Warsaw School of Economics
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Labour market in selected sectors of economy in Lubelskie voivodship in 2008 and its changes in the years 2005-2007

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Introduction

The aim of the report is to present basic parameters of the labour market in Lubelskie 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 staff for the sectors under analysis (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.

Lubelskie voivodship disposes at quite significant work resources potential in comparison to the country average and makes up about 6 % of the total employment in Poland. In 2005–2006 the number of employed persons increased by 4.4%. This fact along with the migration outflow influenced the change in basic labour market parameters of Lubelskie 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 48.6% to 51.1% and in the entire period under analysis it oscillated over the country average level. Nonetheless, a half of work resources in Lubelskie voivodship remains unused.

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

No.	Basic parameters of labour market	2005	2006	2007
1	Employed persons (in thousands)	931	915	972
2	Employment the rate (in %)	48.6	48.8	51.1
3	Unemployed persons (in thousands)	156.8	141.8	118.1
4	Unemployment the rate according to BAEL (in %)	14.3	12.7	9.5
5	Work offers	536	846	750
6	The unemployed number per 1 work offer	292.6	167.6	157.5

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 Lubelskie voivodship the number of unemployed persons fell by 25%. The unemployment rate according to BAEL in the period under analysis fell by 4.8 percentage points. The rate of registered unemployment in the analysed period equalled 17%, 15.5%, and 13%, respectively. 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 Lubelskie voivodship in the period 2005-2007. In 2007, 227 mid-sized and large enterprises of the analysed sectors (employing more than 10 persons) were located in Lubelskie voivodship. Most of the enterprises represented the business services sector and the engineering industry (the majority of new companies appeared in the automotive sector, whereas their number fell in the engineering industry).

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

Sector	2005	2007	Pace of change 2005-2007*
Medical biotechnology sector	7	7	0.00%
Engineering industry	59	54	-8.47%
Electronics industry	14	14	0.00%
Automotive industry	10	11	10.00%
Aviation industry	2	2	0.00%
Business services	139	139	0.00%
Sectors total	**231**	**227**	-1.73%

*the rate of change expressed in percent and calculated by means of the following formula:
(the rate at the beginning of the analysed period – the rate at the end of the analysed period) / the rate 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 Lubelskie voivodship amounted to 164 302 persons (Table 3) 12.96% of which were employed in the selected sectors (21286 persons). In the period 2005-2007 the employment in the sectors under analysis in the voivodship remained at similar level and equalled about 13.8%. In the 1st half of 2008 the highest average employment was reported in the business services sector and the engineering industry (Table 3).

The presented data show a fall in the employment in the electronics industry. (It is important to emphasise, however, that the amount of employment in Lubelskie voivodship can be underestimated due to the absence of the statistical data; this sector is not covered by the activity related to the manufacture of medical, precision and optical instruments, watches and clocks).

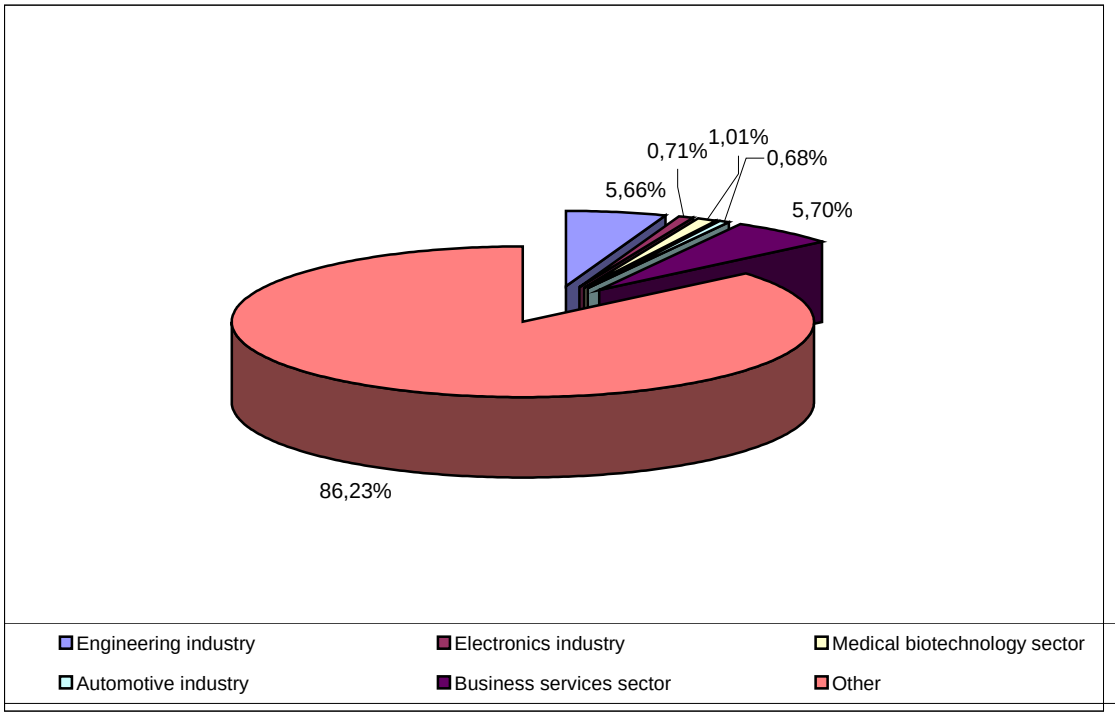
Table 3. Average employment dynamics in the analysed sectors in 2005 – 1st half of 2008

Sector	Average employment in the enterprises sectors in the period of [persons/thousands]:			
	Jan-Dec 2005	Jan-Dec 2006	Jan-Dec 2007	Jan-Dec 2008
Engineering industry	8 646	8 632	8 929	9 388
Electronics industry	1 416	1 184	1 117	903
Medical biotechnology sector	1244	no data	1600	no data
Automotive industry	1047	1007	1070	1169
Aviation industry **	8409	8831	8997	9826
Business services sector	no data	no data	no data	no data
Sectors total	20762	19654	21713	21286
TOTAL average employment in the enterprises sector in Lubelskie voivodship	**150 465**	**152 475**	**157 736**	**164 302**
Employment levels in the analysed sectors in the voivodship	13.80%	12.89%	13.77%	12.96%

*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 Lubelskie voivodship* and the PONT INFO database.

The highest employment level in the analysed sectors in the voivodship was in the business services sector (5.7%) and the engineering industry (5.66%), whereas the medical biotechnology sector (1.1 %), electronics industry (0.71%) and the automotive industry (0.68%) were lower in the rating.

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



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

Table 4 presents the average employment in the sectors under analysis both in Poland and in Lubelskie voivodship as of the end of December 2007. The employment in the analysed sectors in the voivodship is generally lower than the country average. In Lubelskie voivodship the employment in the automotive industry as well as in the medical biotechnology sector is higher than in the other regions of Poland. Therefore these are certainly regional specialisations of Lubelskie voivodship. The percentage of persons employed in the analysed sectors in Lubelskie voivodship is lower than the country average.

In Lubelskie voivodship the employment in the analysed sectors grows at a slower pace than the country average. Only in the medical biotechnology sector it remains at the same level as the Polish average. In other sectors under analysis the employment growth was lower in Lubelskie voivodship than the country average. In 2005-2007 the average employment in the electronics sector in Lubelskie voivodship decreased. It is worth mentioning however, that the average employment in this sector can be underestimated due to the absence of the statistical data.

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 Lubelskie 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	
	Lubelskie voivodship	Poland	Lubelskie voivodship	Poland
Engineering sector	5.66%	5.04%	3.27%	11.55%
Electronics sector* **	0.71%	1.34%	-21.12%	16.13%
Medical biotechnology sector	1.01%	0.49%	28.62%	6.10%
Automotive industry	0.68%	2.40%	2.20%	23.23%
Business services	5.70%	10.91%	6.99%	9.91%
Aviation sector**	no data	0.30%	no data	9.63%
Sectors total	13.77%	20.49%	4.58%	12.03%
TOTAL average employment in the enterprises sector in Lubelskie voivodship	**100.00%**	**100.00%**	**4.83%**	**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.
*** on the example of the activity related to the manufacture of medical, precision and optical instruments, watches and clocks.

Source: own work on the basis of *Statistical bulletin of Lubelskie 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 Lubelskie voivodship this number is higher than the country average and equals 285. Sectors of advanced technology have a demand for graduates of technical secondary schools. In Poland the percentage of technical secondary school graduates in the total of post-gymnasium school graduates is 16%, whereas in Lubelskie voivodship equals 14%.

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 secondary schools	Technical secondary schools	General lyceums
POLNAD	*278*	*12%*	*17%*	*11%*	*16%*	*44%*
Lubelskie voivodship	285	9%	18%	12%	14%	47%

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

* 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*:
    - first level courses (studia pierwszego stopnia); title of Bachelor or Engineer (licencjat/ inżynier);
    - second level courses (studia drugiego stopnia); title of Master (magister)
    - 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).]

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 secondary schools) constitute 68% of the total number of post-gymnasium schools. Currently, there are 7 015 of these entities in entire country 431 of which in Lubelskie voivodship (6.14%).

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:

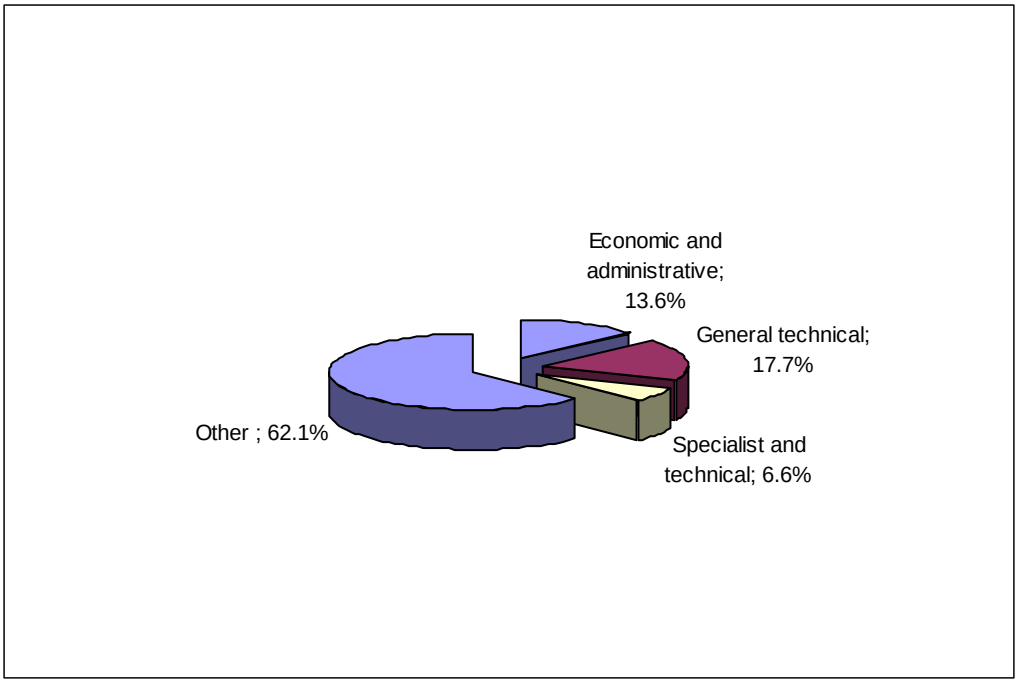
- economic and administrative (this group covers economic and administrative professions offered by specialised secondary schools, such as: administrative clerk, technician of occupational hygiene and workplace safety, technician of economy, trade technician, office technician, accounting technician),
- 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 in Lubelskie voivodship 71292 persons studied at post-gymnasium vocational schools of which 27030 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 Lubelskie voivodship in terms of economic and administrative and specialist and technical specialisations are lower than the country average. As for the learners of general technical professions, their number is at the same level as the country average. The indicators of Lubelskie voivodship are slightly lower than the country average. From the point

of view of enterprises operating in high technology sectors, the most desirable persons are those with specialist and technical professions. In Lubelskie voivodship the percentage of persons studying specialist and technical specialisations equals 4.28%.

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

Graph 2. Post-gymnasium school learners structure in Lubelskie 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 Lubelskie voivodship and in Poland by profession groups which are demanded by the analysed sectors. The average percentage of learners in Lubelskie voivodship in the total number of persons in Poland studying the specialisations concerned equals 6.53%. The occupations of aircraft technician/mechanic, electric/mechanic, electronics technician (specialised secondary school) are studied by over 10% of the post-gymnasium school learners in Lubelskie voivodship (in comparison to the entire country). These are certainly regional specialisations of the voivodship. The profession of aircraft technician/mechanic is a particular example, as nearly one fifth is trained in Lubelskie region. This occupation can be gained at Technikum w Świdniku (the Świdnik Secondary Technical secondary school) in the area of Lublin.

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

Profession	Lubelskie voivodship	Total in Poland	Percentage of Lubelskie voivodship [%]
Aircraft technician/mechanic	88	479	18.37%
Electric/mechanic	401	3 342	12.00%
Electronics technician (specialised secondary school)	54	474	11.39%
Accounting technician	768	7 922	9.69%
Technician of logistics	321	3 915	8.20%
Electroradiologist	55	697	7.89%
Office works technician	366	4 683	7.82%
Mechanic/fitter of machines and devices	306	4 146	7.38%
Technician/mechanic	5 120	69 907	7.32%
Mechatronics technician (specialised secondary school)	109	1 696	6.43%
IT technician	5 249	85 429	6.14%
Economic and administrative clerk (specialised secondary school)	1 856	30 754	6.03%
Car mechanic	2 273	39 173	5.80%
Car electric/mechanic	338	6 303	5.36%
Administrative clerk	1 720	34 901	4.93%
Electronics technician (specialised secondary school)	59	1 201	4.91%
Economic technician	3 878	87 113	4.45%
Electronics technician	1 455	33 346	4.36%
Mechatronics fitter	26	615	4.23%
Electrician	253	6 213	4.07%
Technician of telecommunication	140	3 795	3.69%
CNC operator	109	3 358	3.25%
Mechatronics technician	325	11 056	2.94%
Technician of occupational hygiene and workplace safety	325	12 570	2.59%
Trade technician	799	32 838	2.43%
Technician of logistics	387	16 372	2.36%
Technician of teleinformation	119	5 040	2.36%
Electronics fitter	64	2 866	2.23%
Car tinsmith	67	3 418	1.96%
Total	**27 030**	**514 540**	**5.25%**

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 Lubelskie voivodship.

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

Voivodship	English language	French	German	Russian	Other	Total

		language	language	language	language	
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, 19 universities (7 public and 12 private universities) operated in Lubelskie voivodship that is two universities, one higher technical university, two academies of economics, one medical university and 11 other types of universities (including public higher vocational schools) which attended the total of 106406 students.

In terms of the number of students, one of the largest universities of the region is Uniwersytet Marii-Curie Skłodowskiej (UMCS) (Maria Curie-Skłodowska University in Lublin): 29818 students and 914 candidates for doctor's (Ph.D.) degree (the figures from the schoolyear 2007/2008). Another large academic centres of the region are listed below: Politechnika Lubelska (Lublin University of Technology), Uniwersytet Medyczny (Lublin Medical University), Państwowa Wyższa Szkoła Zawodowa w Białej Podlaskiej (State Higher Vocational School in Biała Podlaska). A great deal of persons study also at Uniwersytet Przyrodniczy w Lublinie (University of Natural Sciences in Lublin): 8.5 thousand persons. At the universities of Lubelskie voivodship prevail the humanities and economic specialisations. It also refers to the largest university of the region, as the prevailing specialisations at the UMCS cover: administration, law, pedagogy, language studies, political sciences.

Wyższa Szkoła Oficerska Sił Powietrznych is located in Dęblin (Air Force Officer High School in Dęblin). The department of aviation is the basic organisational unit in the process of training of officer cadets and the course trainings for the professional cadre of the air force. The Air Force Officer High School organises and coordinates the educational activity of the cadre training in the specialisations of pilotage and air navigation.

The chief higher education centres of the region are mainly located in Lublin. However, independent education centres or branches and consulting points are also present in other smaller cities of the region.

In 2007 in Lubelskie voivodship the total of university graduates equalled 22 679 persons which was 6% 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 Lubelskie voivodship this figure is similar as the country average and equals 156. 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 Lubelskie voivodship it is 5.3%. [1]

The analysis showed an increase of university graduates by 4% 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 number of university graduates in Lubelskie voivodship in 2007, it can be observed that:

- the graduates number of biological sciences was relatively high and equalled 4%; (the country average: 3%).

- the graduates number of physical sciences was similar to the country average and amounted to 3% (the country average: 3%),

- a slightly below the country average number of university graduates covered: computer sciences: 2% (the country average: 4%) and engineering and technical sciences: 7% (the country average: 9%).

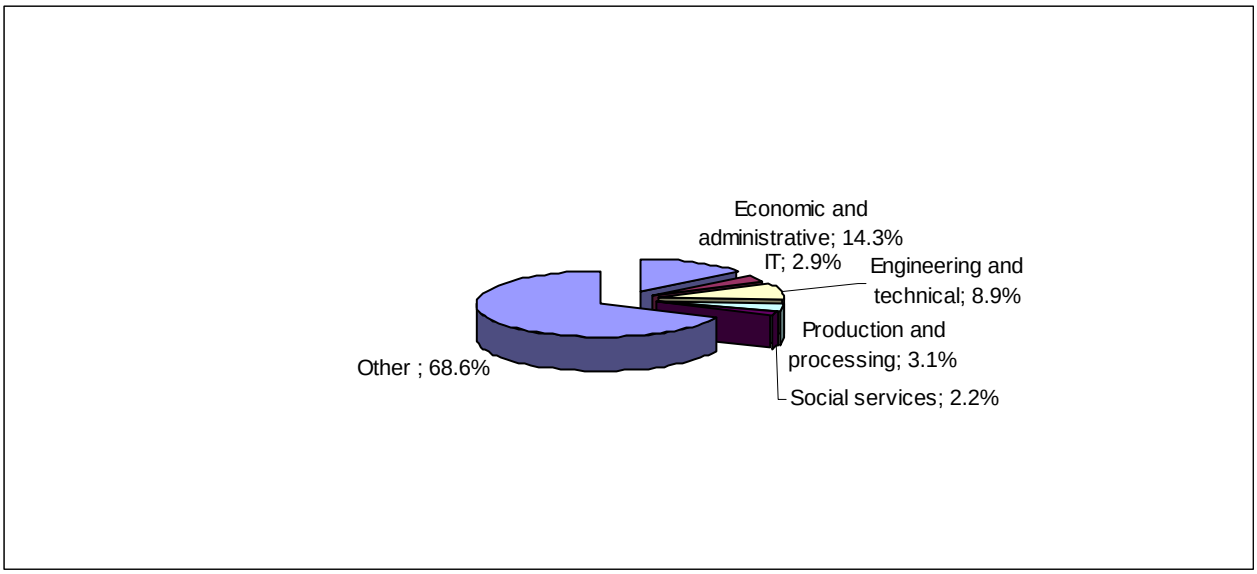
The main entities teaching strictly technical specialisations are public universities. As of 30th November 2007 only 4% of students of engineering and technical as well as production and processing specialisations study at private universities. There are several reasons for this situation. Technical specialisations require adequate infrastructure and higher

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

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 Lubelskie voivodship 21227 persons study the specialisations demanded by the analysed sectors which constitutes 4.5% of 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 Lubelskie 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 Lubelskie 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, 6 266 academic teachers were in Lubelskie voivodship. In 2007 their number increased by nearly 3% (6 476 persons). It constituted about 6.5% of the total of academic teachers in Poland. The highest grow was reported in the group of lecturers (by over 4%). There was also a slight increase in the group of senior lecturers. The number of assistants and professors decreased.

The table below presents the changing figures regarding academic teachers in selected types of universities. The majority of academic teachers of Lubelskie voivodship is employed at universities, that is about 46% (the Polish average: 31%), medical universities: 16% and higher vocational universities: 11%.

Table 8. The academic teachers number and structure change at selected university types in Lubelskie voivodship and in Poland

	POLAND					Lubelskie voivodship				
Type of university	**2005**	**2006**	**2007**	**structure 2007**	**Pace of change 2007-2005**	**2005**	**2006**	**2007**	**structure 2007**	**Pace of change 2007-2005**
Universities	30 349	30 617	30 952	31.20%	1.99%	2 973	3 005	2 984	46.08%	0.37%
Higher technical universities	19 446	19 437	19 261	19.41%	-0.95%	573	577	578	8.93%	0.87%
Schools of Economics	10 884	10 761	11 010	11.10%	1.16%	144	147	138	2.13%	-4.17%
Higher vocational universities	9 717	9 830	9 933	10.01%	2.22%	1 011	1 049	1 059	16.35%	4.75%
Type of university	8 608	9 072	9 597	9.67%	11.49%	596	664	724	11.18%	21.48%
Total	79 004	79 717	80 753	81.39%		5 297	5 442	5 483	84.67%	
Total in the region	**97 702**	**98 262**	**99 221**	100.00%	1.55%	6 266	6 417	6 476	100.00%	3.35%

*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, 7163 persons worked in the field of research and development (the Polish total: 121283) [2] 85.2% of which constituted scientific and research fellows, technicians and the equivalent staff and the other personnel: 8.9% and 5.9%, respectively. The education level structure of persons employed in the research and development activity in Lubelskie voivodship was as follows: professors: 8.2%; habilitated doctors (hab. Ph.D.): 10%, doctors (Ph.D.): 40.6%; other persons with higher education: 31.1%, persons employed with other education: 10.1%. The indicator of employment in the research and development activity per 1000 economically active persons in Lubelskie voivodship equals 3.3 which is below the average indicator of Poland (4.3).

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

By the end of 2006, 42 research and development entities were located in Lubelskie voivodship. The activity of Lubelski Park Naukowo Technologiczny (LPNT) (Lublin Research and Technology Park) has a significant influence on the sectors under analysis. It cooperates with Politechnika Lubelska (Lublin University of Technology) and Park Naukowo Technologiczny Województwa Lubelskiego (Science and Technology Park of the Lublin Voivodship) on the creation of innovative environment in the region allowing effective technology transfer from R&D institutions to enterprises. For the project purposes the research and development institutions established technology centres located at the universities in Lublin. The LPNT coordinates work of the technology centres. Two of them operate in the framework of the analysed sectors:

- **Centrum Biotechnologii (UMCS)**, (Institute of Biotechnology): projects related to innovation and technology transfer from the Institute of Biotechnology, Centrum Leków i Szczepionek Uniwersytetu Medycznego w Lublinie (Medicine and Vaccination Centre in Lublin), Centrum Technologii Żywności Uniwersytetu Przyrodniczego w Lublinie (t Centre of Food Technology in Lublin) scientific centres of Instytut Agrofizyki PAN (Institute of Agrophysics, Polish Academy of Sciences), Instytut Uprawy, Nawożenia i Gleboznawstwa z Puław (Puławy Institute of Plant Cultivation, Fertilization and Soil Sciences) and other regional, national and foreign institutions.
- **Centrum Elektroniki, Optoelektroniki i Teleinformatyki** (Centre for Electronics, Optoelectronics and Teleinformation): projects related to innovation and technology transfer from the Centre for Electronics, Optoelectronics and Teleinformation (Lublin University of Technology) and Pracownia Technologii Światłowodów (UMCS) (Optical Fiber Technology Laboratory), and research centres of other institutions (regional, national and foreign).

The establishment of the following centres is planned: Centrum Leków i Szczepionek w Uniwersytecie Medycznym w Lublinie, (Centre of Medicines and Vaccinations at the Medical University of Lublin), Centrum Nanotechnologii i Centrum Technologii Informatycznych (Centre for Nanotechnology and Centre of Computer Science Technology) (UMCS), Centrum Transferu Technologii and Centrum Doradztwa i Projektów (Centre of Technology Transfer and Centre for Consulting and Projects).

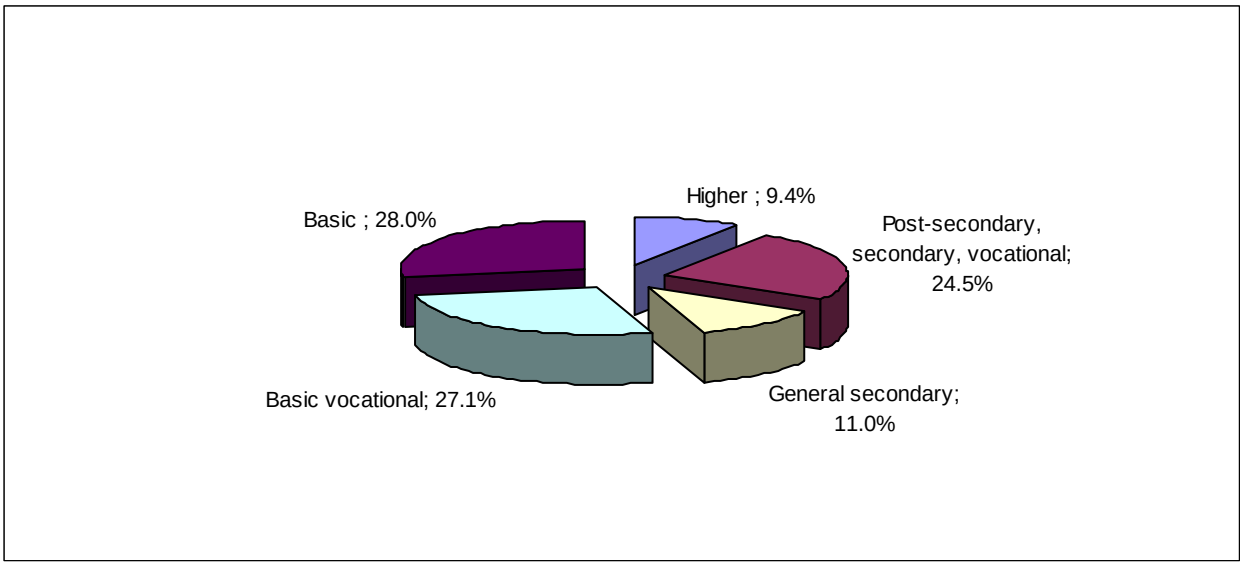
5. Unemployment – surplus/shortage professions

Basic information on the number of unemployed persons, the unemployment rate and the unemployed number per one work offer in Lubelskie 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. In Lubelskie voivodship the percentage grew from 8% in 2005 to 9% 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 Lubelskie voivodship the unemployment in this education group fell from 26% to 24%, whereas the number of persons with general secondary education increased from 9% in 2005 to 11% in 2007 (in Poland: a fall from 9% to 8%). In the analysed period in Poland the number of persons with general vocational education fell from 33% in 2005 to 30% in 2007 (in Lubelskie voivodship: from 30% to 27%). In the analysed period in Poland the number of persons with basic education did not change and amounted to 32%. In Lubelskie voivodship it increased from 27% in 2005 to 28% in 2007. Graph 4 presents the structure of the unemployed persons in Lubelskie voivodship in 2007.

Graph 4. The unemployed by education level in Lubelskie 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 by education level and by voivodships.

Region	Education level					Total
	Basic	Vocational	Secondary	Bachelor's/Engineer's degree	Higher	
POLAND	*2*	*2.6*	*3.1*	*2.7*	*2.9*	*2.9*
Dolnośląskie	1	-	3	2.3	2.5	2.7
Kujawsko-pomorskie	-	3	2.5	-	2	2.6
Lubelskie	-	-	3.1	4	2.8	3.1
Lubuskie	-	3	2.3	-	3	2.6
Łódzkie	-	-	3.4	-	-	3.4
Małopolskie	-	2	3	3	3.2	2.9
Mazowieckie	-	-	3.6	3.5	2.5	3.3
Opolskie	-	-	2.7	2	-	2.5
Podkarpackie	-	1	2.9	3	3.1	2.9
Podlaskie	1	-	3	1	3	2.4
Pomorskie	3	2	2.8	3.5	2.5	2.8
Śląskie	-	3	3	2	2.7	2.9
Świętokrzyskie	-	-	3.3	2	3	3
Warmińsko-mazurskie	-	-	2.8	2	4	2.9
Wielkopolskie	3	3.5	3.2	-	2.7	3.1
Zachodniopomorskie	-	3	3.1	-	4	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 Lubelskie voivodship by professions and specialisations. The persons with the professions of

technician/mechanic, economic assistant and ancillary worker in the processing industry constitute the most numerous group of the unemployed persons in the region under analysis.

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

Profession/specialisation	The unemployed number as of end of 2007	The unemployed percentage in the voivodship as end of Dec 2007
Technician/mechanic *	2 613	2.20%
Economic assistant* (profession learnt: economic technician)	2 378	2.00%
Ancillary worker in the processing industry	1 665	1.40%
Economist	1 476	1.20%
Office services clerk* (profession learnt: office works technician)	1 350	1.10%
Car mechanic	1 162	1.00%
Storekeeper	767	0.60%
Other motor vehicle mechanics	654	0.60%
Administrative clerk* (profession learnt: technician of administration)	585	0.50%
Specialist for marketing and commerce (sales)	583	0.50%

** 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 Lubelskie voivodship*, PAIiIZ, Regional Cooperation Department, Warsaw, July 2008.

On the basis of the analyses conducted by the Voivodship Labour Office in Lublin, it is possible to indicate surplus and shortage professions in the analysed sectors in Lubelskie voivodship**.** In Lubelskie voivodship the following shortage professions were related to the sectors under analysis: specialists for employment and recruitment, experts in statistics, deputies of general directors and presidents, aircraft maintenance mechanics and related professions, office services clerks, secretaries, money flow and customer services clerks, public authorities representatives, higher-ranked clerks, professional activists. Generally, the above-mentioned professions require long-time education as well as some years of practical professional experience. In 2007 the shortage professions of related to the analysed sectors covered: economists, electric equipment wiremen, intermediate technical personnel, specialists for physical, mathematical and technical sciences, metalworking industry workers, mechanics of machines and devices, directors of small enterprises, managers of mid-sized and large organizations, precision worker occupations, ceramists, leather haberdashery producers,

printing industry workers and related professions, industry workers and craftsmen, machine operators and fitters. [3]

Labour offices play an important role in the local and regional labour market. Their objective is to conduct monitoring of changes which take place in the labour market including changes in the demand of enterprises for specific qualifications and professions and also to offer trainings to unemployed persons. The results of an analysis conducted by the Enterprise Institute show that in the recent two years the labour Office located in Lubelskie voivodship have organised trainings commissioned by the enterprises of the analysed sectors. The trainings covered the topics of: entrepreneurship: setting-up a business, organisation and management, accountancy, training for office workers aimed at gaining selected qualifications on human resources. It appears that these trainings only partly meet the expectations of the enterprises of the analysed sectors. Some of the reasons for not taking up a job by the trained persons were low remuneration and the absence of adequate work offers.

6. Wages vs. expected wages

In the 1st half of 2008 the average gross monthly remuneration in the sector of enterprises in Lubelskie voivodship amounted to 2535.14 PLN and it made up 80.44% of the average remuneration in Poland (Table 11). In 2005 – 2007 this percentage oscillated between 81.89% (in 2006) to 82.73% (in 2007).

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

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	2 017,55	2 118,73	2 291,47	2 398,79	18,90%
Electronics sector	2 254,79	2 478,21	2 397,64	2 542,69	12,77%
Medical biotechnology sector	no data	no data	no data	no data	no data
Automotive industry	2 148,71	2 335,43	2 602,53	3 021,21	40,61%
Business services sector	2 137,57	2 226,75	2 366,59	2 749,81	28,64%
Aviation sector	no data	no data	no data	no data	no data
Total average gross monthly remuneration in the sector of enterprises in Lubelskie voivodship	**2 063,10**	**2 156,45**	**2 383,43**	**2 535,14**	22,88%

[3] Monitoring of surplus and shortage professions in Lubelskie voivodship in 2007; the Voivodship Labour Office in Lublin, Research and Analysis Department, Lublin, September 2008.

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 Lubelskie voivodship*.

In the 1st half of 2008 the highest remuneration was offered in the automotive sector, and the lowest in turn in the engineering sector. In the period 2005 – 1st half of 2008 the average gross monthly remuneration in the voivodship increased by nearly 22.88% (in Poland by 25.91%). The highest increase in remuneration of the analysed sectors was reported in the automotive sector.

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 wages were in the business services sector (below 2000 PLN) whereas in other sectors they amounted to 2001-3000 PLN.

Table 22. 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:

$$\frac{\text{Remunerations + Social insurance and other benefits} * 100\%}{\text{Net income from sales and equalising them}}$$

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 fell in Lubelskie 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 manufacture of machinery and electrical equipments (which is a part of the engineering sector) as well as for the business services sector (PKD No. 74: Polish Classification of

Economic Activities): 'other business 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 Lubelskie voivodship and in Poland

Sector	PKD (PCA)	Lubelskie voivodship			Poland		
		2005	2007	Change 2005-2007 [p.p.]	2005	2007	Change 2005-2007 [p.p.]
Medical biotechnology sector	**24.4**	20.04	22.81	2.77	14.93	13.07	-1.86
Engineering sector	**29**	20.28	23.41	3.13	17.62	15.77	-1.85
Electronics sector	**31**	18.79	14.9	-3.89	13.04	12.67	-0.37
Automotive sector	**33**	39.2	40.63	1.43	23.31	21.71	-1.6
Aviation sector	**34**	(.)	(.)	no data	6.33	6.76	0.43
Business services sector	**35.3**	(.)	(.)	no data	33.07	35.51	2.44
Medical biotechnology sector	**70.3**	18.27	19.16	0.89	17.1	18.66	1.56
	74	43.56	22.38	-21.18	31.29	29.95	-1.34
Sections total (in the region)		**11.88**	**9.27**	**-2.61**	**10.78**	**10.49**	**-0.29**

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

Conclusions

In the period 2005-2007 in Lubelskie voivodship the number of mid-sized and large economic entities of the analysed sectors slightly fell. In the same time, there was a growth in the average employment, both in the entire voivodship and in the analysed sectors, but the pace of increase was at the similar level. That is why, the percentage of persons employed in the analysed sectors in the region changed. The highest employment in the analysed sectors in Lubelskie voivodship was in the business services sector (about 5.7%), whereas the medical biotechnology sector (1.01%), the automotive and electronics industries (0.7%) had further results in the ranking. In comparison to the entire country, the employment in the engineering and the medical biotechnology sector in Lubelskie voivodship is higher than average. In Lubelskie voivodship the pace of increase in the average employment in the analysed sectors was faster than the country average.

In terms of the sectors under analysis, the graduates of technical secondary schools are particularly desirable. In Lubelskie voivodship the percentage of technical secondary school graduates in the total of graduates is considerably lower than the country average, due to the fact that, 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 profession of aircraft technician is a particular example, as nearly one fifth is trained in Lubelskie region.

It is observed that in Lubelskie voivodship the trend of university graduates is growing. Taking account of the needs of the medical biotechnology sector, the percentage of graduates of biological sciences is relatively high. Certainly, this situation meets the requirements of the medical biotechnology sector which develops quite dynamically in the sector under study.

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

In the period 2005 –1st half of 2008 in Lubelskie voivodship, a 23% increase in the average gross monthly remuneration was reported, which was below the country average. In the sectors under analysis the highest growth took place in the automotive sector and the business services sector, whereas it was much lower in the electronics industry.

In the period 2005 – 1st half of 2008 in Lubelskie voivodship, the pace of increase in remuneration was lower than the country average and amounted to 23%. The highest growth among the sectors under analysis was reported in the automotive industry and the business services sector, whereas the lowest one in the electronics sector.

In Lubelskie voivodship a drop in the work costs in the income from sales 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 manufacture of machinery and electrical equipments (which is a part of the engineering sector) as well as for the ‘other economic activities’ (which is a part the business services sector).