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EDUCATION SPECIALIZATIONS OF GRADUATES AT PUBLIC AND PRIVATE UNIVERSITIES IN GREATER POLAND REGION¹

KIERUNKI KSZTAŁCENIA ABSOLWENTÓW PUBLICZNYCH I NIEPUBLICZNYCH SZKÓŁ WYŻSZYCH W WIELKOPOLSCE

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Summary: The creation of knowledge-based economy and cooperation in the conditions of globalization and economic integration led to changes in the labour market, which in turn led to changes in the situation of higher education in Poland. Adjusting teaching offer of Polish universities to demands of employers put on their future employees represents an embodiment of educational aspirations of future employees. The aim of this paper is to compare the processes of change which take place in the structure of fields of study at universities with changes visible on the labour market in Poznań and Greater Poland region. The study points the changes that occurred in the structure of specializations chosen by students, and in the structure of a functioning of labour market, and then focuses on the analysis of the intensity, speed and stability of the process of adaptation of these structures in 2008-2014.

Keywords: graduate, higher education, the process of adaptation, Greater Poland region.

Summary: Tworzenie się gospodarki opartej na wiedzy i współpraca w warunkach globalizacji i integracji gospodarczej spowodowały zmiany na rynku pracy, które z kolei stały się przyczyną zmiany sytuacji w szkolnictwie wyższym w Polsce. Dopasowanie oferty dydaktycznej polskich uczelni do wymagań stawianych przez pracodawców przyszłym pracownikom jest wyrazem realizacji aspiracji edukacyjnych przyszłych pracowników. Celem artykułu jest porównanie procesów zmian, jakie zachodzą w strukturze kierunków studiów na uczelniach ze zmianami widocznymi na rynku pracy w Poznaniu i w Wielkopolsce. Badanie wskazuje zmiany, jakie dokonały się w strukturze wybieranych przez studentów kierunków kształcenia oraz w strukturze funkcjonującego rynku pracy, a następnie skupia się na analizie intensywności, szybkości oraz stabilności procesu adaptacji tych struktur w latach 2008-2014.

Keywords: absolwent, studia wyższe, proces adaptacji, Wielkopolska.

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1. Introduction

The political changes in Poland after 1989 determined the transformation of the economy, making it more open to global influences. The labour market, due to companies with foreign capital entering Poland, has been transformed influencing educational decisions and financial situation of Poles. Having a higher education became, in the opinion of most people, a guarantee of obtaining an attractive job offer and sufficiently high salary. This in turn led to increased interest in university studies, which resulted in modifications of the higher education system, and thus enabled training human resources with competences fitting the requirements of the labour market.

In the face of socio-economic changes, the inspection of the process of change in the structure of the labour market and graduates is an interesting and important issue, which in the future can allow for faster diagnosis and in turn better responding to market forces. The analysis of the case of the Greater Poland, as the voivodship with the lowest unemployment in the country, can be used to better understand the relationship between the labour market and the requirements that are put on future employees.

The aim of the paper is to compare the processes of change, which are taking place in the structure of fields of study at public and private universities in Poznań and Greater Poland. The study points the changes that occurred in the structure of fields of study chosen by students, and in the structure of functioning of labour market, and then focuses on the analysis of the intensity, speed and stability of the process of adaptation of these structures in 2008-2014.

2. Higher education as a response to the expectations of the employers

With the process of globalization and changes in the socio-economic realities of the last decade of the twentieth century, an increase in the number of people interested in improving their skills was observed. Market changes, and later requirements of knowledge-based economy, contributed largely to the increase in the number of students in Poland. In the common perception, obtaining higher education became a necessity in the process of applying for an attractive job [Domański 2004]. Also the 2009 study on educational aspirations and motivation of Poles in the years 1993 to 2009 confirmed that on average 85% of Poles wanted their children to obtain higher education, which would guarantee them expected high wages (64%), interesting profession (39 %) and easier life (35%) [CBOS 2009]. Having a university diploma is also one of the main criteria for the selection of candidates in the process of recruiting to work [Gębski 2009]. In some circles, having a higher education is also considered as an indicator of belonging to the circle of intelligence [Kobylarek 2004].

Gaining education takes place at universities and it is them that are responsible for the quality of the educational process, responding to the expectations dictated by both students and employers. The process of education is dominated by public schools, however, after 1995 it was modified by the emergence of the option of creating non-public schools. Along with this possibility changed the model, the role and the functioning of universities [Piróg 2013]. The vision of education underwent transformation in order to make universities meet the requirements of contemporary reality, and, above all, to prepare students to successfully enter the labour market [Leja 2008].

An attempt to answer the demands of employers changed over the years the subject structure of specializations undertaken by the students. The biggest changes were already observed in the twentieth century, with economy and related disciplines becoming the most popular fields of study, which was dictated by the changing economic situation of the country and relatively low costs of conducting economic studies [Piróg 2013]. Also the activities of the Ministry of Science and Higher Education had an impact on changes in the structure of fields of study, as aiming to reduce the gap between graduates of humanities and graduates of technical and science studies, it introduced a formula of ordered courses. After 2000 the changes in the structure of fields of study were not as pronounced as in the last decade of the previous century.

The status of higher education graduate is granted to people with a Ph.D., master's, bachelor's or engineer diploma, gained via intramural and extramural programs on any of various types of public and private universities, which represent different levels of education [Orczykowska 2006]. In addition, a bachelor's degree in Poland is perceived differently than in other countries, as a defective indicator of higher education [Teichler 2011]. A rather varied representation of the group of graduates and the outlook of the labour market makes it in a way impossible, and definitely more difficult, to conduct research and collective assessment of how studies undertaken by graduates correspond with the requirements of employers [Piróg 2013].

Although the process of entering the job market by graduates can be considered as the natural order of things, the reviews of both the graduates themselves and their future employers about the level of education of job candidates are not favourable. SWOT analysis included in the Strategy for Development of Higher Education in Poland by 2020 [EYBA i IBnGR 2010, p. 37] names as weaknesses inflexible curricula, lack of focus on the results of education and demands of the labour market, as well as too high a number of graduates of pedagogical and social sciences, law and economy, while too few students of the fields of social use and health and social care. The opinion of students on the education system in Poland is also not positive – only 10.4% of them positively assessed the way they were prepared for future responsibilities, and half of the respondents negatively assessed the education

system. The methods Polish universities apply to prepare students to move into the labour market was negatively assessed by 60% students (positive opinion was expressed by 7.7% of students) [Deloitte 2013, pp. 30-31].

3. Changes in the structure of fields of study in the Greater Poland region in the years 2008-2014

To describe the process of change the latest possible data were used provided by the Central Statistical Office (GUS). Selected data concerned the number of graduates of public and private universities, in case of which, the structure was distinguished on the basis of fields of study according to ISCED 1997.

Due to the fact that the city of Poznań is the dominant academic centre in Greater Poland region, when interpreting and evaluating the process of adaptation of structures it was decided to isolate the three areas of observation. Apart from the city of Poznań and the whole Greater Poland region (along with the city), it was decided to isolate the third area, which was the voivodship with its capital. This allowed for a more precise look at the processes of change in higher education in the region outside the main academic centre.

In 2014 in Greater Poland 39 thousand students graduated from universities, and almost 28% of them were studying at private schools. The main academic centre of the voivodship was Poznań, where more than 32.5 thousand students completed their studies, which made for 82.4% of all graduates in the voivodship. Of all graduates from Greater Poland, 84.2% studied at public universities. Graduates of private schools from Poznań constituted 77.6% of all graduates of private schools in Greater Poland.

The structure of fields of studies chosen by university graduates was created based on the classification of ISCED 1997, which extracts the eight groups for a total of 22 fields of study. The analysis of structures of graduates of public schools in chosen years makes it clear that the structure in Poznań is much more diverse than in the rest of the voivodship (Table 1). Public schools outside the capital of the province did not offer such courses as law, mathematics and statistics, and the protection and safety. In the case of Poznań, courses completed by the highest numbers of graduates were: economics and administration and social faculty. Also engineering and technical, and medical and humanistic specializations had quite a large share in the structure. Changes introduced since 2008 indicate increasing share in the structure of graduates related to architecture and construction studies, as well as graduates of engineering and technical fields and students of journalism. The percent of graduates of social and biological sciences and fields related to agriculture was the one to decrease the most.

Outside Poznań, the most popular were educational, economic and administrative courses, although a clear decline in their share in the structure in 2014 was observed. Also the share of graduates of humanities and social sciences decreased. Medical

Table 1. The structure of graduates of public and private universities by fields of study in Greater Poland in years 2008 and 2014 (in %)

Specialization		Public university									Private university								
		Poznań			Greater Poland (with Poznań)			Greater Poland (without Poznań)			Poznań			Greater Poland (with Poznań)			Greater Poland (without Poznań)		
		2008	2014	change in p.p.	2008	2014	change in p.p.	2008	2014	change in p.p.	2008	2014	change in p.p.	2008	2014	change in p.p.	2008	2014	change in p.p.
1	Education	8.71	7.85	-0.85	13.01	10.23	-2.78	26.35	22.86	-3.50	8.43	15.47	7.04	17.23	22.17	4.94	39.64	45.55	5.91
2	Humanities	10.71	9.20	-1.51	10.14	8.75	-1.39	8.39	6.36	-2.02	6.06	4.29	-1.77	4.72	3.33	-1.39	1.31	0.00	-1.31
3	Arts	2.24	3.41	1.18	1.95	2.91	0.97	1.04	0.24	-0.80	0.48	1.06	0.58	0.34	0.82	0.48	0.00	0.00	0.00
4	Social and behavioural	14.25	10.10	-4.15	14.19	10.27	-3.93	14.02	11.15	-2.87	9.40	3.51	-5.89	8.95	4.62	-4.33	7.82	8.49	0.67
5	Law	2.65	1.75	-0.89	2.00	1.47	-0.53	0.00	0.00	0.00	0.00	1.77	1.77	0.00	1.38	1.38	0.00	0.00	0.00
6	Health	8.94	9.39	0.44	8.66	10.98	2.32	7.80	19.44	11.64	2.44	6.44	3.99	1.75	5.49	3.74	0.00	2.19	2.19
7	Agriculture. Forestry and fishery	5.06	3.75	-1.31	4.27	3.36	-0.91	1.80	1.26	-0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Journalism and information	0.00	1.54	1.54	0.00	1.42	1.42	0.00	0.78	0.78	4.97	2.97	-1.99	3.57	2.31	-1.26	0.00	0.00	0.00
9	Mathematics and statistics	0.86	1.06	0.20	0.65	0.89	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Computing	3.19	3.13	-0.06	2.66	2.65	-0.01	1.03	0.16	-0.87	2.42	1.77	-0.65	1.98	2.27	0.30	0.84	4.02	3.18
11	Social services	0.00	0.15	0.15	0.00	0.64	0.64	0.00	3.21	3.21	0.00	0.00	0.00	0.00	0.45	0.45	0.00	2.03	2.03
12	Architecture and building	2.51	5.11	2.60	2.02	4.66	2.64	0.48	2.26	1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Personal services	2.97	3.30	0.33	3.37	3.22	-0.15	4.61	2.79	-1.82	13.37	10.04	-3.33	9.60	8.28	-1.32	0.00	2.15	2.15
14	Environmental protection	1.83	2.10	0.27	1.99	2.39	0.39	2.49	3.92	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Transport services	1.27	1.16	-0.11	0.96	1.10	0.14	0.00	0.78	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Security services	0.00	1.22	1.22	0.00	1.03	1.03	0.00	0.00	0.00	0.00	6.99	6.99	0.00	5.74	5.74	0.00	1.38	1.38
17	Business and administration	14.20	15.22	1.03	16.22	15.48	-0.75	22.51	16.83	-5.69	51.62	44.66	-6.96	51.27	42.19	-9.08	50.39	33.60	-16.79
18	Life sciences	3.76	2.33	-1.43	3.06	2.04	-1.02	0.91	0.51	-0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Physical science	3.37	4.03	0.66	2.60	3.42	0.83	0.21	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	Engineering and engineering trades	8.43	10.04	1.60	8.05	9.48	1.43	6.88	6.54	-0.34	0.00	0.00	0.00	0.00	0.13	0.13	0.00	0.57	0.57
21	Manufacturing and processing	5.07	4.16	-0.90	4.19	3.61	-0.58	1.48	0.69	-0.79	0.81	1.03	0.22	0.58	0.80	0.22	0.00	0.00	0.00

Source: own study based on the GUS data.

field of study received great interest and significantly increased its share in the structure from 7.8 to almost 20% in the number of all graduates from outside Poznań.

The representation of non-public higher education in Poznań, showed less varied offer than in the case of public universities. It offered no courses in the following disciplines: biology, physics, mathematics, statistics, environmental protection, engineering and technical studies, and others, and outside Poznań there were also no courses in the fields of arts, law, journalism, or in the fields associated with production and processing (Table 1). The biggest increase in the share of graduates in Poznań was noticed in education, safety and security, and medical fields. Outside Poznań the biggest growth was observed in the case of educational and medical fields as well, but also computer science and social services. Increases in the area of these fields were caused largely by the decline in interest in economic and administrative courses. In particular, such a trend can be noticed outside Poznań.

4. The assessment of intensity, speed and monotonicity of changes in the structure of fields of study in the Greater Poland in the years 2008-2014

The data structures of graduates of public and private schools (21 structures each) created after the transformation were analysed, in order to assess the process of occurrence of changes. In the first instance, to estimate the intensity of overlap of changes a measure called angle θ or cosine of the angle θ (1) was used, which is applied in the studies of transformation intensity. The advantage of this measure is its design, which is based not on the pace of growth of elements of a structure, but which gives different weight to the same shifts in the structure depending on the size of changed share, and so it fully captures the essence of structural changes [Wyźnikiewicz 1987, p. 69]. Index 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 – the contribution of the i -th element in the population ($i = 1, 2, \dots, n$),
 f^1 – participation of element in tested structure,
 f^0 – participation of element in base structure.

This measure can also be found in the literature under the name of the Q Moore measure [Moore 1978]. It is a normalized measure with the value equal 1 for identical structures (angle $\theta = 0^\circ$) and 0 for the largest possible change of structure (angle $\theta = 90^\circ$). Due to the fact that we most often have to deal with small variations (up to 10°) to present the results usually used is the angle θ , and not the cosine, as it allows for more precise interpretation.

The value of θ angle meter can range from 0° to 90° , so on the basis of the analyses the average transformation of the structure of university graduates can be

concluded (Table 2). The average intensity of change in the case of graduates of public schools was higher than in the case of non-public schools, and that applied to all the surveyed areas. The structure most prone to changes was the structure representing graduates of public schools outside Poznań (9.294°). Slightly smaller intensity of changes characterized graduates of schools from Poznań (8.652°). A similar situation occurred in the case of non-public education. Transformations of the highest intensity occurred in the structure of graduates from outside Poznań, but the difference between this structure and that of Poznań was almost imperceptible (0.008°). The results concerning the entire region of Greater Poland, that is the structures collecting all graduates from Poznań and from outside it, were in all cases lower than for Poznań and the rest of the voivodship alone.

Table 2. Intensity (in °), speed and monotonicity of changes in the structure of university graduates in Poznań and Greater Poland in 2008-2014

Localization	Type of university	Intensity						Average	Speed	Monotonicity
		2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014			
Poznań	public	10.826	6.976	5.500	3.605	20.587	4.420	8.652	1.385	0.385
	private	6.750	4.049	4.151	9.924	5.276	4.886	5.839	3.200	0.536
Greater Poland (with Poznań)	public	8.206	5.400	6.036	2.807	18.439	4.559	7.575	1.273	0.450
	private	6.868	4.252	2.901	7.088	4.672	4.040	4.970	2.233	0.518
Greater Poland (without Poznań)	public	4.707	7.075	15.703	8.163	10.239	9.879	9.294	2.261	0.413
	private	11.209	6.846	2.686	3.240	6.981	4.123	5.847	2.978	0.434

Source: own study based on the GUS data.

The study of intensity of changes of separate structures was continued and complemented by an analyses of evolution of structures. It was based on determining average speed of structural changes and their stability [Kukuła 1996]. The measure v (2) describes the value of average speed of structural transformations in terms of dynamic and is expressed as the average value of chain measures of differentiation of separate structures for the area.

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

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

k – the number of components,

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

The measure describes the pace of transformation. The values of this measure, as well as another presented measure – η (3) describe the transformation of the structures. Ratio η 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 speed of structural transformation in examined m -th period with respect to the base structure bearing 0 subscript,
 v_t – the degree of structural changes in the t time.

This ratio allows for the estimation of the evolution of structure and is characterized by a relatively stable direction of changes. The value of monotonicity of structural transformation ratio is in the range $\langle 0; 1 \rangle$. The higher it gets (the degree of monotonicity closer to 1), the more the structure evolves in a consistent manner and is resistant to instability which may be caused by the chaotic transformation of components, which in the long run do not cause changes in the existing structure at the beginning of the period.

The analysis of the speed of occurrence of changes in the structure of university graduates did not refer to the results associated with the intensity – it was just the opposite. The results regarding the pace of changes in the structure indicated that in the structure of graduates of non-public schools changes occurred faster than in the structure of public schools. The biggest difference in the pace index values in case of public and non-public schools was observed in Poznań, and the smallest in the rest of the voivodship.

The analysis of the speed of changes occurrence was accompanied by the analysis of monotonicity of changes. Comparing the structure of graduates revealed that more chaotic changes were noticeable in case of public schools. The most striking difference between monotonicity of changes took place in Poznań, and the most consistent in its direction of changes was the structure of private schools in the capital of the province.

The analysis of the processes of change in the case of structures of university graduates brought conclusions indicating that the process of transformation proceeded most intensively in the case of public schools. The pace of changes, however, was higher in private schools and at the same time it had a more consistent way of transforming the structure of fields of study than in public schools. Distinguishing the process of adapting the structure of fields of study compared to the location of school, the most intense changes, both among public and private schools took place outside Poznań. In terms of the speed of changes occurrence, non-public schools from Poznań stood out – they demonstrated their ability of the fastest transformation. Apart from the slowest pace of transformations, public schools from Poznań were also characterized by highly chaotic changes.

5. Conclusions

The changes in the directions of education on public universities were different from the changes that could be observed for non-public schools. Changes in the structure differed from each other also in terms of location of schools. In Poznań there were more graduates of studies related to construction and architecture, as well as engineering, technical studies and journalism. In the case of schools located outside the capital of the region, the decreasing share of graduates in humanities, social and educational fields is noticeable, as well as of still most popular, economic and administrative fields.

Non-public schools showed the structures in which the biggest change can be seen in the decline of the share of graduates in economy-administration, humanities and social sciences – especially in centres outside Poznań. The specializations in which the share of graduates has increased include medical and educational courses as well as those related to safety and security.

The analysis of structures of graduates of universities brought conclusion that in non-public schools the process of adaptation occurs much faster than in the public schools. Non-public institutions may owe their ability to introduce changes faster and have more intense and stable transformations to their dynamic performance and procedural ease, as they are much smaller than public schools. Moreover, it may be assumed that due to the method of administration, non-public schools are more similar to enterprises than to public schools, and thus are able to develop an offer both attractive to students and meeting the expectations of future employers.

In the case of public schools, transformations had a higher intensity and pace outside Poznań. The conducted analysis therefore indicates clearly that public schools outside the capital of the voivodship, although duplicating offer of Poznań universities, have greater ability to adapt, and it can be expected that this is caused by the need to compete for future students, also with the attractiveness of the main academic centre of the voivodship and non-public schools located in Poznań.

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