

**Warsaw School of Economics**  
**Enterprise Institute**

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

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## Introduction

This report presents basic parameters of the labour market in Zachodniopomorskie voivodship for selected economy sectors, i.e.: engineering, electronics, automotive, aviation, biotechnology, and business services in 2008 and changes thereof in the years 2005 - 2008.

Zachodniopomorskie has 3.7% of the country's employees, however their number was changing in the analysed period. In the years 2005 - 2007 it decreased by 1.6%. This phenomenon connected with migrations of people had an impact on basic parameters of the labour market in Zachodniopomorskie voivodship, including: unemployment rate, employment rate, unemployment intensity, occupation shortage rate, etc. In 2005 - 2007 the employment rate rose from 41.8 to 43.7% and throughout the analysed period stayed below the national average. What is more, with time the discrepancy between the region and the country was increasing. Low employment rate in the voivodship was the consequence of not only the insufficient number of new jobs, but also of people's high employment inactivity. At the beginning of 2008 there were 7 professionally inactive men per 10 active ones, and 13 inactive women per 10 active ones<sup>1</sup>.

Table 1. Basic parameters of the labour market in Zachodniopomorskie voivodship 2005 - 2007

	<b>basic labour market parameters</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
1	2	3	4	5
1	employees in thous.	551	542	542
2	employment rate in %	41,8	42,1	43,7
3	number of the unemployed in thous.	169	139	103
5	unemployment rate acc. to LFS in %	25,6	21,5	16,6
6	job offers	712	1 401	1 455
7	nuber of the unemployed per 1 job offer	237	99	71

Source: own document based on Regional Data of CSO.

In the period 2005 - end of 2nd quarter of 2008 the number of unemployed people went down by 52%. Comparing the decrease rate of the number of unemployed people with the decrease of the number of employees one may conclude that migrations played a very important role in labour market changes. Consequently, the unemployment rate in the analysed period went down from 25.6% in 2005 to 13.4% by the end of the second quarter of 2008, however it was higher than the national average (in the first two quarters of 2008 the unemployment rate in Poland was 9.6%). The growing number of job offers in the years 2005 - 2007 (104%) undoubtedly contributed to the decrease of the unemployment rate; as a result,

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<sup>1</sup> *Employment activity in Zachodniopomorskie voivodship*, Statistical Office in Szczecin, Szczecin 2008.

the number of unemployed people per one job offer fell significantly from 237 persons in 2005 to 70 in 2007 (Table 1). The abovementioned trends were accompanied by a 13.4% increase of average gross wages; however wages in the region throughout this period were lower from the national average.

### **1. Employment in selected economy sectors compared with nationwide situation**

Negative trends in the labour market (decreasing number of employees by 1.6%) do not correspond to the pace of changes in employment in all high technology sectors. The number of the latter<sup>2</sup> in the years 2005 - 2007 in the voivodship went up by 26% while the number of employees in high technology sectors nationwide increased by 19%. As a consequence, the share of the region's employees in the overall number of employees in Poland increase, however it was different depending on the sector. Nevertheless, from the point of view of national economy, none of the analysed high technology sectors is strongly concentrated in Zachodniopomorskie voivodship. Electronics sector is relatively important, in terms of the number of employees. 2007 estimates suggest that ca. 5 - 6% of this sector's employees in Poland worked in companies located in Zachodniopomorskie voivodship. The group of the largest employers in the region's electronics sector include: Ahlstromforetagen Svenska AB and Sonion Microtronic A/S.

Zachodniopomorskie has also ca. 4% of the country's employees in engineering industry and ca. 2 - 1% of business services and automotive sectors. The region's biotechnology sector plays a marginal role in the country.

Since the employment growth rate in high technology sectors was higher than the regional average, in the years 2005 - 2007 employment in these sectors compared with the overall number of employees increased slightly from 3.3% to ca. 4% (it was accompanied by a 19% increase of the number of enterprises in the sector), nevertheless the share was smaller than the national average (7.2% and 7.6% respectively). The abovementioned processes occurred with different intensity in each sector. In the years 2005 - 2007 in Zachodniopomorskie voivodship the highest average employment occurred in the business services sector - 13 337 persons, and its growth rate in the years 2005 - 2008 reached 25.3%.

Taking into the account creation of new jobs, the second position among the selected sectors in the region was taken by the electronics sector. The average employment growth rate

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<sup>2</sup> Excluding representatives of selected sections for whom data for 2005 were missing; this prevented calculation of change dynamics.

in the latter sector was very high reaching 28% - the highest change dynamics among the analysed sectors.

Table 2. Average employment in the selected high-technology sectors in Zachodniopomorskie voivodship in the years 2005 - 2008; enterprises employing 9 persons and more

		business services sector	engineering sector	electronics sector*	automotive sector	TOTAL in voivodship (with the exception of farming)
1	2	3	4	5	6	7
1	average employment in the enterprises sector (I-XII 2005)	10646	2843	3182	1351	149724
2	average employment in the enterprises sector (I-XII 2006)	12822	3153	3874	1377	155163
3	average employment in the enterprises sector (I-XII 2007)	14099	3380	3843	1393	160311
4	average employment in the enterprises sector (I-VI 2008)	13337	3501	4082	1380	163509
5	<b>employment change dynamics 2005-2008</b>	<b>125,3</b>	<b>123,1</b>	<b>128,3</b>	<b>102,1</b>	<b>109,2</b>

\* estimated data

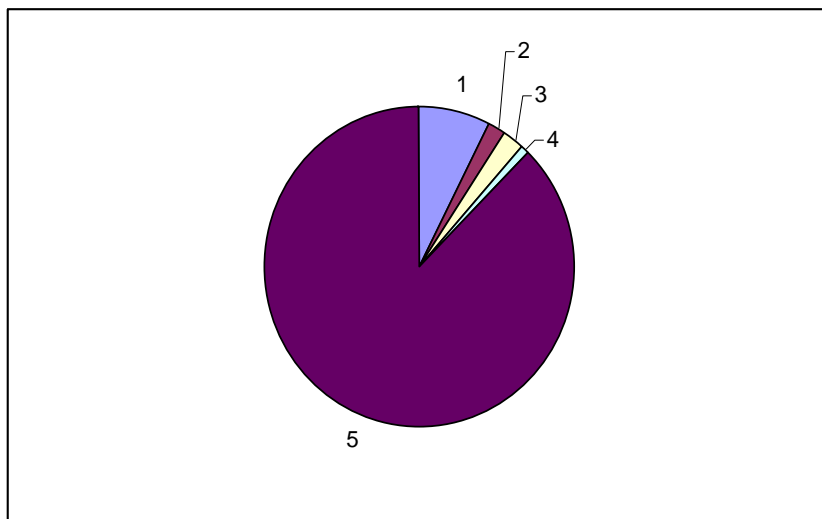
No data for the biotechnology sector.

Source: document prepared by WSE Enterprise Institute on the basis of "Statistical bulletins" for Zachodniopomorskie voivodship.

In 2008 the third position in the region (in terms of average employment in the selected sectors) was taken by the engineering industry with a ca. 23% employment increase from 2005 to 2008.

At the end of the analysed period the lowest employment among the high technology sectors occurred in the automotive industry. Changes of the average employment in the latter sector, in comparison with others, were the least positive. In the years 2005 - 2008 the average employment in the automotive industry increased by only 2%.

Graph 1. Share of employees working in the analysed sectors in the overall number of employees in Zachodniopomorskie voivodship in 2008; enterprises employing 9 persons and more



Key:

1. business services sector
2. engineering sector
3. electronics sector
5. automotive sector
6. other sectors.

Source: own document based on Table 1.

Due to the lack of statistical data the analysis does not include biotechnology and aviation industries. Even though the former sector occupies a much lower position than other sectors in the region, it is still present there; fields of training provided by the voivodship's educational system support biotechnology.

## 2. Graduates of post-gymnasium schools: numbers, fields of study, knowledge of languages \*

\* 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)

High technology sectors have strong demand for employees with higher, as well as secondary technical and often specialist education background. An important role in meeting the demand is played by the local education system, in particular fields of study offered on post-gymnasium and higher school levels.

In Zachodniopomorskie there are almost 67.7 thousand students of post-gymnasium schools. Like in other regions in Poland, the largest group are general lyceum students; graduates of these schools every year constitute ca. 45% of all post-gymnasium school graduates. In terms of the number of graduates the following places are occupied by: post-secondary vocational schools (17%), technical schools (14%), and vocational schools (11%).

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 includes economic and administrative professions gained in specialised lyceums, such as: administrative technician, occupational hygiene and workplace safety technician, economy technician, trade technician, office technician, accounting technician),
- general technical (this group includes technical professions, such as: IT technician, mechanic, car mechanic),
- specialised technical (this group includes: automotive body repairer, electronics engineer, electrical engineering technician, electromechanic, electrician, car electromechanic, mechanic production technicians, mechanical machine fitter, industrial automatic devices and precision appliances mechanic, precision mechanic, mechatronics fitter, electronic fitter, mechatronics fitter, machine tools operator, chemical industry devices operator, electronics technician, electroradiologist, logistics technician, aircraft mechanics technician, mechatronics technician, forwarding agent, ITC technician, telecommunications technician).

In Zachodniopomorskie voivodship there are in total 17.6 thousand pupils studying the abovementioned occupation-oriented fields of training, which is equivalent to 3.4% of all pupils studying these subjects nationwide. From the point of view of high technology enterprises the most desired group are people with specialised technical professions. The share of pupils studying specialised technical subjects in the total number of all occupation-

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- uniform 5-year magister level courses (jednolite studia magisterskie)

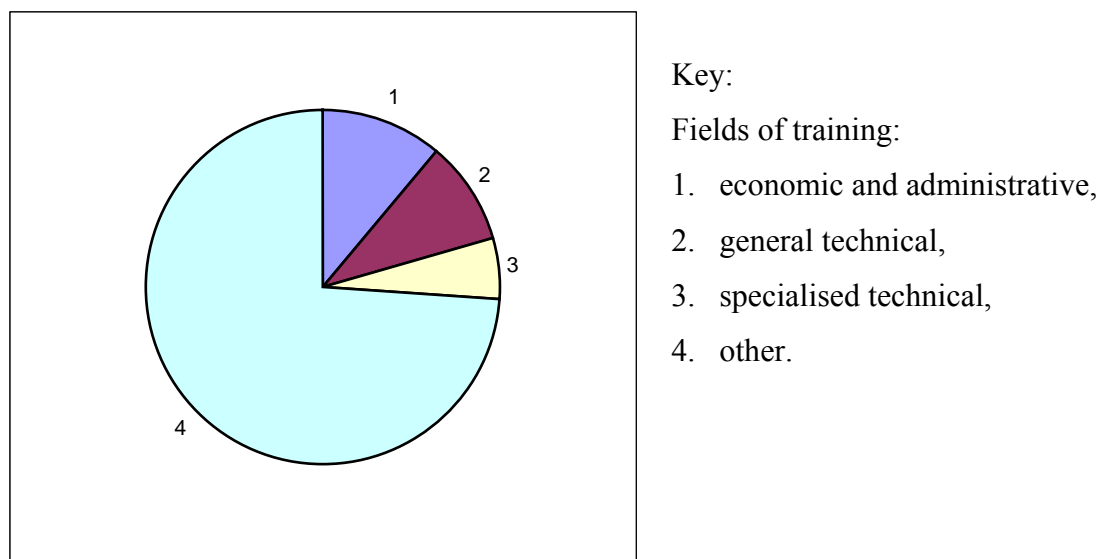
[translator's annotation on the basis of *The European Education Directory*  
<http://www.euroeducation.net/prof/polaco.htm>. (accessed: 15<sup>th</sup> December 2008).]

oriented students in Zachodniopomorskie is 20.8%, which is 0.4 percentage point lower than the national average.

The largest portion of students - 42.3% study economic and administrative professions, i.e. 1.3 percentage points more than the national average. Number of pupils in the voivodship studying general technical professions is lower than the national average. Consequently, in terms of individual occupations, and in comparison with the nationwide average, in Pomorskie voivodship there is a large number of people learning the following professions: economy technician, IT technician, and mechanics technician.

From the point of view of training specialists who may find work in the selected high technology sectors, it is a positive phenomenon that in the voivodship there are two technical schools providing training in mechatronics (41 students), as well as 26 technical schools providing training in maritime navigation (260 students).

Graph 2. Structure of post-gymnasium schools students in Zachodniopomorskie by type of training in the school year 2006/2007



Source: own document based on SIO database - as of 31.03.08

Under the conditions of open national economy and strong link between high technology sectors and the world economy, language learning is a very important field of education. In post-gymnasium schools of the voivodship there is ca. 63.8 thousand students learning foreign

languages (92.4% of all students), including 48.8% learning German, and ca. 44.5% - English<sup>3</sup>.

**Table 3. Number of students learning foreign languages in vocational schools in the school year 2006/2007 – by voivodship**

<b>Voivodship</b>	<b>English</b>	<b>French</b>	<b>German</b>	<b>Russian</b>	<b>Other</b>	<b>Total</b>
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
<b>Zachodniopomorskie</b>	<b>28 417</b>	<b>1 501</b>	<b>31 179</b>	<b>2 747</b>	<b>0</b>	<b>63 844</b>
<b>Poland</b>	<b>718 595</b>	<b>47 548</b>	<b>614 579</b>	<b>158 112</b>	<b>2 014</b>	<b>1 540 848</b>

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

In vocational schools majority of students learn German, and slightly smaller group learns English – table 3. Vocational schools students learning German constituted in the school year 2006/2007 ca. 54% of post-secondary schools students learning the language in obligatory and extended programmes, and 5.1% of vocational schools students in Poland learning the language. In the case of English the share was 48% and 4% respectively.

### **3. Graduates of higher schools: numbers and fields of study**

In Pomorskie there are 18 higher schools (including 12 non-public ones) attended by ca. 84 thousand students. In terms of the number of students the biggest educational establishment is Uniwersytet Szczeciński (University of Szczecin) with ca. 33 thousand students. Other large academic centres in the region are: Politechnika Szczecińska (Szczecin University of Technology) with over 11.5 thousand students, Akademia Rolnicza w

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Statistical data: *Oświata i wychowanie w roku szkolnym 2006/2007 (Education and training in the school year 2006/2007)*, GUS Warszawa 2007.



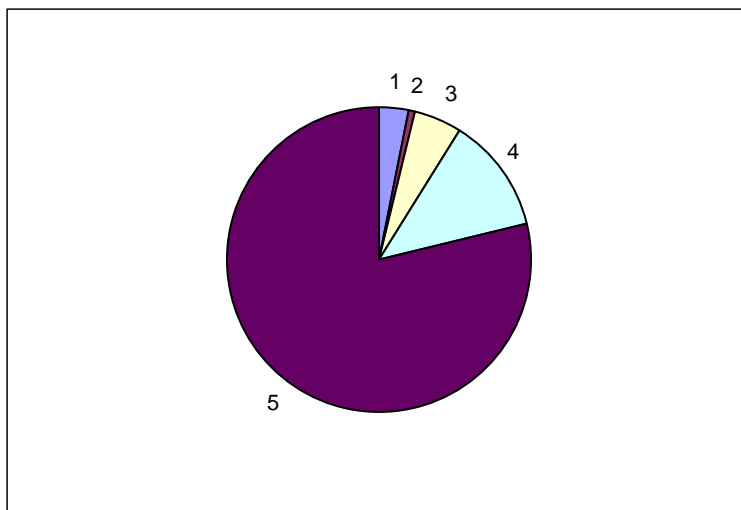
Szczecinie (University of Agriculture in Szczecin) with ca. 10.2 thousand students, and Politechnika Koszalińska (Koszalin University of Technology) with 10 thousand students. All of the establishments attach great importance to technical and/or natural science faculties. Dominant faculties at University of Szczecin, the largest university in the region, include: economy, law, humanities, but also biology, physics and mathematics. At the Agricultural University biotechnology is one of the major faculties, alongside agriculture, fishery and economy.

In Zachodniopomorskie voivodship there are two more smaller, in terms of the number of students, public occupationally-oriented higher schools. Namely: Akademia Morska w Szczecinie (Maritime University of Szczecin) with ca. 4 thousand students, and Akademia Medyczna w Szczecinie (Pomeranian Medical University) with ca. 2 thousand students. Annually, around 13 thousand people graduate from all the abovementioned higher schools (including 40% of graduates of both Technical Universities); this number constitutes over 80% of graduates of all higher schools in the region.

Other higher education establishments in Zachodniopomorskie region are non-public schools with dominant humanist and economic faculties. In the region there are no non-public technical or medical universities. Under Polish conditions non-public higher technical schools do not develop due to bigger capital needs. On the other hand, as it has been mentioned before, technical and natural science faculties play an important role in the voivodship's public higher education sector.

Under such circumstances the public higher education sector is the only source of information about fields of training corresponding with needs of the high technology sectors. In 2007 at the voivodship's public schools there were 23.1 thousand students (ca. 27.5% of all students) in the following five educational fields chosen for further analysis: economy and administration, information technology, engineering, production and processing and services; this number constituted ca. 5% of students in the abovementioned faculties nationwide. The largest population in this group were students of administration and economy - 7 704 (33.1%) and engineering - 7 555 people (32.7%). The following places, in terms of the number of students, were taken by: information technology - 3 377 persons, production and processing - 3 076 persons, and services - 1 401 persons.

Graph 3. Structure of higher schools graduates in Zachodniopomorskie voivodship by faculty in 2007.



Key:

1. faculties of biology
2. faculties of physics
3. faculties of information technology
4. faculties of engineering
5. other faculties.

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

In comparison with the nationwide average, the number of students in information technology faculties was very high. In 2007 the share of IT faculty students in Zachodniopomorskie voivodship was 3.5% higher from the share of IT faculty students in the country's overall number of students. For other educational subgroups, the regional average was lower than the national one: in economy faculties by 40 percentage points, production and processing faculties by 12.6 percentage points, engineering and services 4.5 and 3.2 percentage points respectively.

The dominant fields of study are reflected in graduates' educational background structure; their number in Zachodniopomorskie voivodship in the years 2004 - 2007 went down 4%, in comparison with 6% increase in the country. Comparing the share of graduates with training adequate to high-tech company needs in the overall number of higher school graduates in the region in 2007 (over 17.7 thousand persons), one may conclude that:

1. The region has the highest in Poland (12%) share of engineering faculties graduates (national average - 9%), and a high (5%) share of information technology faculties (national average 4%).
2. The share of biology faculty graduates - 2% (national average 3%).
3. Low share of physics graduates - 1% (national average 3%).

#### **4. Research fellows (in higher schools and research and development units)**

High technology sectors have strong link with the research and development environment. On the one hand, enterprises establish their own research and development centres employing researchers, and on the other, they use outsourced potential (regional, national, or international). An indirect measure of a region's potential in this respect is the number of employees in R+D. In 2007 Zachodniopomorskie had 3841 R+D personnel, including 2872 (74.6%) *actual* research workers. However, in the years 2005 - 2007 the number of the latter went down by 4.2% in consequence of the 8% increase of the overall number of R+D workers in the voivodship. Not all employees work full time, therefore the region's number of employees in R+D sector expressed as full time equivalent workers was slightly lower and reached in 2007 2249 persons, including 72% research and development staff. The share of R+D workers in the region's professionally active population reached 0.54% in 2007; the share in the region's population of employees was slightly higher - 0.66%.

R+D staff are employed in the following sectors: enterprises, governmental and higher education. The share of those in the enterprises sector (expressed as full time equivalent staff) in the region is quite high for Polish conditions and reaches ca. 24%. There are no statistical data for the other categories. However, due to the strong development of higher education in Zachodniopomorskie voivodship, one may assume that R+D workers employed in higher schools constitute a large portion of all R+D employees. Moreover, the report "Zasoby technologiczne województwa zachodniopomorskiego" ("Technological resources of Zachodniopomorskie voivodship") indicates that academic centres are the only source of technological offers in the region. In the voivodship there are no active R+D units, nor commercial units whose core business is technology development and transfer<sup>4</sup>.

In 2007 there were 4132 research fellows employed at the voivodship's higher schools, including 23% of independent researchers. At technical higher schools the number of academic teachers (which is not equivalent to the number of research fellows) was 1191.

Given the high employment of R+D staff in higher schools, efficient networking between higher schools and the practice, including high-technology companies is essential. In the voivodship there are 22 business environment institutions in the public sector which, in the opinion of public authorities representatives, have real influence on individual sectors (e.g. chambers of commerce, advisory companies, entrepreneurship incubators, business centres,

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<sup>4</sup> *Zasoby technologiczne województwa zachodniopomorskiego ("Technological resources of Zachodniopomorskie voivodship"). Projekt Regionalnej Strategii Innowacyjności w województwie zachodniopomorskim ("Regional Innovation Strategy Project in Zachodniopomorskie voivodship"), ZARR, Szczecin 2005, 29.*

HR companies, etc.)<sup>5</sup>. In the light of the need to transfer technologies to high-technology sectors, the following organisations in the region may prove useful: Szczeciński Park Naukowo-Technologiczny Sp. z o.o. (Szczecin Science and Technology Park), Stargardzki Park Przemysłowy (Stargard Industrial Park), Policki Park Przemysłowy (Police Industrial Park), Goleniowski Park Przemysłowy (Goleniów Industrial Park), included in Kostrzyn – Słubice SEZ, Park Naukowo – Technologiczny przy Politechnice Koszalińskiej (Science and Technology Park at Koszalin University of Technology), Fundacja Centrum Innowacji i Przedsiębiorczości (Innovation and Entrepreneurship Centre), Inkubator Przedsiębiorczości – Centrum Technologiczne w Szczecinie (Entrepreneurship Incubator - Centre of Technology in Szczecin).

## **5. Unemployment. Shortage / surplus occupations**

Development opportunities for high technology sectors may also be looked at from the point of view of unemployment. On the one hand, unemployment indicates maladjustment of the education system to the needs of enterprises, on the other it is an information about the region's labour resources that may be used as a development opportunity by, inter alia, high-tech companies. In the years 2005–2007 certain changes occurred in unemployment numbers and structure. From the point of view of high technology sectors two aspects are worth pointing out: age - employers in innovative sectors prefer young people and are more willing to invest in the new staff by, e.g. providing them with specialised training; and education level.

In the region unemployment in all age and education categories decreased. In terms of age, the decrease is the smallest in the group of people aged 55 and more, which to a certain extent results from this group's smaller susceptibility to migration and smaller adaptiveness to new needs of the labour market. Nevertheless, independent of the scale of changes, in the entire analysed period, the largest group of unemployed were people aged 24 - 34 (at the end of 2nd quarter of 2008 22.5 thousand people); the second largest group were people aged 44 - 54 (at the end of 2nd quarter of 2008 21.54 thousand people).

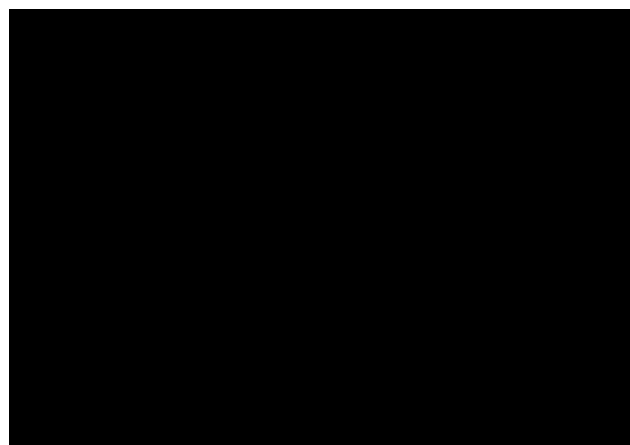
From the point of view of high technology sectors and region's appeal for this type of business education background of the unemployed people is equally important. In the years 2005 - 2008 the largest group among the unemployed people were graduates of secondary

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<sup>5</sup> Poll data from Polish Information and Foreign Investment Agency, Regional Cooperation Department, July 2008.

(over 37%) and basic vocational schools. However, these people would not qualify for a job in high technology sectors without appropriate training. People with higher and secondary education background are potential employees of high-tech companies. Number of unemployed higher education degree holders in the years 2005 - 2008 went down 37%, thus the decrease rate was slower than the total in Zachodniopomorskie voivodship (53%), therefore the share of people with higher education background in the total number of unemployed rose from 4.5% to 6% (end of 2nd quarter of 2008 4.8 thousand people). The same trend was observed in the group of people with secondary education background. On the break of 1st and 2nd quarter of 2008 there were 15.5 thousand graduates of lyceums and secondary vocational schools.

Graph 4. Unemployment structure by education background in Pomorskie voivodship in first two quarters of 2008.



Key:

1. higher education
2. secondary and incomplete higher education
3. vocational training
4. secondary school-level education and lower

Source: own document prepared on the basis of "Statistical bulletins" for Pomorskie voivodship

Another piece of information used to determine potential labour supply to the high technology sector is the occupational structure of the unemployed population. In 2007 in Zachodniopomorskie there was a large group of unemployed people with the following training: technical - 5999 persons (5.8%), mechanics - 3069 persons (3%), fitters - 1819 persons (1.8%), machines and devices operators - 1211 persons (1.2%), and electromechanics and electrical fitters - 1076 persons (1%). The number of unemployed people with other types of training useful for high-tech companies was very low.

In market economy the information about adjustment of the broadly understood education system to needs of enterprises (supply of suitable workforce) is provided by the labour market

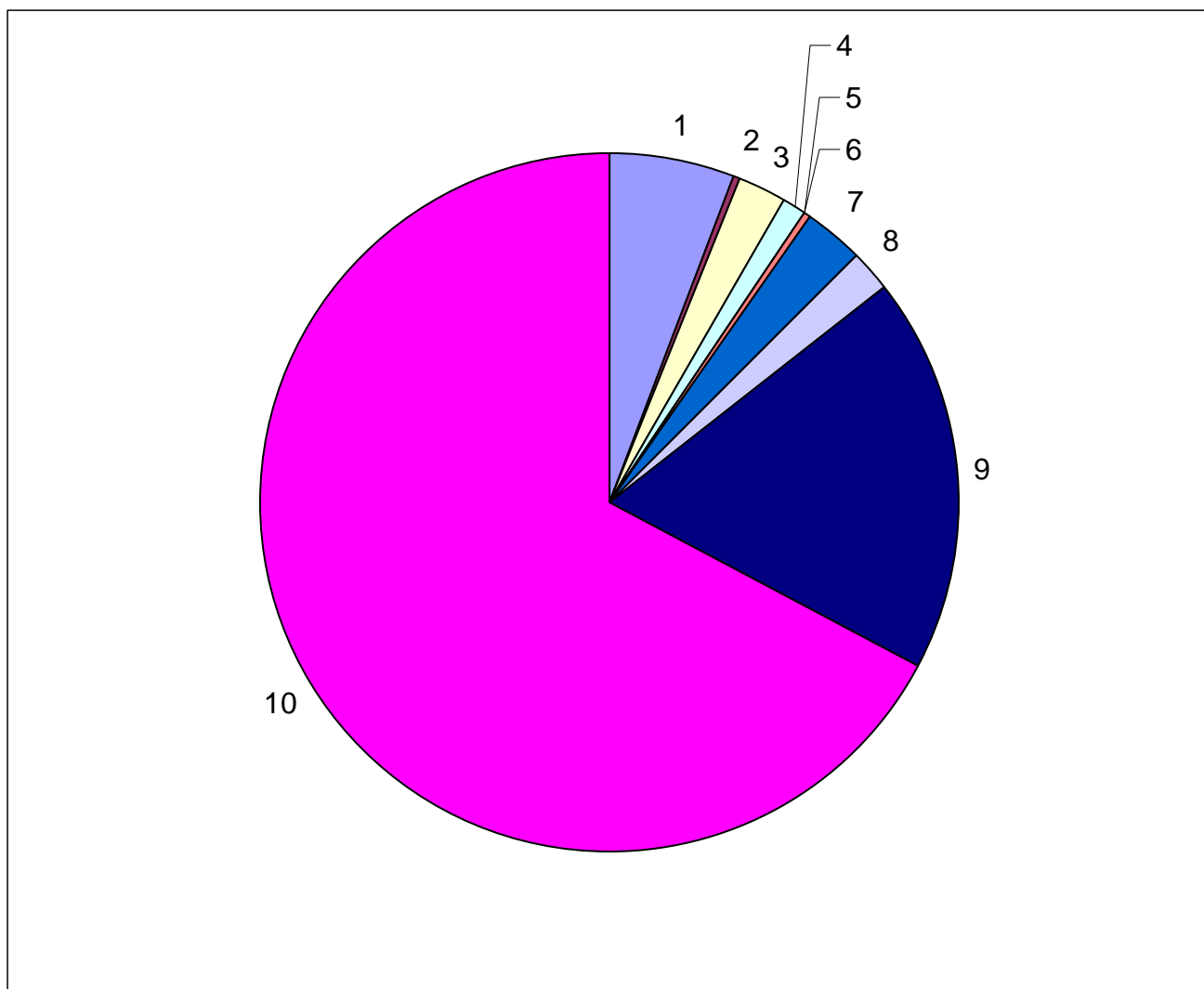
situation perceived in terms of surplus / shortage occupations<sup>6</sup>. Limiting the analysis only to professions and trades related with the high technology sector one may notice that in the years 2005 - 2007 surplus professions were more frequent than shortage professions. However, it should be noted that the data available in Poviats Labour Offices fail to reflect this phenomenon in full. Firstly - not all enterprises notify free positions to Labour Offices - in the case of rare professions they use services of specialised firms. Secondly - unemployed people who register with Labour Office often are not interested in starting to work. Therefore the analysis of shortage / surplus occupations is a mere illustration of certain general trends and relationships, rather than a full statistical analysis.

In accordance with PLO data, the surplus of labour resources in Zachodniopomorskie voivodship concerned in particular specialists (higher education), and technicians including intermediate personnel (secondary education), although it decreased in the analysed period. In the group of specialists and technicians, including the secondary personnel, the surplus of labour in 2007 constituted, respectively, 89.1% and 72.6% of this value in 2005. Nevertheless, at the end of the analysed period still high labour resources surplus occurred in the following groups: physical, mathematical and technical sciences specialists, and engineers; technicians, including secondary personnel: technicians, biological and agricultural sciences technicians, financial and trade personnel.

Graph 5. Unemployment structure by occupation in 2007 in Zachodniopomorskie.

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<sup>6</sup> In accordance with CSO definition, a shortage occupation is a situation where the market demand for an occupation is higher than the number of people looking for work in it.



Key:

1. technical occupations,
2. engineering professions,
3. - machines and devices operators,
4. electromechanics and electrical fitters,
5. biology- and chemistry-related occupations
6. laboratory staff,
7. - mechanics,
8. - fitters,
9. no occupation,
10. other.

Source: document prepared by WSE Enterprise Institute on the basis of data from VLO.

Labour supply surplus in the years 2005 - 2007 occurred in Zachodniopomorskie also among managerial staff, although it was not as large as in the case of specialists and technicians. Reverse trend occurred only in the case of managers of internal core business organisational units.

In the years 2005 - 2007 PLOs in the region observed a slight surplus of labour in the category of occupations achieved through basic vocational training and potentially useful for high-tech sectors.

The surplus (shortage) of an occupation is illustrated by the occupation surplus (shortage) intensity indicator expressing the relation of the average monthly number of job offers in a particular occupation notified to PLO with the average monthly number of registered unemployed representatives of the occupation in a certain period. It is assumed that:

- occupations with the indicator value  $>1.1$  are shortage occupations,
- occupations with the indicator value  $<0.9; 1.1>$  are sustainable occupations,
- occupations with the indicator value  $<0.9$  are surplus occupations.

Following this classification, in 2005 the region's group of shortage occupations included: middle office personnel; the group of sustainable occupations included: tax and customs officials and related (office) occupations and office service personnel. Other occupations in 2005 in Zachodniopomorskie voivodship should be classified as surplus. In 2007 the shortage intensity indicator value increased for the middle office personnel, and sustainable occupations of 2005 became shortage occupations. By the end of the analysed period this group was joined by managers of internal core business units, and money flow and customer service personnel. In 2007, in accordance with information from PLOs, the following occupations were sustainable: managers of large and medium-sized organisations, and machines and devices operators and fitters.

## **6. Wages vs. expected wages**

Labour shortage in high technology sectors may be connected with the fact that actual wages do not meet employees' expectations. In the years 2005 - 2008 in Zachodniopomorskie voivodship average monthly wages in majority of the analysed high technology sectors (with the exception of the automotive industry) increased, however it was lower from the increase of average monthly wages in the region (regional average increase 25.5%).

In the years 2005 - 2008 the biggest increase occurred in the automotive industry - by 48%. Nevertheless, average monthly wages in the entire sector were lower than the regional average. Average monthly wages in the analysed period were lower also in the electronics sector (wage growth rate - 17.3%). In spite of a 17.3% increase of average gross wages in the business services sector, its position was changing; it was both over and under the regional



average. Only in the engineering sector wages throughout the analysed period stayed over the regional average.

Table 3. Average monthly gross wages in selected high technology sectors in Zachodniopomorskie voivodship in the years 2005 - 2008

		business services sector	engineering sector	electronics sector	automotive sector	TOTAL in voivodship
1	average gross wages					
2		3	4	5	6	7
1	Average monthly gross wages in the enterprises sector (I-XI 2005)	2338	2442	2028	1729	2230
2	Average monthly gross wages in the enterprises sector (I-XI 2006)	2253	2577	1863	1856	2326
3	Average monthly gross wages in the enterprises sector (I-XI 2007)	2403	2702	2547	2128	2572
4	Average monthly gross wages in the enterprises sector (I-VI 2008)	2742	2911	2379	2559	2798
5	gross wages change dynamics in the years 2005-2008	117,3	119,2	117,3	148,0	125,5

Source: document prepared by WSE Enterprise Institute on the basis of "Statistical bulletins" for Pomorskie voivodship.

In other words, the high average monthly wage growth rate in the years 2005 - 2008 resulted first of all from the low level of the wages in the base period. These observations confirm the lack of links between growth of wages and work efficiency changes. In the years 2005 - 2008 the highest average monthly wage growth rate occurred in the automotive sector; in this sector in the same period work efficiency dropped nearly 20%. On the other hand, in the electronics industry a 17% average monthly wage growth was accompanied by 326% work efficiency increase.

Wages depend on the position occupied by an employee, and in Zachodniopomorskie voivodship range from 1.2 thousand for manual workers to 15 thousand for managers. Average monthly gross wages in specialised positions are much higher from average gross wages in high technology sectors.

Table 4. Gross wages in Zachodniopomorskie voivodship in 2007 by position in 2006

Position	Gross wage (PLN)
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Production director		9000-15000
Manager		7000-12000
Programmer		4000-8000
Engineer		5000-7000
Marketing specialist		3000-5000
HR specialist		3000-5000
Bookkeeper		4000-7000
Assistant		2500-3500
Technical specialist		4000-5000
Call centre employee		2000-3000
Warehouse worker		2000-2500
Manual workers	qualified, e.g. welders, machine operators	2500-3500
	other manual workers	2000-2500
	unskilled workers	1200-1500

Source: CSO data.

The survey conducted by WSE Enterprise Institute shows that wages offered in high technology sectors in most cases do not meet employees' expectations. The analysis of discrepancies between offered and expected wages indicates that in Poland (and the average wage in Zachodniopomorskie voivodship is lower from the national average) employees (47% of managers and 57% of workers) expect a wage 1000 PLN higher than the offered one. Scarce are cases when the offered wage is higher than the expected one; this is true for 6% recruitment procedures for managerial positions, and 2% of recruitment procedures for manual workers.

## Conclusions

In the years 2005 - 2007 the number of employees in Zachodniopomorskie went down, but dynamics of changes in this field in the selected sectors were positive and above the national average. As a consequence, the share of the region's employees in the overall number of employees in high technology sectors in Poland increased. The number of employees in each sector changed at a different pace. The highest positive change of average employment occurred in the electronics sector. The automotive sector develops much slower.

Zachodniopomorskie had relatively few R+D employees, and the number of *actual* research workers is going down.

Directions of changes in high technology sectors employment depend, inter alia, on the structure of the region's education system, and in particular dominant fields of training, as well as on the structure of supply of jobs. In 2007 the share of post-gymnasium schools students receiving training in specialised technical fields in the total number of students in all

occupation categories was 20.8%, i.e. close to the national average. Nevertheless in comparison with the nationwide average Zachodniopomorskie voivodship has a large number of people learning the following professions: economy technician, IT technician, and mechanics technician. Those in the first group may potentially find employment in high technology sectors, but mainly in business services and real estate services (this is the sector with the highest employment). Demand for this type of employees in other high-technology sectors in comparison with the demand for specialised technical personnel, is much lower. However, the high unemployment of young people, and the group of over 15.5 thousand unemployed graduates of post-secondary vocational and secondary vocational schools are alarming. In 2007 in Zachodniopomorskie there was a large group of unemployed people with the following technical training: mechanics, fitters, electromechanics and electrical fitters, and machines and devices operators. The group of shortage professions, on the other hand, includes: biological and agricultural sciences technicians, machines and devices operators and fitters, and financial and trade workers. This means, that the voivodship, on the secondary technical level, has a considerable unused potential which may become a basis for many high technology sectors (with the exception of biotechnology).

The same situation occurs in the region's higher education. In the public sector an important role, taking into the account the number of students and graduates, is played by technical faculties. The region has the highest in Poland (12%) share of engineering faculties graduates, and a high (5%) share of information technology faculties graduates; the share of biological faculties graduates is similar to the national average. However, it is alarming that the overall number of higher schools graduates went down in the years 2005 - 2007; it may result from unavailability of jobs in the region and low wages in the group of specialists. In accordance with PLO data for 2005 - 2007 (not fully reliable), in the region there was a high surplus of labour in the group of specialists (including engineers). In the period, average monthly wages in the majority of high technology sectors were lower than the region's overall average, with the exception of the engineering industry.

A certain positive symptom of changes - increased demand for employees in high technology sectors - is the increase of average gross wages in the majority of analysed sectors; the highest increase occurred in the automotive sector. Nevertheless, one should conclude that Zachodniopomorskie has an unused supply of labour with higher and secondary education background, potentially linked with high technology sectors.