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# LABOUR INPUT IN POLISH AGRICULTURE AGAINST SIZE OF AGRICULTURAL HOLDINGS – SPATIAL ANALYSIS\*

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**Abstract.** The aim of this paper is to present the analysis of spatial diversification in the labour input in agriculture on the basis of these selected indicators: annual work unit (AWU) per 100 ha agricultural acreage; number of people per AWU; and comparison of labour input to EU-15 standards (LI-EU). Agricultural holdings have been categorised by size into three groups: 0–10 ha (small), 10–20 ha (average), and over 20 ha (large). Labour resources were subject to a comparative study of the density rates of AWUs per 100 ha agricultural acreage in Poland and the EU (EU-15). The analysis covered all of Poland with consideration of the administrative division into sixteen voivodeships (tabular analysis) and 314 poviats (townships and country districts together, including regional offices of the Agency for Restructuring and Modernisation of Agriculture (ARiMR); cartographic analysis). The results of the Agricultural Census of 2010 were used in the study. It demonstrated a significant spatial diversification in labour input in agriculture in general and in each holding size group. Predominantly, the differences are related to historical and political factors. The analysis corroborated agrarian overpopulation in south-east Poland.

**Key words:** labour input, agriculture, spatial differentiation, Poland

## INTRODUCTION

Labour resources, in quantitative and qualitative terms, are a fundamental element of agricultural growth regardless of the place and time (Falkowski and Kostrowicki, 2001). Currently, there is a tendency to reducing the workforce in this sector of state economy; farm workers make a numerous group when compared to people occupied elsewhere, which points to economic backwardness and, by and large, to the agrarian nature of a given region (Bański, 2007).

In the case of Poland, it is commonly thought that the number of workers in agricultural holdings is in excess. This opinion has been substantiated in several academic papers (Poczta and Kołodziejczak, 2004; Kołodziejczak and Wysocki, 2013; Gwiaździńska-Goraj and Jezierska-Thole, 2013; Nurzyńska and Poczta, 2014). The analysis of hidden unemployment performed within the National Agricultural Census of 1996 (NAC 1996) showed that there were 917 thousand people who could resign from work in an agricultural holding altogether or could work there on a part-time basis (GUS, 1997). Unfortunately, this issue was not undertaken in the subsequent national agricultural censuses.

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This article analyses the issue of too high number of human resources self-employed in Polish agriculture. The aim of this study is both to assess the spatial diversification of labour input in the Polish agriculture taking into consideration the agricultural holding acreage and to define all the surpluses in the labour input with reference to the EU-15 standards.

## SCOPE OF ANALYSIS

What is meant by work in one's own agricultural holding is performance of work directly related to agricultural production (plant growing, animal breeding), on the one hand, and general activities connected with farm management (purchase of capital goods, sale of products, transport for farming purposes, etc.), on the other hand, as well as maintenance of the agricultural land used for non-production purposes in a good agricultural condition (GUS, 2010).

Labour resources and labour input in agricultural holdings are complex issues. They involve people aged 15 or more who work in agriculture on a contract basis (which applies to hired workers and workers in agricultural holdings which belong to legal entities and in organisational units which do not have legal personality) and – by far the most numerous group – people who work in individual agricultural holdings without a formal work contract. Household members (i.e. relatives living together and jointly responsible for making a living) with a holding manager (an adult who takes or is authorised by a holding owner/user to take decisions directly related to production processes, their supervision or execution) make up a heterogeneous group in terms of their work in agriculture. The following groups of people can be distinguished:

- working exclusively in their agricultural holding
- working mostly in their agricultural holding; i.e. people who have more than one job, but for whom the work on farm is the most time-consuming or most profitable (if the time spent on different jobs is the same)
- working in their agricultural holding in addition to being employed elsewhere, i.e. people who – apart from those for whom work on farm is the core employment – spend the majority of their time performing extra work on farm or who have the biggest income out of it (if the time spent on different additional activities is the same)

- working exclusively away from their agricultural holding.

As far as labour input in individual agricultural holdings is concerned, an important problem emerges: the so-called 'marginal workforce' in agriculture which is not included in the agricultural statistics of the Central Statistical Office (GUS) and which implies work on farm related to insubstantial periods of a production cycle or to periods of intensified field work often performed by people who formally work exclusively away from their agricultural holding (Rudnicki, 1997). With the assumption that all members of agricultural households – on a small or large scale – participate in farming activities and that they usually constitute extended (multi-generational) families, it also becomes necessary to include the work of both teenagers at a school age (below 15 years of age) and the elderly (officially retired) in the marginal workforce. A high labour activity of people at pre-working and retirement ages is a significant sociological feature of agricultural holdings, at a degree unheard-of in households of other socio-economic groups.

## RESEARCH METHODS

Besides carrying out the analysis of spatial diversification of labour input by means of the index expressed in AWUs per 100 ha agricultural acreage, the authors of the study have also made an attempt at comparing the values for Poland with the economically-developed EU countries. In order to do so, they formulated an index showing the amount of labour input against the EU-15 standards (LI-EU). In 2010 in the old EU-15 there were 4.1 AWUs per 100 ha agricultural acreage, on average (Poczta, 2013). Taking this figure as the optimal reference point for labour input, the recommended number of workers per area has been calculated. This index demonstrates how far the current labour input differs from the EU-15 standards. For instance, if the value is 50, it means that there are 50% workers in excess of current state and that there are twice too many workers in agricultural holdings in a particular spatial unit when compared to the EU-15 standards. However, if the index yields a result in negative values, the conclusion is that a given poviat is characterised by a shortage of human resources. The above-mentioned index has been derived from the AWU/100 ha index.

The approach presented in the article is the first phase of researching of the labour input in Polish agriculture.

It is simplified due to publishing limitation – the difference determined by the structure of agricultural production was not taken into consideration. These issues will be the topic of further research and articles.

Moreover, to see the issue in a wider perspective, the results achieved were juxtaposed to several external agricultural determinants. For the purposes of this study, four of them were examined:

- natural – based on the agricultural production area quality index (APAQI) and with the application criteria imposed in the RDP (PROW) ‘Aid to farmers in Less Favoured Areas’ (LFA) the following categorisation of areas was suggested: (U) with unfavourable natural conditions (below 52 points APAQI, lowlands); (M) with moderately favourable natural conditions (52–72 points APAQI, lowlands); and (F) with favourable natural conditions (above 72 points APAQI, excluded from LFA payments)
- historical – based on borders of the Polish territory in the interwar period, including the area of the historical Austrian Partition (AP/P); Prussian Partition (PP/P); Russian Partition (RP/P); and the area of the historical Prussian Partition belonging to Germany in the interwar period (PP/G)
- urban – based on division into: (R) poorly urbanised areas (situated within predominantly rural sub-regions); (U-R) moderately urbanised areas (situated within intermediate sub-regions); and (U) highly urbanised areas (situated within predominantly urban areas) – categorisation based on the Local Data Bank of the Central Statistical Office
- EU-related – based on calculation of the Common Agricultural Policy (CAP) funds acquired by farmers (PLN90.5 bln between 2002 and 2010) per 1 ha agricultural acreage in good agricultural condition and per 1 agricultural holding with farming activity (Rudnicki, 2014a, 2014b); and subsequently – upon standardisation of the above-mentioned characteristics (Racine and Raymond, 1977) – defined by means of a composite index illustrating: (LA) low absorption (below 0.50  $\delta$ ); (AA) average absorption ( $\pm$  0.50  $\delta$ ); and (HA) high absorption (over 0.50  $\delta$ ) of CAP funds (Table 1).

## NATIONWIDE ANALYSIS

In compliance with the methodology used in NAC 2010, for the estimation of labour input in agricultural

production on farms (regarding the period of twelve months prior to the reference data of the census – June 30<sup>th</sup>, 2010), apart from the total number of farm workers, the labour input in agriculture was expressed in the commonly-accepted unit of AWU, i.e. Annual Work Unit, which is equivalent to the amount of work hours under full-time work contract (2,120 work hours per annum). The census demonstrated that there were 4,539.1 thousand workers in the Polish agriculture – range across voivodeships (RV): from 67.5 thousand workers in the Lubuskie voivodeship to 576.1 thousand workers in the Mazowieckie voivodeship; range across poviats (RP): from 2.1 thousand workers in the poviat of Łobez in the Zachodniopomorskie voivodeship to 73.5 thousand workers in the poviat of Rzeszów in the Podkarpackie voivodeship – which amounted to 2,101.3 thousand AWUs (RV: from 29.4 thousand AWUs in the Lubuskie voivodeship to 297.3 thousand AWUs in the Mazowieckie voivodeship; RP: from 1.0 thousand AWUs in the poviat of Słubice in the Lubuskie voivodeship to 28.0 thousand AWUs in the poviat of Lublin in the Lubelskie voivodeship; Table 1).

The specification of the number of farm workers and the estimation of their work time enabled the assessment of the labour input in agriculture by means of the two indices:

- agricultural workforce in AWU – 2.2 persons on average in Poland (RV: from 1.7 persons in the Kujawsko-pomorskie voivodeship and 1.8 persons in the Warmińsko-mazurskie and Wielkopolskie voivodeships to 2.8 persons in the Śląskie voivodeship and 2.9 persons in the Podkarpackie voivodeship; RP: from 1.4 persons in the poviat of Grojec in the Mazowieckie voivodeship to 3.9 persons in the poviat of Będzin in the Śląskie voivodeship; Fig. 1)
- agricultural workforce in AWU/100 ha agricultural acreage – 13.6 AWU/100 ha agricultural acreage (RV: from 4.2 in the Zachodniopomorskie voivodeship to 34.5 in the Małopolskie voivodeship; RP: from 2.4 in the poviat of Słubice in the Lubuskie voivodeship to 47.3 in the poviat of Myślenice in the Małopolskie voivodeship; Fig. 2).

The workforce density in agricultural holdings established upon such calculations was juxtaposed to the indices for west European countries (EU-15), which was the basis for a comparative study focusing on estimation of the surplus or shortage of human resources in the Polish agriculture.

**Table 1.** Labour input in Polish agriculture – selected study indicators  
**Tabela 1.** Nakłady pracy w rolnictwie polskim – wybrane wskaźniki oceny

| Specification<br>Wyszczególnienie   |      | Employment in agriculture (thousands)<br>Pracujący w rolnictwie (tys.) |         | Agricultural workforce<br>in AWU per 100 ha agricul-<br>tural acreage<br>Liczba jedn. AWU<br>na 100 ha UR | Labour input in relation to<br>EU-15 standards<br>Wskaźnik wielkości nakła-<br>dów pracy ludzkiej w po-<br>równaniu do standardów<br>UE-15 |                           |
|---|------|--|---------|---|--|---------------------------|
|   |      | people<br>osoby  | AWU     |   |  | people/1 AWU<br>os./1 AWU |
| 1   |      | 2  | 3       | 4   | 5  | 6                         |
| Poland  |      | 4,539.1  | 2,101.3 | 2.2   | 13.6   | 69.8                      |
| Dolnośląskie  |      | 181.4  | 79.8    | 2.3   | 8.1  | 49.7                      |
| Kujawsko-pomorskie  |      | 179.2  | 103.6   | 1.7   | 9.6  | 57.4                      |
| Lubelskie   |      | 569.2  | 257.6   | 2.2   | 18.1   | 77.3                      |
| Lubuskie  |      | 67.5   | 29.4    | 2.3   | 6.3  | 35.3                      |
| Łódzkie   |      | 347.6  | 172.6   | 2.0   | 17.1   | 76.1                      |
| Małopolskie   |      | 562.0  | 227.5   | 2.5   | 34.5   | 88.1                      |
| Mazowieckie   |      | 576.1  | 297.3   | 1.9   | 15.3   | 73.2                      |
| Opolskie  |      | 88.9   | 43.1    | 2.1   | 8.3  | 50.5                      |
| Podkarpackie  |      | 564.3  | 196.0   | 2.9   | 28.0   | 85.4                      |
| Podlaskie   |      | 214.7  | 114.9   | 1.9   | 10.8   | 61.9                      |
| Pomorskie   |      | 113.1  | 59.6    | 1.9   | 7.4  | 44.3                      |
| Śląskie   |      | 235.5  | 84.5    | 2.8   | 19.4   | 78.9                      |
| Świętokrzyskie  |      | 285.7  | 134.7   | 2.1   | 24.0   | 82.9                      |
| Warmińsko-mazurskie   |      | 114.7  | 64.2    | 1.8   | 5.8  | 28.9                      |
| Wielkopolskie   |      | 356.4  | 195.1   | 1.8   | 11.1   | 63.1                      |
| Zachodniopomorskie  |      | 82.7   | 41.4    | 2.0   | 4.2  | 2.6                       |
| including external agricultural determinants: – w tym warunki zewnętrzne rolnictwa: |      |  |         |   |  |                           |
| Natural*  | U    | 379.1  | 182.9   | 2.1   | 15.5   | 73.5                      |
| Przyrodnicze*   | M    | 2,738.1  | 1,295.0 | 2.1   | 12.7   | 67.7                      |
|   | F    | 1,421.8  | 623.5   | 2.3   | 15.1   | 72.8                      |
| Historical**  | AP/P | 1,138.8  | 418.4   | 2.7   | 31.6   | 87.0                      |
| Historyczne**   | PP/P | 482.4  | 260.3   | 1.9   | 10.0   | 59.0                      |
|   | RP/P | 2,315.8  | 1,132.9 | 2.0   | 16.3   | 74.8                      |
|   | PP/G | 602.1  | 289.7   | 2.1   | 6.3  | 34.8                      |
| Urban***  | R    | 2,758.1  | 1,331.7 | 2.1   | 14.0   | 70.8                      |
| Urbaniza-<br>cyjne***   | U-R  | 1,349.0  | 584.8   | 2.3   | 12.0   | 65.9                      |
|   | U    | 432.0  | 184.8   | 2.3   | 16.1   | 74.5                      |

**Table 1 cont. – Tabela 1 cd.**

|                   | 1 | 2       | 3       | 4   | 5    | 6    |
|-------------------|---|---------|---------|-----|------|------|
| EU-related**** LA |   | 1,324.0 | 493.7   | 2.7 | 24.4 | 83.2 |
| Unijne**** AA     |   | 2,197.6 | 1,050.7 | 2.1 | 13.9 | 70.6 |
| HA                |   | 1,017.4 | 557.0   | 1.8 | 9.4  | 56.2 |

\* Natural conditions: U – unfavourable; M – moderately favourable; F – favourable.

\*\* Historical: AP/P – area of the Austrian Partition and belonging to Poland in the interwar period; PP/P – area of the Prussian Partition and belonging to Poland in the interwar period; RP/P – area of the Russian Partition and belonging to Poland in the interwar period; PP/G – area of the German Partition and belonging to Germany in the interwar period.

\*\*\* Urban: R – poorly urbanised (rural); U-R – moderately urbanised (intermediate); U – highly urbanized.

\*\*\*\* EU-related: LA – low absorption of CAP funds; AA – average absorption of CAP funds; HA – high absorption of CAP funds.

Source: own elaboration based on GUS, 2010.

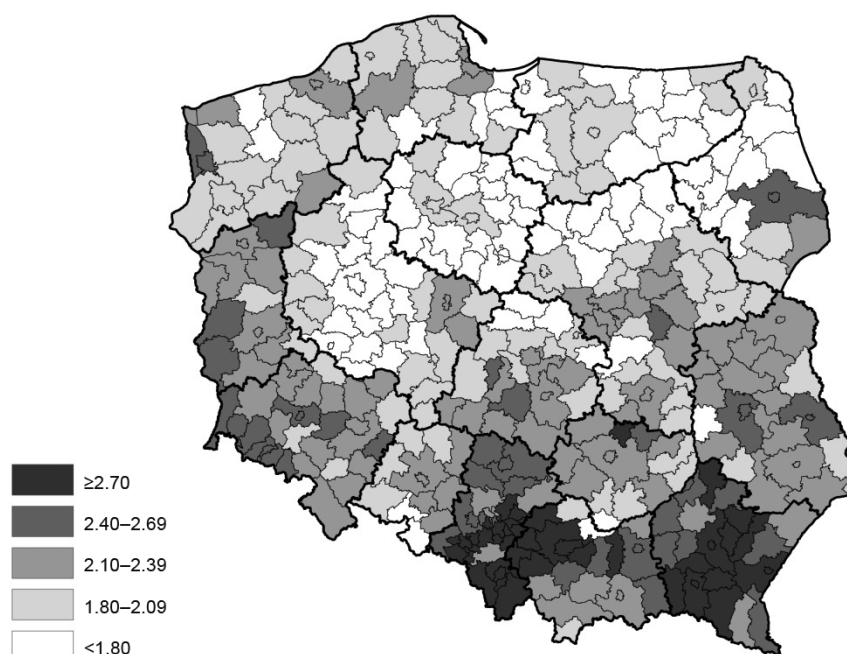
\* Uwarunkowania przyrodnicze: U – niekorzystne; M – przeciętne; F – korzystne.

\*\* Historyczne/history: AP/P – dawny zabór austriacki i Polska w okresie międzywojennym; PP/P – dawny zabór pruski i Polska w okresie międzywojennym; RP/P – dawny zabór rosyjski i Polska w okresie międzywojennym; PP/G – dawny zabór pruski i Niemcy w okresie międzywojennym.

\*\*\* Urbanizacyjne: R – słabo zurbanizowane (wiejskie); U-R – przeciętnie zurbanizowane (pośrednie); U – silnie zurbanizowane.

\*\*\*\* Unijne: LA – niski poziom absorpcji; AA – średni poziom absorpcji/average absorption; HA – wysoki poziom absorpcji.

Źródło: opracowanie własne na podstawie GUS, 2010.

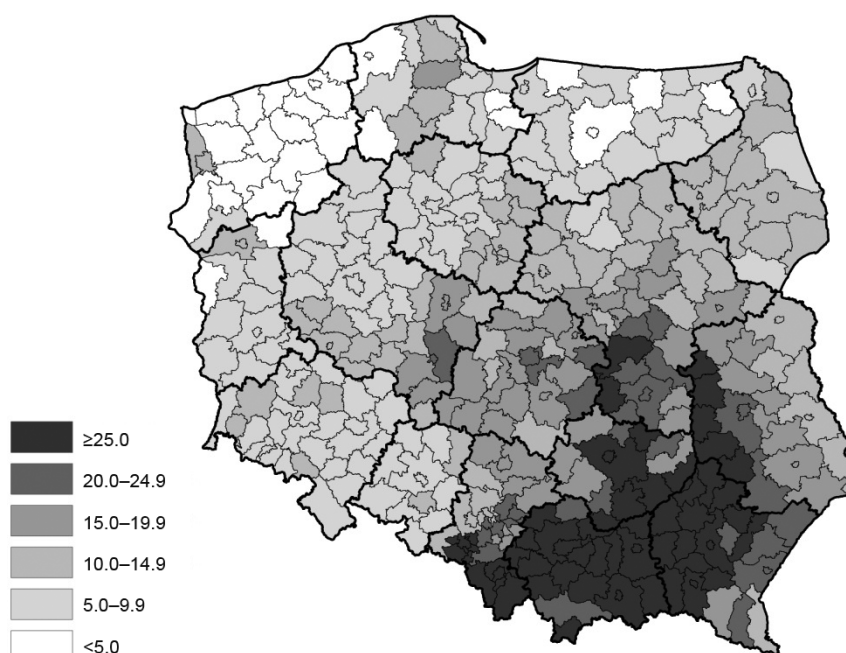


**Fig. 1.** Agricultural workforce in AWU

Source: own elaboration based on GUS, 2010.

**Ryc. 1.** Liczba osób pracujących w rolnictwie w przeliczeniu na 1 AWU

Źródło: opracowanie własne na podstawie GUS, 2010.



**Fig. 2.** Agricultural workforce in AWU per 100 ha agricultural acreage

Source: own elaboration based on GUS, 2010.

**Rys. 2.** Liczba osób pracujących w rolnictwie w jednostkach AWU na 100 ha UR

Źródło: opracowanie własne na podstawie GUS, 2010.

According to the standardised west European norms, there should be 636 thousand full-time farm workers in Poland. Thus, the surplus of human resources amounts to as many as 1,466 thousand AWUs (RV: from 1.1 thousand AWUs in the Zachodniopomorskie voivodeship to 217.5 thousand AWUs in the Mazowieckie voivodeship; RP: –0.7 thousand in the poviats of Słubice in the Lubuskie voivodeship to 22.9 thousand in the poviats of Lublin in the Lubelskie voivodeship). That is nearly 70% of all human resources in the Polish agriculture (RV: from 2.6% in the Zachodniopomorskie voivodeship to 88.1% in the Małopolskie voivodeship; RP: from –67.7% in the poviats of Słubice in the Lubuskie voivodeship to 91.3% in the poviats of Myślenice in the Małopolskie voivodeship; Fig. 3).

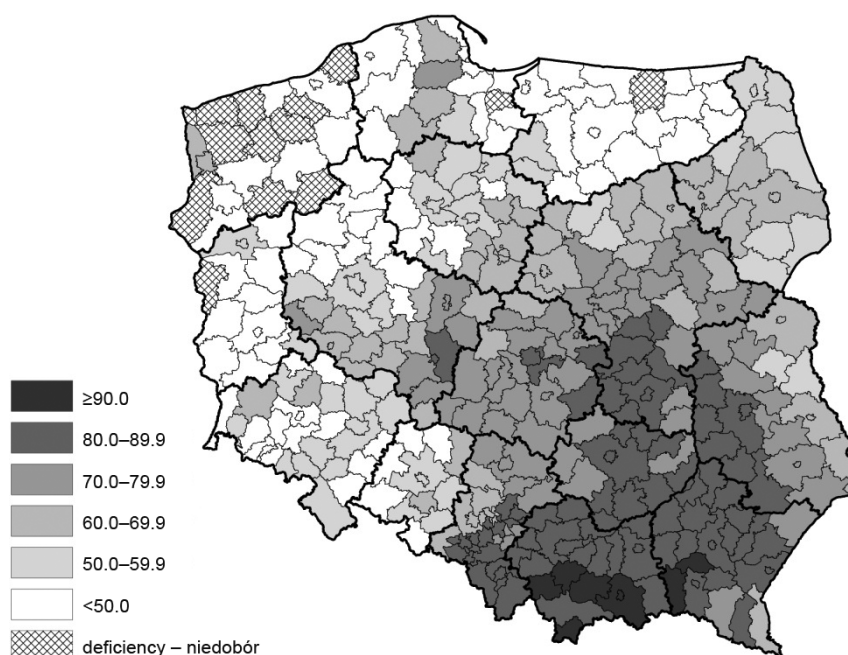
Only thirteen poviats (4% of all; including ten poviats in the Zachodniopomorskie voivodeship) were characterised by a level of labour input in agriculture better than in the west European countries.

On the other hand, the record-breaking values of the LI-EU index – over 90% – were found in seven poviats:

five poviats in the Małopolskie voivodeship and two poviats in the Podkarpackie voivodeship.

With reference to the above-mentioned determinants, it has been concluded that the spatial diversification of labour input in agriculture predominantly results from the impact of historical conditions (e.g. from 6.3 AWU/100 ha agricultural acreage in poviats situated in the historical area of the Prussian Partition and Poland in the interwar period to 31.6 AWU/100 ha agricultural acreage in those situated in the historical area of the Austrian Partition) which also determine the values of the LI-EU index (oscillating between 34.8% and 87.0% across the historical administrative units).

As was demonstrated, there is a link between EU payments and excess of human resources (from 9.4 AWU/100 ha agricultural acreage and 56.2% surplus in the areas with high absorption levels to 24.4 AWU/100 ha agricultural acreage and 83.2% surplus in the areas with low absorption levels; Table 1).



**Fig. 3.** Labour input in relation to EU-15 standards

Source: own elaboration based on GUS, 2010.

**Rys. 3.** Wskaźnik wielkości nakładów pracy ludzkiej w porównaniu do standardów UE-15

Źródło: opracowanie własne na podstawie GUS, 2010.

## ANALYSIS OF AGRICULTURAL HOLDINGS GROUPED BY AREA

The average area of agricultural holding and the workforce per 100 ha agricultural acreage are closely inter-related. The smaller the agrarian and land fragmentation is in a particular area, the smaller the agricultural workforce there is (Stola and Szczęsny, 1976; Drygas, 1989). More recent studies point to a growing rationalisation of employment in agriculture, which is mostly related to the processes of land concentration, technical upgrading of farms and the possibilities of labour migration across the EU (Karwat-Woźniak and Chmieliński, 2006).

The study of area groups proved a pronounced spatial diversification of agricultural labour density (Table 2). The examination of the problem was limited to three size categories of farms: up to 10 ha; 10 – 20 ha; and over 20 ha.

All in all, the result for farms of up to 10 ha in area equalled 1,415.1 thousand AWUs (RV: from 16.8 thousand in the Lubuskie voivodeship to 214.5 thousand in the Małopolskie voivodeship; RP: from 306 in the

powiat of Łobez in the Zachodniopomorskie voivodeship to 24.6 thousand in the powiat of Tarnów in the Małopolskie voivodeship). For every 100 ha agricultural acreage the average was 28.6 (RV: from 18.1 in the Podlaskie voivodeship to 42.9 in the Małopolskie voivodeship; RP: from 13.6 in the powiat of Białobrzegi in the Mazowieckie voivodeship to 57.6 in the powiat of Bielsko-Biała in the Śląskie voivodeship).

When it comes to farms of 10–20 ha in area, there were 386.1 thousand AWUs (RV: from 4.6 thousand in the Lubuskie voivodeship to 74.3 thousand in the Mazowieckie voivodeship; RP: from 15 in the powiat of Skarżysko-Kamienna in the Świętokrzyskie voivodeship to 6.7 thousand in the powiat of Ostrołęka in the Mazowieckie voivodeship). Taking into account the area of the farms in this group, there were 12.5 AWU/100 ha agricultural acreage (RV: from 9.1 in the w the Zachodniopomorskie voivodeship to 15.5 in the Małopolskie voivodeship; RP: from 7.4 in the powiat of Wałcz in the Zachodniopomorskie voivodeship to 26.4 in the powiat of Oświęcim in the Małopolskie voivodeship).



**Table 2.** Labour input in farm groups defined by area

**Tabela 2.** Nakłady pracy w poszczególnych grupach obszarowych

| Specification<br>Wyszczególnienie   |      | Labour input in AWU/100 ha agricultural acreage in farm groups defined by area<br>Nakłady pracy w AWU/100 ha UR w poszczególnych grupach obszarowych |                                  |   | Structural type of the level of labour input<br>Typ strukturalny poziomu nakładów pracy ludzkiej |
|---|------|--|----------------------------------|---|--|
|   |      | small<br>(up to 10 ha)<br>małe<br>(do 10 ha)   | average<br>średnie<br>(10–20 ha) | large<br>(above 20 ha)<br>duże<br>(powyżej 20 ha) |  |
|   |      |  |                                  |   |  |
| Poland – Polska   |      | 28.6   | 12.5                             | 4.0   | –  |
| Dolnośląskie  |      | 25.8   | 10.3                             | 2.6   | 1  |
| Kujawsko-pomorskie  |      | 24.0   | 12.1                             | 4.6   | 2  |
| Lubelskie   |      | 28.2   | 13.0                             | 5.2   | 4  |
| Lubuskie  |      | 25.1   | 9.6                              | 2.3   | 1  |
| Łódzkie   |      | 24.2   | 13.5                             | 6.8   | 4  |
| Małopolskie   |      | 42.9   | 15.5                             | 4.2   | 8  |
| Mazowieckie   |      | 23.5   | 13.1                             | 6.2   | 4  |
| Opolskie  |      | 27.1   | 11.4                             | 3.7   | 1  |
| Podkarpackie  |      | 39.6   | 12.8                             | 2.7   | 7  |
| Podlaskie   |      | 18.1   | 11.9                             | 6.1   | 2  |
| Pomorskie   |      | 22.9   | 11.7                             | 3.1   | 1  |
| Śląskie   |      | 30.9   | 13.6                             | 4.6   | 8  |
| Świętokrzyskie  |      | 30.7   | 15.0                             | 5.4   | 8  |
| Warmińsko-mazurskie   |      | 20.6   | 10.2                             | 3.1   | 1  |
| Wielkopolskie   |      | 26.4   | 13.1                             | 4.8   | 4  |
| Zachodniopomorskie  |      | 22.1   | 9.1                              | 2.0   | 1  |
| including external agricultural determinants: – w tym warunki zewnętrzne rolnictwa: |      |  |                                  |   |  |
| Natural<br>Przyrodnicze   | U    | 27.7   | 12.5                             | 5.4   | 4  |
|   | M    | 26.3   | 12.3                             | 4.1   | 2  |
|   | F    | 34.3   | 12.9                             | 3.7   | 7  |
| Historical<br>Historyczne   | AP/P | 41.9   | 13.8                             | 3.3   | 7  |
|   | PP/P | 26.9   | 12.7                             | 4.6   | 4  |
|   | RP/P | 25.4   | 13.0                             | 6.0   | 4  |
|   | PP/G | 24.6   | 10.2                             | 2.7   | 1  |
| Urban<br>Urbanizacyjne  | R    | 28.2   | 12.5                             | 4.6   | 4  |
|   | U-R  | 27.9   | 12.1                             | 3.0   | 1  |
|   | U    | 33.9   | 13.4                             | 4.5   | 8  |
| EU-related<br>Unijne  | LA   | 37.2   | 13.3                             | 3.6   | 7  |
|   | AA   | 27.3   | 12.9                             | 4.0   | 3  |
|   | HA   | 22.5   | 11.9                             | 4.2   | 2  |

Source: own elaboration based on GUS, 2010.

Źródło: opracowanie własne na podstawie GUS, 2010.

According to NAC 2010, in the last group of farms defined by area – above 20 ha – there were 300.1 thousand AWUs (RV: from 4.3 thousand in the Małopolskie voivodeship to 48.4 thousand in the Wielkopolskie voivodeship; RP: from 7 in the powiat of Sucha Beskidzka in the Małopolskie voivodeship to 4.8 thousand in the powiat of Poznań in the Wielkopolskie voivodeship). With regard to the area of the analysed group, the AWU/100 ha index equalled 4.0 (RV: from 2.0 in the Zachodniopomorskie voivodeship to 6.8 in the Łódzkie voivodeship; RP: from 0.7 in the powiat of Nowy Targ in the Małopolskie voivodeship to 54.3 in the powiat of Białobrzegi in the Mazowieckie voivodeship; Table 2).

With reference to the groups mentioned above, labour input was presented by means of two signatures:

“+” to denote an above-national-average level and “–” to denote a below-national-average level. In this way, eight types of labour input in the Polish agriculture were differentiated (Table 3).

The most favourable conditions were found in those units where the labour input in all area groups was below the average. Such a situation occurred in as many as six voivodeships (Dolnośląskie, Lubuskie, Opolskie, Pomorskie, Warmińsko-Mazurskie, Zachodniopomorskie) and 91 poviats (Table 2, Fig. 4).

In the Kujawsko-pomorskie and Podlaskie voivodeships and in 78 poviats the activities aimed at reducing the rural population should focus on the unfavourable area group where the population density exceeds the average (type 2 – large farms; type 3 – average farms; type

**Table 3.** Labour input in farm groups defined by area – structural types  
**Tabela 3.** Nakłady pracy wg grup obszarowych – typy strukturalne

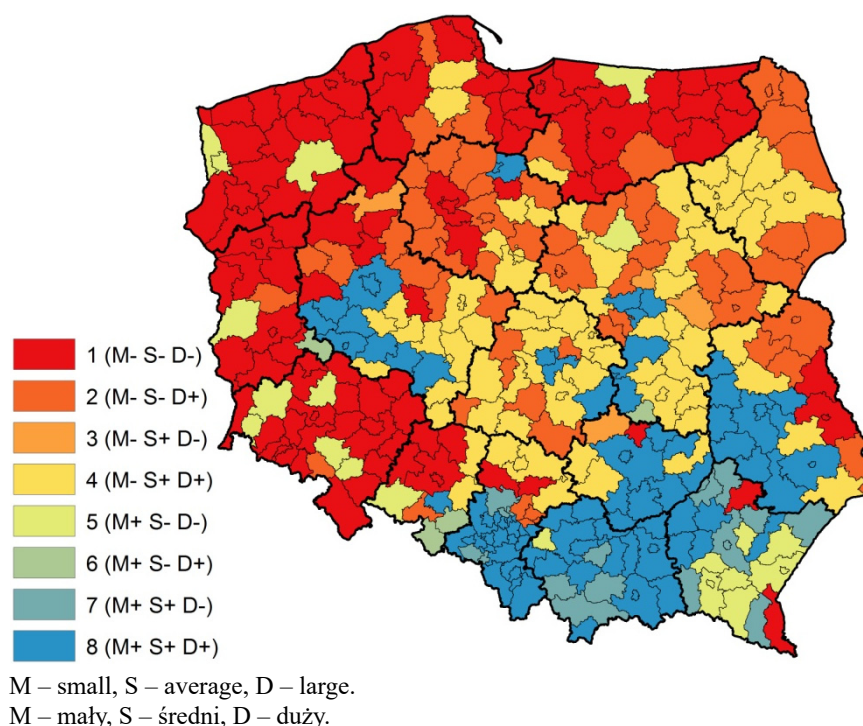
| M | S | D | Description – objaśnienie   | Number<br>Liczba |
|---|---|---|---|------------------|
| – | – | – | Labour input below the average in all area groups<br>Nakłady pracy niższe niż przeciętnie we wszystkich grupach obszarowych   | 91               |
| – | – | + | Labour input below the average in small and average agricultural holdings, above the average in large agricultural holdings<br>Nakłady pracy niższe niż przeciętnie w gospodarstwach małych i średnich, wyższe w gospodarstwach dużych    | 55               |
| – | + | – | Labour input below the average in small and large agricultural holdings and above the average in average agricultural holdings<br>Nakłady pracy niższe niż przeciętnie w gospodarstwach małych i dużych, wyższe w średnich                | 4                |
| – | + | + | Labour input below the average in small agricultural holdings and above the average in average and large agricultural holdings<br>Nakłady pracy niższe niż przeciętnie w gospodarstwach małych, wyższe w średnich i dużych                | 66               |
| + | – | – | Labour input above the average in small agricultural holdings and below the average in average and large agricultural holdings<br>Nakłady pracy wyższe niż przeciętnie w gospodarstwach małych, niższe w gospodarstwach średnich i dużych | 19               |
| + | – | + | Labour input above the average in small and large agricultural holdings and below the average in average agricultural holdings<br>Nakłady pracy wyższe niż przeciętnie w gospodarstwach małych i dużych, niższe w średnich                | 4                |
| + | + | – | Labour input above the average in small and average agricultural holdings and below the average in large agricultural holdings<br>Nakłady pracy wyższe niż przeciętnie w gospodarstwach małych i średnich, niższe w dużych                | 13               |
| + | + | + | Labour input above the average in all area groups<br>Nakłady pracy wyższe niż przeciętnie we wszystkich grupach obszarowych   | 62               |

M – small, S – average, D – large.

Source: own elaboration based on GUS, 2010.

M – mały, S – średni, D – duży.

Źródło: opracowanie własne na podstawie GUS, 2010.



**Fig. 4.** Structural types of levels of labour input

Source: own elaboration based on GUS, 2010.

**Rys. 4.** Typy strukturalne poziomu nakładów pracy

Źródło: opracowanie własne na podstawie GUS, 2010.

5 – small farms). A more challenging situation – with two area groups characterised by above-national-average values – was encountered in the Lubelskie, Łódzkie and Wielkopolskie voivodeships (type 4 – average and large farms), Podkarpackie voivodeship (type 7 – small and average farms) and in 83 poviats.

The study showed that small, average and large farms in the Małopolskie, Śląskie and Świętokrzyskie voivodeships and in 62 poviats altogether are characterised by above-average labour input. Those high levels were mostly determined by intensive (labour-intensive) production. The same applies to poviats in the Wielkopolskie voivodeship and to poviats categorised under orchard areas. Unfortunately, in the case of other regions comprehensive restructuring is necessary (Fig. 4).

Taking into account the external determinants, the biggest disproportions were discovered within the groups of urban (between the intermediate – type 1 and urban – type 8 areas) and historical determinants (between the land of the Prussian Partition and belonging

to Germany in the interwar period – type 1 and the land of the Austrian Partition and belonging to Poland in the interwar period – type 7; Table 2).

## CONCLUSIONS

1. The analysis carried out proved the existence of agrarian fragmentation. There are over 4,509 thousand people working in the Polish agriculture, which – considering their work time – is tantamount to 2,101 thousand full-time workers. The job which is supposed to be performed within one full-time work placement is, statistically, done by over two statistical persons. The presence of regions where 2,120 hours of work are covered by more than three statistical persons is related to a high agrarian fragmentation which stimulates a vivid non-agricultural professional activity of rural inhabitants (Rudnicki et al., 2014).

2. The spatial diversification of labour input (expressed in AWU/100 ha agricultural acreage) results from

the historical political borders (from 6.3 on the land of the Prussian Partition and belonging to Germany in the interwar period to 31.6 on the land of the Austrian Partition and belonging to Poland in the interwar period). The distribution of labour in the Polish agriculture has always been deriving from the historical socio-economic processes rather than from production processes or natural conditions (Kostrowicki, 1978; Olszewski, 1985).

3. The labour input in Poland is far higher than in the EU-15. According to used method, analysed through the prism of standardised west-European norms, the number of full-time workers in the Polish agricultural holdings should amount to 636 thousand. Thus, the surplus of workforce equals 1,466 thousand AWU. That is about 70% of the total workforce.

4. The labour input (expressed in AWU/100 ha agricultural acreage) depends on the area of agricultural holding (small farms – 28.6 AWU; average farms – 12.5 AWU; large farms – 4.0 AWU). The proposed categorization by type shed light on some units with one or two area groups characterized by a higher labour input than what is accepted as the national average.

Agrarian overpopulation, also known as hidden unemployment, is the major deficiency of the Polish agriculture. The study has demonstrated the complexity of the problem both in spatial and structural terms (i.e. in area groups). Moreover, it has been shown what gap must be bridged between Poland and west Europe in order to equalize the level of labour input in agriculture. The problem could be solved if there were enough work places in non-agricultural sectors. The current situation in those sectors combined with the benefits arising from land ownership (area payment schemes, guaranteed source of income) slow down agrarian transformations. Yet, the objective is achievable and that is the main strategic focus of the development policy for the Polish agriculture.

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## NAKŁADY PRACY W ROLNICTWIE POLSKIM A WIELKOŚĆ GOSPODARSTW ROLNYCH – UJĘCIE PRZESTRZENNE

**Streszczenie.** Celem artykułu jest analiza zróżnicowania przestrzennego nakładów pracy ludzkiej w rolnictwie na podstawie wybranych wskaźników: liczby jednostek AWU na 100 ha użytków rolnych, liczby osób przypadającej na 1 jednostkę AWU oraz wielkości nakładów pracy ludzkiej w porównaniu do standardów UE (WNP-UE). Wydzielono trzy grupy wielkościowe gospodarstw rolnych tj.: 0–10 ha (małe), 10–20 ha (średnie), ponad 20 ha (duże). Ocenę zasobów pracy przeprowadzono na podstawie analizy porównawczej wskaźników gęstości liczby jednostek AWU na 100 ha UR w Polsce i Unii Europejskiej (UE-15). Badaniem objęto Polskę w podziale na 16 województw (ujęcie tabelaryczne) i 314 jednostek powiatowych (powiaty grodzkie łącznie z powiatami ziemskimi zgodnie z podziałem na biura terenowe ARiMR, ujęcia kartograficzne). Wykorzystano wyniki Powszechnego Spisu Rolnego z 2010 r. Analiza wykazała silne zróżnicowanie przestrzenne nakładów pracy w rolnictwie – ogółem oraz w przyjętych grupach wielkościowych gospodarstw rolnych. Zmienność ta najsilniej wiąże się z oddziaływaniem uwarunkowań historyczno-politycznych. Analiza potwierdziła problem przeludnienia agrarnego w południowo-wschodniej części kraju.

**Słowa kluczowe:** nakłady pracy, rolnictwo, zróżnicowanie przestrzenne, Polska

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