

Warsaw School of Economics
Enterprise Institute

**Labour market in selected sectors of economy in
Podkarpackie voivodship in 2008
and its changes in the years 2005-2007**

Research leader:

Prof. Ph.D. hab. Irena Lichniak

Prepared by:

Mgr (M.A./M.S.) Agnieszka Komor

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Introduction

The aim of the report is to present basic parameters of the labour market in Podkarpackie voivodship in selected sectors of high technology, that is the engineering, electronics, automotive and aviation industries, the medical biotechnology sector and the business services sector. The analysis will show both the labour market demand as well as the work supply that is the access of the sectors under analysis to work resources (in qualitative, quantitative and cost aspects). This access is defined by the number and profession of school graduates and also to some extent by the number and profession of unemployed persons. The potential of scientific workers is also important for the analysed sectors.

Podkarpackie voivodship disposes at quite significant work resources potential in comparison to the country average which makes up about 5 % of the total employment in Poland. In 2005–2006 the number of employed persons increased by 10.3%. This fact along with the migration outflow influenced the change in basic labour market parameters of Podkarpackie voivodship such as the employment rate, the unemployment rate, the intensity of unemployment and the staff related access shortage. In 2005–2007 the employment indicator increased from 45.2 to 49.3% and in the entire period under analysis it oscillated over the country average level. Nonetheless, a half of work resources in Podkarpackie voivodship remains unused.

Table 1. Basic parameters of labour market in Podkarpackie voivodship in 2005–2007

No.	Basic parameters of labour market	2005	2006	2007
1	Employed persons (in thousands)	748	783	825
2	Employment rate (in %)	45.2	46.7	49.3
3	Employment rate of persons at working age (in %)	164.0	145.2	126.4
4	Unemployed persons (in thousands)	16.6	13.6	9.6
5	Registered unemployment rate (in %)	376	910	745
6	Unemployment rate according to BAEL (in %)	436.1	159.6	169.6

The data base on Badania Aktywności Ekonomicznej Ludności, BAEL (Labour Force Survey, LFS).
Source: own work on the basis of Regional Database of the Central Statistical Office.

In 2005 – 2007 in Podkarpackie voivodship the number of unemployed fell by 23 %. The unemployment rate according to BAEL in the period under analysis fell to 10.5%. The rate of registered unemployment in the analysed period equalled 19%, 18.5%, 16.4% and

14.4%. In the same time, the recorded increase in work offers contributed to the fall in the number of unemployed persons per one work offer.

1. Employment in selected sectors of economy in 2005 – 2008

Table 2 presented below contains the number of economic entities of the analysed sectors in Podkarpackie voivodship in the period 2005-2007. In 2007, 293 mid-sized and large enterprises of the analysed sectors (employing more than 10 persons) were located in Podkarpackie voivodship. Most of the enterprises represented the business services sector and the engineering industry. The highest number of new companies appeared in the aviation sector.

Table 2. Employment in the selected economy sectors in Podkarpackie voivodship. (mid-sized and large entities employing more than 9 persons)

Sector	2005	2007	Pace of change 2005-2007*
Medical biotechnology sector	4	4	0.0%
Engineering industry	78	86	10.3%
Electronics industry	15	15	0.0%
Automotive industry	28	32	14.3%
Aviation industry	3	6	100.0%
Business services sector	140	150	7.1%
Sectors total	268	293	9.3%

*the pace of change expressed in percent and calculated by means of the following formula:

(the pace at the beginning of the analysed period – the pace at the end of the analysed period) / the pace at the end of the analysed period

Source: own work on the basis of the PONT INFO database.

In the 1st half of 2008 the average total employment in the sector of enterprises of Podkarpackie voivodship amounted to 231.6 thousand persons (Table 3.) 21.85% of which were employed in the selected sectors (50.6 thousand persons). It is important to emphasise that the employment in the sectors under analysis increased from 20.65% in 2005 to 21.85% in the first half of 2008. In the 1st half of 2008 the highest average employment was reported in the business services sector, the engineering and the automotive industries.

Table 3. Average employment dynamics in the analysed sectors in 2005 – 1st half of 2008

Sector	Average employment in the enterprises sectors in the period of [persons/thousands]:			
	Jan-Dec 2005	Jan-Dec 2006	Jan-Dec 2007	Jan-June 2008
Engineering industry	13.70	14.10	15.80	16.60
Electronics industry	1.80	1.80	1.70	1.80
Medical biotechnology sector	1.30	1.40	1.40	1.50
Automotive industry	8.60	9.70	11.30	11.40
Aviation industry **	no data	no data	6.20	no data
Business services sector	16.70	17.30	18.40	19.30
Sectors total	42.10	44.30	54.80	50.60
TOTAL average employment in the enterprises sector in Podkarpackie voivodship	203.90	210.40	221.40	231.60
Employment levels in the analysed sectors in the voivodship	20.65%	21.06%	24.75%	21.85%

*the pace of change expressed in percent and calculated by means of the following formula:

(the pace at the beginning of the analysed period – the pace at the end of the analysed period) / the pace at the end of the analysed period.

** Employment in mid-sized and large enterprises (employing minimum 10 persons) on the basis of the PONT INFO database.

Source: own work on the basis of *Statistical bulletin of Podkarpackie voivodship* and the PONT INFO database.

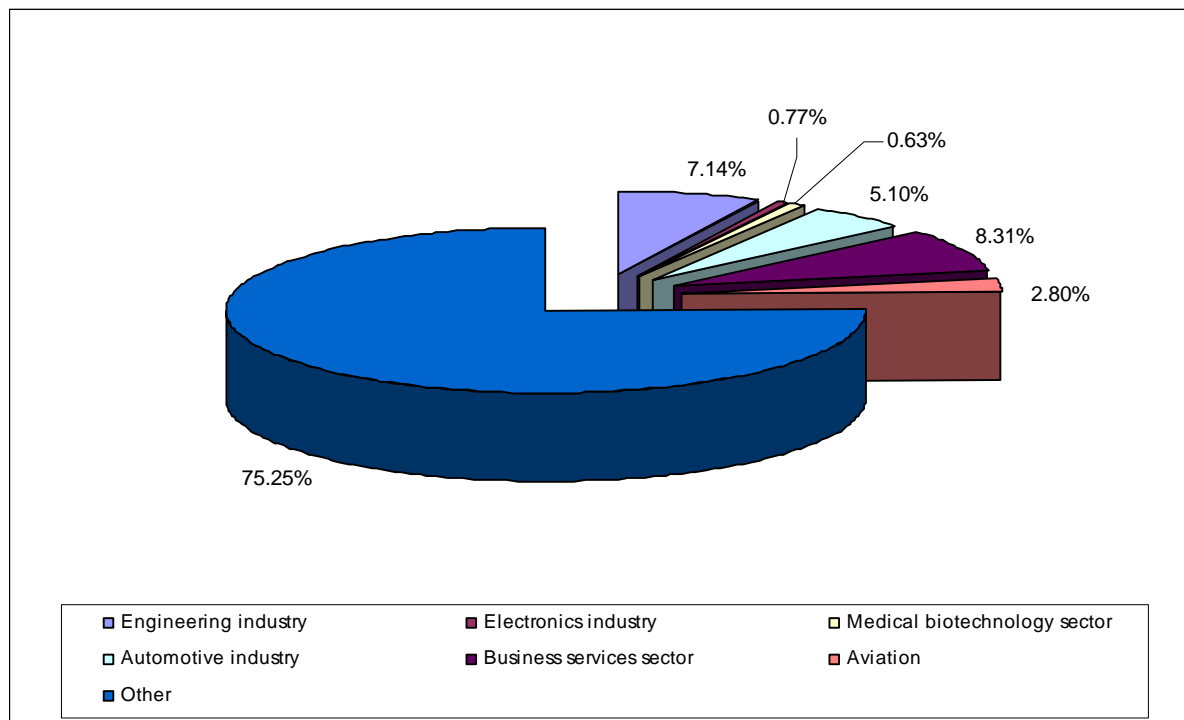
The Central Statistical Office lacks data on the employment in the aviation industry which is becoming particularly important in the economy of Podkarpackie voivodship. The data concerning the number of employed persons in this sector in 2007 were retrieved from the PONT INFO database. They refer to the number of persons employed in the enterprises of more than 9 workers, which submitted F-01 or F-02 reports. Taking account of the sector specificity, it seems that the underestimation is considerable. The majority of mid-sized and large enterprises of the aviation sector employ minimum 10 persons.

Enterprises, research and development centres as well as the educational and training base operating in the aviation sector are located in Podkarpackie region. Stowarzyszenie Grupy Przedsiębiorców Przemysłu Lotniczego Dolina Lotnicza Aviation Valley operates in Rzeszów (the Aviation Valley Aeronautic Industry Group of Businessmen Association). It was not by accident that the Aviation Valley was located in the south-eastern Poland, as the developed aviation industry and the aviation training centres operate in this region. Presently, 60 entities are associated in the Aviation Valley, the majority of which constitute sub-contractors and sub-suppliers of parts and devices for the aviation industry. Most of the enterprises involved in the Aviation Valley project are actually located in Podkarpackie voivodship, in particular in the area of Rzeszów.

The highest employment level in the analysed sectors in the voivodship was in the business services sector (8.31%) and the engineering industry (7.14%), whereas the

automotive industry (5.1%), the aviation industry (2.8%), electronics industry (0.77%) and the medical biotechnology sector (0.63%) had lower positions in the rating.

Graph 1. Average employment structure in the analysed sectors in Podkarpackie voivodship in 2007



Source: own work on the basis of *Statistical bulletin of Podkarpackie voivodship* and the PONT INFO database.

Graph 1 presents the average employment in the sectors under analysis and in the number of persons employed in Poland and in Podkarpackie voivodship as of the end of December 2007. The employment in the analysed sectors in the voivodship is generally higher than the country average. In Podkarpackie voivodship the employment in the aviation, engineering and automotive industries as well as in the medical biotechnology sector is higher than in the other regions of Poland. Therefore these are certainly regional specialisations of Podkarpackie voivodship. The percentage of persons employed in the analysed sectors in Podkarpackie voivodship is lower than the country average.

In Podkarpackie voivodship the employment in the analysed sectors increases more than the country average. However, the situation varies by specific sectors. The number of persons employed in the engineering and automotive sectors grows faster average in Poland. In the business services sector, in turn, the increase in Podkarpackie voivodship is at similar level as in Poland. In other sectors under analysis the employment growth was lower in Podkarpackie voivodship than the country average. In 2005-2007 the average employment in

the electronics sector in Podkarpackie voivodship decreased, although in the 1st half of 2008 the number of the employed in this industry grew.

Table 4. Comparison of the percentage and the pace of change in the average employment in the enterprises sector of the industries under analysis in Podkarpackie voivodship and in Poland

Sector	The analysed sectors percentage in the average employment in the enterprises sector as of end Dec 2007		Pace of change in the average employment in 2005-2007	
	Podkarpackie voivodship	Poland	Podkarpackie voivodship	Poland
Engineering sector	7.14%	5.04%	15.33%	11.55%
Electronics sector	0.77%	1.34%	-5.56%	16.13%
Medical biotechnology sector	0.63%	0.49%	7.69%	6.10%
Automotive industry	5.10%	2.40%	31.40%	23.23%
Business services	8.31%	10.91%	10.18%	9.91%
Aviation sector**	2.80%	0.30%	no data	9.63%
Sectors total	24.75%	20.49%	30.17%	12.03%
TOTAL average employment in the enterprises sector in Podkarpackie voivodship	100.00%	100.00%	8.58%	7.89%

*the pace of change expressed in percent and calculated by means of the following formula:

(the pace at the beginning of the analysed period – the pace at the end of the analysed period) / the pace at the end of the analysed period.

** Employment in mid-sized and large enterprises (employing minimum 10 persons) on the basis of the PONT INFO database.

Source: own work on the basis of *Statistical bulletin of Podkarpackie voivodship* and the PONT INFO database.

2. Students and graduates of post-gymnasium schools: numbers and fields of study *

In Poland the average number of post-gymnasium school graduates per 1000 persons at 15-18 years of age amounts to 278 (Table 5). In Podkarpackie voivodship this number is lower than the country average and equals 264. Sectors of advanced technology have a demand for high quality human resources that is persons with higher as well as secondary technical, often specialised level of education. In Poland the percentage of technical secondary school graduates in the total of post-gymnasium school graduates equals 16%, whereas the highest indicator in the country refers to Podkarpackie voivodship (22%).

Table 5. Post-gymnasium school graduates (except special schools) in 2007

Region	Number of post-gymnasium school graduates per 1000 persons over 15-18 years old	Graduates structure by school type				
		Vocational schools	Post-secondary schools	Specialised lyceums	Technical secondary schools	General lyceums
POLAND	278	12%	17%	11%	16%	44%
Podkarpackie voivodship	264	12%	13%	12%	22%	42%

* Structure of Polish Educational System:

- *Primary*: Primary School (Szkoła Podstawowa)
- *Basic Vocational*: Basic Vocational School (Zasadnicza Szkoła Zawodowa)
- *Lower Secondary*: Gymnasium (Gimnazjum)
- *Technical Secondary*: Technical Secondary School (Technikum)
- *Upper Secondary*: General Lyceum (Liceum Ogólnokształcące)
- *Vocational Secondary*: Vocational Secondary School (Liceum Zawodowe) /Specialized Lyceum (Liceum Profilowane)
- *Post-secondary*: Post-secondary Vocational School (Szkoła Policealna)
- *Higher education*:
 - o first level courses (studia pierwszego stopnia); title of Bachelor or Engineer (licencjat/inżynier);
 - o second level courses (studia drugiego stopnia); title of Master (magister)
 - o uniform 5-year magister level courses (jednolite studia magisterskie)

[translator's annotation on the basis of *The European Education Directory*

<http://www.euroeducation.net/prof/polaco.htm>.(accessed: 15th December 2008).]

Source: own work on the basis of Regional Database of the Central Statistical Office as of 11th October 2008.

The labour market demand for persons with technical education of different levels is growing. From the point of view of the analysed sectors, the most desirable persons are those with specialist and technical professions. Vocational schools (technical secondary schools, basic vocational schools and specialised lyceums) constitute 68% of the total of post-gymnasium schools. Currently, there are 7 015 of these entities in the entire country of which 379 in Podkarpackie voivodship (5.4%).

Fields of training in occupation-oriented schools (specialised lyceums, technical schools, vocational schools) are in a different degree adjusted to the needs of high technology sectors. In order to assess their usefulness, professions were divided into three groups:

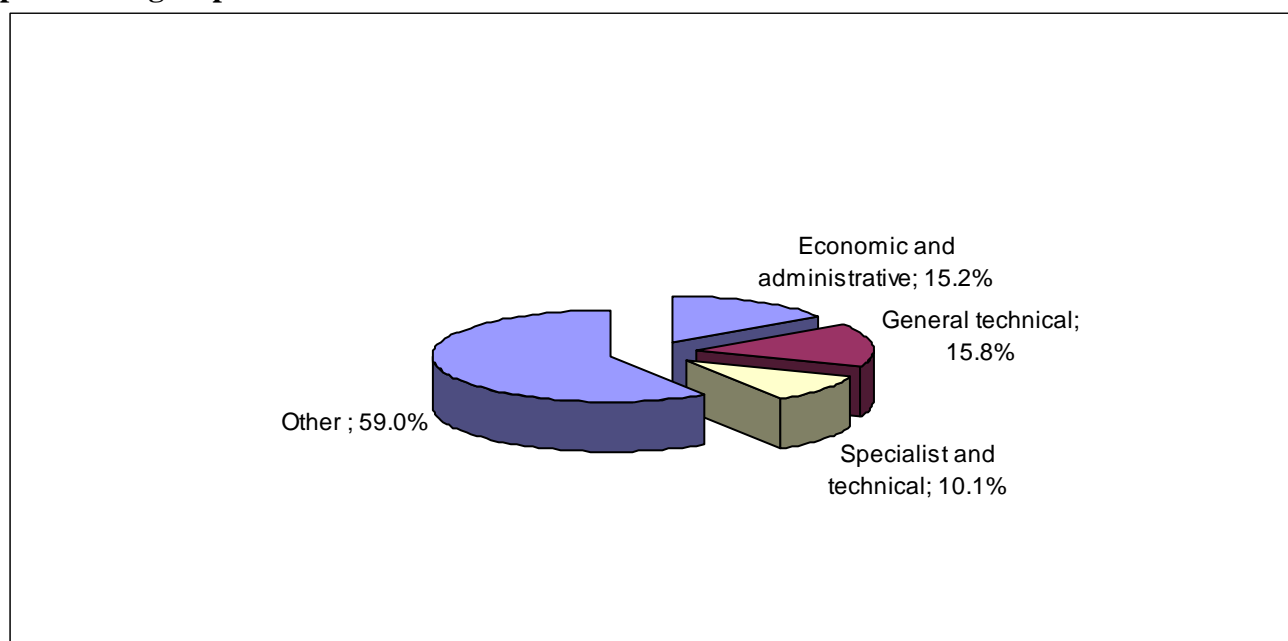
- economic and administrative (this group covers economic and administrative professions offered by specialised lyceums, such as: administrative clerk, technician of occupational hygiene and workplace safety, technician of economy, trade technician, office technician, accounting technician),
- general technical (this group covers technical professions, such as: IT technician, mechanic, car mechanic),
- specialist and technical (this group covers specialist and technical professions, such as: car tinsmith, electronics engineer, electrotechnician, electromechanic, electrician, car electromechanic, mechanic production technicians, machine and appliance fitter, mechanic of industrial automatic devices and precision appliances, precision mechanic, mechatronics worker, electronics fitter, mechatronics fitter, CNC operator, operator of chemical industry devices, electronics technician, technician for electrodiology, technician of logistics, mechanic technician for aviation, mechatronics technician, forwarding technician, technician of teleinformation, technician of telecommunication).

As of 31st March 2008, 81894 persons studied at post-gymnasium vocational schools of which 33614 in Podkarpackie voivodship were studying professions considered desirable by the analysed sectors. The analysis of the number of persons studying professions which are useful for the sectors under analysis in comparison to the total of learners in a given region indicates that Śląskie voivodship is a leading region, as it achieved the highest values in all educational groups. The indicators of Podkarpackie voivodship are slightly lower than the country average. From the point of view of enterprises operating in high technology sectors, the most

desirable are persons with specialist and technical professions. In Podkarpackie voivodship the percentage of persons studying specialist and technical specialisations equals 7.55%.

The graph below presents the structure of post-gymnasium schools in Podkarpackie voivodship by profession groups useful for the analysed sectors. The majority of persons in Podkarpackie voivodship study general technical, economic and administrative and specialist and technical specialisations.

Graph 2. Post-gymnasium school learners structure in Podkarpackie voivodship by profession groups as of 31.03.2008



Source: own work on the basis of the database of Educational Information System of the Ministry of Education as of 31st March 2008.

Table 6 presents the number of post-gymnasium school learners in Podkarpackie voivodship and in Poland by profession groups which are demanded by the analysed sectors. The average percentage of learners in Podkarpackie voivodship in the total number of persons studying the specialisations concerned in Poland equals 6.53%. Over 10% of the post-gymnasium school learners in Podkarpackie voivodship (in comparison to the entire country) study the occupations of: precision mechanic, CNC operator, aviation technician/mechanic, electroradiologist, mechatronics technician, technician of teleinformation, technician of telecommunication. These are certainly regional specialisations of the voivodship. The professions of precision mechanic (almost one fourth of all the persons is trained in

Podkarpackie voivodship) and of CNC operator (nearly one fifth is trained in Podkarpackie region) are particular examples.

Table 6. The number of post-gymnasium school learners by professions

Profession	Podkarpackie voivodship	Total in Poland	Percentage of Podkarpackie voivodship [%]
Precision mechanic	56	226	24.78%
CNC operator	623	3 358	18.55%
Aviation technician/mechanic	60	479	12.53%
Electroradiologist	78	697	11.19%
Technician of telecommunication	417	3 795	10.99%
Technician of teleinformation	524	5 040	10.40%
Mechatronics fitter	62	615	10.08%
Electric/mechanic	3 228	33 346	9.68%
Mechatronics technician	1 043	11 056	9.43%
Car mechanic	558	6 303	8.85%
Mechatronics technician (specialised lyceum)	147	1 696	8.67%
Mechanics technician	5 930	69 907	8.48%
Electronics technician (specialised lyceum)	92	1 201	7.66%
Economic and administrative clerk (specialised lyceum)	2 236	30 754	7.27%
Electrician	428	6 213	6.89%
Office works technician	318	4 683	6.79%
Economy technician	5 732	87 113	6.58%
Trade technician	2 042	32 838	6.22%
Car electric/mechanic	195	3 342	5.83%
IT technician	4 572	85 429	5.35%
Electronics fitter	139	2 866	4.85%
Technician of occupational hygiene and workplace safety	565	12 570	4.49%
Administrative clerk	1 474	34 901	4.22%
Mechanic of industrial automatic machines and precision devices	12	306	3.92%
Machine and appliance fitter	127	4 146	3.06%
Car tinsmith	99	3 418	2.90%
Forwarding technician	111	3 915	2.84%
Mechanical production techniques	7	341	2.05%
Technician of logistics	237	16 372	1.45%
Accounting technician	68	7 922	0.86%
Total	33 614	514 540	6.53%

Source: own work on the basis of the database of Educational Information System of the Ministry of Education as of 31st March 2008.

The command of foreign languages is an important element of the quality of education of the future personnel in the sectors under analysis. Table 7 presents the number of students learning a foreign language in the schoolyear 2006/2007 in specific voivodships. The most

frequently chosen foreign languages in Poland are: English, German and Russian. The same were preferences of students in Podkarpackie voivodship.

Table 7. Learners number learning a foreign language at vocational schools in the schoolyear 2006/2007 - by voivodships

Voivodship	English language	French language	German language	Russian language	Other language	Total
Dolnośląskie	45 043	3 197	50 395	3 877	44	102 556
Kujawsko - Pomorskie	39 194	1 539	31 267	14 552	0	86 552
Lubelskie	42 569	1 753	25 626	19 932	217	90 097
Lubuskie	19 310	2 219	22 276	1 659	0	45 464
Łódzkie	38 503	2 213	34 375	9 839	21	84 951
Małopolskie	67 648	7 821	56 742	9 905	264	142 380
Mazowieckie	76 090	2 989	47 116	32 650	532	159 377
Opolskie	20 342	493	21 135	544	0	42 514
Podkarpackie	52 785	2 872	44 738	8 218	0	108 613
Podlaskie	27 091	670	19 578	10 114	0	57 453
Pomorskie	40 722	1 944	38 001	6 117	430	87 214
Śląskie	94 321	12 295	72 503	12 879	270	192 268
Świętokrzyskie	28 453	803	21 514	7 094	179	58 043
Warmińsko - Mazurskie	30 015	598	25 834	8 151	0	64 598
Wielkopolskie	68 092	4 641	72 300	9 834	57	154 924
Zachodniopomorskie	28 417	1 501	31 179	2 747	0	63 844
POLAND	718 595	47 548	614 579	158 112	2 014	1 540 848

Source: Own work based on *Oświata i wychowanie w roku szkolnym 2006/2007 (Education and training in the school year 2006/2007)*, GUS Warszawa 2007.

3. Students and graduates of higher schools: numbers and fields of study

In 2007, 17 universities operated in Podkarpackie voivodship that is one university, one higher technical secondary school, four schools of economics as well as 11 other types of universities (including public higher vocational schools) which were attended by the total of 73839 students. One of the largest universities of the region is Uniwersytet Rzeszowski (University of Rzeszów) (21 thousand students). At the universities of Podkarpackie voivodship prevail the humanities and technical specialisations. An important institution which teaches the future personnel for the sectors under analysis is Politechnika Rzeszowska (Technical University of Rzeszów) which attend 12.5 thousand students. The advantage of the Technical University is that it offers rare specialisations, i.e.: the specialisations of aviation offers four different diploma courses: aircrafts, aircraft engines, avionics and pilotage which is the unique course offered by a civil university in Poland. Since the 1st October 2005

Laboratorium Badań Materiałów dla Przemysłu Lotniczego (Research and Development Laboratory for Aerospace Materials) has been operating at the Technical University of Rzeszów. The laboratory performs scientific and research projects in the scope of advanced technology of aerospace materials in cooperation with other universities. Along with the Technical University of Rzeszów the following universities participate in the project: Politechnika Warszawska (Warsaw Technical University), Politechnika Śląska (Katowice Technical University) and Akademia Górniczo-Hutnicza im. S. Staszica w Krakowie (AGH University of Science and Technology of Cracow).

The chief higher education centres of the region are mainly located in Rzeszów. However, independent education centres or branches and consulting points are also present in other smaller cities of the region. In 2007 in Podkarpackie voivodship the total of university graduates equalled 18 307 persons, which was 4% of the total of graduates in the country. In Poland the average number of university graduates per 10 thousand inhabitants amounts to 157 persons. In Podkarpackie voivodship this number is lower than the country average and equals 134. As far as the demand of the analysed sectors is concerned, the graduates with the engineer's degree are among the most frequently required specialists. The country average is 8.5%, whereas in Podkarpackie voivodship it equals 8.9%.¹

The analysis showed an increase of university graduates by 15% in the voivodship in 2004 -2007 at the country average of 6%. Taking account of the number of persons, who graduated specialisations which are tailored to the needs of the analysed sectors, in comparison to the total of university graduates in Podkarpackie voivodship in 2007, it can be observed that:

- the graduates number of computer sciences was relatively high and equalled 5%; (the country average: 4%).
- a slightly below the country average number of university graduates covered: biological sciences: 2% (the country average: 3%); physical sciences: 2% (the country average: 3%); engineering and technical: 7% (the country average: 9%).

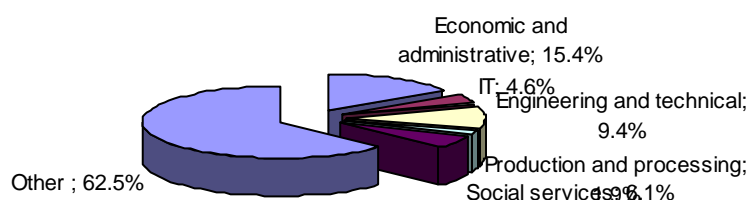
The main entities teaching strictly technical specialisations are public universities. As of 30th November 2007 only 4% of students of engineering and technical as well as production and processing specialisations study at private universities. There are several

¹ *Universities and their finances in 2007*. Information and statistical reports, CSO, Warsaw 2008

reasons for this situation. Technical specialisations require adequate infrastructure and higher expenditures. Moreover, human resources for technical specialisations are limited. Therefore private universities offer mainly economic and administrative specialisations.

In such a case, the source of information on specialisations tailored to the requirements of the selected sectors is the public higher education sector. In the framework of the research, an analysis of the number of students of selected study specialisations at public universities was conducted. In Podkarpackie voivodship 17735 persons study the specialisations demanded by the analysed sectors which constitutes 3.82% of the students of this type of specialisations in Poland. The majority of persons study economic and administrative specialisations and engineering and technical specialisations (Graph 3). In Podkarpackie voivodship the number of students of public services in comparison to the total of persons of the same sub-group in Poland, exceeds the country average. With respect to other specialisations this percentage is lower than the Polish average.

Graph 3. Student structure at public universities in Podkarpackie voivodship by educational sub-groups in 2007



Source: own work on the basis of the database of Educational Information System of the Ministry of Education as of 31st March 2008.

4. Research fellows

In 2005, 3 379 academic teachers were in Podkarpackie voivodship. In 2007 their number fell by nearly 5% (3 212 persons). It constituted 3.2% of the total of academic teachers in Poland. The highest drop was reported in the group of assistants (by nearly 50%).

There was also a slight fall in the group of professors (by nearly 1%). The number of lecturers increased by 11%.

The table below presents the changing figures regarding academic teachers in selected types of universities. The majority of academic teachers of Podkarpackie voivodship is employed at universities that is 40% (the Polish average: 31%), higher vocational universities: (25.7%) and higher technical universities (21%).

Table 8. Academic teachers number and structure change at selected university types in Podkarpackie voivodship and in Poland

Type of university	POLAND					Podkarpackie voivodship				
	2005	2006	2007	Structure in 2007	Pace of change 2005-2007	2005	2006	2007	Structure in 2007	Pace of change 2005-2007*
Universities	30 349	30 617	30 952	31.20%	1.99%	1 284	1 275	1 292	40.22%	0.62%
Higher technical universities	19 446	19 437	19 261	19.41%	-0.95%	673	681	680	21.17%	1.04%
Schools of Economics	10 884	10 761	11 010	11.10%	1.16%	393	362	346	10.77%	-11.96%
Higher vocational universities	8 608	9 072	9 597	9.67%	11.49%	921	826	825	25.68%	-10.42%
Total	69 287	69 887	70 820	71.38%		3 271	3 144	3 143	97.85%	
Total in the region	97 702	98 262	99 221	100.00%	1.55%	3 379	3 239	3 212	100.00%	-4.94%

*the pace of change expressed in percent and calculated by means of the following formula:

(the pace at the beginning of the analysed period – the pace at the end of the analysed period) / the pace at the end of the analysed period.

Source: own work on the basis of Regional Database of the Central Statistical Office.

In order to have a complete overview of the research fellows, it is necessary to indicate the number of persons employed in the research and development activity. As of 31st December 2006, 3116 persons worked in the field of research and development (the Polish total: 121283)² 77.2% of which constituted scientific and research fellows, technicians and the equivalent staff and the other personnel 17.4% and 5.5%, respectively. The education level structure of persons employed in the research and development activity in Podkarpackie voivodship was as follows: professors: 4.7%; habilitated doctors (hab. Ph.D.): 6.8%, doctors (Ph.D.): 28.3%; other persons with higher education: 45.9%, persons employed with other education: 14.3%. The indicator of employment in the research and development activity per 1000 economically active persons in Podkarpackie voivodship equals 1.7 which is considerably below the average indicator of Poland (4.3).

² *Science and Technique 2006*, CSO Warsaw 2007.p. 36

By the end of 2006, 54 research and development entities were located in Podkarpackie voivodship, 8 of which have a significant influence on the activity of the sectors under analysis³:

- Politechnika Rzeszowska (Technical University of Rzeszów) – automatics and machine construction, aviation, advanced technologies, plastic materials,
- Centrum Transferu Nowoczesnych Technologii Wytwarzania (Centre for Transfer of Modern Technologies of Production) at Technical University of Rzeszów: computer design of production processes, in particular, in aviation technology;
- Polskie Towarzystwo Mechaniki Teoretycznej i Stosowanej w Rzeszowie (Polish Society for Theoretical and Applied Mechanics branch in Rzeszów) – mechanics and robotics;
- Polskie Towarzystwo Chemiczne w Rzeszowie (Polish Chemical Society branch in Rzeszów) at Technical University of Rzeszów: chemical technology;
- Instytut Gospodarki Wyższej Szkoły Informatyki i Zarządzania w Rzeszowie (University of Information Technology and Management, branch in Rzeszów) – analysis of the voivodship economic situation,
- Centrum Transferu Technologii RARR S.A. (Centre for Technology Transfer - the Rzeszów Regional Development Agency): activity aimed at innovation and development of the aviation sector, electric and engineering industry, computer sciences and environmental protection.

5. Unemployment – surplus/shortage professions

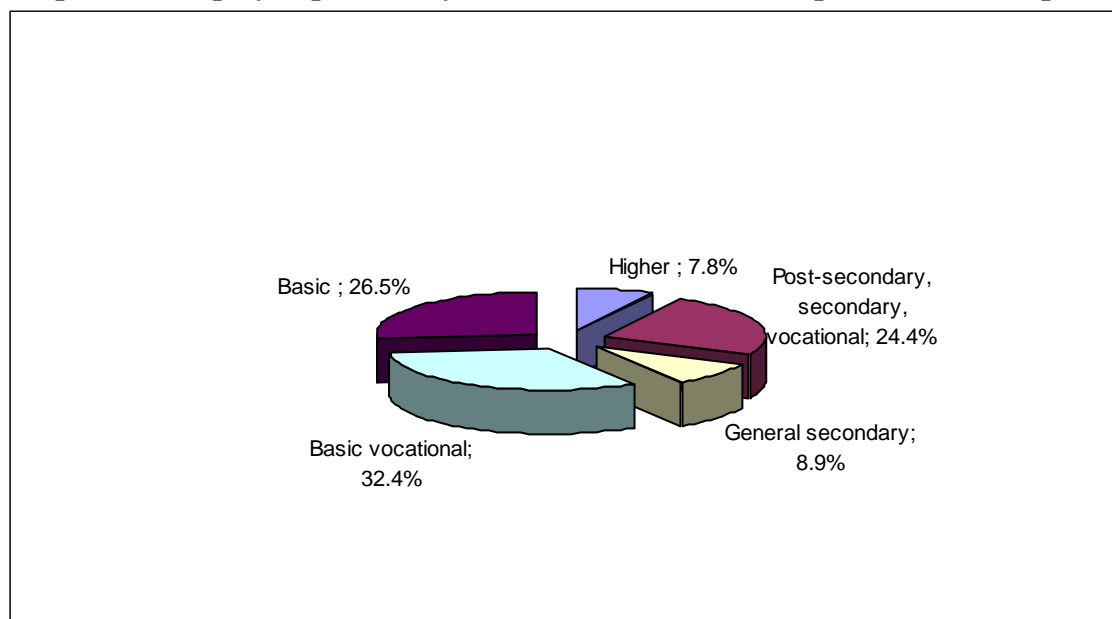
Basic information on the number of unemployed persons, the unemployment rate and the unemployed number per one work offer in Podkarpackie voivodship were presented in Table 1.

In 2007 in Poland the percentage of unemployed persons with higher education increased to 7% from 5% in 2005 (Table 13). In Podkarpackie voivodship the percentage grew from 6% in 2005 to 8% in 2007. In the analysed period 2005 – 2007, the percentage of unemployed persons with post-secondary and secondary education in Poland amounted to 22%. In Podkarpackie voivodship the unemployment in this education group fell from 25% to 24%, whereas the number of persons with general secondary education increased from 8% in 2005 to 9% in 2007 (Poland: indicators of similar values). In the analysed period in Poland

³ *Questionnaire on investment attractiveness of Podkarpackie voivodship*, PAIiIZ, Regional Cooperation Department, Warsaw, July 2008.

the number of persons with general vocational education fell from 33% in 2005 to 30% in 2007 (in Podkarpackie voivodship: from 35% to 32%). In the analysed period in Poland, the number of persons with basic education did not change and amounted to 32%. In Podkarpackie voivodship it also remained unchanged (26%). Graph 4 presents the structure of the unemployed persons in Podkarpackie voivodship in 2007.

Graph 4. Unemployed persons by education level in Podkarpackie voivodship in 2007



Source: own work on the basis of Regional Database of the Central Statistical Office.

The information on the command of English language among the unemployed persons was gathered by means of an analysis conducted by the Enterprise Institute on the sample of 219 persons. In Poland the average mark on the 1-5 scale amounts to 2.9 and it is not correlated with the level of education. The persons with basic education had the weakest command of English (2.0), whereas the persons with secondary education assessed their knowledge with the highest (3.1) marks. The unemployed persons with higher education estimate their command of language as 2.9 which is a slightly higher mark than among the persons with the Bachelor's or Engineer's degree and with vocational education (2.7 and 2.6, respectively).

The average assessment of the command of English by the unemployed varies by regions from 2.5 in Opolskie voivodship to 3.4 in Łódzkie voivodship. In Lubelskie voivodship the average assessment of the knowledge of English language equals 3.3 which is higher than the Polish average. The assessment of the command of English by the

unemployed from the following voivodships is higher than the country average: Mazowieckie (3.3), Zachodniopomorskie (3.2), Wielkopolskie (3.1), Lubelskie (3.1) and Świętokrzyskie (3.0).

Table 9. Average assessment of the command of English by the unemployed persons by the level of education and by voivodships.

Region	Education level					Average
	Basic	Vocational	Secondary	Bachelor's/Engineer's degree	Higher	
<i>POLAND</i>	2.0	2.6	3.1	2.7	2.9	2.9
Dolnośląskie	1.0	-	3.0	2.3	2.5	2.7
Kujawsko-pomorskie	-	3.0	2.5	-	2.0	2.6
Lubelskie	-	-	3.1	4.0	2.8	3.1
Lubuskie	-	3.0	2.3	-	3.0	2.6
Łódzkie	-	-	3.4	-	-	3.4
Małopolskie	-	2.0	3.0	3.0	3.2	2.9
Mazowieckie	-	-	3.6	3.5	2.5	3.3
Opolskie	-	-	2.7	2.0	-	2.5
Podkarpackie	-	1.0	2.9	3.0	3.1	2.9
Podlaskie	1.0	-	3.0	1.0	3.0	2.4
Pomorskie	3.0	2.0	2.8	3.5	2.5	2.8
Śląskie	-	3.0	3.0	2.0	2.7	2.9
Świętokrzyskie	-	-	3.3	2.0	3.0	3.0
Warmińsko - Mazurskie	-	-	2.8	2.0	4.0	2.9
Wielkopolskie	3.0	3.5	3.2	-	2.7	3.1
Zachodniopomorskie	-	3.0	3.1	-	4.0	3.2

„-”, no data

Source: own work on the basis of the analysis of the Enterprise Institute.

Table 10 presents the most numerous groups of the unemployed in Podkarpackie voivodship by professions and specialisations. The persons with the professions of economy technician (3865 persons) and technician/mechanic (2355 persons) constitute the most numerous group of the unemployed in the region under analysis.

Table 10. The most numerous groups of the unemployed by professions and specialisations in Podkarpackie voivodship

Profession/specialisation	The unemployed number as of end of 2007	The unemployed percentage in the voivodship as end of Dec 2007
Economic assistant* (profession learnt: economy technician)	3 836	3.00%
Technician/mechanic*	2 355	1.90%
Car mechanic	1 503	1.20%
Office services clerk* (profession learnt: office works technician)	1 487	1.20%
Farm worker	1 288	1.00%
Ancillary worker in the processing industry	1 267	1.00%

Economist	1 174	0.90%
Administrative clerk* (profession learnt: technician of administration)	591	0.50%
Other specialists for economics and management not classified elsewhere	568	0.40%
Other motor vehicle mechanics	547	0.40%
Specialist for marketing and commerce (sales)	539	0.40%

* The profession is taught within the school system. In most of the cases, the professions contained in the classification of professions and specialisations required by the labour market conform to the classification of professions of the vocational education. In some cases, the names of professions differ or a vocational profession is so extensive that it covers the entire groups listed in the classification of professions required by the labour market.

Source: *Questionnaire on investment attractiveness of Podkarpackie voivodship*, PAliIZ, Regional Cooperation Department, Warsaw, July 2008.

The list below presents the professions and specialisations which were most frequently sought after by employers of the analysed sectors by means of poviat (district) labour offices and the media: ⁴

- ✓ Specialists for economics and management not classified elsewhere
- ✓ Specialists for finance and commerce not classified elsewhere
- ✓ Engineers and related professions not classified elsewhere
- ✓ Insurance agents
- ✓ Dealers and stock brokers for financial assets and related professions
- ✓ Specialists for finance
- ✓ Workers for simple works in the industry
- ✓ Electrotechnicians
- ✓ Administrative clerks, secretaries and related professions
- ✓ Car mechanics
- ✓ Heads of human resources and related departments
- ✓ General and executive directors, presidents
- ✓ Programmers
- ✓ Office services clerks not classified elsewhere

On the basis of analyses by Instytut Gospodarki Wyższej Szkoły Informatyki i Zarządzania w Rzeszowie (University of Information Technology and Management of Rzeszów), it is possible to indicate surplus and shortage professions in the analysed sectors in Podkarpackie voivodship. In 2005 and 2006, 10 surplus professions of the region were related to the selected sectors, that is the ones of: technician/mechanic, economic assistant, car mechanic and economist. The most shortage professions in 2005-2006 are as follows:

⁴ Source: *Analysis of work offers in Podkarpackie voivodship*, BD CENTER CONSULTING, Rzeszów 2007

operators of automated and robotised production line, other office services clerks not classified elsewhere, fitters of precision mechanisms and devices, administrative clerks, other workers for simple works in the industry.⁵

The analyses conducted by Centrum Doradztwa Strategicznego w Krakowie (Strategic Consulting Centre of Cracow) enable to formulate the forecast on the demand for workers of the analysed sectors in Podkarpackie voivodship ⁶. In the upcoming few years the labour market of Podkarpackie region will demand qualifications indispensable for the following professions related to the selected sectors: specialist for marketing and commerce, computer hardware specialists, IT specialists, specialists for handling and administration of Internet services, specialists for computer systems, electronics technicians, electricians, operators of production lines and industrial robots, mechanics and operators of machines and devices (also digitally controlled), mechanics of machines and devices, security officers, specialists for finance and statistics, economists/bankers, bookkeepers/finance analysts, money flow clerks, investment consultants, business consultants, office services clerks, specialists for quality and safety, ecological and environmental protection advisors, specialists for machine cutting and metal processing.

6. Wages vs. expected wages

In the 1st half of 2008 the average gross monthly remuneration in the sector of enterprises in Podkarpackie voivodship amounted to 2462.47 PLN which made up 78.14% of the average remuneration in Poland (Table 11). In 2005–2007 this percentage oscillated between 79.08% (in 2006) to 79.60% (in 2007). In the 1st half of 2008 the highest wages were offered in the medical biotechnology sector and the lowest in turn in the electronics sector. In the period 2005-1st half of 2008 the average gross monthly remuneration in the voivodship increased by nearly 24% (in Poland by 25.91%). The highest increase in remuneration of the analysed sectors was reported in the business services sector.

Table 11. Average gross monthly remuneration in the sector of enterprises of the selected industries in 2005 – 1st half of 2008.

⁵ *Surplus and shortage professions in Podkarpackie voivodship in 2000-2006. Guidebook for the labour market institutions*, University of Information Technology and Management of Rzeszów, October 2006.

⁶ *The forecast on the demand for specific qualifications in the regional labour market in a 5-year perspective in Podkarpackie voivodship*, Strategic Consulting Centre of Cracow, January 2007, p. 61-62

Sector	Average gross monthly remuneration in the sector of enterprises in the period of [PLN]:				Pace of change (2005-2008)*
	Jan-Dec 2005	Jan-Dec 2006	Jan-Dec 2007	Jan-Dec 2008	
Engineering sector	1914.68	2057.93	2223.91	2348.22	22.64%
Electronics sector	1874.51	2006.54	2176.73	2315.27	23.51%
Medical biotechnology sector	3062.58	3105.36	3319.30	3680.57	20.18%
Automotive industry	2367.92	2331.93	2478.20	2547.08	7.57%
Business services sector	1747.12	1832.55	2171.73	2549.12	45.90%
Aviation sector	no data	no data	no data	no data	no data
Total average gross monthly remuneration in the sector of enterprises in Podkarpackie voivodship	1983.32	2082.26	2293.41	2462.47	24.16%
Average gross monthly remuneration in the sector of enterprises in Poland	2 502.96	2 633.26	2 881.03	3 151.51	25.91%

*the pace of change expressed in percent and calculated by means of the following formula:

(the pace at the beginning of the analysed period – the pace at the end of the analysed period) / the pace at the end of the analysed period.

Source: own work on the basis of *Statistical bulletin of Podkarpackie voivodship*.

The table below containing the results of the Enterprise Institute is presented with the aim of comparing the amount of remuneration of the executive staff and the management staff. In Poland, the highest average gross monthly remuneration in the analysed sectors of the management staff fluctuated between 5001 and 6000 PLN in the engineering, automotive aviation sector. The lowest remuneration that is 2001-3000 PLN was offered in the business services sector. Such significant variations were not reported with respect to the executive staff. The lowest remuneration was in the business services sector (below 2000 PLN) whereas in other sectors it amounted to 2001-3000 PLN.

Table 22. Average gross monthly remuneration in the analysed sectors according to the opinion of respondents

Medical biotechnology sector	Managerial staff	3001 – 4000 PLN
	Executive staff	2001 – 3000 PLN
Engineering industry	Managerial staff	5001 – 6000 PLN
	Executive staff	2001 – 3000 PLN
Electronics sector	Managerial staff	3001 – 4000 PLN
	Executive staff	2001-3000 PLN
Automotive sector	Managerial staff	5001-6000 PLN
	Executive staff	2001-3000 PLN
Aviation sector	Managerial staff	5001 – 6000 PLN
	Executive staff	2001-3000 PLN

Services for business	Managerial staff	2001 – 3000 PLN
	Executive staff	Below 2000 PLN

Source: Analysis by the Enterprise Institute 'Labour market in Polish regions in 2008'

The results of the analysis carried out by the Enterprise Institute indicate that in most of the cases remunerations fail to meet the expectations of employees. The analysis of discrepancies between the offered and the expected remunerations show that on average the employees expect a remuneration higher by 1000 PLN than actually offered. In few cases the offered remuneration exceeds the expectations. This refers to 6% of candidates for managerial positions and 2% of candidates for executive posts.

In order to analyse in a regional approach the work costs level in specific sectors, the indicator calculated with the following formula was applied:

Remunerations + Social insurance and other benefits * 100%

Net income from sales and equalising them

The indicator informs on the percentage of the total work costs in the income from sales. It also shows which regions, due to the work costs per unit sales income, were an attractive location for the analysed sectors. Moreover, on the basis of an analysis of the indicator value change, it is possible to define perspectives for development of a given sector in the region.

As Table 13 shows, in Poland both in 2005 and in 2007, among the selected types of activity this indicator reached the highest value in the aviation sector, whereas the lowest one in the automotive sector. In the period 2005-2007 the highest value increase of the indicator was reported in the aviation sector. The growth of the percentage of the total work costs in the sales income was present in the automotive industry and real estate management on a fee or contract basis (sub-group 70.3) which is included in the business services sector. In other analysed sectors in Poland, the value of the work costs indicator fell.

A lower indicator value of the analysed work costs is favourable for the enterprises. Generally, this indicator slightly grew in Podkarpackie voivodship. However, on the basis of the accessible data for this region, it can be assumed that in the period 2005-2007, due to the percentage of work costs in the sales income, the attractiveness of the voivodship increased

for the engineering, electronics and automotive industries as well as for the business services sector (analysed on the example of ‘other economic activities’ including: legal consulting, accounting, market research, advertising, labour recruitment, translations, technical consultancy and security activities).

Table 13. Unit work costs in the analysed sectors in Podkarpackie voivodship and in Poland

Sector	Podkarpackie voivodship			Poland		
	2005	2007	change 2005-2007 [p.p.]	2005	2007	change 2005-2007 [p.p.]
Medical biotechnology sector	(.)	(.)	no data	14.93	13.07	-1.86
Engineering sector	25.83	22.93	-2.9	17.62	15.77	-1.85
Electronics sector	40.66	23.61	-17.05	23.31	21.71	-1.6
Automotive sector	12.74	11.78	-0.96	6.33	6.76	0.43
Aviation sector	(.)	33.86	no data	33.07	35.51	2.44
Business services sector	36.41	35.09	-1.32	31.29	29.95	-1.34
Sections total (in the region)	12.87	12.92	0.05	10.78	10.49	-0.29

Source: own work on the basis of the PONT INFO database.

Conclusions

In the period 2005-2007 in Podkarpackie voivodship the number of economic entities of the analysed sectors increased. It refers in particular to: engineering, electronics, automotive and aviation industries, the medical biotechnology sector and also in the business services sector. The average employment in the sectors under analysis increased as well. The highest employment in the analysed sectors in Podkarpackie voivodship was in the business services sector (8.31%) and the engineering industry (7.14%), whereas the automotive industry (5.1%), the aviation sector (2.8%), the electronics sector (0.77%), the medical biotechnology sector (0.63%) were lower in the ranking. In comparison to the entire country, the employment in the employment in the aviation, engineering and automotive industries as well as the medical biotechnology sector in Podkarpackie voivodship is higher than average. In Podkarpackie voivodship the pace of increase in the average employment in the analysed sectors was faster than the country average. In particular, it refers to persons employed in the engineering and automotive industry.

In terms of the sectors under analysis, the graduates of technical secondary schools are particularly desirable. In Podkarpackie voivodship the percentage of technical secondary school graduates in the total number of graduates is the highest of all the regions. However, the professions which the students of post-gymnasium schools gain are not very well-suited to

the requirements of the analysed sectors. There are also regional specialisations of the voivodship. The professions of precision mechanic (almost one fourth of all the persons is trained in Podkarpackie voivodship) and of CNC operator (nearly one fifth is trained in Podkarpackie region) are particular examples. The forecasts indicate that in the forthcoming years the labour market of Podkarpackie region will demand qualifications indispensable for the professions related to the selected sectors.

It is observed that in Podkarpackie voivodship the trend of university graduates is growing. Taking account of the needs of the analysed sectors, the percentage of graduates of computer sciences is relatively high.

A higher than average percentage of unemployed persons of higher post-secondary and vocational secondary education in Podkarpackie voivodship shows that a significant amount of work resources of the region remains unused.

In the period 2005–1st half of 2008 in Podkarpackie voivodship a 20% increase in remunerations was reported in the majority of the sectors under analysis. The automotive sector is an exception, as the remunerations in this field increased by about 7.6%. That is why, the profession of car mechanic was one of the most frequently sought after in the regional labour market.

In Podkarpackie voivodship a slight growth of the work costs in the sales income was present. As far as the sectors under analysis are concerned, in 2005-2007 the voivodship became more attractive in terms of location for the engineering, electronics and automotive industries as well as for the business services sector (PKD 74: Polish Classification of Economic Activities No. 74): ‘other economic activities’).