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Specialisations of University Graduates and Changes in the Labour Market in Voivodeships

Abstract: Knowledge-based economy and cooperation in the conditions of globalisation and the economic integration result in shifts in the job market, which became the cause of development in higher education in Poland. Suitability of the offer of Polish universities to the demands of future employers represents an embodiment of the educational aspirations of future employees. The aim of the article is to analyse the processes that occur in the structure of the studies at universities in correlation to the changes visible on the labour market in individual voivodeships. The study shows the changes that took place in the structure of the education fields chosen by students as well as in the structure of the labour market. It uses measures for structural analyses and examines the intensity, rate and stability of the adaptation of these structures in the years 2008–2014. The study shows differences in the characteristics of adaptive processes in the fields of study and structure of labour markets in voivodeships in Poland.

Keywords: adaptation process; graduate; higher education; labour market; voivodeships

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Introduction

Higher education is one of the many goals, the achievement of which is expected to provide young people with a well-paid job and decent life in the future. Systemic changes in Poland, which occurred at the end of the last century, were the reason for the increase in interest in higher education and to a large extent influenced educational choices of Poles. Transformations in the economy, its openness to global influences, as well as the emergence of companies with foreign capital, made young people aware of the need for higher education to facilitate an attractive job and high salary. Increased interest

in obtaining higher education influenced modification of the higher education system and greater attention to the quality of teaching to meet the needs of students, but also, and perhaps above all, the expectations of future employers.

Observing the labour market and education process, and in particular higher education, is an interesting and important issue that would allow us to understand better the mechanisms of both spheres that function and interpenetrate each other creating a system which is difficult to describe. Recognising mechanisms, observing changes and their conclusions could allow for faster and better responsiveness to market mechanisms in the future and help better understand the relationship between the labour market and the requirements facing future workers.

The aim of the article is to compare the adaptation processes that take place in the structure of higher education studies with changes visible on the labour market in the voivodeships. The study shows changes that took place in the structure of education fields chosen by students and in the structure of the functioning labour market. The structure of the job market was based on the number of people working in enterprises in the selected sections of the Polish Classification of Economic Activities (Polska Klasyfikacja Działalności – PKD), specifically on the PKD 2007 classification. The paper analyses the intensity, speed and stability of the processes of adaptation of the analysed structures in the years 2008–2014 by voivodeship.

HE graduates in the labour market

Systemic changes in Poland which took place after 1990 brought about significant changes in the economy, also caused by the influx of foreign capital. Socioeconomic changes, and in the later years also the process of globalisation, along with the demands of the knowledge-based economy, affected the phenomenon of exceptional interest in higher education. In general opinion, higher education became a necessity in the process of getting an attractive job (Domański, 2004). Poles with higher education also hope for a better life in the future (Wronowska, 2015). According to a survey conducted by CBOS (2009) on the topic of aspirations and educational motives of Poles, 85% of respondents on average admitted that they would like their children to obtain higher education. It was considered to guarantee them high wages (64%), interesting profession (39%) and easier life (35%), despite the fact that higher education diploma is no longer one of the criteria for access to the job search process.

To obtain higher education, one must complete a higher education institution that seeks to equip the students with skills, knowledge and competencies helpful in getting a job and, at the same time, expected by potential employers. Higher education institutions responsible for the education of students should ensure that students' expectations and job market expectations are balanced. The education process dominated by public schools was modified after 1995 by the emergence of non-public schools. With this possibility, the model, role and functioning of the university changed (Piróg, 2013). The vision of education was transformed so that higher education institutions meet the demands of modern realities, and above all prepare students for successful entry into the labour market (Leja, 2008).

The struggle of universities responding to the needs of employers changed the structure of the study fields selected by students over the years. The greatest changes occurred

in the late 20th century when the most popular areas of study were economics and administration which fitted perfectly into the changing economic environment in the country, and were relatively inexpensive (Piróg, 2013). At the beginning of the new millennium, the influence of changes in students' choices was affected by the activities of the Ministry of Science and Higher Education. They aimed at reducing the disproportion between the number of graduates of the faculties of humanities and the number of graduates of technical and science studies, introduced the form of so-called ordered specialties. After 2000, changes in the specialty structure were not as pronounced as in the last decade of the previous century.

Moreover, it is impossible to define a homogeneous, clearly identifiable group of people who graduate and acquire higher education. In the Polish system of education, a graduate is a person who holds a doctoral, master's, bachelor's or engineering degree; someone who has studied either full-time or part-time in various types of public and non-public higher education institution, which represent a diverse level of education (Orczykowska, 2006). Quite differentiated representation of a group of graduates in a collision with the labour market in a sense prevents and certainly hinders, research and collective evaluation of the correlation between the studies undertaken by graduates and the requirements of employers (Piróg, 2013).

In most cases, higher education makes it easier for graduates to enter the labour market. However, both graduates and potential employers think the level and quality of education is not high. In its "weak" section, the SWOT analysis included in the Higher Education Development Strategy in Poland until 2020 (EYBAi IBnGR, 2010: 37) mentions inflexible study programs, lack of orientation on learning outcomes, as well as lack of consideration of labour market demand. Moreover, the study says graduates of pedagogical disciplines, social sciences, law and economics are overrepresented, while there are shortages of students of socially useful specialisations, as well as health and social welfare. The students' opinion on the education system was also unfavourable. Only 10.4% of the students surveyed positively assessed their preparation for future duties, and half of the respondents negatively evaluated the education system. Preparation for surviving in the labour market by Polish universities was assessed as negative by 60% of respondents (only 7.7% of students were positive) (Deloitte, 2013: 30–31).

Both the job market and the specialty structure of higher education graduates are transforming and remaining in the correlation which is hard to evaluate. Attempts to indicate any dependencies resulting from the co-existence of both structures (market and graduates) are primarily problematic in methodological terms, making it difficult to conclude from observations. The diversity of the group called graduates as mentioned above is just one of the issues. It should also be noted that few graduates work in their profession (e.g. doctors, lawyers). It seems that most graduates can change their vocation and work in a position not necessarily in line with the specialisation of their education.

Moreover, it may happen that the job market offer will force graduates to take job offers below their professional qualifications. Not all jobs require the skills attributed to higher education graduates. Another argument that hampers the analysis of the labour market concerning the supply on the graduate market is that employers require some of their workers to undertake university courses. The students may also be variously motivated to undertake education in a given field of study. Not always economic reasons or good prospects for finding a job are the main criteria for choosing a faculty. Furthermore,

studying is a time-consuming process, and it is important to consider time backlog from the moment the market signals requests for a particular type of specialist until the graduate with the expected competencies is released. It is also important to consider the mobility of future employees in the context of the spatial differentiation of the labour market.

In quantitative research of the structures of the labour market and graduates, there are also difficulties in obtaining a sufficiently long period of study. Moreover, it is challenging to match the corresponding areas from the two separate classifications (e.g. PKD as the basis for determining the labour market structure and ISCED classification for the structure of fields of studies). Due to the inability to directly confront the job market with the supply of graduates at a given point in time, a way to verify the correlation between the two may be an attempt to investigate the changes that occur in both structures affected by external factors from the shared outside environment.

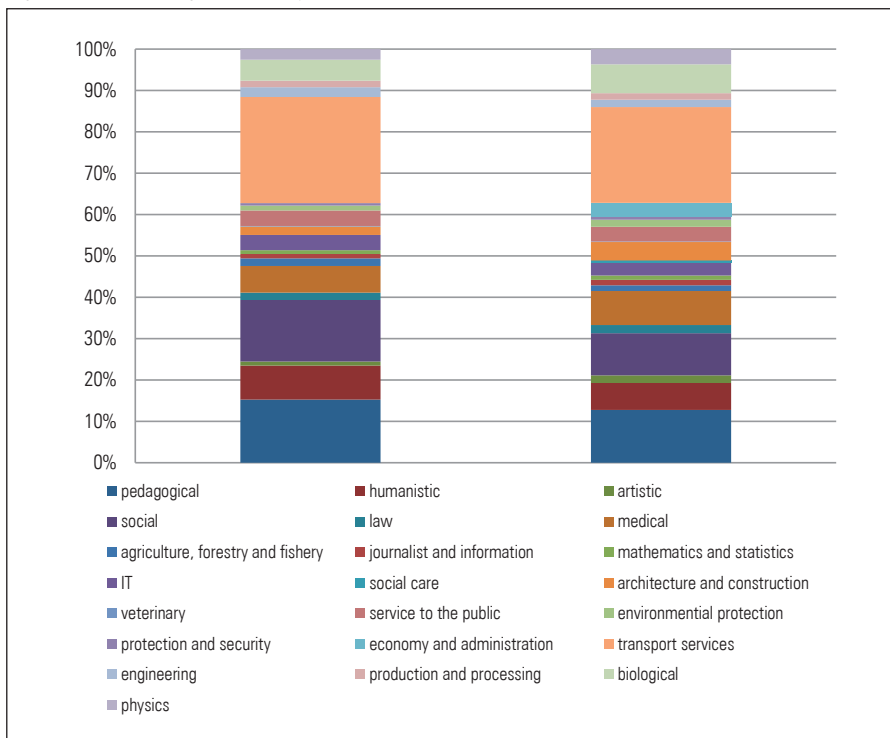
Changes in the structure of studies and labour market in voivodeships in the years 2008–2014

The most recent data provided by the Central Statistical Office (Główny Urząd Statystyczny – GUS) was used to describe the process of changes in the structure of studies and labour market. The structure of studies was reflected in the number of graduates of public and non-public higher education institutions. The division into different fields of study was organised using the ISCED 1997 classification. The structure of the labour market was created using the PKD section and is reflected by the number of employees of companies registered in the REGON register in the sections. Due to the availability of data, the survey focused on corporate employees in the following sections: C, F, G, H, I, J, L, M, N, and S (Section 95 only). The spatial scope of the study covered administrative regions of voivodeships, and the data were collected for the years 2008–2014 to maintain a consistent period for both types of structures.

The number of HE graduates entering the labour market annually over the considered period was more than 400,000. In 2008 it amounted to 418,500 graduates while in 2014 it was 424,300, which indicates an upward trend. The process of increasing the proportion of Poles with higher education is even more evident when the state of 2014 is compared with 2002 when higher education was obtained by over 340,000 graduates. However, the increase in the number of graduates in the period 2008–2014 was not permanent. The number of graduates grew up until 2011, when it reached its maximum. In the following years, the number of graduates dropped to the 2008 level.

The number of graduates in 2008 and 2014 was at a similar level, however, and over these six years, there were changes in the structure of studied areas. The collected data allowed to classify graduates according to 22 fields of study. The largest group of graduates were graduates of economics and administration (Fig. 1). The graduates of pedagogical, social, humanistic and medical fields were also quite well represented. The biggest changes compared to 2008 were observed in almost five percentage points (pp) drop in the share of graduates of social sciences, pedagogical studies (about 3 pp), economic and administrative (about 2.5 pp), and humanities (drop by 1.7 pp). The greatest increase in the share of graduates was noted for graduates representing the fields of protection and security (3.2 pp), architecture and construction (2.5 pp), engineering (1.9 pp) and medical fields (1.8 pp).

Fig. 1. Structure of graduates by fields of studies in 2008 and 2014

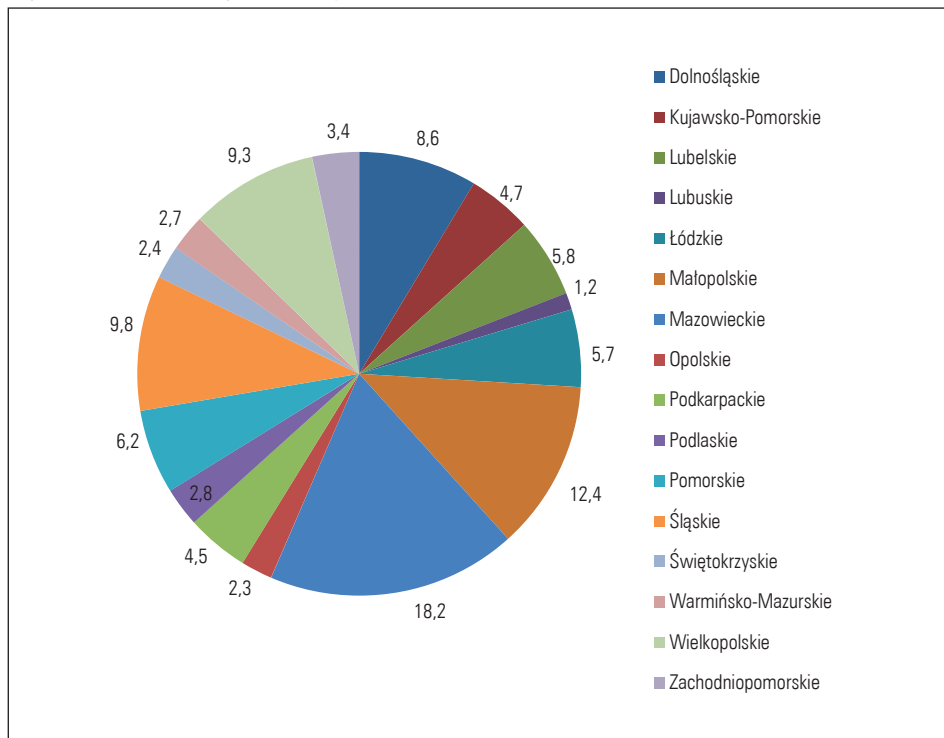


Source: own work based on the GUS data

The highest number of graduates in 2014 was recorded in the Mazowieckie Voivodeship, where every fifth graduate in Poland studied, followed by Małopolskie (12.4%) (Fig. 2). This situation is related to the largest base of higher education institutions in these voivodeships compared to smaller academic centres. The voivodeships, where every 10th graduate studied were Śląskie and Wielkopolskie (9.8% and 9.3% respectively), as well as Dolnośląskie with 8.6% of the total number of graduates. The lowest number of graduates completed studies in Lubuskie (1.2%), Warmińsko-Mazurskie (2.7%) and Podlaskie (2.8%). The situation in 2014 was similar to that of 2008. The biggest changes in the structure included an increase in the percentage of graduates in Małopolskie (3.1 pp) and Mazowieckie (1 pp), which means the two largest academic centres in Poland – Warsaw and Kraków – strengthened their position. One can also observe a slight change (0.6 and 0.5 pp) in the case of Opolskie and Pomorskie Voivodeships. The largest decrease occurred in the Lubuskie Voivodeship (1.3 pp), whose share in the structure was still small. Similarly, in the case of the voivodeships with a low proportion of graduates in the number of graduates from all over the country: Warmińsko-Mazurskie recorded a drop by one pp. The decrease was also recorded in the second voivodeship regarding the number of graduates in 2008 – Śląskie, in which the percentage of graduates decreased by 0.9 pp.

The companies registered in the sections C, F, G, H, I, J, L, M, N and S (only section 95) of the REGON system employed over 7.4 million Poles in 2008, i.e. almost 150,000 more

Fig. 2 Structure of HE graduates by voivodeships in 2014



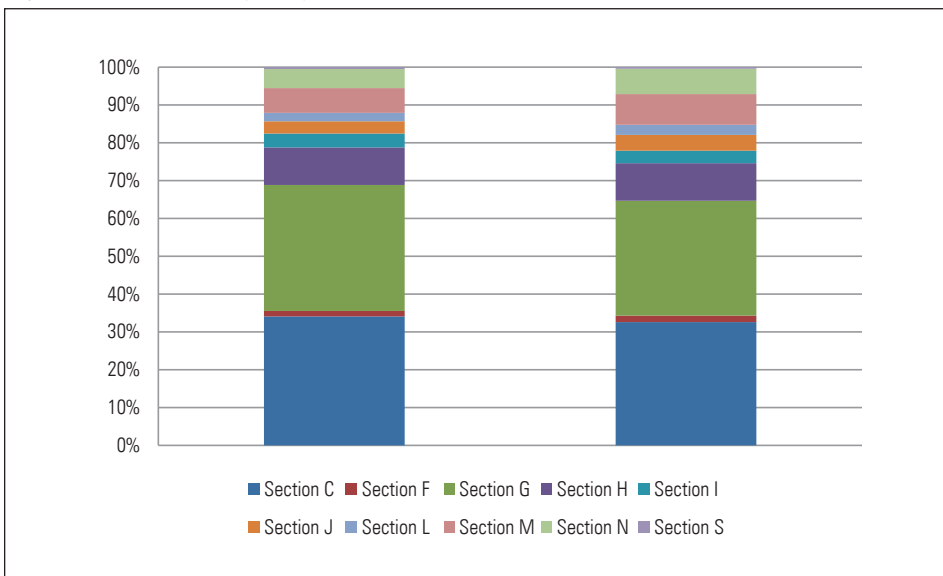
Source: own work based on the GUS data

people than in 2014. In the analysed period, it was possible to see that the number of employees decreased year by year, reaching the lowest level in 2013.

The largest group of enterprise employees in 2014 were those working in section C – manufacturing (ca. 33%) and in section G – wholesale and retail trade; repair of motor vehicles, including motorcycles (30.4%) (Fig. 3). Together, both groups accounted for more than 60% of the total population surveyed. The smallest share of the workers were those employed in section 95 S – repair and maintenance of computers and personal and household goods (0.46%), and section F – construction (1.7%). When comparing the structure of employees in 2014 and 2008, it can be seen that the changes that took place did not disturb the 2008 order regarding the share of groups of employees in each section. Despite the decrease in the proportion of employees in section G (by 2.86 pp) and the reduction in the share of employees in section C (by 1.52 pp), both accounted for more than 60% of the structure. The highest increase in the percentage of persons employed in enterprises by sector was noted in sections N – administration and support services (1.72 pp), and in sections M – professional, academic and technical activities (1.56 pp).

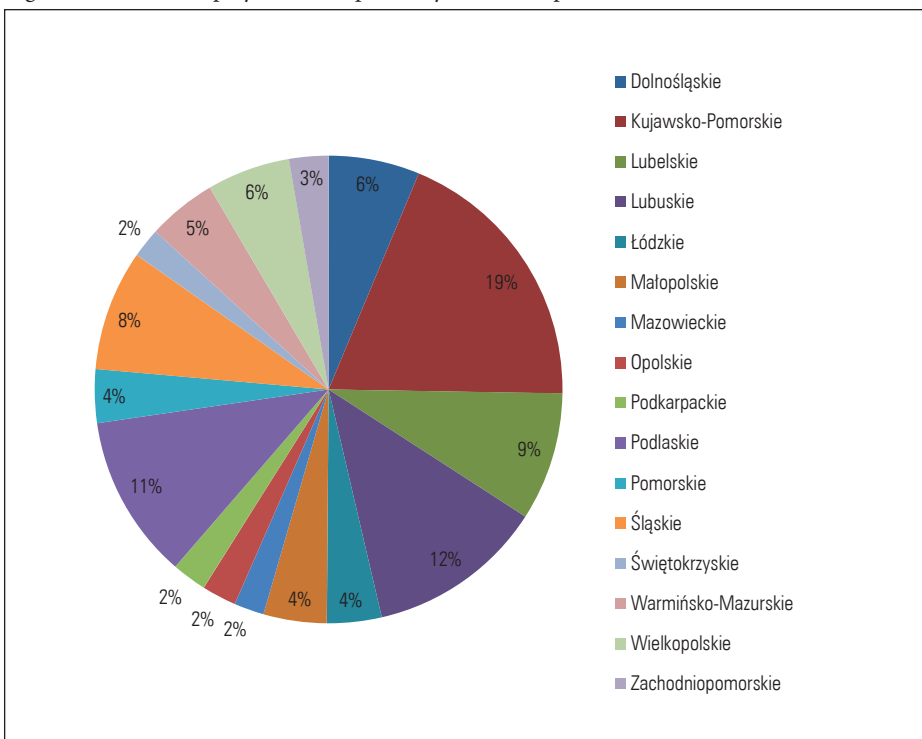
The voivodeships which recorded the largest number of workers both in 2014 and 2008 were Mazowieckie, Śląskie and Wielkopolskie (Fig. 4). The smallest share in the number of employees of enterprises was recorded in Świętokrzyskie, Warmińsko-Mazurskie and Lubuskie Voivodeships. In the period under analysis, changes in the structure

Fig. 3 Structure of employees by PKD sections in 2008 and 2014



Source: own work based on the GUS data

Fig. 4 Structure of employees of companies by voivodeship in 2014



Source: own work based on the GUS data

of employees of companies by voivodeship cannot be assessed as significant. The biggest change – the increase in the percentage of workers in Wielkopolskie – did not exceed one pp (0.95 pp). Equally, a small growth was recorded in Małopolskie Voivodeship (0.62 pp). Significant decreases occurred in the voivodeships: Łódzkie (0.39 pp), Zachodniopomorskie (0.34 pp) and Świętokrzyskie (0.3 pp).

The process of adaptation of the structure of graduates and structure of workers

The structure of employees (112 structures) and university graduates (112 structures) formed after the transformation of the data was subjected to further analysis aimed at assessing the process of structural changes. A measure called angle θ or angle cosine θ (1) is used to estimate the intensity of change. The construction of this measure is not based on the rate of growth of the structural elements, but on the different shifts in the structure, depending on the magnitude of the change in the structure, thus reflecting the structural change significantly (Wyżnikiewicz, 1987: 69). The measure is described by the following formula:

$$\cos \theta = \frac{\sum_{i=1}^n f_i^0 f_i^1}{\sqrt{\sum_{i=1}^n (f_i^0)^2} \sqrt{\sum_{i=1}^n (f_i^1)^2}} \quad (1)$$

where:

f_i – share of the i th element in the population ($i = 1, 2, \dots, n$),

f^1 – share of the element in the studied structure,

f^0 – share of the element in the base structure.

In the literature this measure is referred to as the Moore measure (Moore 1978), and is normalised. It reaches a value of 1 for identical structures, i.e. when the angle $\theta=0^\circ$, and a value of 0 at the maximum change of the structure, where angle $\theta=90^\circ$. Because we usually deal with minor structural changes of the order of 10° , the value of the angle θ rather than its cosine is often used in the presentation of the results, due to the precision of the interpretation.

The measured value of the angle θ can range from 0° to 90° , which is why it can be stated that the average transformation in the structure of graduates only in individual years and voivodeships exceeded 10° (Table 1). The value of this measure reached by the structures of those employed ranged from 2.117° to 18.515° , so the discrepancy between the years in the structures was not significant. The highest average intensity of transformation was observed in Warmińsko-Mazurskie and Zachodniopomorskie Voivodeships, while the smallest in Mazowieckie and Wielkopolskie Voivodeships.

Even less intense changes were observed in the structure of enterprise employees (Table 2). The average intensity of change in the case of university graduates did not exceed 2° in any voivodeship. In the following years, the power of variation ranged from 0.441 to 3.456° . The most dynamically changing structure was the structure representing higher education graduates in Warmińsko-Mazurskie (1.806°) and Podkarpackie (1.501°) Voivodeships. The structure of graduates from Śląskie (1.007°) and Kujawsko-Pomorskie (1.136°) graduates was characterised by the smallest intensity of changes.

Table 1. Intensity ($^{\circ}$), rate and monotonicity of changes in the structure of HE graduates by voivodeship in the years 2008–2014

Voivodeship	Intensity							Rate	Monotonicity
	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	average		
Dolnośląskie	1.794	1.913	1.380	1.105	1.321	1.415	1.488	0.918	0.754
Kujawsko-Pomorskie	2.341	1.094	0.857	0.798	0.889	0.840	1.136	0.718	0.660
Lubelskie	1.927	1.377	1.531	0.753	0.852	0.738	1.196	0.815	0.677
Lubuskie	1.972	1.567	0.609	1.341	0.792	2.620	1.483	0.887	0.582
Łódzkie	2.494	1.850	1.732	1.318	0.749	0.773	1.486	0.895	0.600
Małopolskie	1.487	1.241	0.980	1.745	0.910	0.877	1.207	0.775	0.751
Mazowieckie	1.912	1.610	1.015	1.100	0.892	1.167	1.282	0.724	0.810
Opolskie	1.629	1.910	2.174	1.580	0.821	0.441	1.426	0.867	0.488
Podkarpackie	2.455	1.550	1.197	1.138	1.367	1.302	1.501	0.962	0.403
Podlaskie	1.039	0.806	1.529	1.796	0.722	1.486	1.230	0.749	0.498
Pomorskie	1.490	1.634	1.663	0.995	1.815	1.342	1.490	0.916	0.729
Śląskie	2.609	0.754	0.482	0.648	0.907	0.643	1.007	0.610	0.589
Świętokrzyskie	1.937	1.325	0.611	1.279	0.759	1.434	1.224	0.762	0.700
Warmińsko-Mazurskie	2.003	0.857	1.202	3.456	1.449	1.866	1.806	1.020	0.439
Wielkopolskie	1.654	1.672	0.725	1.153	2.049	0.922	1.363	0.805	0.524
Zachodniopomorskie	1.609	1.163	1.574	1.282	1.547	0.868	1.340	0.787	0.530

Source: own work based on the GUS data

Table 2. Intensity ($^{\circ}$), rate and monotonicity of changes in the structure of employees in companies by voivodeship in the years 2008–2014

Voivodeship	Intensity							Rate	Monotonicity
	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	average		
Dolnośląskie	4.502	4.530	5.321	3.347	16.577	4.896	6.529	1.280	0.459
Kujawsko-Pomorskie	5.843	6.858	5.878	5.096	10.922	3.405	6.334	1.430	0.385
Lubelskie	6.929	4.031	8.639	5.251	12.770	5.377	7.166	1.510	0.512
Lubuskie	7.988	7.320	6.555	7.573	10.584	7.234	7.876	2.050	0.613
Łódzkie	2.305	2.693	6.551	6.142	10.091	3.161	5.157	1.172	0.678
Małopolskie	5.435	3.764	6.864	3.167	18.515	3.942	6.948	1.202	0.471
Mazowieckie	3.431	2.117	5.022	4.714	9.296	2.893	4.579	0.999	0.611
Opolskie	7.962	4.196	4.456	4.732	10.026	8.317	6.615	1.385	0.530

Podkarpackie	8.010	5.605	7.108	5.628	11.884	5.985	7.370	1.765	0.556
Podlaskie	11.935	4.594	7.786	4.675	10.124	7.368	7.747	1.747	0.619
Pomorskie	3.393	4.230	7.834	6.640	15.504	3.618	6.870	1.232	0.565
Świętokrzyskie	7.713	4.710	9.329	6.748	12.874	7.003	8.063	2.019	0.347
Śląskie	3.404	2.186	6.734	4.226	15.363	4.000	5.985	1.031	0.554
Warmińsko-Mazurskie	10.268	7.388	4.425	11.399	11.999	10.051	9.255	2.019	0.472
Wielkopolskie	3.476	2.669	4.042	3.180	11.374	4.172	4.819	1.001	0.548
Zachodniopomorskie	4.448	8.360	10.507	7.892	16.378	6.060	8.941	1.816	0.620

Source: own work based on the GUS data

Continuing and complementing the study of the depth of transformations of the separated structures, an analysis of the evolution of structures was conducted. It consisted of determining the average rate of structural change and defining the stability of these changes (Kukuła, 1996). Measure v (2) describes the mean rate of structural transformations in a dynamic perspective and is expressed by the average value of the chain of measures of the diversity of the structures separated for a given area.

$$v = \frac{\sum_{t=0}^{n-1} \sum_{i=1}^k |\alpha_{it} - \alpha_{i(t+1)}|}{2n}, \quad (2)$$

where:

$$\alpha_i = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \dots \\ \alpha_k \end{bmatrix} - \text{vector of the structure of the object A, so as } \sum_{i=1}^k \alpha_i = 100$$

k – number of elements,

$t = (0, 1, \dots, t)$.

This measure describes the rate of change. The values of this measure, as well as the next presented measure – η (3), describe the process of transforming structures. The η indicator shows the monotonicity of structural changes:

$$\eta = \frac{v_{m,0}}{\sum_{t=0}^{m-1} v_{t,t+1}}, \quad (3)$$

where:

$v_{m,0}$ – average rate of structural transformations in the examined m th term to the baseline structure bearing the subscript 0,

v_t – level of structural changes during time t .

This measure allows you to see if the evolution of the structure is characterised by a relatively stable direction of change. The value of the monotonicity coefficient of structural transformations is in the range $\langle 0; 1 \rangle$. The higher the degree of monotonicity (closer to 1), the more the structures evolve consistently and are resistant to the instability that can be caused by chaotic transformations of components which in the long run are not the cause of structural changes at the beginning of the period.

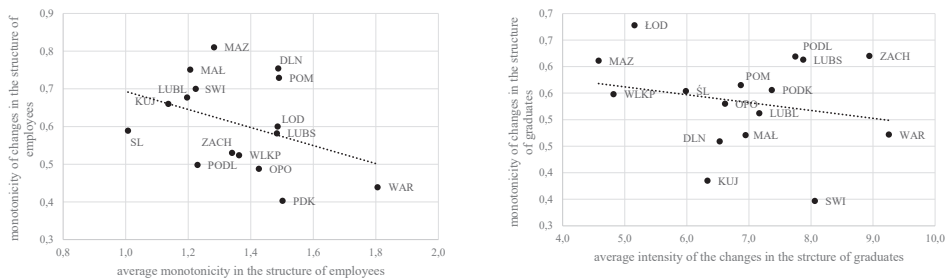
The analysis of the rate of change in the structures of graduates and enterprise employees from 2008 to 2014 indicated similarities as the analysis of the intensity of structural changes presented by the Moore index. Variations in the structure of graduates occurred faster than changes in the structure of employees. After analysing the rate of change, the analysis of monotonicity of changes was carried out. It can be seen that variations in the structure of employees of enterprises showed a more stable direction. It follows that in most cases low intensity and rate of change were accompanied by higher levels of stability; and vice versa, with higher mean intensity and rate of change, the monotonicity nature of the change was lower.

Observing the situation concerning transformation of structures of graduates of higher education institutions and analysing the average intensity of changes and their monotonicity, three groups of voivodeships can be distinguished. The first one includes the voivodeships, where changes are less intensive but very stable. These are Mazowieckie, Łódzkie, Wielkopolskie and Śląskie Voivodeships, so the regions with highly active academic centres (Fig. 5). Podlaskie, Lubuskie and Zachodniopomorskie are the areas with a rather high intensity of change and quite large monotonicity. We can say that in the case of these voivodeships one can observe the processes of transformations with a stable and consistent direction of change. The third group of voivodeships includes Świętokrzyskie and Warmińsko-Mazurskie characterised by high intensity of changes but unstable nature.

In the case of shifts in the structure of employees of enterprises in particular voivodeships, similar observations may be made. In Dolnośląskie, Pomorskie and Łódzkie Voivodeships, the processes of transformation in this structure are both intense and stable. The least intensive changes and, also, of chaotic nature were recorded by the structures from Śląskie, Podlaskie, Wielkopolskie and Zachodniopomorskie Voivodeships. Quite intense and chaotic changes could be noted in Lubuskie, Opolskie, Podkarpackie and Warmińsko-Mazurskie, while the low intensity of changes and at the same time their high stability was observed in Mazowieckie, Małopolskie, Świętokrzyskie, Lubelskie and Kujawsko-Pomorskie Voivodeships.

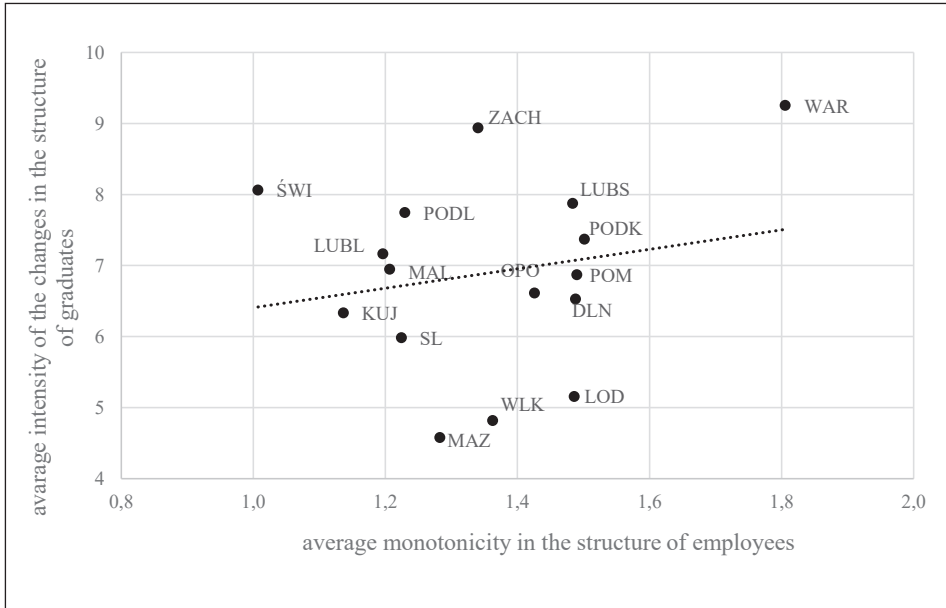
Evaluation of the changes in the studied structures was based on the comparison of the mean intensity of changes in the structure of graduates and the structure of employees of enterprises (Fig. 6). It can be observed that voivodeships with high intensity of changes, both in the composition of workers and in the structure of graduates,

Fig. 5. Average intensity and monotonicity of the changes in the structure of graduates and the structure of employees of enterprises in the years 2008–2014



Source: own work based on the GUS data.

Fig. 6. Average intensity of changes in the structure of graduates and the structure of employed in enterprises in voivodeships in the years 2008–2014



Source: own work based on the GUS data

include voivodeships with a small number of employed and a small number of graduates, i.e. Warmińsko-Mazurskie, Lubuskie and Podkarpackie. A group of voivodeships with the low average intensity of changes in both types of structures are formed by Mazowieckie, Śląskie, Wielkopolskie, and also by Małopolskie and Kujawsko-Pomorskie, i.e. those with a high share of the number of employed persons in the whole country and with active academic centres. The group of voivodeships with a high average intensity of changes in the structure of graduates and at the same time the low intensity of changes in the structure of employees, included Świętokrzyskie, Lubelskie, Podlaskie and Zachodniopomorskie Voivodeships. The last group was formed by the following voivodeships: Opolskie, Pomorskie, Dolnośląskie and Łódzkie, which were characterised by a high average intensity of transformation in the workers' structure and a low average intensity of changes in the graduates' structure.

Conclusions

The links between education and employers' requirements seem to be inseparable. However, trends in education and the labour market are difficult to grasp due to various methodological issues. One of the conclusions that emerged during this discussion is the need to develop a diagnostic tool that would include an in-depth analysis of the links between the labour market and the needs of employers expressed through the offer of the education system, including in particular higher education.

Due to the inability to directly compare the situation on the labour market and the offer of higher education, it was decided to examine the process of change in both spheres.

This decision was based on the assumption that the labour market and the offer of higher education, operating in a variable environment, are subject to external conditions from this environment. The analysis shows that a greater intensity of transformation refers to the structure of HE graduates created by fields of study rather than in the case of the structure of employees of enterprises constructed by the PKD sections. Although the transformation of the structures of the employees of companies was less intense and faster, it also had a more stable character. Voivodeships with large academic centres and a large proportion of students showed a small intensity of changes in the graduates structure; however, these changes were relatively stable.

The high intensity of changes in both types of examined structures was observed in the voivodeships showing a small number of employed persons and a small number of graduates, i.e. Warmińsko-Mazurskie, Lubuskie and Podkarpackie. Voivodeship with strong academic centres and a large proportion of workers, such as Mazowieckie, Śląskie and Wielkopolskie, had a low average intensity of changes in both types of structures. Świętokrzyskie, Lubelskie, Podlaskie and Zachodniopomorskie Voivodeships were characterised as having a high intensity of changes in the graduates structure, but low intensity of transformation in the structure of the workforce. The high intensity of changes in the structure of the work force, together with the low intensity of changes in the structure of students, was characteristic for the following voivodeships: Opolskie, Pomorskie, Dolnośląskie and Łódzkie.

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