

Warsaw School of Economics
Enterprise Institute

**Labour market in selected sectors of economy in
Mazowieckie 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 Mazowieckie voivodship in selected sectors of high technology that is 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.

Mazowieckie voivodship disposes at considerable work resources potential in comparison to the country average which makes up about 15 % of the total employment in Poland. In 2005–2006 the number of employed persons increased by almost 16%. This fact along with the migration outflow influenced the change in basic labour market parameters of Mazowieckie 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 47.8% to 51.9% and in the entire period under analysis oscillated over the country average level. Nonetheless, a half of work resources in Mazowieckie voivodship remains unused.

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

No.	Basic parameters of labour market	2005	2006	2007
1	Employed persons (in thousands)	1 979	2 144	2 291
2	Employment the rate (in %)	47.8	49.9	51.9
3	Unemployed persons (in thousands)	332.5	285.6	219.9
4	Unemployment the rate according to BAEL (in %)	14.8	12.2	9.1
5	Work offers	2 057	2 678	4 432
6	The unemployed number per 1 work offer	161.7	106.7	49.6

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 Mazowieckie voivodship the number of unemployed fell by 34 %. The unemployment the rate according to BAEL in the period under analysis fell by 5.7 percentage points. The rate of registered unemployment in the analysed period equalled 13.8%, 11.8%, and 9.3%, 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 Mazowieckie voivodship in the period 2005-2007. In 2007, 1510 mid-sized and large enterprises of the analysed sectors (employing more than 10 persons) were located in Mazowieckie voivodship. Most of the enterprises represented the business services sector and engineering and electronics industries. In 2005-2007 the majority of new companies appeared in the aviation sector, the engineering industry, the business services sector and the medical biotechnology sector. The number of large and mid-sized enterprises fell in electronics and automotive sectors.

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

Sector	2005	2007	Pace of change 2005-2007*
Medical biotechnology sector	44	45	2.27%
Engineering industry	175	180	2.86%
Electronics industry	122	112	-8.20%
Automotive industry	38	37	-2.63%
Aviation industry	3	4	33.33%
Business services	1079	1132	4.91%
Sectors total	1461	1510	3.35%

*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 Mazowieckie voivodship amounted to 1 295 670 persons (Table 3) 20.43% of which were employed in the selected sectors (264 643 persons). In the period 2005-2007 the employment in the sectors under analysis in the voivodship increased from 19.7% in 2005 to 20.43% in the 1st half of 2008. In the 1st half of 2008 the highest average employment was reported in the business services sector and engineering and electronics 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-Dec 2008

Engineering industry	26 233	29 040	30 763	32 866
Electronics industry	19 180	22 083	20 411	18 863
Medical biotechnology sector	8 564	8 801	8 173	7 973
Automotive industry	6 631	6 854	7 748	8 479
Aviation industry **	164 339	171 691	181 028	196 462
Business services	963	no data	998	no data
Sectors total	225 910	238 469	249 121	264 643
TOTAL average employment in the enterprises sector in Mazowieckie voivodship	1 146 517	1 182 895	1 241 035	1 295 670
Employment levels in the analysed sectors in the voivodship	19.70%	20.16%	20.07%	20.43%

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

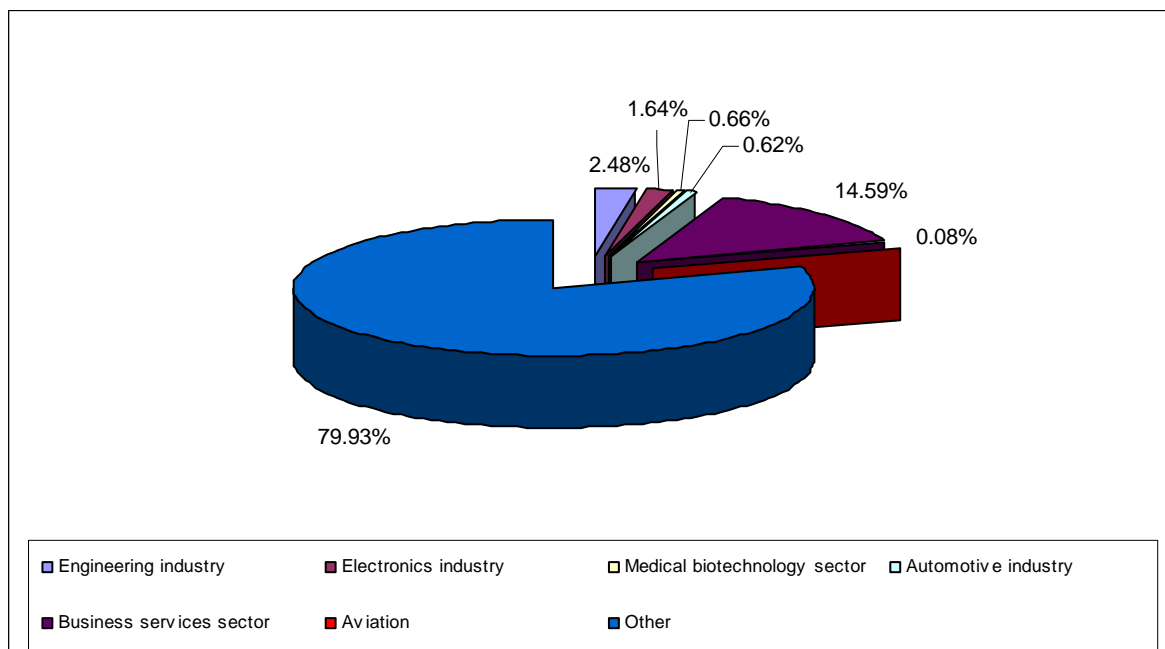
(the pace at the beginning of the analysed period – the pace at the end of the analysed period) / the pace at the end of the analysed period.

** 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 Mazowieckie voivodship* and the PONT INFO database.

The highest employment level in the analysed sectors in the voivodship was in the business services sector (14.59%) and the engineering industry (2.48%), whereas the electronics industry (1.64%), medical biotechnology sector (0.66%), the automotive industry (0.62%) and the aviation industry (0.08%) were lower in the rating.

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



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

Table 4 presents the average employment in the sectors under analysis and in the number of persons employed in Poland and in Mazowieckie voivodship as of the end of December 2007. The employment in the analysed sectors in the voivodship is slightly lower than the country average. In Mazowieckie voivodship the employment in the business services sector, the electronics 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 Mazowieckie voivodship. The percentage of persons employed in the analysed sectors in Mazowieckie voivodship is lower than the country average.

In Mazowieckie voivodship the employment in the analysed sectors grows at a slower pace than the country average. However, the situation varies by specific sectors. The number of persons employed in the engineering sector grows faster average in Poland. In the business services sector, in turn, the increase in Mazowieckie voivodship is at similar level as in Poland. In other sectors under analysis the employment growth was lower in Mazowieckie voivodship than the country average. In 2005-2007 the average employment in the medical biotechnology sector in Mazowieckie voivodship decreased.

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 Mazowieckie 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	
	Mazowieckie voivodship	Poland	Mazowieckie voivodship	Poland
Engineering sector	2.48%	5.04%	17.27%	11.55%
Electronics sector	1.64%	1.34%	6.42%	16.13%
Medical biotechnology sector	0.66%	0.49%	-4.57%	6.10%
Automotive industry	0.62%	2.40%	16.85%	23.23%
Business services sector	14.59%	10.91%	10.16%	9.91%
Aviation sector**	0.08%	0.30%	3.63%	9.63%
Sectors total	20.07%	20.49%	10.27%	12.03%
TOTAL average employment in the enterprises sector in Mazowieckie voivodship	100.00%	100.00%	8.24%	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 Mazowieckie 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 Mazowieckie voivodship this figure 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 Mazowieckie voivodship it 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 lyceums	Technical secondary schools	General lyceums
POLNAD	278	12%	17%	11%	16%	44%
Mazowieckie voivodship	273	10%	14%	10%	14%	52%

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*:
 - 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).]

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 797 are located in Mazowieckie voivodship (11.4%).

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:

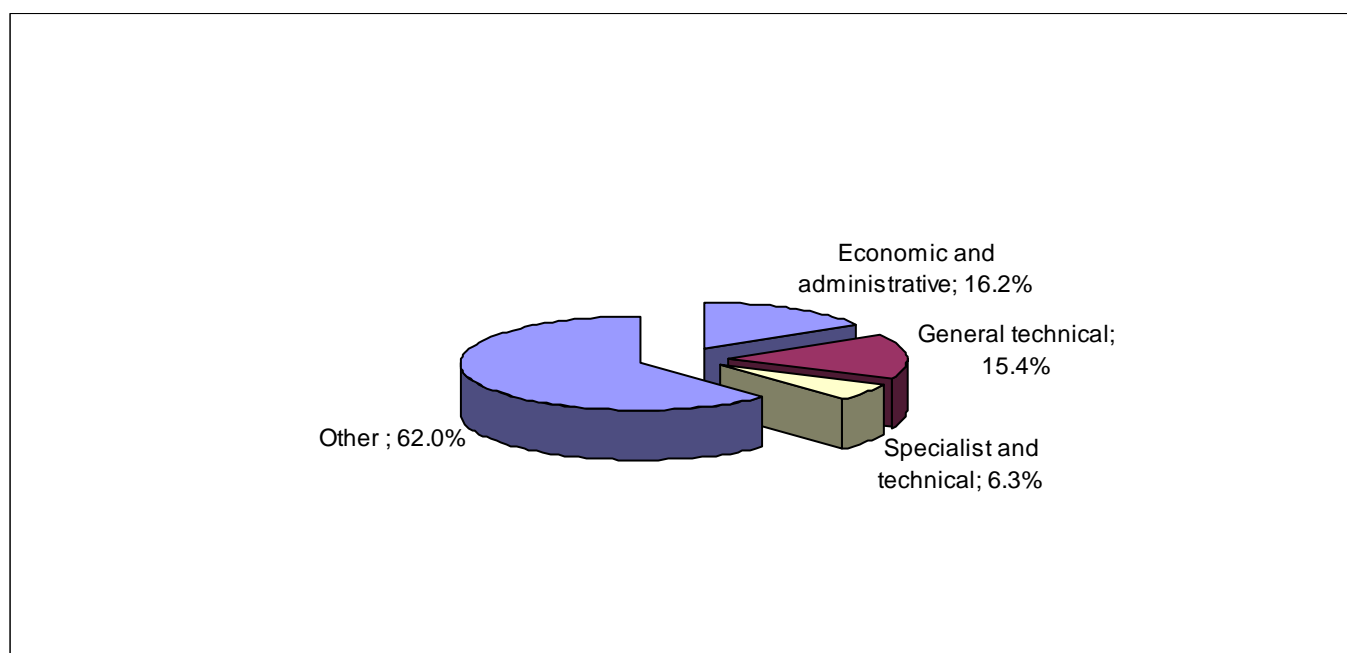
- economic and administrative (this group covers economic and administrative professions offered by specialised lyceums, such as: administrative clerk, technician of occupational hygiene and workplace safety, technician of economy, trade technician, office technician, accounting technician),
- general 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 in Mazowieckie voivodship 139 056 persons studied at post-gymnasium vocational schools of which 52 777 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 regarding the percentage of persons learning the professions demanded by the sectors under analysis are higher than the country average. In fact, Mazowieckie voivodship is the third region (after the above-mentioned Śląskie

voivodship and Wielkopolskie voivodship) with the highest indicators of the number of learners studying the professions required by the analysed sectors with respect to the total number of learners in a given region. From the point of view of enterprises operating in high technology sectors, the most desirable persons are those of specialist and technical professions. In Mazowieckie voivodship the percentage of persons studying specialist and technical specialisations equals 8.07%.

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

Graph 2. Post-gymnasium school learners structure in Mazowieckie 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 Mazowieckie voivodship and in Poland by profession groups which are demanded by the analysed sectors. The average percentage of learners in Mazowieckie voivodship in the total number of persons in Poland studying the specialisations concerned equals 10.26%. Over 10% of the post-gymnasium school learners in Podkarpackie voivodship (in comparison to the entire country) study the occupations of: aircraft technician/mechanic, mechanical production techniques,

economic and administrative professions (specialised lyceum). These are certainly regional specialisations of the voivodship. The profession of aircraft technician/mechanic is a particular example, as nearly one third is trained in Mazowieckie region.

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

Profession	Mazowieckie voivodship	Total in Poland	Percentage of Mazowieckie voivodship [%]
Aircraft technician/mechanic	156	479	32.57%
Mechanical production techniques	57	341	16.72%
Economic and administrative professions (specialised lyceum)	5038	30 754	16.38%
Mechanic of industrial automatic machines and precision devices	43	306	14.05%
Electroradiologist	94	697	13.49%
Car mechanic	5025	39 173	12.83%
Electronics fitter	356	2 866	12.42%
Technician/mechanic	8 378	69 907	11.98%
Administrative clerk	4119	34 901	11.80%
Technician of teleinformation	540	5 040	10.71%
Mechatronics technician (specialised lyceum)	177	1 696	10.44%
Electrician	647	6 213	10.41%
Electronics technician (specialised lyceum)	125	1 201	10.41%
Mechanic/fitter of machines and devices	429	4 146	10.35%
Office works technician	471	4 683	10.06%
Trade technician	3 193	32 838	9.72%
IT technician	8 046	85 429	9.42%
Economic technician	8 111	87 113	9.31%
Car tinsmith	280	3 418	8.19%
Electronics technician	2705	33 346	8.11%
Technician of occupational hygiene and workplace safety	971	12 570	7.72%
Accounting technician	611	7 922	7.71%
Technician of logistics	1 210	16 372	7.39%
Mechatronics technician	808	11 056	7.31%
Car electric/mechanic	422	6 303	6.70%
CNC operator	217	3 358	6.46%
Technician of telecommunication	226	3 795	5.96%
Forwarding technician	196	3 915	5.01%
Operator of chemical industry devices	2	45	4.44%
Electric/mechanic	124	3 342	3.71%
Total	52 777	514 540	10.26%

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 Mazowieckie 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
POLSKA	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, 104 universities (which constitutes over 23% of all the universities in Poland) operated in Mazowieckie voivodship which attended the total of 347964 students (that is 18% of all the students in Poland). The following types of universities are located in the voivodship: 2 universities, 5 higher technical universities, 26 academies of economics, one medical university and 50 other types of universities (including public higher vocational schools).

In terms of the number of students, one of the largest universities of the region is Uniwersytet Warszawski (University of Warsaw) which attend 56.2 thousand students. Another large academic centres of the region are listed below: Politechnika Warszawska (Warsaw University of Technology) (over 31 thousand students), Politechnika Radomska (Technical University of Radom) (over 17 thousand students) Uniwersytet im. Kardynała Wyszyńskiego (Cardinal Stefan Wyszyński University in Warsaw) (over 15.8 thousand students), Akademia Podlaska w Siedlcach (Academy of Podlasie in Siedlce) (about 13

thousand students), Szkoła Główna Handlowa w Warszawie (Warsaw School of Economics) (about 12 thousand students) and Akademia Medyczna w Warszawie (Medical University of Warsaw) (about 6.7 thousand students).

In the context of employment in the analysed sectors, it is worth emphasizing that rare specialisations are offered at the above-mentioned universities, such as microelectronics, optoelectronics and radioelectronics which are taught at the Warsaw University of Technology.

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

In 2007 in Mazowieckie voivodship the total number of university graduates equalled 76198 persons, which was 19% 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 Mazowieckie voivodship this number is higher than the country average and equals 211. 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 Mazowieckie voivodship it equals 9.4%.¹

The analysis showed an increase of university graduates by 16% in the voivodship in 2004 -2007 and the average in the entire country was 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 Mazowieckie voivodship in 2007, it can be observed that:

- the graduates number of engineering and technical specialisations was relatively high and equalled 10%; (the country average: 9%).

- 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%); computer sciences: 3% (the country average: 4%).

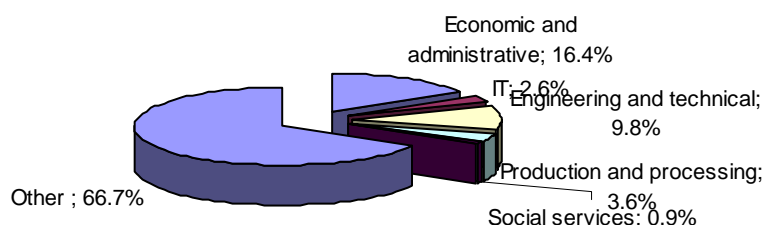
The main entities teaching strictly technical specialisations are public universities. As of 30th November 2007 only 4% of students of engineering and technical as well as production and processing specialisations study at private universities. There are several reasons for this situation. Technical 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 Mazowieckie voivodship 61962 persons study the specialisations demanded by the analysed sectors which constitutes 13.36% 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 Mazowieckie voivodship the percentage of students of the region in all the study sub-groups in comparison to all the persons belonging to the same study sub-groups in Poland exceeds the country average.

Graph 3. Student structure at public universities in Mazowieckie 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 11th October 2008.

4. Research fellows

In 2005, 16 385 academic teachers were in Mazowieckie voivodship. In 2007 their number increased by about 0.5% (16 464 persons). It constituted 16.6% of the total of

academic teachers in Poland. The highest growth was reported in the group of lecturers (by 3%). There was also a slight one of senior lecturers. The number of professors and assistants fell.

The table below presents the changing figures regarding academic teachers in selected types of universities. The majority of academic teachers of Mazowieckie voivodship is employed at universities that is 24% (the Polish average: 31%), higher technical universities (about 19%) and at schools of economics (about 16%).

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

University type	POLAND					Mazowieckie 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%	3 718	3 802	3 910	23.75%	5.16%
Higher technical universities	19 446	19 437	19 261	19.41%	-0.95%	3 086	3 096	3 106	18.87%	0.65%
Schools of Economics	10 884	10 761	11 010	11.10%	1.16%	2 720	2 647	2 616	15.89%	-3.82%
Higher vocational universities	9 717	9 830	9 933	10.01%	2.22%	1 401	1 443	1 462	8.88%	4.35%
Total	8 608	9 072	9 597	9.67%	11.49%	1 149	1 119	1 130	6.86%	-1.65%
Total in the region	79 004	79 717	80 753	81.39%		12 074	12 107	12 224	74.25%	
Universities	97 702	98 262	99 221	100.00%	1.55%	16 385	16 325	16 464	100.00%	0.48%

*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, 33492 persons worked in the field of research and development (the Polish total: 121283)² 73.6% of which constituted scientific and research fellows, technicians and the equivalent staff and the other personnel: 14.1% and 12.3%, respectively. The education level structure of persons employed in the research and development activity in Mazowieckie voivodship was as follows: professors: 7.7%; habilitated doctors (hab. Ph.D.): 8%, doctors (Ph.D.): 27.9%; other persons with higher education: 36.6%, persons employed of other

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

education: 19.8%. The indicator of employment in the research and development activity per 1000 economically active persons in Mazowieckie voivodship equals 9.8 which is considerably above the average indicator of Poland (4.3).

By the end of 2006, 320 research and development entities were located in Mazowieckie voivodship, The list of selected centres which influence the activity of the sectors under analysis ³ is presented below:

- Warszawski Park Technologiczny Technoport S.A. (Warsaw Technology Park „TechnoPort”): new technologies, IT, biotechnology, business services, commerce;
- Płocki Park Przemysłowo – Technologiczny (Płock Industry and Technology Park): chemical , biochemical, refinery sectors, new technologies;
- Instytut Farmaceutyczny (Pharmaceutical Research Institute): the pharmaceutical sector;
- Instytut Lotnictwa (Institute of Aviation): the aviation industry;
- Przemysłowy Instytut Telekomunikacji (Telecommunications Research Institute): the telecommunication sector;
- Krajowa Izba Gospodarcza Elektroniki i Telekomunikacji (Polish Electronics and Telecommunications Chamber of Commerce): electronics and telecommunication sectors;
- Fundacja Centrum Innowacji FIRE (Foundation for Innovations, Restructuring, Entrepreneurship): new technologies;
- Instytut Elektrotechniki (Electrotechnical Institute): the electrotechnical sector.

5. Unemployment – surplus/shortage professions

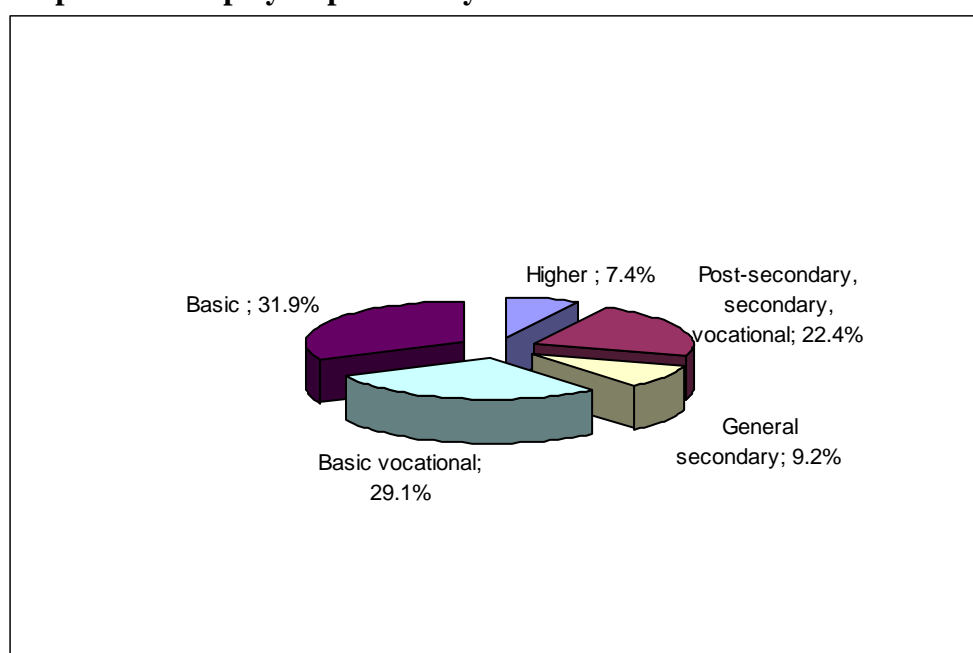
Basic information on the number of unemployed persons, the unemployment rate and the unemployed number per one work offer in Mazowieckie voivodship were presented in Table 1.

In 2007 in Poland the percentage of unemployed persons of higher education increased to 6% from 7% in 2005 (Table 13). In Mazowieckie voivodship the percentage grew from 6% in 2005 to 7% in 2007. In the analysed period 2005–2007, the percentage of unemployed

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

persons with post-secondary and secondary education in Poland amounted to 22%. In Mazowieckie voivodship the unemployment in this education group fell from 23% to 23%, 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 the number of persons with general vocational education fell from 33% in 2005 to 30% in 2007 (in Mazowieckie voivodship: from 32% to 29%). In the analysed period in Poland, the number of persons with basic education did not change and amounted to 32%. In Mazowieckie voivodship it also remained unchanged (26%). Graph 4 presents the structure of the unemployed persons in Mazowieckie voivodship in 2007.

Graph 4. Unemployed persons by education level in Mazowieckie 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>POLSKA</i>	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-	-	-	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 Mazowieckie voivodship by professions and specialisations. The persons with the professions of office worker, ancillary worker in the processing industry and economic assistant 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 Mazowieckie voivodship

Profession/specialisation	The unemployed number as of end of 2007	The unemployed percentage in the voivodship as end of Dec 2007
Administrative clerk* (profession learnt: technician of administration)	5 396	2.50%
Ancillary worker in the processing industry	4 914	2.20%
Economic assistant* (profession learnt: economic technician)	4 632	2.10%
Technician/mechanic*	3 428	1.60%
Economist	2 945	1.30%
Car mechanic	2 431	1.10%
Administrative clerk* (profession learnt: technician of administration)	1 402	0.60%
Bookkeeper (independent)	899	0.40%
Specialist for marketing and commerce (sales)	805	0.40%
Electronics technician *	776	0.40%
Mechanic of industrial machines and devices	664	0.30%
Other vehicles mechanic	578	0.30%
Secretary	568	0.30%

** 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*, PAIiZ, 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 Mazowieckie voivodship. In Mazowieckie voivodship the following shortage professions were related to the sectors under analysis: managers of large and mid-sized organisations, managers of small enterprises, office services clerks, money flow and customer services clerks. 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: intermediate technical personnel, other specialists, specialists for physical, mathematical and technical sciences, metalworking industry workers, mechanics of machines and devices, precision worker occupations, ceramists, leather haberdashery producers, printing industry workers and related professions, machine operators and fitters.⁴

⁴ Monitoring of surplus and shortage professions in Mazowieckie voivodship in 2007; the Voivodship Labour Office in Warsaw, Warsaw, April 2008.

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 by the Enterprise Institute show that in the recent two years the labour Office located in Mazowieckie voivodship have organised trainings commissioned by the enterprises of the analysed sectors, such as a training for operators of digitally controlled machine tools. Some of the reasons for not taking up a job by the trained persons were low remuneration, more attractive work offers, lack of perspectives of professional development and inconvenient commuting.

6. Wages vs. expected wages

In the 1st half of 2008 the average gross monthly remuneration in the sector of enterprises in Mazowieckie voivodship amounted to 3865.76 PLN and it made up 122.66% of the average remuneration in Poland (Table 11). In 2005–2007 this percentage oscillated between 123.78% (in 2007) to 126,69% (in 2005). In the 1st half of 2008 the highest remuneration was offered in the medical biotechnology sector and the lowest in turn in the automotive sector. In the period 2005-1st half of 2008 the average gross monthly remuneration in the voivodship increased by nearly 21.91% (Poland: by 25.91%). The highest increase in wages of the analysed sectors was reported in the engineering sector and the lowest one in the automotive industry.

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	3 240.49	3 376.80	3 649.49	3 959.33	22.18%
Electronics sector	3 297.09	3 196.06	3 713.36	3 960.59	20.12%
Medical biotechnology sector	3 747.00	3 937.63	4 073.04	4 456.77	18.94%
Automotive industry	2 515.80	2 448.00	2 649.81	2 740.21	8.92%
Business services sector	3 680.40	3 863.25	4 120.17	4 471.36	21.49%
Aviation sector	no data	no data	no data	no data	no data
Total average gross monthly remuneration in the sector of enterprises in Mazowieckie voivodship	3 170.96	3 316.95	3 566.26	3 865.76	21.91%

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%
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*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 Mazowieckie 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 managerial staff. (Table 12). In Poland, the highest average gross monthly remuneration in the analysed sectors of the managerial 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.

The results of the analysis carried out by the Enterprise Institute indicate that in most of the cases wages 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.

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'

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

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

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 two branches of the business services sector (finance, insurance and IT ancillary activities) and also in the aviation sector. The growth of the percentage of 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) as well as post and telecommunication (sub-group 64) which are 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 Mazowieckie voivodship. 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 medical biotechnology sector, the engineering sector, manufacture of medical, precision and optical instruments, watches and clocks (which is included in the electronics sector), the automotive industry as well as in two branches of the business services sector (post and telecommunication and finance and insurance auxiliary activities).

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

Sector	PKD	Mazowieckie voivodship	Poland
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	(PCA)	2005	2007	Change 2005-2007 [p.p.]	2005	2007	Change 2005- 2007 [p.p.]
Medical biotechnology sector	24.4	17.76	15.78	-1.98	14.93	13.07	-1.86
Engineering sector	29	11.47	9.85	-1.62	17.62	15.77	-1.85
	31	14.16	13.52	-0.64	13.04	12.67	-0.37
Electronics sector	32	7.37	7.75	0.38	8.58	8.23	-0.35
	33	19.63	18.44	-1.19	23.31	21.71	-1.6
Automotive sector	34	9.91	7.89	-2.02	6.33	6.76	0.43
Aviation sector	35.3	(.)	33.55	no data	33.07	35.51	2.44
Business services	64	17.21	11.1	-6.11	17.13	17.31	0.18
	65	14.41	18.15	3.74	14.96	13.67	-1.29
	67	22.31	19.63	-2.68	8.09	11.5	3.41
	70.3	15.77	20.55	4.78	17.1	18.66	1.56
	72	22.95	24.88	1.93	22.99	26.11	3.12
	74	25.31	27.12	1.81	31.29	29.95	-1.34
Sections total (in the region)		10	9.81	-0.19	10.78	10.49	-0.29

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

Conclusions

In the period 2005-2007 in Mazowieckie voivodship the number of economic entities of the analysed sectors. The average employment in the sectors under analysis grew as well. The highest employment in the analysed sectors in Mazowieckie voivodship was in the business services sector (14.6%) and the engineering industry (2.5%), whereas the electronics sector (1.64%), the automotive industry and the medical biotechnology sector (about 0.6%) and aviation sector (0.08%) were lower in the ranking. In comparison to the entire country, the employment in the employment the business services sector, the electronics industry as well as the medical biotechnology sector in Mazowieckie voivodship is higher than average. In Mazowieckie voivodship the pace of increase in the average employment in the analysed sectors was slower than the country average.

In terms of the sectors under analysis, the graduates of technical secondary schools are particularly desirable. In Mazowieckie voivodship the percentage of technical secondary school graduates in the total of graduates is higher than the country average. The professions which the students of post-gymnasium schools gain, generally meet the requirements of the analysed sectors. Mazowieckie voivodship is the third region with the highest indicators of the number of learners studying the professions required by the analysed sectors with respect to the total number of learners in a given region. It has to be emphasised that Mazowieckie voivodship is a leader in teaching of specific specialisations. The profession of aircraft

technician/mechanic is a particular example, as nearly one third is trained in Mazowieckie region.

It is observed that in Mazowieckie voivodship the trend of university graduates is growing. Taking account of the needs of the analysed sectors, the percentage of graduates of engineering and technical specialisations is relatively high.

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

In the period 2005–2007 in Mazowieckie voivodship, a 22% 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 engineering sector, whereas it was lower in the automotive industry.

In Mazowieckie 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 medical biotechnology sector, the engineering sector, the manufacture of medical, precision and optical instruments, watches and clocks (which is included in the electronics sector) as well as in two branches of the business services sector (post and telecommunication and finance and insurance auxiliary activities).