per employee and a smaller GVA disparity per employee in agriculture and outside agriculture.

Deviations from the trend line may result from natural conditions, the direction of production and technical equipment, which is related to geographical location and historical circumstances. It can also be seen that in the lower part of the graphs, below the trend line, there are mainly voivodeships in the southern and eastern parts of Poland, and in the upper part, voivodeships from the central part. The distribution of voivodeships is similar in both cases, although the deviations from the trend line are more pronounced for GVAap than for the GVAap and GVAisp ratio.

Table 3 presents employment in agriculture (Ea), its "unproductive" (UEa, UER) and "optimal" level (OEa, OEra) and changes (Ea – OEra) in voivodeships. In 2022, agriculture was the main place of employment for 1,276,500 people in Poland. According to the assumption that GVAap should ultimately be equal to GVAisp, the surplus of employment in agriculture (UEa) amounted to 810,100 people in 2022, i.e. (UER) 63.5% of those employed in agriculture. Optimal employment in this sector (OEa) should be 466,300 people, or (OEra) 3.1% of the total number of people

employed in the national economy, which means a reduction of 5.3 percentage points compared to the baseline.

Figure 1. *UAA per person employed in agriculture, GVAap and GVAap as a percentage of GVAisp in voivodeships in 2022*



Source: *Own study based on data from the GUS.*

Table 3. *Employment in agriculture (Ea), its "unproductive" (UEa, UER) and "optimal" level (OEa, OEar) and changes (Ear–OEra) in 2022*

VOIVODSHIPS	Ea (thousands of people)	UEa (thousands of people)	OEa (thousands of people)	UER (%)	OEar (%)	Ear – OEra (p.p.)
POLAND	1276.5	810.1	466.3	63.5	3.1	5.3
Dolnośląskie	48.5	34.0	14.5	70.0	1.3	2.9
Kujawsko-pomorskie	69.0	32.3	36.7	46.9	4.8	4.2
Lubelskie	149.7	106.9	42.8	71.4	5.6	13.9
Lubuskie	20.3	8.6	11.7	42.4	3.2	2.3
Łódzkie	93.2	51.4	41.8	55.2	4.2	5.1
Małopolskie	148.7	133.2	15.5	89.6	1.1	9.3
Mazowieckie	173.2	102.0	71.2	58.9	2.9	4.2
Opolskie	30.9	18.7	12.2	60.5	3.5	5.4
Podkarpackie	92.3	81.4	10.9	88.2	1.4	10.7
Podlaskie	82.5	49.2	33.3	59.6	7.7	11.3
Pomorskie	47.8	26.8	21.0	56.1	2.3	2.9
Śląskie	40.6	28.0	12.6	68.9	0.7	1.6

Świętokrzyskie	65.3	46.2	19.1	70.8	4.4	10.6
Warmińsko-mazurskie	48.5	14.0	34.5	28.8	7.1	2.9
Wielkopolskie	131.9	66.7	65.2	50.6	4.2	4.3
Zachodniopomorskie	34.0	10.6	23.4	31.2	3.9	1.8

Source: *Own study based on data from the GUS.*

The highest level of surplus employment in agriculture is characteristic of the voivodeships in the southern and eastern parts of the country: Małopolskie (UER = 89.6%), Podkarpackie (88.2%), Lubelskie (71.4%), Świętokrzyskie (70.8%), Dolnośląskie (70.0%) and Śląskie (68.9%).

Expressed in terms of the number of people employed, the surplus of employment in agriculture (UEa) in these voivodeships totals 429,700 people, which accounts for 53.0% of the total UEa surplus in Poland. Optimal employment (OEa) in this group of voivodeships is 115,400 people, which accounts for 24.7% of total optimal employment in domestic agriculture.

The smallest scale of employment surpluses was characteristic of the Warmińsko-mazurskie (28.8%) and zachodniopomorskie (31.2%) voivodeships. Slightly higher, but still relatively low compared to other voivodeships, UER values are found in Lubuskie (42.4%) and Kujawsko-Pomorskie (46.9%). A common feature of these four voivodeships is the high average size of agricultural holdings, as far as Polish conditions are concerned. This is due to the high share of state-owned farms in these voivodeships in the past.

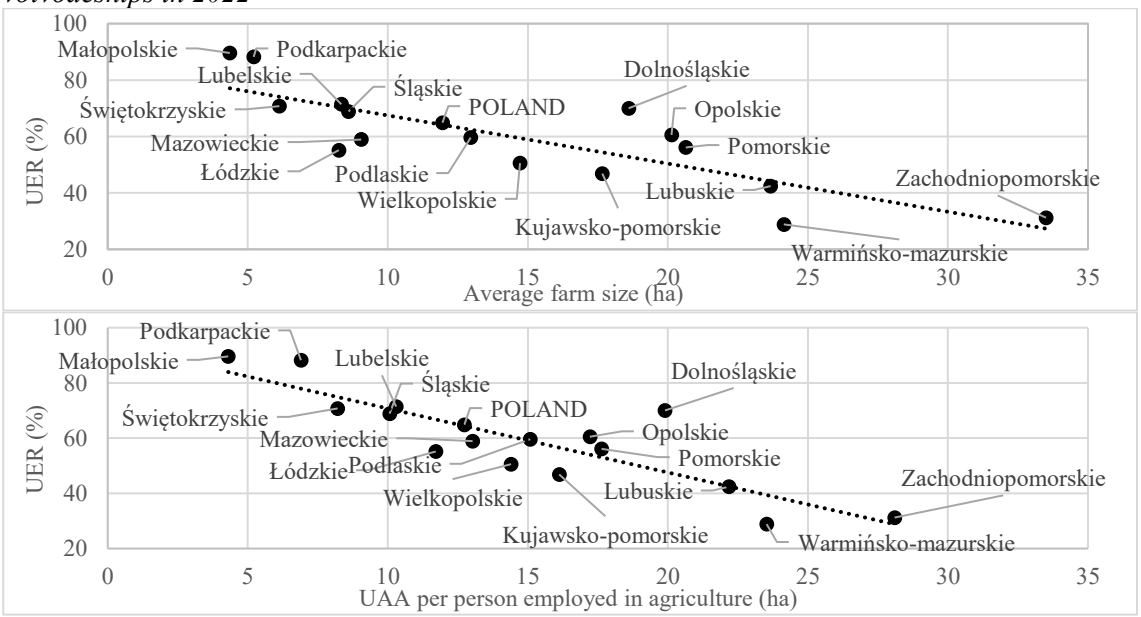
Although the agricultural land of these enterprises has been largely divided between smaller farms, the historically conditioned impact of land fragmentation, characteristic of individual farms, is less significant in these voivodeships. The total number of excess employees in these voivodeships is 65,500, and the target optimal employment level is 106,300. The target optimal level of employment in agriculture in this group is quite high, ranging from 3.2% to 7.1% of the total number of people employed in the economy.

Another group includes the remaining voivodeships, where the UER ranges from 50.6% to 60.5%. It includes voivodeships in central Poland (Wielkopolskie, Łódzkie and Mazowieckie), north-western Poland (Pomorskie), south-western Poland (Opolskie) and north-eastern Poland (Podlaskie). In this group of voivodeships, the UEa totals 314,800 people and the OEa 244,700 people. The target level of employment in agriculture in these voivodeships ranges between 2.3% and 7.7%.

Figure 2 shows the UER in relation to the average farm size and the area of agricultural land per person employed in agriculture. It can be seen that the UER decreases with increasing area, and this relationship is stronger in the case of agricultural land per person employed than in the case of average farm size. This points to two ways of improving the situation: striving for concentration of agricultural land and, related to

this, reducing the demand for human labour through the use of more efficient machinery and production technologies that increase productivity in economic and technical terms.

Figure 2. *UER, average farm area and UAA per person employed in agriculture in voivodeships in 2022*



Source: *Own study based on data from the GUS.*

It can be assumed that due to the criteria for identifying workers used in the LFS methodology and the dual occupation of some farmers, the labour surpluses in agriculture presented in Table 3 are slightly overestimated. However, this does not significantly change the conclusion, as the aim is to indicate the direction of change rather than to precisely determine labour surpluses.

At the same time, the concentration of excessive employment in the smallest farms draws attention to the need to strive for land consolidation and an increase in the average farm size. This must be followed by changes in the organisation and technology of production, which will reduce the actual demand for labour in agriculture. However, such measures may sometimes conflict with the pursuit of non-productive and non-food functions of agriculture (Kołodziejczak, 2020a).

Of course, the call for a reduction in employment does not mean striving for a model of industrial agriculture, but only rationalising the use of production factors in agriculture. Moreover, even if labour productivity growth had to be sacrificed for environmental goals, it is in the general interest to strive for the lowest possible employment in agriculture.

This will allow non-agricultural sectors to develop better (by using labour resources freed up from agriculture) and will not be overly burdened by transfers to agriculture (necessary to maintain decent wages in this sector).

Opportunities for reducing employment in agriculture can be found in maintaining high absorption capacity of the non-agricultural labour market, both domestically and abroad. It seems that finding employment outside agriculture should not be a significant problem at present, because on an aggregate scale, the problem of the Polish labour market in recent years has been a shortage of workers rather than a surplus (Bartuś, 2025).

However, due to structural mismatches between labour demand and supply (i.e. differences between the characteristics of people working in agriculture and the demand reported by employers), it is possible (and common) that despite the existence of employment shortages outside agriculture, there will be overt or hidden structural unemployment. Previous studies have shown that the population associated with agriculture is usually less educated and less mobile.

The distance between their place of residence and potential non-agricultural employment opportunities hinders the process of reducing employment in agriculture (Marciniak, 2019). It is easier for young people who are better educated to leave agriculture. This exacerbates the structural mismatch between the agricultural population and non-agricultural labour demand. If younger and more mobile farmers leave unproductive farms, they deprive them of successors, and it can be assumed that over time these farms will be taken over by larger and stronger entities.

This usually happens when the current users acquire the right to retirement benefits and decide to sell their land. Thanks to the opening of Western European labour markets after Poland's accession to the EU, the mobile part of the rural population was given a choice: whether to migrate to work in the country or to more absorbent and higher-paying foreign labour markets.

These were often temporary migrations, and part of the wages earned abroad were used to support the migrants' households in Poland. It is quite difficult to determine the scale of these transfers, as it can be assumed that many of them were not registered. However, there is no doubt that they improved the economic situation in rural areas and often enabled investments to be made in modernising and increasing the productivity of farms (Kołodziejczak and Wysocki, 2015).

The dominant structural nature of excessive employment (hidden unemployment) in agriculture does not preclude the possibility of improving the situation thanks to a favourable economic situation, provided that economic growth is sustainable. As mentioned earlier, sufficiently high economic growth, combined with job creation outside agriculture in the long term, may also reduce structural unemployment, as its rate usually decreases during economic upturns (and, consequently, open and hidden

unemployment as well) (Socha and Sztanderska, 2002). This is because the scale and significance of qualitative mismatches between labour supply and demand decrease over time.

These mismatches may relate to qualifications, age and gender, but also to physical accessibility or the economic and social cost-effectiveness of reaching non-agricultural jobs (Kołodziejczak and Wysocki, 2015). Unfortunately, in the event of an economic downturn, agriculture may once again become a buffer, protecting those laid off from industry and services from overt unemployment.

5. Conclusions, Proposals, Recommendations

Polish rural areas and Polish agriculture have specific characteristics resulting from their history. Different conditions have shaped a diverse agrarian structure between voivodeships. Despite the passage of time and the progress made towards modernisation and upgrading, historical differences are still visible, especially between the western and central parts of the country and the eastern and southern parts.

According to the assumption that GVAap should ultimately be equal to GVAisp, the surplus employment in agriculture (UEa) in 2022 was 810,100 people, or (UER) 63.5% of those employed in agriculture. Optimal employment in this sector (OEa) should be 466,300 people, or (OEra) 3.1% of the total number of people employed in the national economy, which means a reduction of 5.3 percentage points compared to the baseline.

The largest scale of employment surpluses in agriculture (UER) is characteristic of the voivodeships in the southern and eastern parts of the country: Małopolska, Podkarpackie, Lubelskie, Świętokrzyskie, Dolnośląskie and Śląskie (UER from 68.9% to 89.6%).

Expressed in terms of the number of people employed, the surplus employment in agriculture in these voivodeships totals 429,700 people, which accounts for 53.0% of the total surplus in Poland.

The optimal employment in this group of voivodeships is 115,400 people, which accounts for 24.7% of the total optimal employment in domestic agriculture. The smallest scale of employment surpluses was characteristic of voivodeships where large-scale state-owned farms were of great importance in the past: Warmian-Masurian and West Pomeranian (28.8% to 31.2%).

Slightly higher, but still relatively low compared to other voivodeships, UER values are found in Lubuskie and Kujawsko-Pomorskie (42.2% and 46.9%). A common feature of these four voivodeships is the high average size of agricultural holdings by Polish standards.

The study indicates that the number of employees per hectare of agricultural land and UER is higher in voivodeships where the average farm size is small, and decreases as the average farm size increases. This points to the positive effects of land concentration. Larger farms can use human labour more productively thanks to better technical equipment, more modern production technology and better organisation.

The process of increasing productivity in agriculture is therefore conditioned by further reductions in employment and labour input, and the concentration of ownership and use of agricultural land, which allow for the exploitation of economies of scale. On the other hand, the high share of subsidies and grants in the structure of agricultural income indicates that it is not possible to increase them without an increase in GVA per employee, which in turn depends on a reduction in employment in agriculture.

The concentration of agricultural land use does not necessarily mean a change in the ownership structure, as there are parallel paths, such as leasing, the creation of cooperatives and producer groups, and the use of agricultural services provided by specialised entities or technically better equipped farms. Such solutions enable economies of scale to be achieved, similar to those of larger farms, and reduce the technologically determined demand for labour. The part of employment freed up in this way can be used outside agriculture on a full-time or part-time basis, without necessarily giving up agriculture altogether.

This is an opportunity to optimise labour input: during busy periods, it will help to reduce labour shortages (dual-occupation farmers can devote part of their time to working on the farm, helping those employed there on a permanent basis), and during seasonal downtime, it will avoid wasting labour and generate income from outside agriculture. Dual employment can take the form of full-time employment, non-agricultural business activity or service activity in agriculture.

For this to happen, it is necessary to have an efficient system of incentives and instruments stimulating non-agricultural activity and land use concentration. Due to historical circumstances, tools that force concentration through sales should not be used. This process should take place naturally.

However, it is necessary to promote cooperatives and producer groups, not only in terms of their negotiating position with customers, but also in terms of agricultural production, its planning, joint purchases of current assets, fixed assets and optimisation of their use. The development of agricultural services also requires attention and support to make them technically accessible and cost-effective compared to doing the work oneself.

Supplementing agricultural income with non-agricultural work or completely giving up work in agriculture also requires demand for labour that is sufficiently high and adapted to the qualifications and spatial distribution of the agricultural population.

Therefore, one of the objectives of economic policy should be to stimulate such demand, especially in voivodeships where the UER is highest. On the other hand, it is important to adapt the qualifications of the workforce released from agriculture to the needs of the non-agricultural labour market and to counteract transport exclusion, which may prevent or make it unprofitable to take up work outside agriculture, despite the existing vacancies.

The diversity of situations between voivodeships requires that measures taken in both areas be adapted to the specific characteristics of individual voivodeships, although some instruments, especially macroeconomic ones, may be universal.

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