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THE ASSESSMENT OF DISEQUILIBRIUM OF THE PODLASKIE VOIVODESHIP LABOUR MARKET USING SYNTHETIC INDEX

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Abstract: One of the key tasks of the provincial labour offices is the regular monitoring of the situation on the labour market. It includes assessment of the equilibrium in each profession, in order to determine a deficit, balance or excess in professions. In this paper the results of a study designed to determine the condition of groups of occupations have been presented. The study was based on a multidimensional analysis of the data collected in regard to demand and supply of labour in terms of the individual data, which allowed for a relative assessment of the situation in the various professions.

Keywords: multivariate data analysis, synthetic index, labour market balance

INTRODUCTION

Regular monitoring of the situation on the labour market, including the development of in-depth analysis at the regional level (which covers monitoring of deficit and surplus in professions) is one of the key statutory tasks of the Polish provincial labour offices [Ustawa o promocji… 2004]. In the Podlaskie region, starting from 2009, this task was accomplished partly through the initiatives of the

Podlaskie Labour Market and Economic Forecasting Observatory[1]. The idea of this project was to develop a regional system for obtaining and analyzing information on current trends and projected changes in the economy (including the labour market), and then to develop a system of dissemination and exchange of collected data. One of the measurable results of this project was the regular publication of a study entitled Podlaskie Map of Occupations and Qualifications (Podlaska Mapa Zawodów i Kwalifikacji, PMZiK). The annual reports from the study covered, among others, a thorough assessment of supply and demand in occupations and groups of occupations in the region. The assessment of the situation (balance) in the professions and specialties, in order to determine the deficit, balanced or surplus professions was included in this monitoring. The analysis of demand and supply of labour was performed in spatial (at county level) and time terms (quarterly) [Podlaska Mapa 2014]. The study presented in this paper (in the original and narrower version) was one of the sub analysis of Podlaskie Map of Occupations and Qualifications 2014 published by the Voivodeship Labour Office in Bialystok. The survey was conducted by VIVADE Institute of Research and Analysis. The authors of this paper were members of the research team.

The relationship between the number of job seekers (labour supply) and the number of employment positions offered in a given time (labour demand) is one of the key analytical issues in relation to the labour market. Although the unemployment rate (amounting in Podlaskie 15.1% in 2013[2]) undoubtedly is the basic economic category associated with the phenomenon of imbalance in the labour market, it does not reflect the nature of the imbalance. The unemployment rate provides us only with the overall scale of the imbalance. The authors of a number of theories relating to the labour market perceive the causes of such imbalance in three main areas: structural (infrastructural inadequacy, for example theory of segmentation), the long-term nature of the adjustment process in the labour market (such as theory of human capital and job search) and wage rigidity (theories of effective wage, insiders-outsiders theory) [Jarmołowicz, Knapińska 2011]. Apart from the overall of imbalances, it should be emphasized that the processes taking place in today's labour market are very complex. The market is evolving in a dynamic manner and is influenced – in addition to structural changes – by seasonal fluctuations and frequent changes. All the direct market participants, both employers and potential employees, try to adapt to the changes in a flexible way. As a result, the frequent change of jobs, working part-time or self-employment are common phenomena [Strawiński 2013]. The analysis of the nature of the imbalance as well as monitoring of deficit and surplus in professions and

[1] The idea and tasks of Podlaskie Labour Market and Economic Forecasting Observatory is described in details at: http://www.obserwatorium.up.podlasie.pl/ [15.04.2014 r.].
[2] Data source: Local Data Bank, Central Statistical Office of Poland: [http://stat.gov.pl/bdl/; 20.07.2014 r.].

specialties becomes therefore particularly important. Such a monitoring allows for the acquisition of relevant information on the structure of unemployment, and the staffing needs of employers. In a wider perspective, it should also serve to coordinate the training of the unemployed and provide a basis for the development of the educational offer (with particular emphasis on vocational training).

In this paper the methodology and results of a study aiming at a broader recognition of the problem of determining the chances of finding a job were presented. The analysis of disequilibrium was performed at the level of the groups of professions. The study was based on a multidimensional data analysis of labour demand and supply data, obtained in terms of the individual job offer or unemployed (including jobs in relation to specific positions and information on unemployment registered by the district labour offices). Using a set of eight variables a synthetic index of the situation in the group of professions was constructed, which allowed for the relative assessment of the chances of finding work in groups of professions. The main aim of this study was to rank the groups of professions and specialties with the use of proposed synthetic index.

RESEARCH METHODOLOGY

Source data

In this paper the databases developed for the PMZiK were used. All the datasets covered the year 2013. The labour supply data consisted of information on the number and structure of the unemployed individuals registered at the local labour offices of Podlaskie voivodeship (nearly 71 thousand records). The database was made available for the study by Voivodeship Labour Office in Białystok and contained of half-yearly information on the registered unemployment (at 30.06.2013 and 31.12.2013 as well).The data used in the study were originally subject to public employment services reporting, and consisted of basic information about the unemployed with regard to professions and specialties according to the Polish Classification of Occupations and Specialties 2010 (Klasyfikacja Zawodów i Specjalności, KZiS)[3].

The analysis of the labour demand was based on the public information on the jobs offered in the Podlaskie region in 2013. The database of job opportunities was developed by the EU-CONSULT Ltd. on the basis of local labour offices internal databases and a wide range of offers from the other sources as well

[3] Polish Classification of Ocupations and Specialties (Polska klasyfikacja zawodów i specjalności, KZiS) is based on the ISCO-08 International Standard of Classification of Occupations developed by the International Labour Organisation and recommended by EUROSTAT for use in the European Union (Commission Recommendation of 29 October 2009. concerning the use of the International Standard for Qualifications (ISCO-08) Journal. OJ L 292, 10/11/2009 P. 0031-0047).

[Podlaska Mapa ... 2014]. Therefore a relatively broad spectrum of job offers was included in this study as the analysis of the demand was based on more than 86 thousand records.

It is important to consider a number of restrictions arising from the adopted methodology of collecting data on job vacancies in the Podlaskie in 2013, especially when the interpreting of the presented results is concerned. The restrictions relate in particular to the issues such as the scope of the sources included in the process of collecting data on job vacancies and the methodology adopted to eliminate repeated records (vacancies). With regard to the first problem, the analyzed database contained information gathered through the cataloguing of the jobs in the period 01.01.2013 - 31.12.2013. A wide range of data sources was used in that process, such as public employment services, academic labour offices, regional newspapers, and Internet portals (national and regional). Nevertheless, the adopted directory, though undoubtedly very wide, does not cover all sources, in which potential employers publish their offers. When the second restriction is concerned, the elimination of repeated offers included a two-step selection of advertisements on vacancies. In the first stage all the ads that appeared again in a short period of time in the source were skipped (all of the offers published in the same source in less than 14 days were treated as a repeated offer). In the second stage the elimination over a variety of sources was made. Although such a procedure was effective, it has to be assumed that in the case of certain professions (such as salesman or sales representative), in which employers conduct continuous recruitment (there is a large turnover of employees), the number of jobs identified in job advertisements may, however, differ from the real vacancies.

A continuous identification of deficits and surpluses in the occupations and specialties (performed by the Voivodeship Labour Office) is conducted on a very detailed data. The lowest level of classification of occupations (meaning the most detailed data – professions and specialties) used in these studies causes, however, that analyzes are significantly hindered. It precludes or significantly restricts the substantive interpretation of the obtained results (both in terms of supply and demand for labour). Moreover, a detailed analysis of the quality of data made by authors, suggests that there are number of errors in regard to determining the codes of professions in the available collections of information (both for the unemployed and job offers).

Therefore, aiming for a broader interpretation of the results obtained in this study, the assessment of the situation on the labour market in the Podlaskie voivodeship was conducted at the level of large groups of KZiS 2010 (double-digit symbol of occupational groups).

Synthetic index development

In order to determine imbalances in groups of occupations in the Podlaskie region, and thus answer the question about the chances of finding work in

occupations belonging to the groups, an analysis including the following variables was made:

X_1 – the number of jobs other than internships offered in the occupational group in which the Podlaskie voivodeship was indicated as a place of work;

X_2 – the number of jobs offered in the occupational group in which the whole Poland or the voivodeship other than Podlaskie was indicated as a place of work;

X_3 – the number of internships in the occupational group;

X_4 – the number of abroad jobs offered in the occupational group;

X_5 – the inflow of unemployed to the Podlaskie voivodeship labour offices, classified in the group of occupations;

X_6 – total number of unemployed people in the group of occupations, registered in the public labour offices (at the end of the year);

X_7 – the number of unemployed in the occupational group who were unemployed for a period longer than 12 months, registered in the public labour offices (at the end of the year);

X_8 – the number of unemployed in the occupational group who completed their education within previous 12 months (having graduate status), registered in the public labour offices (at the end of the year).

The values of X_1-X_8 were computed for each of the occupational groups. In the second stage the standardization of the obtained variables was made, using the following formula [Panek 2009]:

$$u_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j} \tag{1}$$

where:

x_{ij} – obserwation i of X_j variable, i = 1, 2, …, n; j = 1, 2,…, 8;

$\bar{x}_j$ – mean of X_j variable;

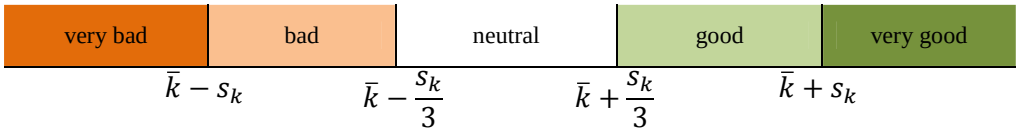
s_j – standard deviation of X_j variable.

All of the standardized variables of the demand side (U_1-U_4) were treated as stimulants, while supply-side variables (U_5-U_8) as destimulants of the analysed phenomena (situation in the group of occupations). The variables were then used to compose a synthetic variable, that descibed a relative condition of each of the occupational groups. In the construction of synthetic variable the not-pattern approach was used [Gatnar, Walesiak 2004]. The value of synthetic variable (index of a relevant condition of the group of occupations) was obtained according to the formula:

$$K_i = \sum_{j=1}^{4} u_{ij} w_j - \sum_{j=5}^{8} u_{ij} w_j \tag{2}$$

where w_j stands for weights relevant to the share of X_j in the sum of X_1-X_4 (for the demand side variables) or X_5-X_8 (for the supply). The obtained values of a synthetic variable were the basis of assignment of the groups of occupations to one of five clusters (Figure 1).

Figure 1. The classification of occupational groups in accordance to the the synthetic index value ('condition' of the occupational group)



$\bar{k}$ – mean of synthetic index in the analysed occupational groups;

s_k – standard deviation of the synthetic index.

Source: own study

The method adopted in this paper allowed us for identifying occupations in which finding a job was very difficult (there was a significant oversupply of job seekers compared to the number of jobs offered in the occupational group). On the other hand, the groups of professions in which finding a job was relatively easy (the number of jobs in the occupational group significantly exceeded the number of potential employees) were identified as well.

RESEARCH RESULTS

According to the official data, the total number of unemployed in the Podlaskie voivodeship in 2013 was by nearly 25,000 higher than the number of jobs offered (assuming that the Podlaskie voivodeship was declared as a place of work) [Podlaska Mapa ... 2014]. The level of discrepancy between the number of job seekers and the number of available positions in specific occupational groups, however, was significantly differentiated. According to the study there were five groups of occupations that could be described as those with the smallest difficulties of finding employment. The first cluster covered the following groups of occupations: administration associate professionals, information and communications technology professionals, building and related trades workers (excluding electricians), business and administration professionals and administrative and commercial managers (Table 1). Such a diagnosis could be confirmed by the structure of jobs and the unemployed registered in labour offices (Table 2). There were approx. 15% of the unemployed remained in the groups of occupations with a very good situation (taking into account both the number of unemployed on 31.12.2013 (X_5), and the inflow of the new unemployed in the period (X_6)). At the same time nearly 37% of jobs in which Podlaskie voivodeship

was the place of work (X_1), and nearly half of the jobs out of the region (X_2) concerned occupations classified in the first cluster.

Table 1. Occupational groups with a good or very good relative situation on the labour market in the Podlaskie region in 2013

Group ID	Group name	Synthetic index	Class
33	Business and administration associate professionals	1,4211	Very good
25	Information and communications technology professionals	1,3191	Very good
71	Building and related trades workers, excluding electricians	1,2083	Very good
24	Business and administration professionals	1,0663	Very good
12	Administrative and commercial managers	0,9209	Very good
96	Refuse workers and other elementary workers	0,5994	Good
13	Production and specialised services managers	0,4495	Good
83	Drivers and mobile plant operators	0,4474	Good
92	Agricultural, forestry and fishery labourers	0,3017	Good
41	General and keyboard clerks	0,2915	Good
11	Chief executives, senior officials and legislators	0,2614	Good

Source: own calculations

According to the research results, there were only approx. 5% of the unemployed registered in groups of occupations with good situation (X_5, Table 2). At the same time almost 10% of jobs in which Podlaskie was the place of work, and more than 11% of jobs outside the province concerned occupations classified in these groups. Good situation of people representing these groups of occupations (understood as a relatively high chance of finding employment) was partly caused by a relatively high percentage of internships and job offers abroad (respectively 27.3% (X_3) and 26% (X_4) of the total numbers).

Table 2. The structure of vacancies and unemployment in the Podlaskie region in 2013 in the scope of the analyzed variables

Class of occupational group	Labour demand				Labour supply			
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
very good	36,2%	46,6%	9,9%	23,2%	15,9%	15,6%	14,8%	31,2%
good	9,9%	11,4%	27,3%	26,0%	5,3%	5,4%	6,0%	12,8%
neutral	25,3%	20,6%	34,0%	20,8%	21,6%	21,0%	21,5%	28,5%
bad	21,3%	14,1%	22,4%	15,2%	31,2%	29,9%	29,4%	21,4%
very bad	7,4%	7,3%	6,4%	14,9%	26,0%	28,1%	28,3%	6,1%
TOTAL	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Source: own calculations

The situation described as neutral involved approx. 21% of the total number of persons registered in labour offices in the Podlaskie region. There were approx. 25% of vacancies addressed to these job-seekers in the region, and as many as 34% of total internship offers. Detailed analysis of the occupational groups with a neutral situation leads to the conclusion that there was a relatively high staff turnover in these professions (such as seller, security staff, customer service staff, etc. (Table 3)). It means that it was relatively easy to find both the job and the employee in the professions belonging to this group (which often did not require special competences).

Table 3. Occupational groups with a neutral situation on the labour market in the Podlaskie region in 2013

Group ID	Group name	Synthetic index	Class
52	Sales workers	0,2477	Neutral
14	Hospitality, retail and other services managers	0,2193	Neutral
94	Food preparation assistants	0,2184	Neutral
95	Street and related sales and service workers	0,2176	Neutral
34	Legal, social, cultural and related associate professionals	0,1771	Neutral
42	Customer services clerks	0,1732	Neutral
44	Other clerical support workers	0,1356	Neutral
54	Protective services workers	0,1349	Neutral
63	Subsistence farmers, fishers, hunters and gatherers	0,1349	Neutral
53	Personal care workers	0,1114	Neutral
22	Health professionals	0,0657	Neutral
62	Market-oriented skilled forestry, fishery and hunting workers	0,0530	Neutral
35	Information and communications technicians	0,0256	Neutral
82	Assemblers	-0,0163	Neutral
43	Numerical and material recording clerks	-0,0612	Neutral
32	Health associate professionals	-0,0698	Neutral
91	Cleaners and helpers	-0,0704	Neutral

Source: own calculations

Among all of the analysed professions the metal, machinery and related trades workers, food processing, wood working, garment and other craft and related trades workers as well as science and engineering associate professionals (Table 4) had the most difficult situation on the regional labour market. This situation is fully reflected in the structure of jobs: there were only about 7% of all offers related to these professions (X_1, Table 2), whereas more than a quarter of the registered unemployed belonged to the groups above.

Table 4. Occupational groups with a bad or very bad situation on the labour market in the Podlaskie region in 2013

Group ID	Group name	Synthetic index	Class
73	Handicraft and printing workers	-0,2702	Bad
74	Electrical and electronic trades workers	-0,2799	Bad
81	Stationary plant and machine operators	-0,2951	Bad
51	Personal service workers	-0,3828	Bad
21	Science and engineering professionals	-0,3959	Bad
61	Market-oriented skilled agricultural workers	-0,4076	Bad
23	Teaching professionals	-0,4546	Bad
93	Labourers in mining, construction, manufacturing and transport	-0,4810	Bad
26	Legal, social and cultural professionals	-0,7595	Bad
72	Metal, machinery and related trades workers	-1,8284	Very bad
75	Food processing, wood working, garment and other craft and related trades workers	-1,9112	Very bad
31	Science and engineering associate professionals	-2,5173	Very bad

Source: own calculation

The classification of occupational groups carried out in this paper gave also a rough estimate on how the vocational schools and educational institutions offer was fitted to the needs of the local labour market and to the expectations of employers as well. According to the study, nearly 31% of all graduates registered in labour offices have completed their education in occupations belonging to the groups with the best situation, and more than 6% – with the worst (Table 2). It leads to the conclusion of relatively good adjustment of educational offer to the labour market needs (there was a small percentage of graduates in the least popular professions). On the other hand, it emphasizes the question on the quality of education (it was difficult to take up employment immediately after completion of education by the graduates).

SUMMARY AND CONCLUSIONS

The method of assessing imbalances in the regional labour market presented in this paper allows for an in-depth analysis of the occupational groups in relative terms. It allows to formulate general conclusions in terms of both the current situation and trends (in case of analysing the data from consecutive periods) in relation to the chances of finding work in groups of occupations. Furthermore, it provides a broader approach to the problem of the imbalance in the labour market than the analysis including only identification of surplus and deficit in occupations or specialties. The level of generality presented in that paper (meaning large groups of KZiS, not professions or specialties) increases the transparency of the obtained

results, and partly eliminates the classification errors occurring within the process of data collection. The assessment of the situation on the labour market in large groups of occupations can be used in the analyses conducted by the public employment services, educational institutions, municipalities and other entities participating in the regulation of the labour market and vocational education.

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