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– Quality of human resources

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ANALYSIS



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Analysis

Part – Quality of human resources

CONTENT

INTRODUCTION.....	3
1. LIFELONG LEARNING	4
1.1 Adult participation in education	4
1.2 Barriers to participation in continuing education	7
1.3 Companies' approach to human resources development.....	14
2. HUMAN RESOURCES FOR THE KNOWLEDGE ECONOMY	30
2.1 Employment structure in qualification-intensive sectors and demanding professions ...	30
2.2 Earnings and qualification intensity of work.....	42
2.3 Internationalisation of tertiary education.....	46
CONCLUSION	60
CHALLENGES FOR THE CZECH REPUBLIC.....	64
REFERENCES.....	66

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Introduction

This part is broken down into two chapters. The first chapter deals with lifelong learning. Adult participation in education is assessed, the barriers to participation are identified and training in enterprises is analysed. The second chapter focuses on human resources for knowledge-based economy. The attention is paid to employment structure, wage differentiation in the relation to qualification and to the globalisation of tertiary education.

Lifelong learning (Věra Czesaná, Olga Kofroňová, Zdeňka Matoušková): The first part of this chapter focuses on the adult participation in education in relation to their labour market positions, gender and occupation, the position of CR in the frame of EU-27 is assessed. The second part on the base of adult population survey identifies the most important reasons why the population do not participate in continuing education. These reasons are investigated according to the age, education, profession, place of residence and the income level. The third part analyses the willingness of firms located in the individual EU-27

countries to invest into employee training. The influence of a shortage of qualified employees on companies' innovating activities and innovating companies' approach to human resources development is also searched.

Human resources for knowledge economy (Věra Czesaná, Věra Havlíčková, Zdeňka Matoušková): The chapter is divided into three parts. The first one deals with the employment in qualification demanded occupation and in qualification-intensive sectors. Second part includes the analysis of wage differentiations among educational group and inside these groups. Average earning in high-tech manufacturing industry is compared with average earnings in manufacturing as a whole. The same approach is applied for knowledge intensive service sector. The third part aims at the analysis of mobility of students in the EU and focuses specifically on foreign students studying in the CR and Czech citizens studying abroad. The teaching professional' opinions on including the student mobility as an obligatory part of curricula are contained, too.

1. Lifelong learning

1.1 Adult participation in education

Learning in adulthood is becoming an essential part of the life of every individual. Employability for one's entire productive life increasingly requires supplementing and deepening one's qualifications or gaining new qualifications. The significance of continuing education is growing along (a) with the increased speed of technological progress, since knowledge acquired during one's initial education may become outdated and (b) with the continued rise in retirement age. The longer the period between completing one's initial education and retirement, the more frequently the individual will have to renew his or her qualifications.

Since the 1960s, national and international institutions have been paying close attention to the issue of continuing education as part of the concept of lifelong learning. The contemporary conception of lifelong learning in addition to formal education emphasises the role of non-formal and informal learning in various environments. Responsibility for lifelong learning is distributed among all main actors: state, regions, municipalities, employers, individuals. One keystone for lifelong learning should be the completion of upper secondary education, i.e. remaining in initial education at least until age 17–18.¹

The analysis of participation in continuing education is based on data from the Labour Force Survey conducted in the second quarter of each year. The values of indicators are counted only from valid responses; respondents who did not answer a question are not included. The analysis focuses on overall participation in education by the population aged 25-64 and on differences in the level of education as related to position on the labour market, gender and the intensity of an occupation's qualification requirements. Also studied is participation in non-formal learning – both overall adult participation as well as the participation of population groups with various levels of formal education.

Adult participation in education

Adult participation in education is analysed on the basis of participation in formal and non-formal education by people aged 25-64 over the four weeks prior to the survey. The definitions of formal and non-formal education used during the survey are given in the box 1.

In 2006, almost 10% of the adult population in the EU-27 countries participated in education, with a relatively prominent difference between old and new member states. In the new member states, the figure was only about 4% of the population aged 25-64, while in the old member states it was 11% – an almost threefold difference.

In the Czech Republic, 6% of the population participated in education, i.e. significantly less than the EU-15 average. Participation in education was weaker than the EU-27 average but stronger than in the new member states. Figure 1 shows the average level of participation in education in 2006; the values for the entire 2003-2006 period are given in table 1A in Annex.

Box 1: Definition of formal and non-formal education

Formal education is defined as education and training with the following characteristics:

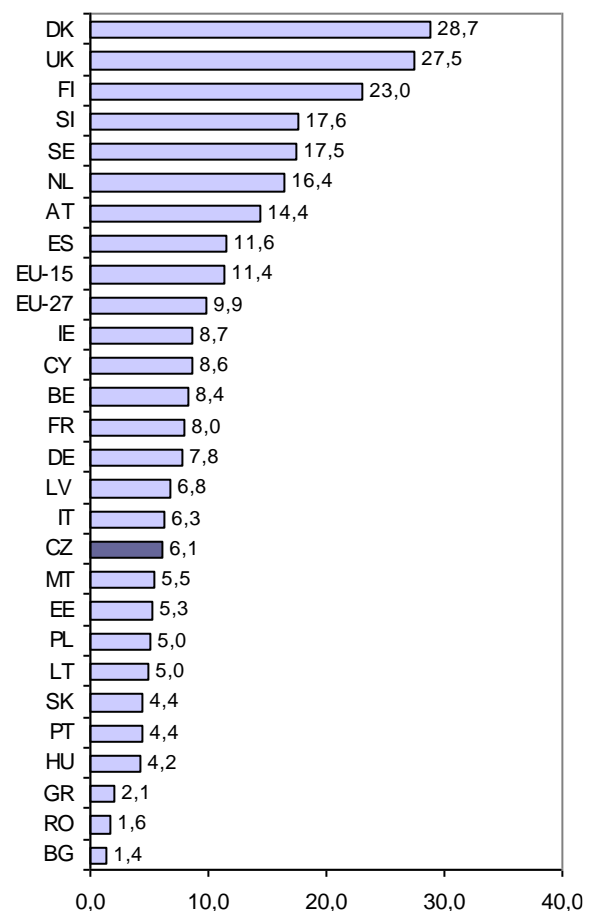
- purpose and format are predetermined,
- provided in the system of schools, colleges, universities and other educational institutions,
- it normally constitutes a continuous ladder of education,
- it is structured in terms of learning objectives, learning time and learning support,
- it is normally intended to lead to a certification recognized by national authorities qualifying for a specific education or programme.

Non-formal education is defined as being organized like a course, a conference or seminar for which the interviewee has applied and has participated in. It could be for a short or longer period also with minor breaks.

Source: EUROSTAT (2006a, pp. 52-53).

There are clear differences between the individual member states. On one end of the spectrum there are the Nordic member states, where around one fourth of the population participates in education, while on the other end there are the newest EU members: Bulgaria with 1.4% Romania with 1.6% rate of participation.

Figure 1: Adult participation in education (% , 2006)



Note: no data available for Luxembourg.

Source: EUROSTAT (2006b), own calculations.

To a certain extent, differences in the level of participation in education are influenced by the methodology used for indicators calculation. The population includes all people

¹ OECD: Lifelong learning for all. EC: White Paper on education and training.

of the given age, i.e. even those who are still completing their initial education – considering the age group, this would be namely tertiary education. This means that countries with a large level of participation in tertiary education by people aged 25 and over are statistically advantageous. An illustrative example is Denmark, which recorded the highest level of participation in education as well as the highest median age of people in tertiary education. In Denmark the age which divides the population studying tertiary education into two equal halves is 25.3, while the EU-27 average is 22.1.²

The data for 2006 indicate that the great majority of countries was not able to implement the suitable measures that would have allowed them to meet the goals laid out by the Lisbon strategy. This goal was at least 12.5% rate of participation in education among the population aged 25-64 by the year 2010. Even if there are still four years to go, it is unlikely that countries with participation levels of 6% will be able to achieve this goal. In 2006, a total of 10 countries had participation levels lower than 6%. This group mostly includes new member states (except Slovenia, Latvia and Cyprus) plus Portugal and Greece.

For these countries, achieving the Lisbon objectives would mean more than doubling participation in education. The example of Spain does indicate that this is possible, however. In Spain, participation in education in 2003 was slightly less than 6%, but in 2006 it was almost 12% (see table 1). This is more likely to be an exceptional case, however, and only the data for 2007 will show whether the country can sustain this very positive level of participation.

Table 1: Changes in adult participation in education (% , percentage points)

	2003	2006	2006-2003
EU-27	8.6	9.9	1.3
EU-15	9.8	11.4	1.6
ČR	5.4	6.1	0.7
Denmark	18.9	28.7	9.8
United Kingdom	21.2	27.5	6.3
Spain	5.8	11.6	5.8
Hungary	6.0	4.2	-1.8
Greece	3.9	2.1	-1.9
Sweden	34.2	17.5	-16.7

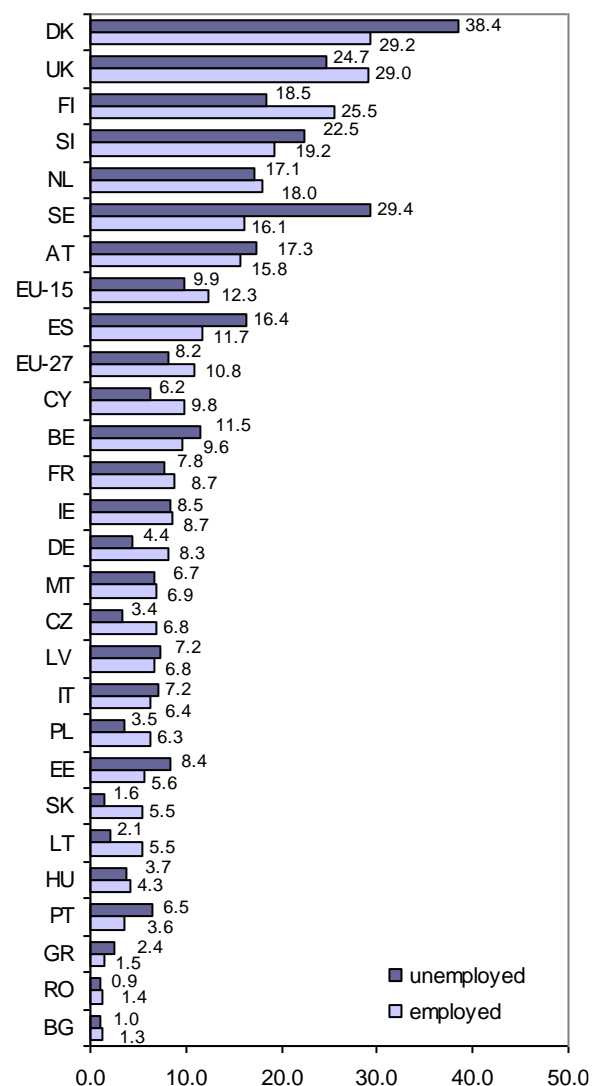
Source: EUROSTAT (2003, 2006b), own calculations.

In comparison to 2003, in 2006 the average participation in education increased by 1.3 percentage points for the EU-27 countries and by 1.6 percentage points for the EU-15 countries. The growth in participation is slower in the new member states, although it is very low in these countries. Across the EU-27, most countries' participation in education increased; only in nine countries there was a decrease (the 2006 data for Luxembourg are not available). The most dramatic decline occurred in Sweden, where the level of participation dropped from 34% to 18%. In the other countries, the decline was no more than 2 percentage points. A decline was recorded not only in countries with a high level of participation, but also in countries with a low level of participation. One example is Greece, where participation dropped from 4% in 2003 to

2% in 2006. In the Czech Republic, participation increased from 5.1% to 5.6%.

Participation in education differs significantly by individuals' **position on the labour market**, i.e. whether the person is employed or unemployed. On average across the EU-27, participation in education was greater among the employed than the unemployed people. In 2006, 11% of employed persons but only 8% of the unemployed participated in education. As can be seen from figure 2, however, in a relatively large number of countries (10), unemployed people participate in education at higher rates than the employed. These include countries with different levels of economic development (Denmark, Latvia) which apparently have in common the fact that much attention is paid on the education or re-training of the unemployed, on appropriate guidance and counselling systems and on effective tools for encouraging the unemployed to participate in education.

Figure 2: Participation of employed and unemployed individuals in education (% , 2006)



Note: no data available for Luxembourg.

Source: EUROSTAT (2006b), own calculations.

The level of participation of employed persons is highest in Denmark (29%), that of the unemployed in Sweden (29%). The Czech Republic is located in the second half

² Source: EUROSTAT, table Median age, Tertiary education

of the scale with 6% of the employed and a mere 3% of the unemployed participating in education. The LFS figure for education of the unemployed is significantly lower (about one half) of the data from the Ministry of Labour regarding the number of unemployed and the number of people undergoing re-training. This difference is the result of the different manner of data collection (the LFS data relate only to the four-week period prior to the survey).

The greatest difference in the level of participation in favour of the unemployed was reported by Sweden and Denmark, while the greatest difference in favour of the employed was found in Finland and the United Kingdom.

The level of participation of employed and unemployed individuals differs by gender. Table 2A in Annex clearly shows that, among both the employed and unemployed, women participate in education to a greater extent than men. In 2006 the EU-27 average was 13% of employed women but only 9% of employed men. For the unemployed, the figures were 10% of women and 7% of men. Not a single EU country deviated from this trend, i.e. in no country did the number of men (employed or unemployed) exceed the number of women participating in education. Countries with the greatest difference in favour of employed women were Lithuania and Malta (more than double the level of participation), while Belgium and Bulgaria had almost equal shares. For the unemployed, the greatest difference was recorded by Estonia, where five times as many women as men participated in education; the smallest difference was in Malta, where the difference was insignificant. In the Czech Republic, participation was 8% of employed women and 6% of employed men, and 5% of unemployed women versus only 2% of unemployed men.

Participation in education differs significantly by an individual's **profession/occupation**. Occupations are categorised using the ISCO-88 (International Standard Classification of Occupations). Occupation is understood as a specific activity or set of tasks and obligations performed by a worker. The Czech Republic uses the KZAM classification system, which is based on ISCO-88. All occupations are grouped into 10 main classes (0-9), with classes 1-3 considered to be demanding occupations and classes 4-9 less demanding. An overview of ISCO categories is given in box 2.

Box 2: ISCO major groups

ISCO 1	legislators, senior officials and managers
ISCO 2	professionals
ISCO 3	technicians and associate professionals
ISCO 4	clerks
ISCO 5	service workers and shop and market sales workers
ISCO 6	skilled agricultural and forest workers
ISCO 7	craft and related trades workers
ISCO 8	plant and machine operators and assemblers
ISCO 9	elementary occupations

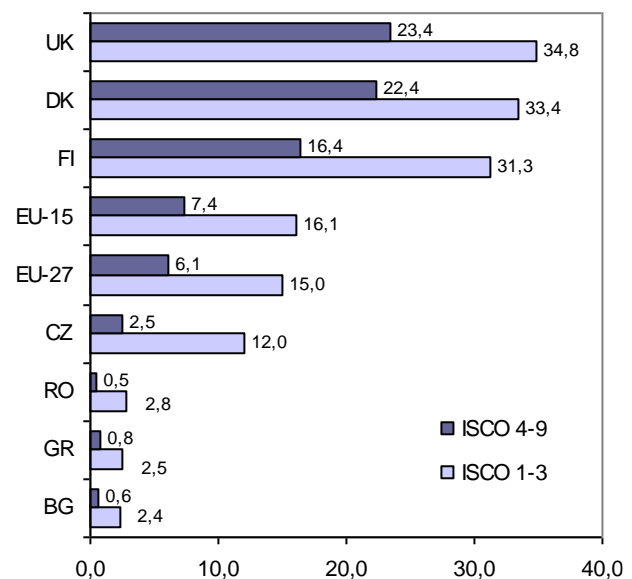
Participation in education as it relates to the person's occupation was analysed for two groups – demanding (ISCO 1-3) and less demanding occupations (ISCO 4-9). Figure 3 shows the average levels of participation in education for persons working in demanding and in less demanding occupations in the EU, the Czech Republic and the three countries with the highest and lowest values for 2006. The order of countries differs slightly from that found in figure 1, since participation in education by pro-

fession is calculated only for employed persons, i.e. unemployed and inactive persons are not included. The values for the individual countries and for the period 2003-2006 are contained in table 3A in Annex.

In all EU-27 countries, persons in demanding occupations participate more in education than people with less demanding occupations (see table 3A in Annex). The EU-27 average for 2006 was 15% persons in demanding positions but only 6% of persons in less demanding positions. The difference was even more dramatic in the Czech Republic, almost fourfold (12% vs. 3%).

The United Kingdom had the greatest share of people in demanding positions participating in education (35%); the smallest figure was for Bulgaria (2%). Figure 3 shows that the difference in participation between demanding and less demanding professions depends on the overall level of participation in education: the higher is overall level, the lesser are the differences. In the United Kingdom, participation in education by persons in less demanding positions was 67% of the participation by people in more demanding positions; in Bulgaria this figure was a mere 25%.

Figure 3: Adult participation in education, by occupation (% , 2006)



Note: only the employed are included in the calculation.
Source: EUROSTAT (2006b), own calculations.

The differences within the group of demanding positions (ISCO 1, 2, 3) across the EU are shown in table 4A in Annex. On average across the EU-27, the most frequent participation in education in 2006 was among professionals (ISCO 2 – 21%), followed by technicians and associate professionals (ISCO 3 – 15%) and legislators, senior officials and managers (ISCO 1 – 12%). This order was the same in almost all countries, with the exception of five countries. In the Czech Republic, Cyprus and Slovakia, ISCO 1 was ahead of ISCO 3 (although by an insignificant one to three tenths of a percentage point). In Bulgaria participation decreases as we move towards demanding professions, and in Romania the order was ISCO 3, followed by ISCO 1 and ISCO 2. All these exceptions involve new member states.

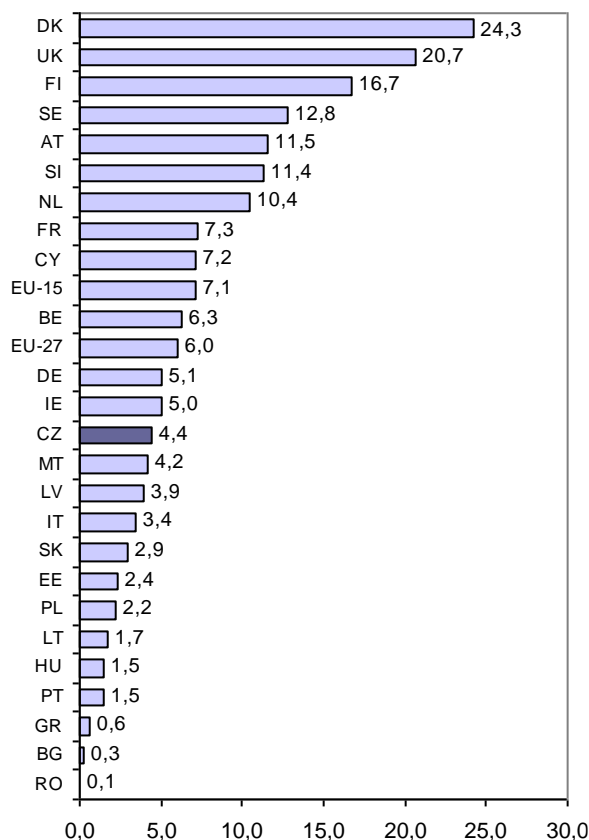
Participation in non-formal education

Participation in non-formal education is studied for the 25-64 age group, excluding students. The available data do not allow us to follow participation in non-formal education by students. A definition of non-formal education may be found in box 1. Participation in non-formal education is analysed from the point of view of overall participation and in relation to achieved level of initial education.

In 2006, the EU-27 average for adult participation in non-formal education was 6%. The greatest share was in Denmark (24%), the smallest was in Romania (0.1%). With a share of about 4%, the Czech Republic is relatively far below the EU-27 average (see figure 4).

The data for 2003-2006 contained in table 5A in Annex show that in this period there was no clear trend on the EU-27 level and that years with an increase in the level of participation in non-formal education alternated with years of a decline. Only two EU-27 countries recorded an increase in participation in non-formal education for every year – Denmark and Slovenia. Slovakia, on the other hand, experienced a year-on-year decline.

Figure 4: Adult participation in non-formal education (% , 2006)



Note: no data available for Luxembourg and Spain, students of formal education not included.

Source: EUROSTAT (2006b), own calculations.

If we compare the values available for the individual countries for the initial and final years, then we can state that in most countries the share of persons participating in non-formal education declined (15 countries). The greatest decline was in Sweden (15 percentage points), the greatest growth in the United Kingdom (14 percentage points).

On average across the EU-27, the increase between 2003 and 2006 was by a mere 0.6 percentage points.

Participation in non-formal education is highly dependent on achieved level of education. **Level of education** is divided into three categories. A low level of education is associated with no more than completed lower secondary education (ISCED 0-2), a middle level of education with upper secondary education (ISCED 3, 4) and a high level of education with tertiary education (ISCED 5, 6). The situation for 2006 is similar to that in 2003.

Participation in non-formal education increases with level of formal education. In 2006, on average across the EU-27 countries, 13% of the population aged 25-64 which had completed tertiary education participated in non-formal education in the four weeks prior to the survey, 5% of people with upper secondary education and 2% of people with no more than primary or lower secondary education. On average, the level of participation of the group with the lowest level of education is around one half of the group with the highest level of education.

In countries with a relatively high level of participation in non-formal education, the differences between the different levels of education are not as large as in countries where the level of participation in non-formal education is generally low. For example, in Denmark the level of participation of the lowest educated group was about 70% of the participation of the highest educated group; in Poland, this figure was only around 14%.

Table 2: Participation in non-formal education by level of education (2006, %)

	ISCED		
	0-2	3,4	5,6
EU-27	2.27	5.18	12.89
EU-15	2.57	6.83	14.16
CZ	0.58	3.29	13.83
Finland	8.61	13.78	25.53
United Kingdom	12.34	18.18	30.52
Denmark	14.93	21.72	32.58
Romania	0.00	0.08	0.55
Lithuania	0.03	0.91	4.39
Estonia	0.03	2.17	3.60

Note: no data available for Luxembourg and Spain, students of formal education not included.

Source: EUROSTAT (2006b), own calculations.

Level of education significantly influences participation in continuing education. It is clear that if an individual did not build a positive attitude to education during his initial education, then in later age he will continue with education only with great difficulty. Besides the individual's relationship to education or the willingness to participate in continuing education, another important factor is the ability to participate in continuing education. This disadvantage, however, may be removed by offering appropriate educational opportunities or individualising these opportunities.

1.2 Barriers to participation in continuing education

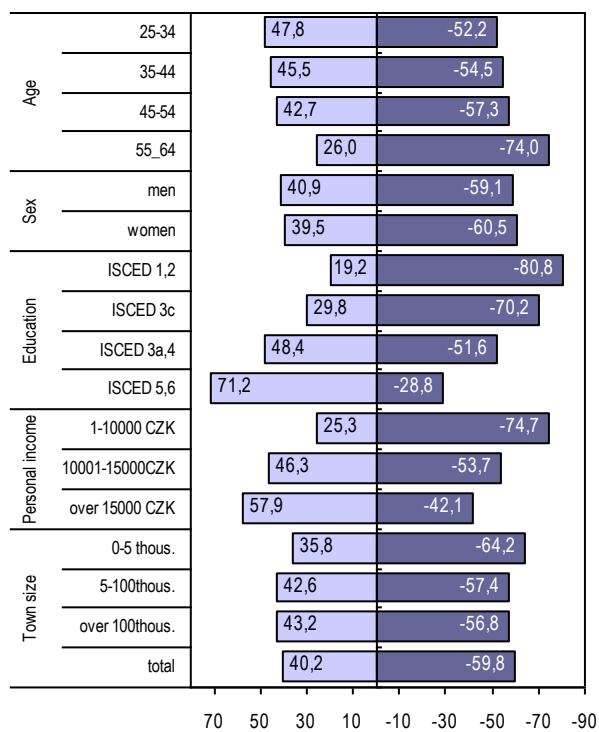
The various social groups of the adult population participate in continuing education at different levels. We see here certain inequalities in educational opportunities. This sub-chapter aims at the barriers which hinder individual

social groups' access to continuing education. Barriers to participation in continuing education are described on the basis of the results of individual surveys performed by the National Training Fund's National Observatory of Employment and Training in cooperation with the Public Opinion Research Centre (CVVM, SoÚ AVČR, 2005/2006)³. The surveyed target group was the Czech population aged 25 to 64; a total 2,987 persons were interviewed. The data were collected via standardised personal interview.

Participation in continuing education

The survey outcomes show that over the preceding 12 months, 40% of respondents participated in education and 60% of respondents did not participate in any form of education, nor did they in any way self educate. Figures 5 and 6 show the basic characteristics of the population which participates in some form of education (left) and of those people who do not participate in any form of education (right).

Figure 5: Total participation and lack of participation in education I. (%)



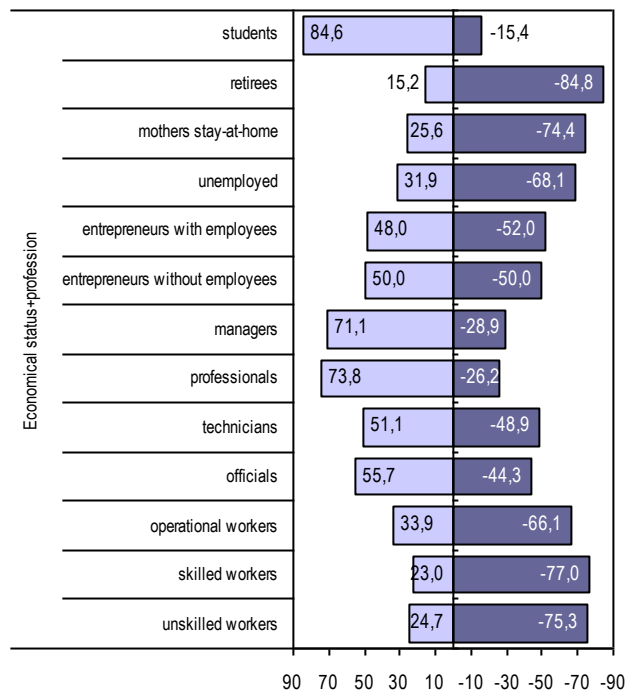
Source: NOZV, CVVM (2006).

According to the survey results, women and men participate in education at comparable levels, i.e. around 40%. With increased age, there is a slight decline in the willingness to educate oneself further (48% in the 25-34 age group, 43% among people aged 45-54), with a sharp decline in the pre-retirement age (26% of people aged 55-64). The share of people participating in education rises rapidly along with the individual's level of formal education

³ The survey was performed as part of the project "Unequal Access to Education: The Extent, Sources, Social and Economic Consequences, Policy strategies".

(30% of people with upper secondary education; 71% of people with "maturita"). Participation in education also is higher with higher personal income (25% to CZK 10,000, 58% above CZK 15,000).

Figure 6: Total participation and lack of participation in education II. (%)



Source: NOZV, CVVM (2006).

As concerning the town size, people from towns with less than 5,000 inhabitants participate less in education. In term of regions of the Czech Republic, the lowest willingness to participate in continuing education was found in the Vysočina, Pardubice and Ústí nad Labem regions, with the other regions roughly on an equal level.

People who are economically active participate in education more frequently than those who are economically inactive (except for students in formal education). These include primarily people in higher positions (71.1% of managers, 73.8% of top professionals). Entrepreneurs participate less in continuing education (around 50%) and blue-collar workers do so least of all (23% of skilled workers, 24.7% of unskilled workers). Low participation is also found among the unemployed and economically inactive, including stay-at-home mothers (25.6%) and retirees (15.2%).

Social groups with low participation in continuing education

In terms of employability and the ability to succeed in the labour market, people who seek no education at all are in particular at risk. These are especially three fourths of people older than 55, i.e. those in **pre-retirement age**. With retirement age on the rise, it is very important that these people be included into non-formal continuing education, since their working career is by far not over and their ability to compete on the labour market depends on gaining new skills. One particular barrier for these people may be insufficient skills in working with information and communication technology. We also see a lack of motivation – both among this group and among employers un-

willing to finance such employees' education in view of the approaching end of their economically active years.

Another important factor in participation in education is **level of formal education**. The survey showed that people without school-leaving examination ("maturita") participate in continuing education only to a limited degree; there was not much difference between those who had only primary or lower secondary education (ISCED 0-2) and those with upper secondary education without "maturita" (ISCED 3C): 80% of people with primary or lower secondary education and 70% of people with upper secondary education without "maturita" did not participate in continuing education. We see here a significant barrier in the form of insufficient knowledge and skills vital for continuing education, as well as a habitual resistance to school education. It is not until secondary school with a school-leaving examination ("maturita") that we see a breakthrough which apparently instils the motivation and skills necessary for continuing education. In the case of tertiary education it is clear that these people are aware of the need for lifelong learning and also have easier access to education.

Another significant barrier is **personal income**. Three fourths of people with a net income of CZK 10,000 or less do not participate in any education. We may assume that this level of income is connected to a low level of formal education and with work which requires little or no qualifications. In the survey, two thirds of service workers and shop and market sales workers, and three fourths of skilled and unskilled workers did not participate in education. For this group of people, the lack of motivation and the skills necessary for continuing education – barriers associated primarily with a low level of formal education – are accompanied by financial barriers. This is because people must pay for many non-formal educational courses themselves, and even certain informal ways of learning (internet access, libraries, purchase of literature) involve financial costs.

Another group with a low level of participation in continuing education is the **unemployed**. Two thirds of unemployed people do not participate in any education and thus represent a potential but currently unused labour force. This has shown itself to be a great problem, since these people gradually lose the work and personal skills which they had, and may thus fall into the trap of long-term unemployment. Compared to other countries, in the Czech Republic only a small share of unemployed people are included in re-training programmes and a large share of the unemployed are long-term unemployed. For many of the unemployed, the previously described barriers associated with low literacy level, lack of motivation and finances combine to increase this group's risk for social exclusion. In these cases, publicly funded education can help these people to at least remain active and give them basic skills for functioning in society, without consider their immediate reintegration into employment necessarily as the main criteria for effective re-training results..

Another significant group which does not participate in education is three fourths of stay-at-home mothers and women on maternity or parental leave. Although gender per se does not represent a barrier to continuing education (according to the survey, 40% of men as well as around 40% of women participate in education), this group of women requires special attention. This is because they represent a potential labour force which must

maintain and develop its skills during its time of inactivity. It is a very diverse group in terms of educational level, but its main barrier to education is family responsibilities, frequently combined with financial barriers associated with the woman's dependent role in a household with limited income.

Another barrier in access to education, although not as significant as the previously mentioned barriers, is place of residency. Almost two thirds of residents of towns with fewer than 5,000 inhabitants do not participate in education. This, too, is a very diverse group of people.

We may assume that such towns have a smaller share of people with tertiary education than towns with more than 100,000 people, although the main barrier may be poor transport connections and thus higher financial and other costs associated with participation in non-formal education courses. We may also assume that there is poorer access to tools for information learning such as internet, libraries etc.

We may summarise the above information by saying that the typical person who does not participate in education and has encountered barriers to access to continuing education has only primary or lower secondary education, is aged 55-64, has an income of less than CZK 10,000, is economically inactive and lives in a town with fewer than 5,000 inhabitants.

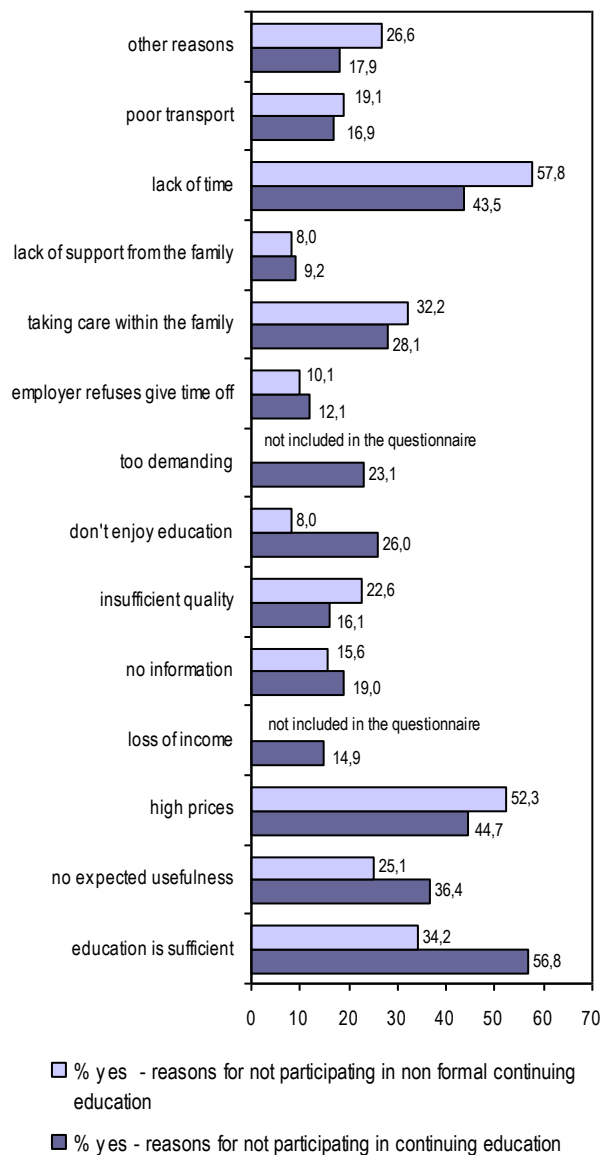
Reasons for not participating in continuing education

If we are to find ways to change this situation, it is important to analyse the causes which prevent individuals or socially excluded groups from participating in continuing education. When asking respondents why they did not participate in any form of continuing education, the survey offered a scale of 13 reasons. These reasons can be ordered according to the type of evaluation.

The first group of reasons involve self-evaluation and include answers such as: "I consider my education to be sufficient" and "I am concerned that education won't bring the expected usefulness". The second group of reasons is related to the first; they are also based on self-evaluation, but offer a different angle. These answers reveal the individual's attitude towards the educational process itself and include answers such as: "I don't enjoy education" or "I find education (especially formal education) too demanding". The third group includes reasons of a financial character – either "high price of courses" or possible "concerns of loss of income or lowered income while studying/attending courses". The fourth group of reasons is related to the availability of continuing education. Respondents either stated that there is an "insufficient or poor-quality offer of courses" or that they "don't have enough information about available education and would need some advice". Other reasons are related to family circumstances limiting the ability to participate in continuing education, for instance "taking care of the family" or "lack of support from within the family". Other reasons included: "lack of time", "poor transport" and an unaccommodating attitude on the part of employers ("employer refuses to give me time off").

Figure 7 shows the reasons why individuals do not participate in any continuing education, i.e. do not take advantage of any form of education, in comparison with the reasons why people do not participate in non-formal education.

Figure 7: Reasons for not participating in any education and in non-formal education (%)



Source: NOZV, CVVM (2006).

Adults may combine various forms of education according to their specific situation. In reality, they may focus only on certain forms of education while ignoring others, for which they may have specific reasons. The survey thus included, in addition to a question about reasons for not participating, a question aimed at people who participate partially in continuing education (for instance through informal self-learning) but do not participate in non-formal education courses. We may encounter such a situation if the person is attending some educational programme at school, i.e. is participating in formal education, or if he is involved in some form of self-learning but does not combine such self-learning with course attendance.

The majority of reasons given in the first third of the range appeared with equal frequency, i.e. they are of similar importance. The group of most important causes includes lack of time, high price of courses, satisfaction with cur-

rent level of education, caring for the family and scepticism towards benefits of continuing education.

What differs, however, is their ordering. Unlike people who reject all continuing education, persons who do not make use of non-formal education courses list lack of time in first place. At the same time, fewer of them believe that their current level of education is sufficient. Even the ordering of other, less important, reasons differs between the two groups. Persons who are already participating in some form of continuing education are significantly less likely to state that they do not enjoy education (8% versus 26%) or that it is of no use (25% versus 36%). They are more likely to state, however, that they are concerned about insufficient availability of courses. These differences clearly show that persons who are already participating in some form of education are more willing to participate in continuing educational courses, and that they are better able to find the necessary information about the availability of courses. On the other hand, in addition to their time abilities, they evaluate the offer and focus of courses far more cautiously (23% versus 16%).

In view of the relatively small sample (214 persons) of responses regarding the reasons for not participating in non-formal education, a more detailed division is not possible. In terms of the survey's ability to offer useful information from a sufficiently large sample, a more detailed analysis was performed only of the reasons given by people who did not participate in any form of education (1,787 persons).

Figures 1A and 2A in Annex show the spectrum of reasons for not participating in relation to respondents' professional status. The figures also show the intensity of individual reasons for not participating, of which the most significant are: a sense that one's education is sufficient, high financial costs and lack of time.

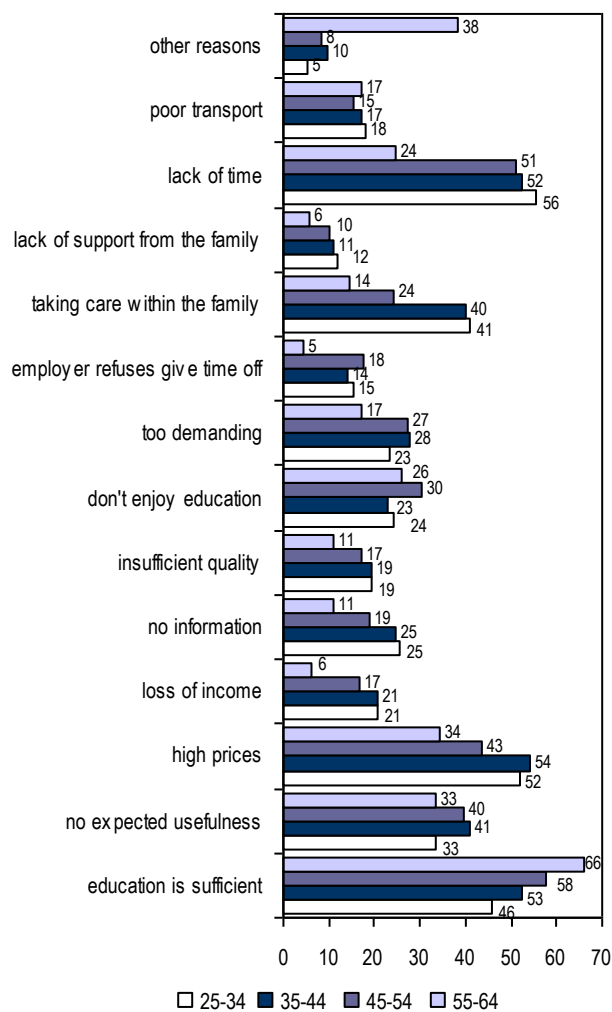
Reasons why people do not participate in any education are most frequently associated with their **attitudes** and a related factor, motivation. More than one half of adults (57%) interviewed were convinced that their qualifications were sufficient.⁴ In view of the fact that the average level of education in the Czech Republic is significantly behind that of other European countries (both old members and the majority of new member states), this represents a significant overestimation of one's own knowledge and skills. At the same time, Czech adults' level of participation in continuing education is lower than that found in other EU countries (the level of participation in the Czech Republic is roughly one-third lower). This overestimation may result from the fact that most individuals lack a more objective gauge for comparison, which may be associated with an insufficiently systematic approach by companies towards employee development. Employees are not pressured to develop along with the company's future development plans. Qualification needs are not determined and decision-making regarding personnel changes is performed short-sightedly and under pressure of the situation at hand. Satisfaction with the level of one's education also reflects the fact that most people still believe the old opin-

⁴ Similar findings were made by a survey performed by ÚIV in 2003. Kuchař, P.: Needs and interests of participants in continuing education – an analysis of public opinion. Prague, ÚIV, 2003.

ion that one gains education at school prior to entering the labour market and that this education determines one's future employment and is sufficient for the rest of one's career.

As shown by figure 8, satisfaction with one's level of education increases with age, although it is objectively clear that older workers have a lower level of education than younger workers. In addition, education received some 30-40 years ago is often outdated, without the necessary foundation for the use of modern technologies, language skills, etc. People's evaluation of the sufficiency of their education clearly correlates to the number of years they have worked, i.e., to the amount of practical experience. Practical experience does form an important part of increased qualifications but with today's rapid technological changes and the occasional need to change professional focus, practice can no longer replace additional education.

Figure 8: Reasons for not participating in education, by age of respondent (%)



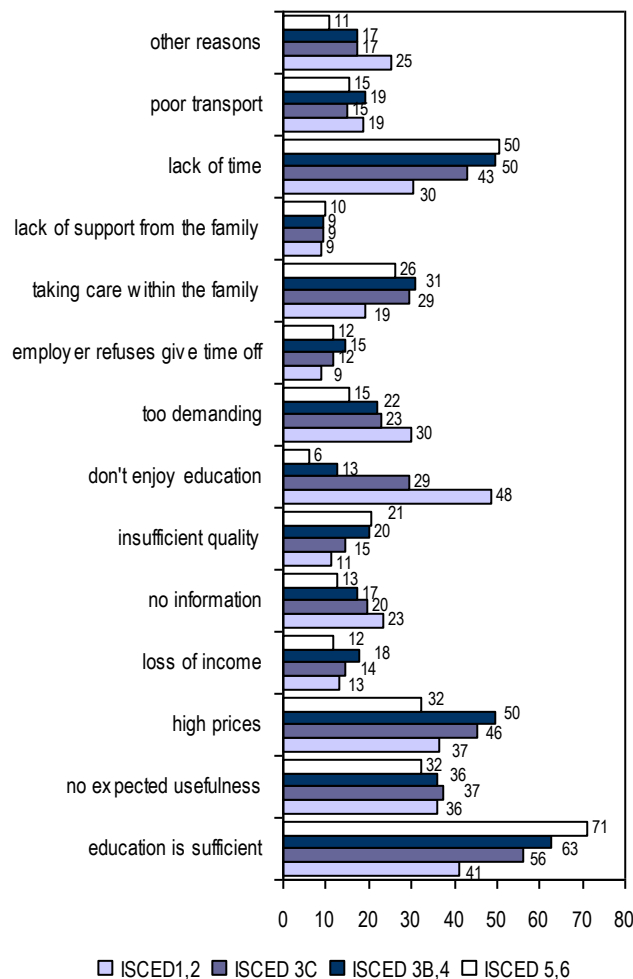
Source: NOZV, CVVM (2006).

A large number of respondents (33% – 40%) are also convinced that continuing education will not be of any positive use. This fraction is smaller than those who consider their education to be sufficient. This means that, despite the expression of satisfaction with one's current level of education, a certain part of respondents does admit that continuing education is a useful thing. Never-

theless, respondents' evaluation tends to be sceptical. This scepticism may result from an insufficient range or quality of educational opportunities. In evaluating responses related to the educational offer, it is clear that this reason is not one of the main barriers to participation in education. Scepticism is thus more associated with an unsystematic approach to the development of human resources on the part of employers, where increased qualifications are not tied to career growth and are not sufficiently reflected in remuneration.

Another important factor which influences people's decision to participate in continuing education is the **financial factor**. Some 45% of respondents gave high course prices as a reason for not participating in education. Concerns related to a possible loss of income when attending courses were much less common (only 15% of respondents). This means that in most cases continuing education does not involve an interruption of money-earning activities, but that it is done concurrently.

Figure 9: Reasons for not participating, by respondent's level of education



Source: NOZV, CVVM (2006).

Especially sensitive to the prices of courses are people from the mid-range income group, i.e. people with an average net income of CZK 10,000-15,000. People with higher income logically do not place as much importance on the costs of studies as other population groups. It is interesting, however, that a slightly higher share

(49%) of people in the mid-range income group gave the cost of courses as a barrier to continuing education than did people from the low-income category (46%). Although not significant, the difference may indicate that persons with lower income are more sure that the course costs will be covered by, for instance, their employer.

As can be seen from figure 9, another group which sees high prices of courses as a barrier to education is persons with upper secondary education (either with school-leaving examination - "maturita" or with apprenticeship certificate) – some 46% to 50%. Persons with primary and lower secondary education gave prices less frequently as a reason (37%). As with low income, this may be because people with low qualifications are considered at risk and rely more on public institutions. Another reason why such people do not see educational costs as a serious barrier may be that they do not think about education at all and thus have no idea of the costs of courses. When interpreting the data, it is important to consider that persons with a lower level of education less frequently state that they do not participate in education because of "substitute" reasons (e.g., costs and time demands) than persons at higher levels of qualifications.

From the point of view of job position and profession, only top positions – entrepreneurs with employees, managers and top professional employees – consider financial aspects to be unimportant. For all other categories of workers, the price of courses represents a barrier to participation in one half of cases (somewhat less among unskilled workers: 44%). Awareness of the importance of financial aspects increases in younger and middle ages (up to age 45), i.e. the time when people tend to be taking care of dependant children. After this, the significance of this barrier logically decreases, since the worker no longer has to take care of his or her children and also sees an increase in income as a result of practical experience.

In general, we may state that financial reasons (high course prices) play an important role in deciding whether to participate in continuing education. This applies not only for low-skilled or low-income persons – financial aspects have a strong influence on a broad group of persons of average age, qualifications and income. These factors are interrelated and, with some simplification, we may say that income level is a reflection of the other two factors. More significant financial incentives for middle income persons could thus have the most extensive positive impact on participation in education. Financial support should, however, not reduce individual initiative, and recipients of support should be aware of the full value of the education they receive and should participate financially as well.

Lack of time was the third most frequently stated reason for not participating in continuing education (43% of respondents). Time is the most significant for young people up to age 34 (56% of this age group), where we may assume that they have high time demands because they are caring for their family. Time ceases to be a significant barrier for education only at a later age, among persons older than 55.

This also applies for persons with the highest incomes, where there are strong demands for work efficiency and

career, especially entrepreneurs, professionals, officials and clerks.

Factor analysis of barriers to participation of social groups in continuing education

Individual social groups' level of participation in continuing education and a factor analysis of the reasons for their failure to participate helped to identify at-risk social groups which are not participating in education, as well as the barriers which limit their access to education. This analysis revealed four primary factors. For each factor, one specific aspect – barrier – clearly dominates...

- For **factor 1**, this is the barrier of "high course prices", combined with "insufficient information on course offer" and "insufficient course offer". The statement "does not enjoy education" is not all too characteristic for this factor, which we may thus label "**actual barriers**" to education. They have a real foundation in the outside world, they are real existing insufficiencies in the availability of courses, which can be removed through certain measures. The remaining three factors (though they may have real foundations) are more related to attitude or situation.
- The key barrier for **factor 2** is "lack of time". Here, a strongly present barrier is "care for family". We can also see a strong awareness that one's education is not sufficient (based on the negative factor loadings for the first aspect). This factor can thus be labelled "**cannot**" participate in continuing education.
- **Factor 3** is composed in particular of the aspect "considers education to be sufficient". From the negative marks of additional factor loadings, we can see that we are definitely not dealing with a lack of information on available courses, nor with significant concerns regarding the demanding nature of formal education. Particularly if we consider the first aspect, this factor can be labelled "**does not need**" continuing education.
- The final factor, **factor 4**, is clearly headed by the barrier "education does not offer the expected usefulness". Three other aspects are represented to a lesser extent: "does not enjoy education", "lack of time" and "formal education is too demanding". We see here a lack of trust in and distaste for continuing education. This factor can thus be labelled as having "**given up**" on continuing education.

Table 7A in Annex of factor loadings indicates the level to which each factor is covered by the original aspects of reasons for not participating in continuing education. Table 3 shows which factors/barriers are characteristic for certain social groups.

Factor analysis revealed that there are two basic groups of people who are not participating in education:

1. people who are interested in continuing education but are not realising this interest because of "actual barriers" (external, associated with offer);
2. people who are not interested in continuing education because of their attitudes or personal situation.

Re: 1) **The group interested in continuing education** is characterised by the fact that they consider their education to be insufficient, are not satisfied with it, and are interested to continue their education. They sense so-called objective (actual) barriers existing in the world outside of them. These are primarily course prices, insufficient information on course offer and insufficient course offer.

This group in particular includes the **unemployed**. These persons are, at least for a certain period of time, motivated to participate in education. Highly significant here are labour offices, which can help these people overcome the above described barriers and provide the appropriate continuing education. The situation is more difficult, however, because among many unemployed persons these barriers are accompanied by their having given up on continuing education (see the next group).

Other people who are interested in education but mention objective barriers to access to continuing education include clerks, technicians and people aged 35-44. These barriers also affect people with secondary education with school-leaving examination ("maturita"), people with average income (CZK 10,000 – 15,000) and people living in towns with fewer than 5,000 inhabitants (who consider the main barrier to be poor transport connections); women also state that they are affected by these barriers more frequently than men.

Table 3: Factors – barriers characteristic for social groups

	F 1	F 2	F 3	F 4
students	3,00	2,50	3,50	3,00
retirees	2,83	3,00	2,46	2,97
mothers stay-at-home	2,48	1,56	2,62	2,84
unemployed	2,24	3,12	2,86	2,24
entrepreneurs with employees	2,87	1,98	2,63	2,33
entrepren. without employees	2,46	2,24	2,51	2,40
managers	2,82	2,55	2,05	2,45
professionals	2,66	2,19	2,09	2,54
technicians	2,27	2,30	2,33	2,42
clerks	2,22	2,16	2,24	2,36
operational workers	2,43	2,33	2,51	2,37
skilled workers	2,43	2,53	2,44	2,20
unskilled workers	2,52	2,63	2,90	2,13
personal income 1-10,000 CZK	2,51	2,62	2,58	2,60
10-15,000 CZK	2,39	2,45	2,38	2,32
over 15,000 CZK	2,74	2,33	2,29	2,37
education ISCED 1,2	2,76	2,84	3,04	2,45
ISCED 3C	2,54	2,51	2,51	2,45
ISCED 3A,4	2,35	2,35	2,25	2,56
ISCED 5,6	2,71	2,34	2,11	2,70
people aged 25-34	2,32	2,18	2,63	2,48
35-44	2,29	2,30	2,46	2,34
45-54	2,57	2,42	2,50	2,31
55-64	2,78	2,89	2,39	2,75
people living in the country	2,44	2,47	2,51	2,52
in a small towns	2,63	2,56	2,52	2,51
in a big towns	2,48	2,43	2,34	2,46
men	2,61	2,57	2,40	2,33
women	2,45	2,44	2,56	2,65

Note: F 1 – factor 1 (actual barriers), F 2 – factor 2 (cannot), F 3 – factor 3 (does not need), F 4 – factor 4 (given up), (average on the scale 1-4 – 1=yes, 4=no).

Source: NOZV, CVVM (2006).

These social groups naturally require different approaches than the unemployed, although also with a focus on financial support, better access to information and advisory services. Since most of these people are not serviced by labour offices, it is necessary to expand and increase the availability of free individual advisory services related to the possibilities of continuing education. These people also do not have access to financial support for educating the unemployed and often have limited access to employee training (companies train primarily managers and higher professionals and for this middle-qualifications and mid-income group companies pay primarily the courses required by law). Financial support, for instance in the form of educational vouchers, would be of fundamental help for increasing this group's participation.

Re: 2) The group of people who are not interested in continuing education can be divided into three subgroups:

Subgroup 2.1 is those who have **given up** on continuing education.

Under certain circumstances, this group would like to receive education, but they do not believe that education can offer any usefulness. On the other hand, they do not trust themselves to manage such education. They have had overwhelmingly negative experiences with education, do not enjoy learning and find education too demanding.

In addition to the previously mentioned **unemployed**, this group also includes **skilled and unskilled blue-collar workers**. These people are often found on the secondary labour market, frequently change employment and have low incomes. Their current level of education offers little way out of this situation. This group is also marked by actual barriers to access to education of which they are usually not aware, in particular financial barriers. In addition to introducing measures for reducing the above mentioned actual barriers, it is thus also important to provide motivational educational approaches. The education offered this group must be related to their actual problems in such a way that they can apply their experience while learning. Continuing education courses should thus include practical exercises so that participants immediately see the meaning and purpose of their new knowledge. Courses should definitely not resemble school, nor should they be offered in a school environment. This group would thus benefit from a special offer of courses that will motivate them to participate in education. Even if the education does not provide them with better work or pay, this approach will give them the knowledge and experience necessary to remain employable and to avoid social exclusion.

Subgroup 2.2 **cannot participate** in continuing education, usually because of lack of time and the need to care for the family.

This group would like to participate in continuing education and considers its education to be insufficient. Actual barriers do not play too great a role in their inability to participate, but they cannot find the time for education. This particularly concerns stay-at-home mothers. Although this reason is found more among women, it is also common for the younger age group (25-34) in general. This is the period in which people are starting their families and are caring for young children, which is the most demanding time in terms of the family's financial security.

An important factor for increasing this group's participation in continuing education is the provision of family services, in particular child care. Also important are family-oriented policies allowing people to balance work and family life, as well as special courses for women who are returning to work after raising their children or are looking for a new place on the labour market. Promoting this group's participation in continuing education thus cannot be limited to partial measures in the area of education, but requires a comprehensive family, social and educational policy.

Other people who cannot participate in education because of a lack of time include **entrepreneurs with employees, higher professionals and officials**. Here, the lack of time is the result of this group's long working hours. Although members of this group participate in education, they are often very aware of the need for continuing education. While lack of time is a clear problem for entrepreneurs with employees, among higher professionals lack of time is often combined with lack of interest in continuing education. Officials also often encounter the previously mentioned actual barriers. It is apparent that increased participation in education will not be solved by partial measures in education, but will require a comprehensive policy for the support of small and medium-sized businesses in order to allow entrepreneurs and key employees to take time off for continuing education courses without threatening business operations. This is an important factor for increasing a company's innovation potential and for maintaining and increasing its competitiveness.

Officials working for state and regional government offices are faced with a specific situation. This group requires specific educational programmes that will increase their qualifications and promote increased efficiency to the level of European standards. Education for this group requires public support.

Subgroup 2.3 **does not require education** because they consider their education to be sufficient

This group generally feels no actual barriers to access to education, but also has no interest in education since its members consider their education to be sufficient. This reflects the old belief that education received at school is sufficient for one's entire life.

This group includes **managers, higher professionals and people with tertiary education**. We should add that these attitudes are found only among around 30% of respondents from these groups who are not participating in education. Otherwise, this group has the highest level of participation in continuing education (more than 70%). This is probably influenced by their satisfaction with their current employment, a certain sense of resignation regarding change or an unwillingness to change. A closer examination shows that satisfaction with one's current education increases with age and is found primarily among male managers. This is a relatively unsettling situation, since by later age one's initial education is already outdated and one's experience cannot totally cover the lack of additional education. In addition, with such attitudes, managers without the proper skills may hinder company development.

Measures which could motivate these educated people to participate in continuing education should be oriented primarily on offering attractive courses that will

support these employees' further development. Motivational benefits from the employer, such as time off for education, may be of great help.

Because older people in the Czech Republic participate in education overwhelmingly (90.8%) for reasons associated with employment, there is a need for a well considered retirement policy which will motivate these people to remain on the labour market and to continue to be economically active.

1.3 Companies' approach to human resources development

Employee development is becoming an ever more important part of companies' strategies – not only because human resources are increasingly essential for companies' competitiveness but also as a result of the growing and relatively fast-changing demands placed on employees' knowledge and skills. Companies cannot rely solely on finding suitably qualified people on the labour market, but must also be pro-active towards newly hired and existing employees. The following international comparison of companies' approaches to human resources development is based on the outcomes of a survey conducted by the World Economic Forum.

Box 3: The WEF survey of human resources development in companies

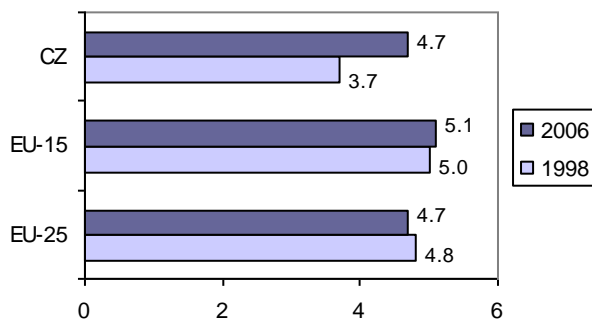
The annual questionnaire-based survey is conducted during the first five months of the year by approaching small, medium-sized and large/multinational corporations in various fields and with various ownership forms (privately-held domestic companies, foreign-owned companies and companies with government participation). The respondents answer the question: "The general approach of companies in your country to human resources is (1 = to invest little in training and employee development, 7 = to invest heavily to attract, train and retain employees). From this, a median response is calculated, along with a standard deviation indicating the match rate of responses.

According to managers and entrepreneurs, the situation in the Czech Republic regarding companies' willingness to invest into employee training and development was less favourable in 1998-2005 than the EU-25 average. Nevertheless, the gap between the Czech Republic and the EU-25 average showed a gradual decrease and in 2006 the Czech Republic was rated at the same level as the EU-25 average. Nonetheless, the willingness of companies located in the Czech Republic is still rated significantly lower than in developed countries, as shown by the difference with the EU-15, which was 0.4 points in 2006. The gap between the Czech Republic and the top-rated countries, however, is much greater. Companies located in the Czech Republic were rated at 4.7 points, while the best countries, Sweden and Denmark, received 5.9 points. The lowest rated companies in 2006 operated in Cyprus (3.4 points) or in member states that joined the EU in 2007 (Bulgaria – 2.6 points, Romania – 3.3 points). In all other member states the rating is close to or more than 4 points.

The improved position of the Czech Republic is influenced not only by the inflow of foreign capital, which is accompanied by approaches to human resources development commonly found in the home countries, but

also by gradual changes in the behaviour of domestic companies. A number of other factors are also at play. Empirical analyses have shown that companies' approach to human resources development differs not only in relation to company ownership (foreign vs. domestic), but also in relation to company size measured by number of employees and in relation to sector and profession. It is clear that a change in these characteristics, i.e. an increase in the number of foreign-owned companies, large companies, and economic sectors with above-average investment into human resources and professions with high demands on qualifications is accompanied by increased care for employee development.

Figure 10: Companies' willingness to invest into human resources development



Note: best rating = 7, worst rating = 1.

Source: WEF – The Global Competitiveness Report 2004-2006.

We may assume that a company's approach to human resources development has a relatively strong correlation to whether a company is performing innovating activities. Prior to implementing innovation, innovating companies are always faced with the need to train at least a part of their employees. The range of employees to be trained and the character of training depend on the type of innovation – whether it is a product-related, process, marketing or organisational innovation.

Influence of human resources on companies' innovating activities

The importance of human resources for a company's innovating behaviour is also shown by the results of a survey "Innovation in the Czech Republic in the year 2005" conducted by the Czech Statistical Office (ČSÚ). This survey searched the influence of the following eleven factors: shortage of financial resources at the company, shortage of finances from sources outside the company, shortage of qualified employees, excessively high costs of innovation, shortage of information on technologies, shortage of information on markets, difficulties in finding partners, market dominated by established companies, unstable demand for innovated goods or services, no need for innovation in view of previous innovations, innovation not desired.

Of eleven surveyed factors, shortage of qualified employees was ranked seventh or eighth in relation to a company's innovativeness. Among innovating companies, defined as company that in the studied period introduced at least one innovation, this factor placed in seventh, among non-innovating in eighth place. From

this we can deduce that innovating companies have a greater problem to gain and maintain suitably qualified employees, that the demands placed on employees are apparently greater at innovating companies and that they expect a far greater level of flexibility from their workers. Only 6.1% of non-innovating companies stated that human resources represent a limiting factor that highly influences the company's innovating activities, while among innovating companies the figure was 2.3 percentage points higher, i.e. 8.4%.

Table 4: Influence of shortage of qualified employees on a company's innovating activities (in %)

	innovating companies	non-innovating companies
Total CZ	8.4	6.1
small (10-49 employees)	7.2	5.8
medium-sized (50-249 employees)	11.6	7.9
large (250 and more employees)	9.0	2.6

Source: ČSÚ. Innovation in the Czech Republic in the year 2005.

The influence of a shortage of qualified employees on companies' innovating activities is felt with varying intensity **by small, medium-sized and large companies**. Among innovating companies, it is the greatest problem for medium-sized companies. Least affected are small companies with 10-49 employees. Among such small innovating companies, we can assume that employees have a relatively strong level of identification with company strategy and that workplace relations are more informal. Both these facts positively influence hiring and keeping employees. Medium-sized companies are in an unfavourable position as compared to both small and large companies. The positive characteristics of small companies are not present as strongly, and compared to larger companies they are more limited by the amount of time and money they can devote to human resources development. Among non-innovating companies, the shortage of qualified employees is felt strongest by medium-sized companies; large companies have the least problems.

From the point of view of **economic sector**, the influence of a shortage of qualified employees on innovating activities is felt most strongly by innovating companies than by non-innovating companies, with the exception of two sectors: construction and the electricity, gas and water supply. Of innovating companies, the largest share of companies which feel that this factor has a large influence are active in computer and related activities (15.8%) and in the manufacture of electrical and optical equipment (15.7%). Among non-innovating companies, they are in the manufacture of machinery and equipment sector (10.3%) and construction (9.3%).

Although training is important for the functioning of all companies, we can assume that innovating companies pay more attention to their employees' development.

Innovating companies' approach to human resources development

A survey conducted by the National Observatory of Employment and Training (NOZV) in cooperation with the MEDIAN research agency was aimed at determin-

ing the approach to human resources by companies undergoing various types of innovation – strategic, modifying, irregular and adoptive. Basic information on the survey is contained in box 4.

Box 4: NOZV survey – Approaches of innovating companies for gaining and developing human resources

The survey was performed in October and November 2004 and January 2005 using the CAPI method (Computer-Assisted Personal Interviewing). A total of 327 fully completed questionnaires was received; respondents were directors of innovating companies (21%) or persons responsible for human resources management (79%). The surveyed companies were located in all regions of the Czech Republic, with most companies from Prague (16.2%) and the smallest proportion from the Karlovy Vary region (1.5%). In term of economic sectors, the most common companies were those focused on manufacture of machinery and equipment (classification of economic activity NACE-29, 19.6%); the survey did not include companies from the service sector.

The questionnaire had six parts. The first part asked about basic information on the company, the second part focused on the characteristics of human resources at the company, the third part looked at the intensity and forms of employee training, the fourth part was about the systematic approach of companies towards human resources development, the fifth part looked at innovating activities and the sixth part at human resources development for the needs of specific innovating activities. Respondents answered a total of 32 questions, 9 of which were open questions.

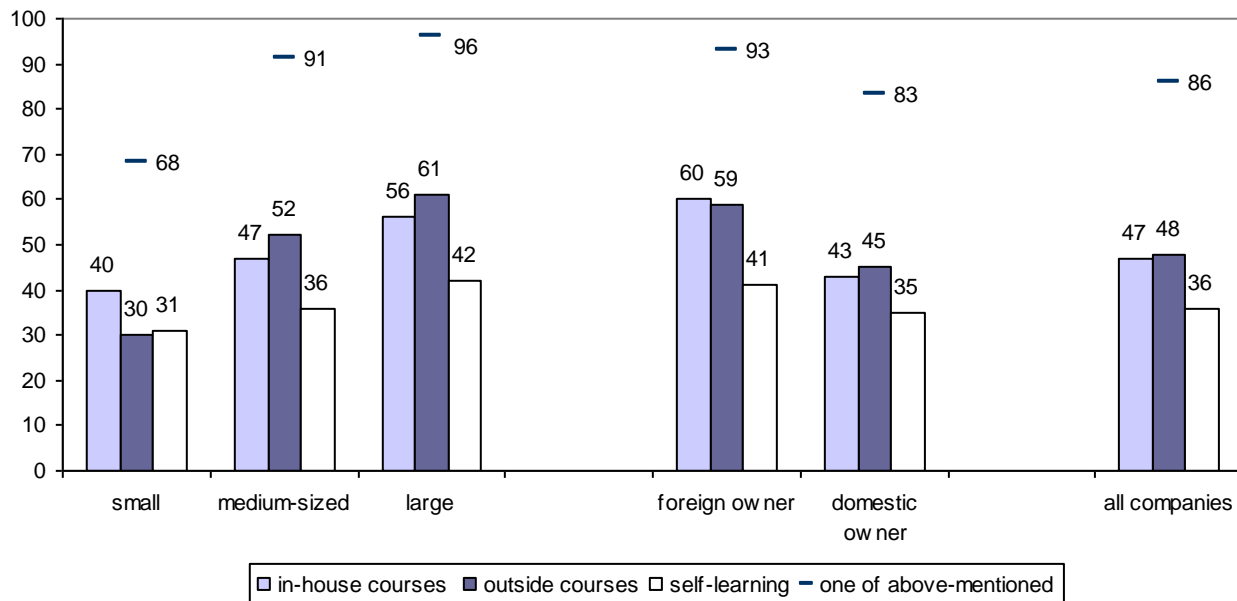
If companies do not gain new employees with skills corresponding to the innovating activities, 85% of them provide for their development through one of the

three most frequent forms of training – in-house courses, external courses or self-learning (see figure 11). On average, the most frequently provided form of training for new employees are courses provided by external agencies (48% of companies) and in-house courses (47% of companies); only 36% of companies made use of self-learning.

Large companies are most active in training new employees – only 4% of companies with more than 250 employees do not focus on this issue. On the other hand, almost one third (32%) of small companies, i.e. companies with 49 or fewer employees, does not pay attention to this issue. This means that they are either able to find employees with the corresponding skills or they rely on the employees to develop missing or insufficient skills while performing their work or on their own initiative outside of working hours. In providing training of new employees, small companies also rely more on courses provided on their own; medium-sized and large companies, on the other hand, rely on courses provided by external institutions.

Differences in the behaviour of innovating companies are expressed not only in relation to company size but also in relation to **ownership**. Foreign-owned companies provide more training of new employees than companies owned by domestic capital (93% vs. 83% of companies). While foreign-owned companies make greater use of internal manpower than external agencies for training their employees, domestically owned companies rely more on external trainers.

Figure 11: Training of new employees in innovating companies



Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

Course topics differ in relation to the type of innovating activities which the employer is implementing. For employees involved in research and development, acquiring the results of external research and development, acquiring machines and equipment and design the most frequent course topics are new machines, materials, approaches and technology. Employees involved in acquiring other external knowledge most commonly participate in language courses; training focuses primarily on questions of work safety. Training of employees involved in introducing innovations on the market is focused primarily on management, marketing, purchase, sale, trade etc.

The ideal form of employee development involves a **systematic approach** with the constant repetition of three fundamental stages – determining training needs, providing training and inspection of quality and evaluation of benefits. Determining training needs can be divided into the following four steps:

- determine individual positions' requirements as regards qualification, knowledge and skills,
- evaluate individual employee's capability, determine differences between the position's requirements and the employee's capability,
- determine training needs,
- elaborate individual development plan.

Figure 12: Systematic approach towards determining educational needs



Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

As can be seen in figure 12, the level of engagement of innovating companies declines at the higher stages of the systematic approach towards determining training needs. Only 3% of innovating companies have not defined the **requirements for qualification**, knowledge and skills for individual job positions. These are companies with a small number of employees which we can assume function on the basis on informal structures and working relations and which expect a high level of flexibility and mutual substitutability from their employees. 70% of companies have defined job descriptions for all positions; 27% have done so only for selected employees. 7% of interviewed innovating companies do not perform **regular employee assessment**; among companies which do assess their employees we again see a domination of companies which evaluate all employees (67%) over companies

which assess only employees in certain positions (26%). A total of 13% of companies do not determine **training needs** at all; 55% of companies do so for all employees and 32% do so for only certain employees. A comparison of the total share of companies that provide employee assessment and determine training needs shows that about 6% of companies do not base employees' training needs on employee assessment. A full third of innovating companies does not elaborate **individual development plans**. This is also the only step that more companies realise for a selected group of employees (41%) than for all employees (27%). Such an approach does make some sense and one can assume that individual development plans are elaborated primarily for positions that to a certain extent are exclusive, with high demands on qualifications. For employees in positions represented by a large number of employees, one can assume a less individualised training approach.

Around one fifth of studied companies (20.8%) realises all stages of the systematic approach to human resources development for all employees. At these companies, qualification requirements have been established for all employees, their capability is regularly assessed, their further training needs are determined, and development plans are elaborated for them. The second largest group of companies is those which realise the first three steps of the systematic approach for all employees but elaborate individual development plans only for certain employee categories (14.7%). The third largest group (6.7%) is formed by companies which perform all activities only for certain employee categories. 2.1% of studied companies realise none of these activities, regardless of whether for all or only certain employee categories.

The comprehensiveness of a company's approach to human resources development depends to a large degree on the **type of innovating companies**. The characteristics of the individual types of innovating companies are given in box 5. Most active in relation to human resources development are strategic companies; least active are adoptive companies. Only relatively few strategic innovating companies do not implement the individual steps for determining training needs, while for adoptive companies this number is relatively significant. Modifying companies pay nearly as much attention to this issue as strategic companies, while the approach of irregular companies is closer to that of adoptive companies. The gap between modifying companies and strategic companies is relatively small, but it is more significant between adoptive and irregular companies.

Table 5: Companies not working on human resources development (in %)

	requirements	assessment	needs	plans
strategic	1.4	3.5	7.6	24.3
modifying	2.4	4.9	9.8	31.7
adoptive	5.0	20.0	27.5	55.0
irregular	6.6	11.5	21.3	37.7
all	3.1	7.3	13.1	32.4

Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

Besides type of innovating companies, companies' approach to determining training needs also depends on company size, market area and ownership. The influence

of these factors somewhat overlaps since larger companies are more frequently active on the international market and have a foreign owner.

Box 5 – Types of innovating companies

Strategic – innovation is a key factor in competitive strategy, internal research and development are performed systematically with the objective of developing new products or processes, the company is a source of innovations which spread to other companies.

Irregular – internal research and development is performed only when necessary (under pressure or favourable circumstances), but innovation is not a key strategic activity; sometimes research and development activities are focused on adapting new technologies developed by other companies to the company’s personal needs.

Modifying – existing products and processes are adapted using innovating activities not based on research and development; frequently, the company functions as a process-based innovator which innovates through production engineering (i.e. according to practical experiences from production).

Adoptive – innovations are introduced by adopting innovations developed by other companies or organisations.

From the **company size** point of view, it is apparent that (a) the larger the company, the larger the share of companies which are realising the individual steps for determining training needs, (b) the larger the company, the smaller the difference in the share of individual types of innovating companies which are also realising so-called higher or supplementary steps, (c) the gap between medium-sized companies and large companies is smaller than the gap between small companies and medium-sized companies.

All large, almost all medium-sized companies (99.3%), and more than 90% of small companies (90.3%) have established qualification requirements for at least certain employee categories. Around 84% of large companies, 74% of medium companies and 41% of small companies have developed individual development plans for at least certain employee categories. In determining the requirements for qualifications, the difference between large and medium-sized companies is 0.7 percentage points and the difference between medium-sized and small companies is 9 percentage points; the difference in elaborating individual development plans, however, is about 10 and 33 percentage points, respectively (see table 6).

Table 6: Companies implementing individual steps for the development of human resources (in %)

employees	requirements	assessment	needs	plans
250+	100.0	97.9	94.7	84.2
50-249	99.3	97.1	92.1	74.1
- 49	90.0	80.6	71.0	40.9

Source: Innovating companies’ approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

In term of differences in behaviour among domestically or foreign-owned companies (see table 7), the survey showed that foreign-owned companies pay more attention to the development of human resources. All foreign-owned companies regularly assess employee capability – 72% assess it of all employees and 28% assess it only of certain employees. As with differences related to company size, the difference between foreign and domestically owned companies widens in relation to more specific

stages of the systematic approach to human resources development. The share of foreign-owned companies which established requirements for job positions was 2.5 percentage points higher than domestically owned companies; for employee assessment this figure was 9.8 percentage points, for determining training needs it was 14.3 percentage points and for elaborating individual training plans it was 17.1 percentage points. This trend is similar to the one found for company size, which results from the fact that there exists a relatively strong correlation between company size and ownership: large companies tend to have a foreign owner, while small companies are usually domestically owned.

Companies’ approach to human resources also differs **in relation to the market** on which the company operates – whether it is active on the international, national or regional market (see table 7). The difference between national and regional market was defined as the customers’ distance from the location of the innovating company. If the main customer is located more than 50 km from the company, then the company is considered to be active on the national market; if not, then the regional market. Companies which pay the greatest attention to human resources development are those active on the international market, followed by companies active on the national and regional markets. As with the previous two indicators, the differences are greater at more advanced stages of the comprehensive approach. In establishing qualification requirements, there is no difference between companies active on the national or international market, while the greatest difference is in the elaboration of individual development plans (18.1 percentage points). Companies active on the regional market have the smallest lag behind national companies when it comes to elaborating individual training plans (9 percentage points), but the greatest when it comes to determining training needs (27.9 percentage points).

Table 7: Companies implementing individual steps of the systematic approach towards human resources development (in %)

	requirements	assessment	needs	plans
owner				
foreign	98.8	100.0	97.5	80.4
domestic	96.3	90.2	83.2	63.3
market				
international	98.6	96.8	93.2	74.8
national	98.6	88.0	85.1	56.7
regional	85.7	78.6	57.2	47.7

Source: Innovating companies’ approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

Only high quality training can provide the expected results, which is why **quality assessment** of the training provided should be an indispensable part of the systematic approach to human resources development. However, not all innovating companies which provide employee training inspect the quality of the training provided. Around one third of companies do not inspect the quality of training. The survey does not enable to draw a conclusion as to the reasons behind this fact, i.e. whether there is a lack of interest in quality (which would indicate that, to some extent, training is considered a formality), whether the companies are sure of the quality on the basis of prior

experiences or references or whether quality control of training is considered unnecessary since the outcomes/benefits of training are assessed by individual employees. In this relation, however, we should point out that about one fifth of companies do not assess benefits.

The most diligent approach to quality control of training is found with strategic innovating companies, more than three fourths of whom (76.1%) performed inspections. For irregular and modifying companies, this figure was more than 60% (64.4% and 61.7%, respectively), but for adoptive companies it was less than half (42.5%). Companies most frequently inspect the quality of training via a questionnaire survey of course participants, inspection of acquired skills or knowledge (tests or other forms), or inspection during the course. Controls are most frequently performed by the course participant's supervisor or the participant himself.

Quality of training is most frequently controlled by companies with more than 250 employees (83.2%), less so by companies with 50-249 employees (69.8%) and least of all by companies with no more than 49 employees (42.0%). Companies with foreign ownership or co-ownership inspect the quality of training more frequently than domestically owned companies (66.1% vs. 33.9%).

Quality of training is closely related to the **outcomes/benefits of training**. There is no single universal assessment tool, and assessment always depends on the individual form of training and individual professional groups. The outcomes or effectiveness of training are most easily assessed if there are clear training goals and if the training is focused on performing a specific job. Results are usually most pronounced if the person can test the acquired knowledge in practice and bears responsibility for the results. The success of training can be assessed by the fulfilment of objectives established in a regular employee appraisal.

Companies appear to be unsure about how to assess the results of training, and so nearly one fifth of studied companies (19.6%) performed no assessment. Unlike quality control of training, however, innovating companies clearly pay greater attention to assessing the benefits of training. Most frequently (in 57.5% of cases), the benefits of training are assessed by the supervisor of the trained employee; 18.9% of companies rely on assessment by the course participant himself, while the remaining 4% use other methods. Large companies assess benefits more frequently than small and medium companies; foreign-owned companies do so more frequently than domestic companies. Some 91.6% of large companies, 87.1% of medium-sized companies and a mere 58% of small companies assess benefits. A full 89% of foreign-owned companies assess benefits; among domestically owned companies, this figure is only 77.5%.

Intensity of training in innovating companies

The survey showed that 48% of innovating companies train their employees frequently, 29% less frequently. Although only a small proportion of companies do not train their employees at all (less than 6%). If we include also companies which only rarely train their employees, the proportion of innovating companies which does not pay much attention to human resources development reaches almost 23%.

In term of the expected development of training intensity, almost 86% of surveyed companies expected further growth, while roughly 14% anticipate a decrease in training activities. The reason for this negative trend is apparently unfilled expectations of training or poor experiences with the quality of training, resulting in the conviction that training represents an inefficient expenditure of resources and a waste of valuable employee time. Nevertheless, innovating companies are aware of the importance of qualified employees for their competitiveness, as proven by the fact that 40.4% of surveyed companies listed qualified employees (professionalism) as one of five key sources⁵ of competitive advantage.

Formal education in innovating companies

Employees of innovating companies take only minimum advantage of the chance to increase or expand their qualifications by **studying at school**. Companies in the Czech Republic do not have a duty to accommodate employees interested in studying. The Labour Code does not require employers to provide employees with a lightened workload or material support during studies. They may provide these if the employee is increasing his qualifications for performing the work described in the employment contract. In such a case, the employer and employee may enter into an agreement in which the employer undertakes to provide a lightened workload and material support during the time in which the employee is increasing his qualifications. The employee undertakes to remain with the employer for a specific period, but no more than five years, or to repay the costs associated with the studies if he breaks the employment relation prior to completing his studies. If the employer is not willing to provide the employee with material support or a lightened workload, the employee may take his holiday in order to meet his study-related duties. One problem with this is the fact that, according to the Labour Code, the holiday schedule is at the discretion of the employer, who need not agree with the employee's taking a holiday during the period in which he needs to meet his study-related duties.

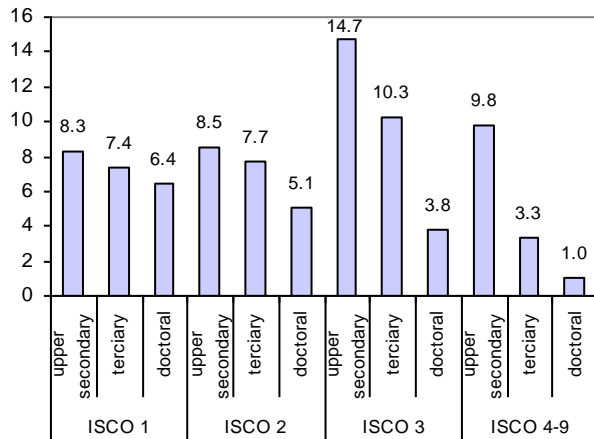
The survey showed that, at more than three fourths of innovating companies, no employees are working to increase their qualifications by studying at school. This may indicate that, at the great majority of companies, the employees' level of qualifications suits the demands of the individual jobs and that companies do not have any problem filling positions with properly qualified persons. A less favourable explanation may be a lack of employee interest in increasing their level of qualification because they sense resistance from the employer, they find it difficult to juggle work, studies and personal life, or they do not consider the results worth the effort.

As shown by figure 13, regardless of profession employees most frequently supplement their education with **upper secondary education**. With decreasing demands on qualification among the individual professions we logically see a greater difference in participation in the various levels of formal education. The smallest difference is among senior officials and managers (ISCO 1), the greatest difference is among persons in less demanding professions (ISCO 4-9). The sample under review included

⁵ Based on open questioning; companies did not select from a list of suggested answers.

companies that enable persons in low-qualified positions to gain tertiary education. These apparently are individuals who are working part-time in order to be able to balance work and study-related duties; after finishing their studies, they move on to a job that reflects their level of education. In view of the fact that the company accommodates them in some manner, this new job is usually within the company instead of elsewhere.

Figure 13: Formal training in innovating companies (in %)



Note: proportion of companies which answered "frequently" and "less frequently" to the question with which intensity they provide the individual forms of training to the individual categories of employees. Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

Technicians (ISCO 3) seek out formal education most frequently, followed by senior officials and managers (ISCO 1) and professionals (ISCO 2). Companies are least likely to enable persons in less demanding professions (ISCO 4-9) to study formal education, although they do receive a relatively strong possibility to complete upper

secondary education, which (except for employee category 9) is associated with these qualification categories.

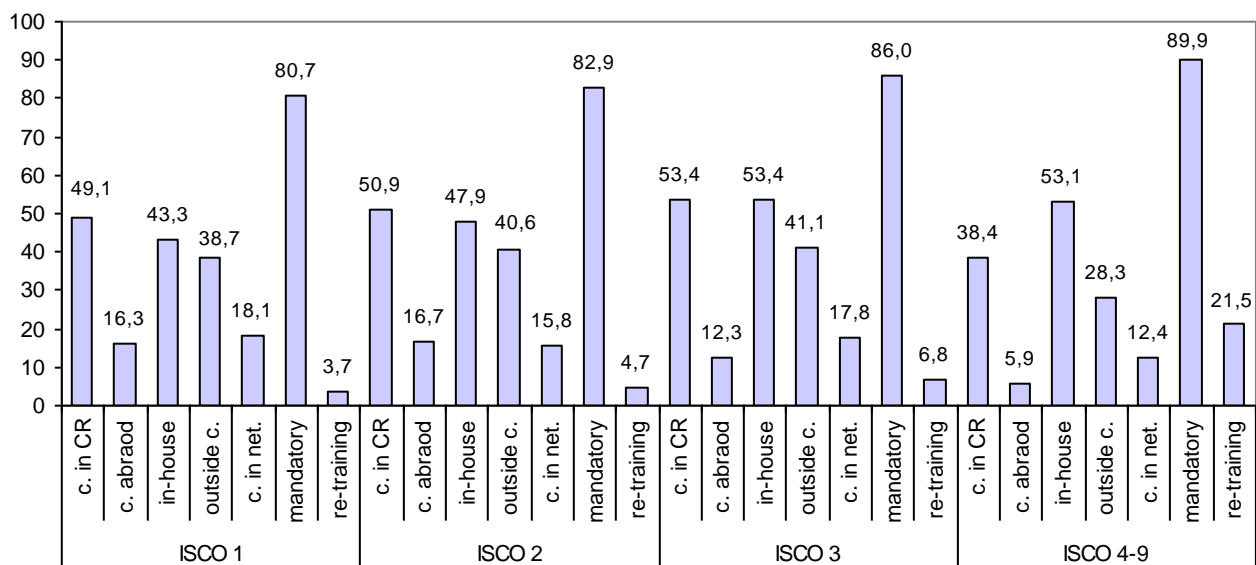
Quite surprising is the relatively high proportion of companies at which employees in highly demanding positions (ISCO 1, 2) go on to complete secondary education. No further information is available to explain this fact, so we can only hypothesise. For senior officials and managers (ISCO 1), we may surmise that we are dealing with persons in lower management positions who, as a result of a switch from a vertical to a horizontal organisational structure, have been given additional competencies and responsibilities with increased demands on their existing level of qualification, and who are thus supplementing their apprentice-level education with a school-leaving examination ("maturita"). Among professionals (ISCO 2), these are most likely individuals who acquired their necessary knowledge and skills over the course of their professional life, but are now faced with a situation in which formal education has become indispensable for the performance of their profession or for increased wages.

One pleasant finding is the fact that at a relatively large proportion of innovating companies (about 15 %) technicians (ISCO 3), whose profession usually requires capabilities corresponding to secondary professional education, are supplementing their education with studies at tertiary professional schools or higher education institutions. It is clear that increased technological demands of production are accompanied by increased demands on qualifications for technicians.

Non-formal education in innovating companies

The Labour Code requires employers to (a) train employees in order to ensure their safety and health protection at work; (b) arrange adequate vocational practice for graduates; (c) ensure induction training or on-the-job training for unskilled employees; (d) arrange training for an employee who is transferred to a new workplace or a new type of work.

Figure 14: Non-formal education in innovating companies (in %)



Note: c. = courses, net. = network. The share of companies that answered „often“ and „less often“ the question „What is the intensity of providing the individual form of training to the individual categories of employees?“ on the whole number of interviewed companies. Source: NOZV, MEDIAN (2005), own calculations.

The employer is entitled to require employees to participate in training in order to increase their qualifications. For certain sectors, the education and indispensable prerequisites for performing certain professions are regulated by laws or decrees (e.g., health care, education, public administration, electricity, etc.). Legal regulations concerning mandatory education are expressed in the structure of non-formal education. In fact, courses for mandatory education were provided most frequently – by more than 80% of surveyed companies. Courses for mandatory education were most frequently provided for employees in less demanding positions (ISCO 4-9).

As shown by figure 14, at innovating companies education via professional courses regardless of form was focused primarily on **technicians** (ISCO 3), followed by professionals (ISCO 2). The least (almost equal for both categories) amount of intensity was focused on courses for less demanding positions (ISCO 4-9) and for senior officials and managers (ISCO 1). This results primarily from the higher level of mandatory education and in-company education for less qualified positions as compared to senior officials and managers.

The different approaches of the various types of innovating companies to the non-formal education of employees in various occupations can be seen in figures 3A-6A in Annex. The analysis excludes courses provided as part of mandatory training, since the differences in the intensity of their provision result from legal regulations. We can observe, however, that more expansive duties within mandatory training seem to reduce the space available for other types of non-formal education.

Most engaged towards **senior officials and managers** (ISCO 1) were strategic innovating companies, with less intensity seen among modifying companies. Except for re-training courses and courses provided as part of a network of companies, irregular companies paid more attention to non-formal education than adoptive companies. Adoptive companies lead in the provision of re-training courses, although this type of education was provided by an insignificant number of companies.

Strategic companies provide non-formal education for professionals (ISCO 2) to a greater extent than other types of innovating companies, followed by modifying, adoptive and irregular companies. Adoptive companies are significantly ahead of irregular companies when it comes to less common courses, courses provided within a network of companies, and re-training courses.

From the non-formal education point of view, technicians (ISCO 3) receive the most attention from strategic companies, somewhat less from modifying companies, followed by adoptive and irregular companies. The same conclusion applies to the education of people in less demanding positions (ISCO 4-9). Adoptive companies' lead over irregular innovating companies is again influenced primarily by the more intense use of re-training courses and courses provided in networks.

Informal learning in innovating companies

Informal learning at the workplace is often a more important source of information and experiences than non-formal education courses. The survey of innovating companies found the following types of informal learning:

- induction at the workplace,

- coaching,
- different forms of rotational intership,
- experiential learning within work teams,
- internet using,
- professional literature using,
- conferences participation.

As shown by figure 8A in Annex, the most frequent manner for information and experience passing out the workplace is during the **induction** of new employees. This approach is applied in particular for less qualified employees (ISCO 4-9), at three fourths of companies. Its frequency declines with increased employee qualifications. While for technicians (ISCO 3) this approach is applied frequently or less frequently by more than one half of companies, for professionals (ISCO 2), this figure is 40% and for senior officials and managers (ISCO 1) it is only one third of companies, in particular large companies. This results primarily from the fact that less qualified or unqualified employees require direct training, usually under supervision and for a specific job, and the company is obliged to provide such training.

Because it is a relatively demanding process, **coaching**, i.e. long-term guidance of an employee by an experienced employee (coach), can be expected more among highly qualified or management-level employees. Only relatively few companies (up to 15%) use coaching for all occupation groups.

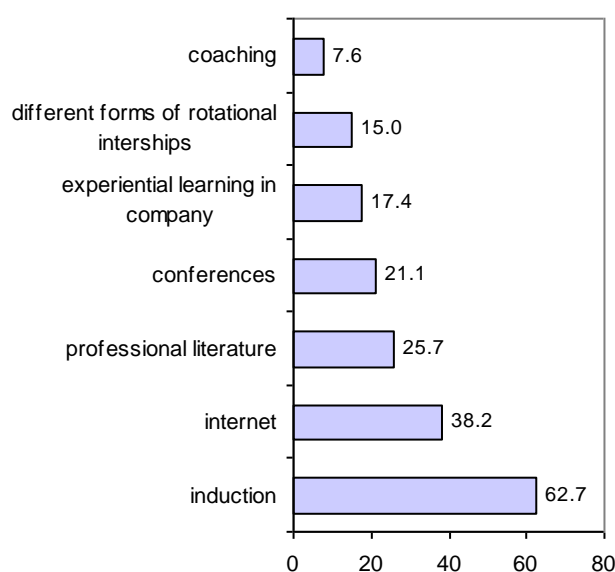
Another method for passing experience is **rotational interships**, employed primarily within the company. These are used to a greater extent for less qualified employees, although the differences are not as great. More than one fourth of companies use this method for less qualified employees (ISCO 4-9) and technicians (ISCO 3), while the figure is 19% for professionals and for managers it is 12% of companies.

A similar approach applies to **experiential learning** within work teams, which is supported more frequently for less qualified employees (ISCO 4-9 – 40% of companies, ISCO 3 – 35% of companies) than for highly qualified employees (ISCO 2 – 33% of companies) and least for senior officials and managers (ISCO 1 – 24% of companies). Although it is clear that these employees would benefit from rotational interships and experiential learning at other companies as well, this opportunity is used only minimally.

A completely different picture is offered by the use of the internet, professional literature or conferences. Companies support these sources of informal learning primarily for qualified employees. The use of the **internet** is supported by almost all companies for all qualification categories, though for less qualified employees (ISCO 4-9) only around one third of innovating companies do so. The use of professional literature is supported by 90% of companies, primarily for qualified employees, most of all for professionals (ISCO 2). Participation at conferences for qualified employees (ISCO 1,2) is supported by more than one half of companies; the figure for technicians (ISCO 3) is 40%, while unqualified employees receive only minimal support. Support of informal learning also differs by **company size**. Large companies make more frequent use of direct forms of information and experiences passing (induction, rotational interships, experiential learning in teams), while small companies support self-learning.

The main differences among the various **types of innovating companies** are that strategic and modifying companies make significantly higher use of all forms of informal learning (except for induction) than irregular or adoptive companies. Coaching, which is only used to a small degree, is used primarily by strategic companies. Practically all companies provide internet access to their qualified employees (ISCO 1,2,3), but they differ in enabling access to less qualified employees (ISCO 4-9). Nearly half of strategic companies but only roughly one third of other companies do so. Strategic and modifying companies also provide their employees with professional literature (up to 90% of companies) to a greater extent than other types of companies. Strategic and modifying companies also make more use of participation at conferences, primarily for managers and professionals (two thirds of companies), but also for technicians (one half of companies).

Figure 15: Proven methods of informal learning



Source: Innovating companies' approaches towards gaining and developing human resources, NOZV survey, MEDIAN, 2004-5, own calculations.

Of the various types of informal learning, the one which innovating companies found most worthy (see figure 15) was induction of new employees at the workplace (in particular at large companies), followed by providing internet access (in particular at small and medium-sized companies and domestically owned companies), purchase of professional literature (again primarily at small and medium-sized companies and domestically owned companies) and participation at conferences (here, there were no large differences among the individual categories). More than one fifth of companies stated, however, that they found all forms of informal learning to be worthwhile.

Motivation of employees to participate in continuing education in innovating companies

Education is associated with certain expenses borne by employer and employee alike, which is why human resource strategy also includes employer incentives to increase employees' interest and responsibility in their professional growth. Incentives may take various forms

and may be financial or non-financial in nature. The survey studied the use of the following incentives at innovating companies:

- courses during working hours,
- paid time off for studies,
- financial support for individual learning,
- better pay after completing education,
- promotion at work after completing education,
- reduced risk of termination.

The use of incentives was studied in relation to different professions with varying demands on qualification as well as in relation to the type of innovating company. In view of the fact that certain professions did not exist at some companies, the intensity of the use of incentives towards individual professions is calculated only for the group of companies in which said professions were employed.

Judging by the proportion of companies which use the six surveyed types of incentives frequently and less frequently and the proportion which do so exceptionally or not at all, innovating companies do not consider motivating their employees to participate in continuing education to be very important. For all types of incentives, the proportion of companies which **do not motivate** their employees is higher than those that do, although the ratio differs for each type of incentive.

The most frequently used type of incentive is **courses during working hours**, followed at a relatively large distance by the promise of better pay and the promise of promotion. Financial support for individual learning is less common, but more so than the promise of better job security. Paid time off for studies was used least commonly. This relates to the fact that a very small percentage of employees supplement their formal education.

Innovating companies motivate the various categories of professions with different levels of intensity (see figure 7A in Annex). The survey showed that, from the point of view of motivation towards continuing education, the studied professions can be divided into two groups with a similar intensity in the use of incentives.

The group which received more attention included technicians (ISCO 3) and professionals (ISCO 2), while the second group included professions with the highest as well as lowest demands on qualifications, i.e. senior officials and managers (ISCO 1) and less qualified positions (ISCO 4-9). This may reflect the fact that senior officials and managers are expected to have strong personal initiative for self-learning, while for professions with low skill demands, companies make use of the possibilities given by the Labour Code, i.e. they prescribe training.

Overall, the least used incentive was paid time off for employees in less demanding positions (ISCO 4-9). The proportion of such companies from the entire sample of innovating companies was one tenth. The most used incentive, on the other hand, was courses during working hours for technicians (ISCO 3). The share of companies offering this incentive to them was more than half of all companies in which this employee category was represented.

Table 1A: Adult participation in education (in %)

	2003	2004	2005	2006
EU-27	8.6	8.4	10.1	9.9
EU-15	9.8	9.4	11.7	11.4
Austria	12.5	12.0	13.8	14.4
Belgium	8.5	9.5	10.0	8.4
Bulgaria	1.4	1.3	1.1	1.4
Cyprus	7.9	9.3	5.6	8.6
Czech Republic	5.4	6.3	5.9	6.1
Denmark	18.9	26.5	27.6	28.7
Estonia	6.2	6.7	5.9	5.3
Finland	17.6	23.5	22.8	23.0
France	7.6	7.9	7.8	8.0
Germany	6.0	7.4	8.2	7.8
Greece	3.9	1.8	1.9	2.1
Hungary	6.0	4.6	4.2	4.2
Ireland	9.6	7.2	8.0	8.7
Italy	4.7	6.8	6.2	6.3
Latvia	8.1	9.1	7.6	6.8
Lithuania	4.5	6.5	6.3	5.0
Luxembourg	6.5	9.8	8.5	0.0
Malta	4.2	4.8	5.8	5.5
Netherlands	17.4	17.3	16.6	16.4
Poland	5.0	5.5	5.0	5.0
Portugal	3.7	4.8	4.6	4.4
Romania	1.3	1.6	1.6	1.6
Slovakia	4.8	4.6	5.0	4.4
Slovenia	15.1	17.9	17.8	17.6
Spain	5.8	5.1	12.1	11.6
Sweden	34.2	35.8	18.2	17.5
United Kingdom	21.2	16.0	29.1	27.5

Note: Missing answers are not included. Source: EUROSTAT (2003, 2004, 2005, 2006b, 2nd quarter of individual years), own calculations.

Table 2A: Adult participation in education by labour market position and gender (in %)

	2003						2006					
	employed			unemployed			employed			unemployed		
	men	women	total	men	women	total	men	women	total	men	women	total
EU-27	8.0	11.3	9.4	6.1	8.0	7.0	9.2	12.9	10.8	6.8	9.5	8.2
EU-15	8.9	12.6	10.5	7.7	9.5	8.6	10.5	14.7	12.3	8.5	11.3	9.9
Austria	12.9	14.2	13.5	13.4	13.8	13.6	14.3	17.6	15.8	13.7	20.8	17.3
Belgium	9.0	11	9.9	8.1	12.2	10.0	9.5	9.7	9.6	10.3	12.9	11.5
Bulgaria	0.9	1.4	1.1	0.9	2.5	1.6	1.2	1.3	1.3	0.6	1.4	1.0
Cyprus	7.4	11.4	9.2	3.5	7.8	5.6	8.5	11.4	9.8	3.4	8.6	6.2
Czech Republic	5.4	7.2	6.2	3.3	3.4	3.4	5.9	8.0	6.8	1.6	4.7	3.4
Denmark	15.4	20.8	17.9	14.6	23.8	19.3	25.5	33.5	29.2	35.5	40.7	38.4
Estonia	5.4	8.2	6.8	2.7	10.6	6.4	4.5	6.7	5.6	2.7	13.9	8.4
Finland	15.8	21.9	18.8	16.0	20.3	17.9	22.4	28.9	25.5	14.8	22.1	18.5
France	8.0	8.6	8.3	6.8	9.2	8.1	8.1	9.4	8.7	7.1	8.4	7.8
Germany	5.8	6.3	6.0	3.9	4.8	4.3	7.6	9.0	8.3	4.2	4.7	4.4
Greece	3.1	5.3	3.9	4.4	6.2	5.6	1.3	1.8	1.5	2.4	2.5	2.4
Hungary	5.9	8.5	7.1	1.9	5.0	3.3	3.5	5.2	4.3	2.5	4.9	3.7
Ireland	8.1	12.8	10.1	6.6	13.8	9.2	6.5	11.6	8.7	4.8	14.3	8.5
Italy	2.7	5.0	3.6	4.2	5.1	4.7	5.2	8.2	6.4	7.1	7.2	7.2
Latvia	7.1	12.9	10	1.3	4.7	3.0	5.1	8.4	6.8	1.4	15.5	7.2
Lithuania	3.7	6.7	5.2	2.8	1.7	2.2	3.2	7.8	5.5	1.6	2.6	2.1
Luxembourg	6.5	7.0	6.7	6.5	12.1	9.4	:	:	:	:	:	:
Malta	4.8	7.4	5.5	6.5	9.0	7.2	5.2	11.1	6.9	6.5	6.8	6.7
Netherlands	18.2	21.0	19.4	13.0	20.9	16.6	17.4	18.8	18.0	14.9	19.4	17.1
Poland	5.6	7.8	6.6	2.8	4.9	3.8	5.0	8.0	6.3	2.6	4.6	3.5
Portugal	2.6	3.8	3.1	6.6	7.7	7.2	3.3	4.0	3.6	4.4	8.2	6.5
Romania	0.7	1.3	1.0	0.8	1.8	1.2	1.1	1.6	1.4	0.9	1.1	0.9
Slovakia	5.8	6.6	6.2	1.5	2.3	1.9	4.7	6.6	5.5	0.8	2.3	1.6
Slovenia	15.8	20.2	17.8	10.5	13.9	12.2	17.5	21.1	19.2	20.1	24.3	22.5
Spain	3.8	6.2	4.7	9.5	11.4	10.7	9.9	14.3	11.7	13.4	18.5	16.4
Sweden	30.0	36.8	33.3	30.9	31.1	31.0	11.4	21.2	16.1	26.5	32.4	29.4
United Kingdom	18.4	28.5	23.1	18.0	24.6	20.5	23.6	34.9	29.0	19.6	31.1	24.7

Source: EUROSTAT (2003, 2006b, 2nd quarter of individual years), own calculations.

Table 3A: Adult participation in education by occupation (in %)

	2003		2004		2005		2006	
	ISCO 1-3	ISCO 4-9	ISCO 1-3	ISCO 4-9	ISCO 1-3	ISCO 4-9	ISCO 1-3	ISCO 4-9
EU-27	14.9	6.0	14.5	5.6	17.2	7.2	16.6	6.8
EU-15	15.6	7.0	15.1	6.5	18.5	8.6	17.8	8.3
Austria	21.8	9.2	20.0	8.7	23.3	10.0	24.5	10.0
Belgium	14.6	6.4	17.0	6.8	17.0	6.4	13.7	6.2
Bulgaria	2.2	0.6	2.3	0.5	1.4	0.5	2.6	0.7
Cyprus	17.7	5.4	21.5	6.0	12.6	3.7	19.3	5.7
Czech Republic	11.9	2.7	14.2	2.9	12.6	2.5	12.9	2.7
Denmark	22.8	13.4	33.2	19.6	34.7	22.5	34.8	23.4
Estonia	13.7	2.5	14.8	3.4	12.1	3.0	10.1	2.1
Finland	25.8	13.2	35.8	18.3	35.2	17.0	34.2	17.6
France	12.5	5.4	13.0	5.6	12.2	6.0	12.6	6.1
Germany	8.9	3.6	11.9	4.4	13.2	5.0	12.7	4.4
Greece	7.1	2.5	2.9	0.9	2.7	0.7	2.6	0.9
Hungary	13.0	3.9	9.4	2.6	8.1	2.6	7.7	2.3
Ireland	14.2	6.9	10.3	4.8	11.9	5.0	12.0	6.3
Italy	6.2	2.3	12.1	3.7	10.9	3.1	10.9	3.2
Latvia	21.5	4.2	22.5	4.9	18.4	3.6	13.2	2.9
Lithuania	11.0	2.5	17.0	2.6	15.3	2.7	11.1	2.4
Luxembourg	10.4	4.2	15.5	6.8	12.4	5.5	0.0	0.0
Malta	11.3	2.1	11.4	2.7	11.5	4.1	11.6	3.8
Netherlands	23.2	14.6	22.6	14.7	21.9	14.1	21.7	13.7
Poland	13.7	3.1	14.0	3.7	13.0	2.9	12.9	2.8
Portugal	6.9	1.8	8.5	2.6	7.1	2.5	7.5	2.1
Romania	3.3	0.3	4.0	0.8	3.8	0.6	3.5	0.7
Slovakia	10.9	3.5	11.2	2.5	11.1	2.6	11	2.3
Slovenia	29.7	10.4	34.1	11.7	32.6	11.7	30.5	10.7
Spain	7.9	3.2	6.7	2.8	20.9	8.5	18.8	8.2
Sweden	44.3	23.7	46.8	25.0	20.7	13.1	20.0	12.4
United Kingdom	29.5	18.0	18.6	13.0	36.7	24.6	34.5	23.5

Note: only working population is included; missing answers are not included.
 Source: EUROSTAT (2003, 2004, 2005, 2006b, 2nd quarter of individual years), own calculations.

Table 4A: Adult participation in education by demanding occupation (in %)

	ISCO 1	ISCO 2	ISCO 3	ISCO 1-3
EU-27	12.4	20.6	15.2	16.6
EU-15	13.3	22.4	16.3	17.8
Austria	18.0	33.8	22.0	24.5
Belgium	10.0	17.4	10.6	13.7
Bulgaria	1.9	2.6	3.2	2.6
Cyprus	14.5	25.2	14.3	19.3
Czech Republic	10.8	18.7	10.7	12.9
Denmark	26.6	37.5	35.7	34.8
Estonia	7.5	13.9	8.3	10.1
Finland	30.3	39.0	31.5	34.2
France	7.7	15.4	12.8	12.6
Germany	7.8	16.6	11.1	12.7
Greece	0.8	3.8	2.9	2.6
Hungary	5.2	9.1	7.9	7.7
Ireland	7.1	15.9	12.4	12.0
Italy	5.5	17.0	10.2	10.9
Latvia	12.1	17.1	10.8	13.2
Lithuania	9.2	12.1	11.4	11.1
Malta	4.7	15.6	13.0	11.6
Netherlands	15.4	24.4	22.6	21.7
Poland	8.0	16.9	9.9	12.9
Portugal	2.9	11.3	7.7	7.5
Romania	3.5	2.8	4.1	3.5
Slovakia	9.8	14.2	9.5	11.0
Slovenia	25.1	36.0	27.5	30.5
Spain	7.3	26.8	17.3	18.8
Sweden	16.6	21.3	19.6	20.0
United Kingdom	27.3	39.5	37.1	34.5

Note: missing answers are not included.
 Source: EUROSTAT (2006b, 2nd quarter of individual years), own calculations.

Table 5A: Adult participation in non-formal education (in %)

	2003	2004	2005	2006
EU-27	5.4	5.3	6.9	6.0
EU-15	6.1	6.2	8.3	7.1
Austria	10.1	9.5	11.2	11.5
Belgium	(:)	7.7	7.7	6.3
Bulgaria	0.4	0.3	0.2	0.3
Cyprus	6.6	7.9	4.5	7.2
Czech Republic	4.4	4.7	4.0	4.4
Denmark	13.1	20.7	22.2	24.3
Estonia	2.9	2.9	2.2	2.4
Finland	12	17.2	16.6	16.7
France	6.9	7.2	7.1	7.3
Germany	3.3	4.7	5.3	5.1
Greece	2.7	0.6	0.7	0.6
Hungary	(:)	1.8	1.6	1.5
Ireland	5.7	3.9	4.3	5.0
Italy	(:)	3.9	3.4	3.4
Latvia	4.3	4.1	3.0	3.9
Lithuania	(:)	3.2	2.9	1.7
Luxembourg	5.5	9.0	7.5	(:)
Malta	(:)	3.5	4.2	4.2
Netherlands	11.7	11.1	10.5	10.4
Poland	(:)	2.5	1.8	2.2
Portugal	(:)	1.9	1.6	1.5
Romania	0.2	0.3	0.2	0.1
Slovakia	4.0	3.3	3.4	2.9
Slovenia	9.0	11.0	11.2	11.4
Spain	3.5	3.0	9.3	(:)
Sweden	27.5	30.4	13.3	12.8
United Kingdom	(:)	6.6	21.7	20.7

Note: students of formal education are not included. Missing answers are not included. In the following countries there is higher proportion of missing answers that could influence the results: Sweden, UK, Netherlands, France in 2003, 2004, 2005, 2006, Poland in 2005.

Source: EUROSTAT (2003, 2004, 2005, 2006b, 2nd quarter of individual years), own calculations.

Table 6A: Adult participation in non-formal education by education attainment level (in %)

	2003			2006		
	ISCED					
	0-2	3,4	5,6	0-2	3,4	5,6
EU-27	2.3	4.9	10.9	2.3	5.2	12.9
EU-15	2.6	5.9	11.4	2.6	6.8	14.2
Austria	3.2	10.3	20.5	4.4	10.9	22.2
Belgium	(:)	(:)	(:)	2.4	5.2	11.8
Bulgaria	0.0	0.4	1.0	0.0	0.1	0.9
Cyprus	1.5	5.4	14.6	1.3	5.8	15.4
Czech Republic	0.6	3.5	14.0	0.6	3.3	13.8
Denmark	8.2	10.7	19.7	14.9	21.7	32.6
Estonia	0.6	1.9	5.8	0.0	2.2	3.6
Finland	6.4	10.2	18.6	8.6	13.8	25.5
France	3.4	6.7	12.6	3.1	7.0	13.4
Germany	0.8	2.5	7.2	1.5	3.6	11.2
Greece	0.5	3.1	7.2	0.1	0.5	1.7
Hungary	0.0	0.0	0.0	0.4	1.3	3.6
Ireland	2.5	5.4	11	2.1	4.4	9.3
Italy	(:)	(:)	(:)	0.9	4.1	11.9
Latvia	0.9	2.9	12.8	1.7	2.9	8.8
Lithuania	(:)	(:)	(:)	0.0	0.9	4.4
Luxembourg	2.6	6.1	11.8	(:)	(:)	(:)
Malta	(:)	(:)	(:)	2.9	5.5	10.5
Netherlands	7.0	12.9	15.5	5.9	11.0	14.3
Poland	(:)	(:)	(:)	0.2	1.2	7.8
Portugal	(:)	(:)	(:)	0.7	2.5	5.4
Romania	0.0	0.2	1.0	0.0	0.1	0.5
Slovakia	0.8	3.4	11.5	0.2	2.1	9.5
Slovenia	1.8	8.1	22.0	3.2	9.0	25.7
Spain	1.5	4.1	8.2	(:)	(:)	(:)
Sweden	14.3	24.8	41.2	7.3	11.9	17.4
United Kingdom	0.0	0.0	0.0	12.3	18.2	30.5
EU-12	0.3	1.9	6.6	0.3	1.4	6.5

Note: students of formal education are not included. Missing answers are not included. In the following countries there is higher proportion of missing answers that could influence the results: Sweden, UK, Netherlands, France in 2003, 2004, 2005, 2006, Poland in 2005.

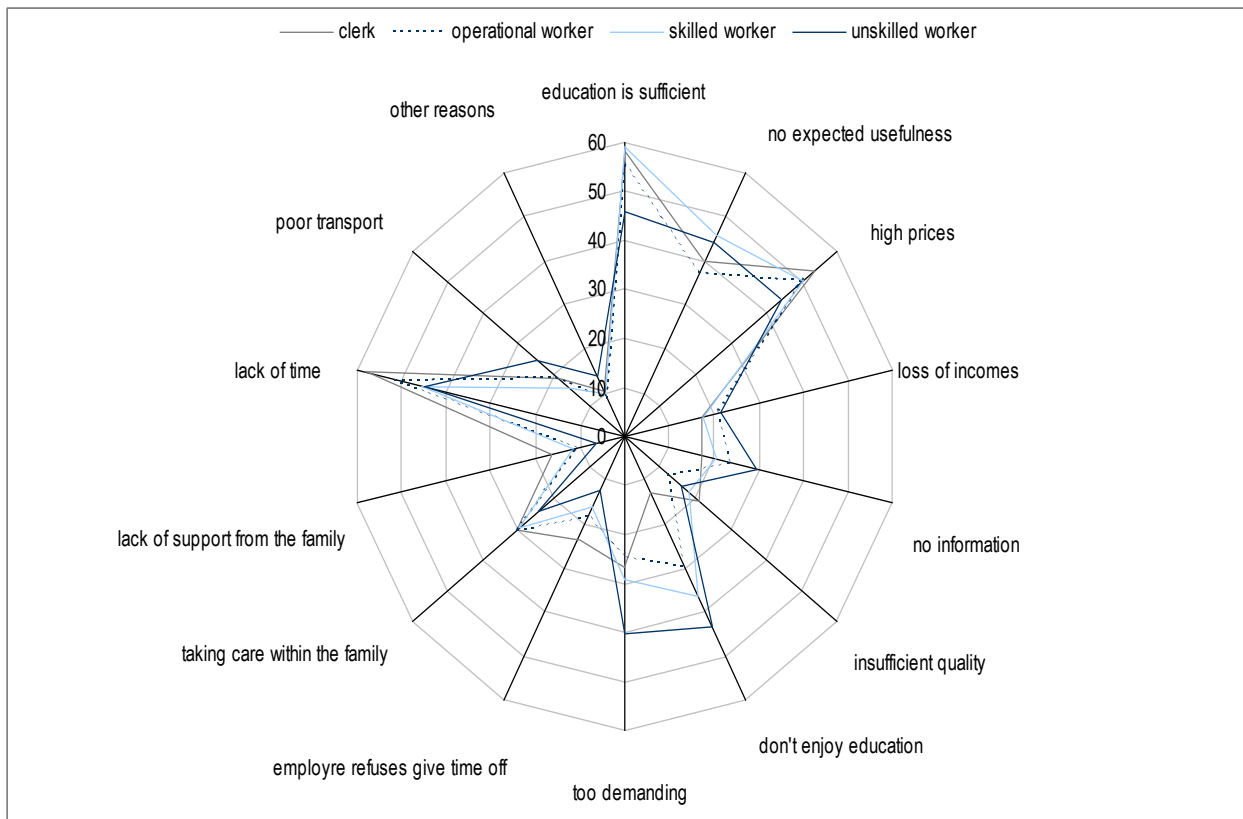
Source: EUROSTAT (2003, 2006b, 2nd quarter of individual years), own calculations.

Table 7A: Factors of not participating in continuing education

	Factor 1 (Actual barriers)	Factor 2 (Cannot)	Factor 3 (Does not need)	Factor 4 (Given up)
considers education to be sufficient	-0.098	-0.114	0.445	0.018
Insufficient information on course offer	0.149	-0.053	-0.16	0.001
formal education is too demanding	0.093	-0.074	-0.114	0.103
insufficient course offer	0.136	-0.018	-0.023	-0.023
concerns of loss of income or lowered income	0.074	0.008	-0.013	0.032
high prices of courses	0.436	0.032	0.048	0.048
education won't bring the expected usefulness	0.023	-0.06	0.026	0.434
employer refuses to give time off	0.034	0.032	0.007	-0.001
care for family	0.034	0.282	0.023	-0.078
lack of support from within the family	0.002	0.037	-0.016	-0.015
lack of time	-0.023	0.429	0.002	0.122
poor transport	0.103	0.001	-0.033	-0.005
does not enjoy education	-0.17	-0.072	-0.074	0.128

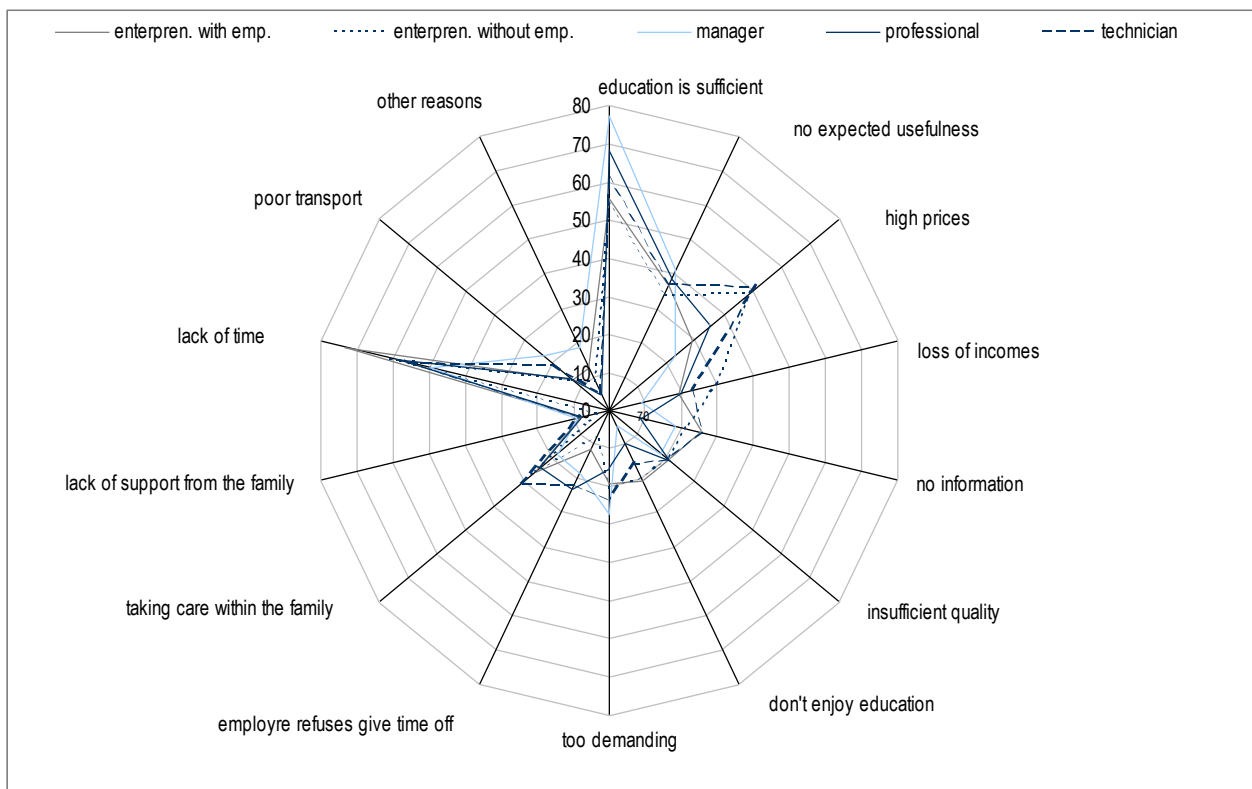
Source: NOZV, CVVM (2006).

Figure 1A: Reasons for not participating in continuing education by respondent's professional status (in %)



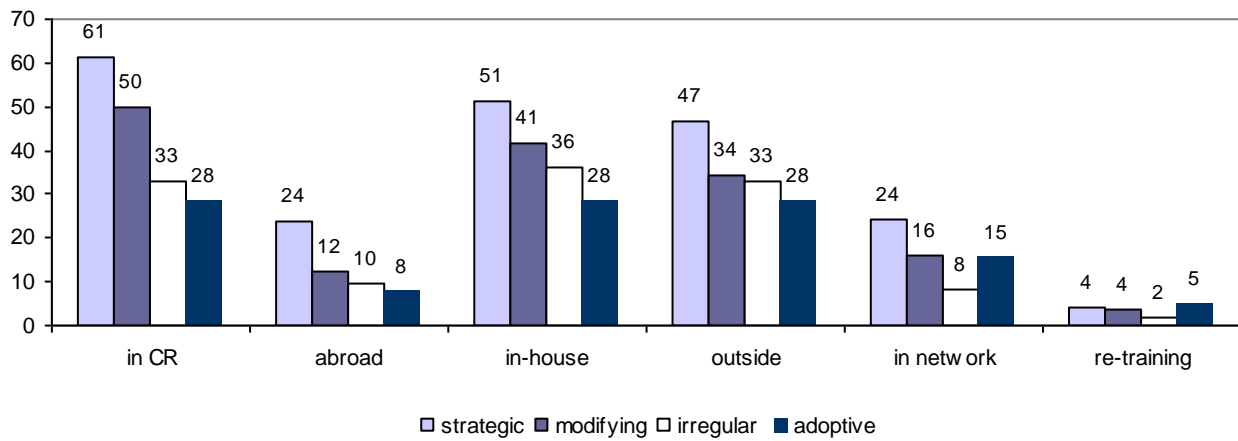
Source: NOZV, CVVM (2006).

Figure 2A: Reasons for not participating in continuing education by respondent's professional status (in %)



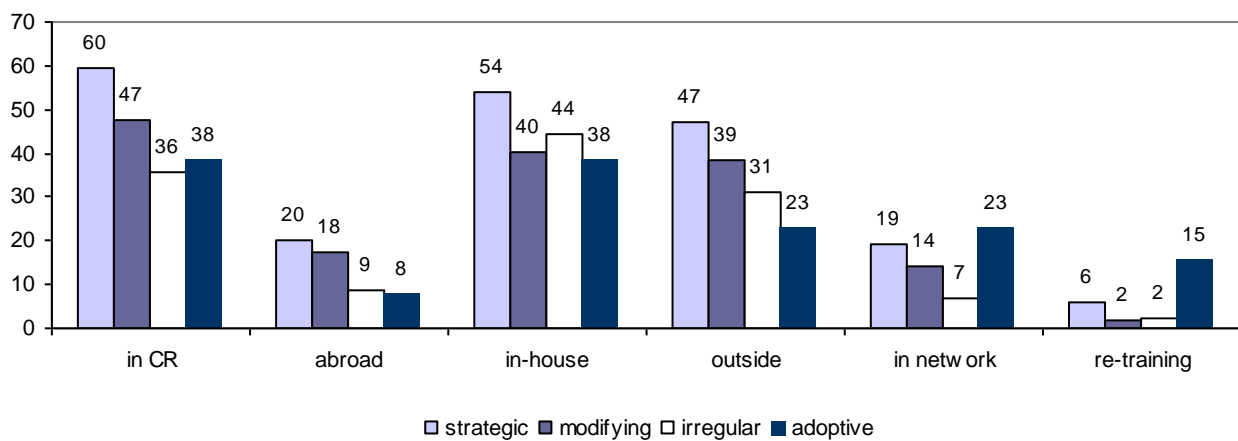
Source: NOZV, CVVM, (2006).

Figure 3A: Non-formal education of senior officials and managers - ISCO 1 (in %)



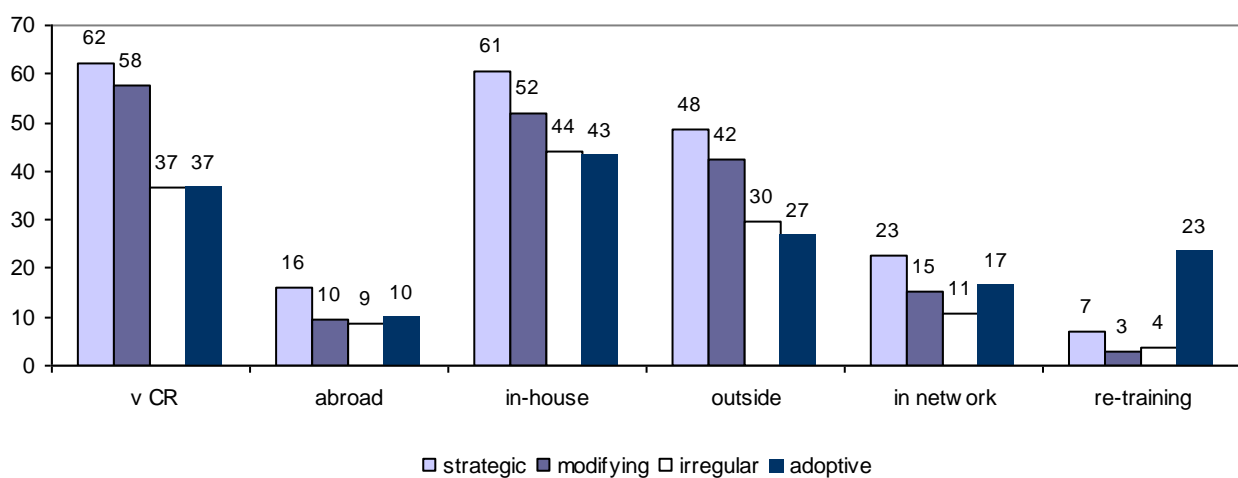
Source: NOZV, MEDIAN (2005), own calculations.

Figure 4A: Non-formal education of professionals – ISCO 2 (in %)



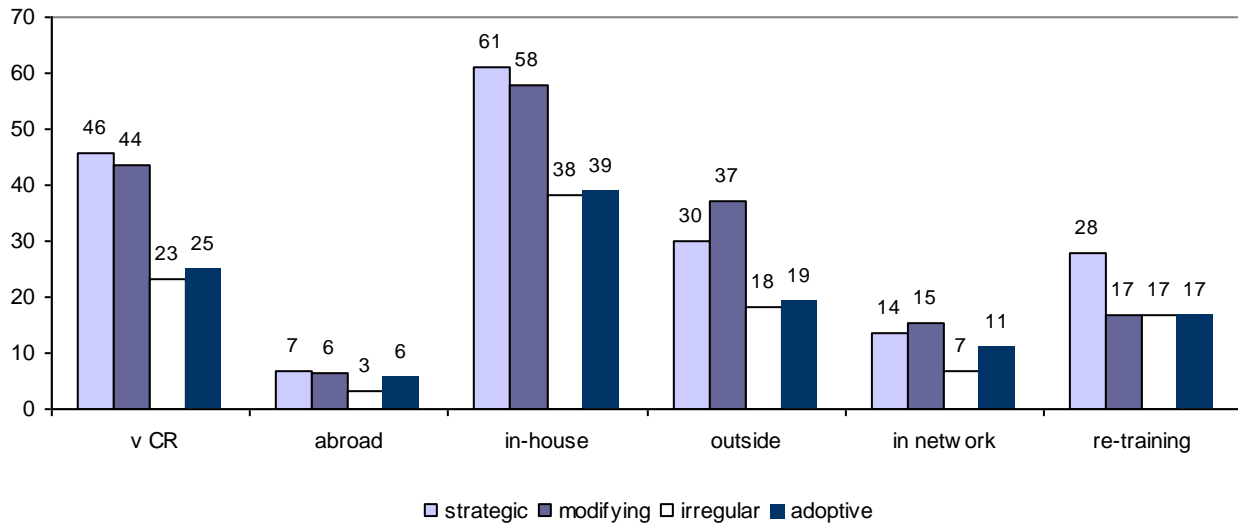
Source: NOZV, MEDIAN (2005), own calculations.

Figure 5A: Non-formal education of technicians -ISCO 3 (in %)



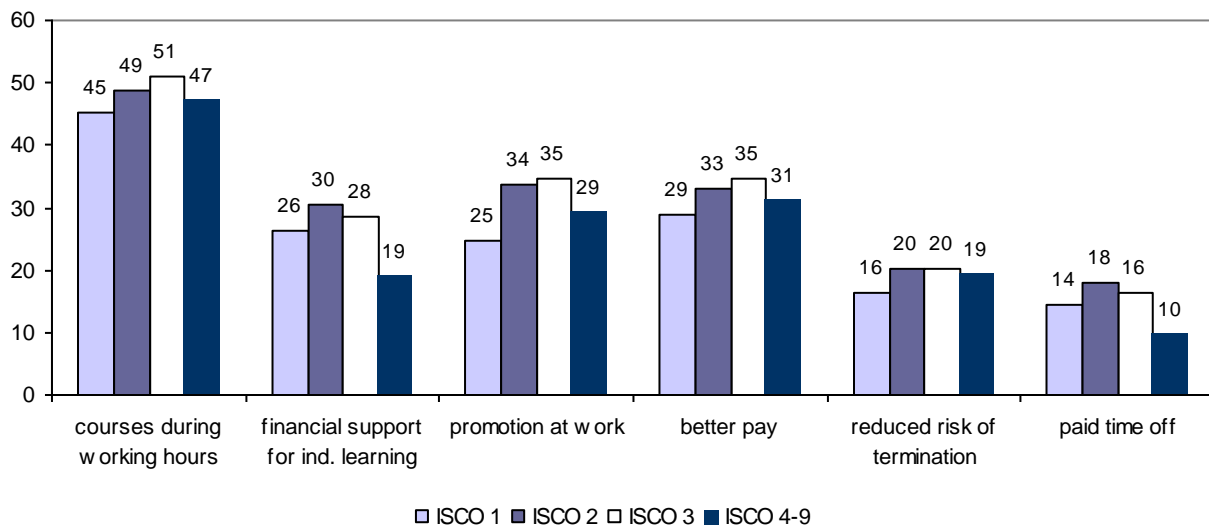
Source: NOZV, MEDIAN (2005), own calculations.

Figure 6A: Non-formal education of less demanding professions - ISCO 4-9 (in %)



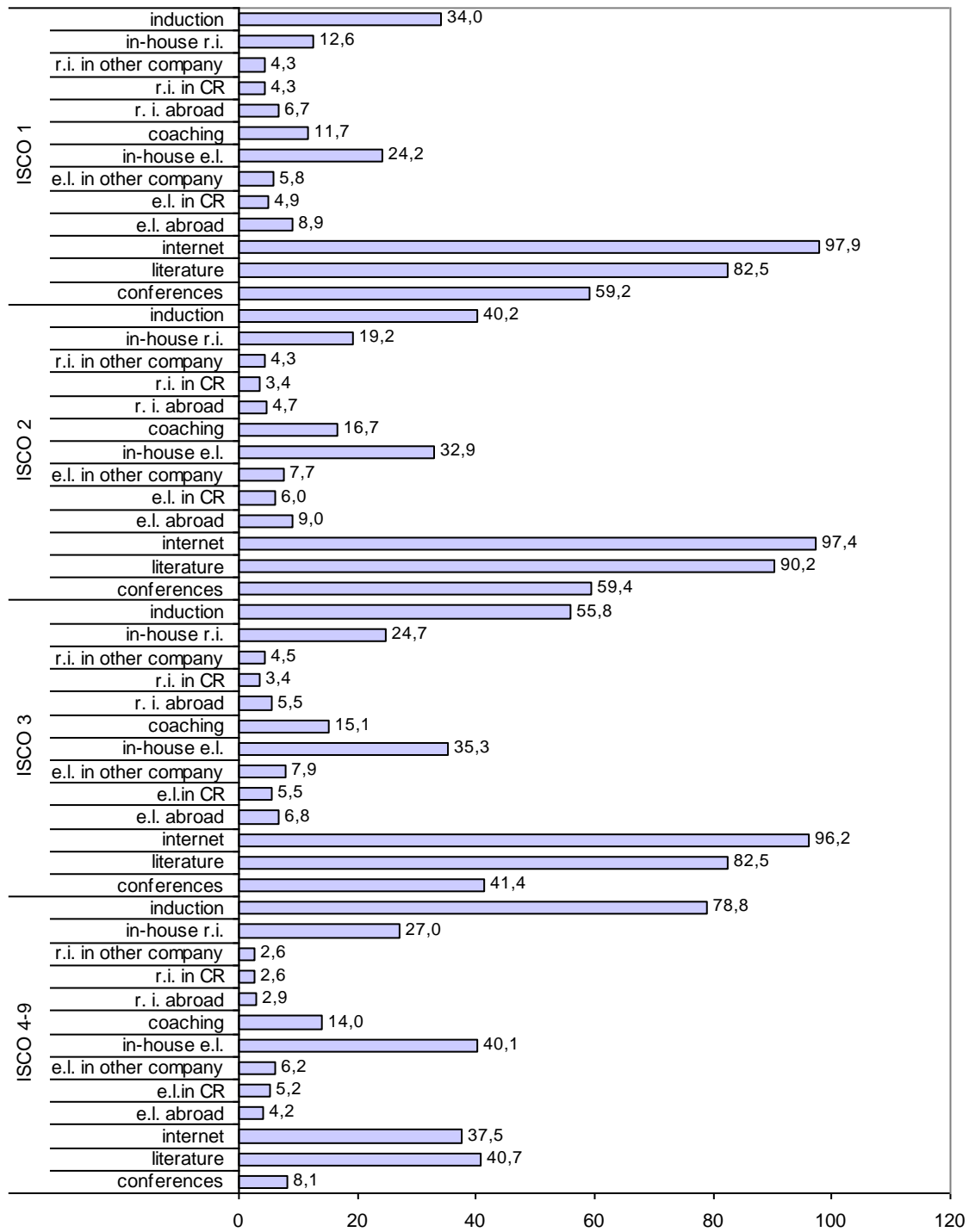
Source: NOZV, MEDIAN (2005), own calculations.

Figure 7A: Motivation incentives using for enhancing the participation of employees in continuing education (in %)



Note: Share of innovating companies using the individual incentives often and less often. Only companies employing individual professions are included. Source: NOZV, MEDIAN (2005), own calculations.

Figure 8A: Incentives used for individual professions (in %)



Notes: e.l. = experiential learning; r.i. = rotational interships, Source: NOZV, MEDIAN (2005), own calculations.

2. Human resources for the knowledge economy

This chapter is divided into three parts. The first part focuses on the level of qualification-intensity of employment in the Czech Republic, its development and a comparison with the situation in the EU. It is aimed at employment in high-tech and knowledge-intensive sectors, specifically the ICT sector. The second part focuses on questions of wage differences as an incentive for increasing one's level of qualification. It includes an international comparison of the level of wage differences in relation to level of education and the level of qualification-intensity of individual sectors and professions. The third part identifies decisive factors which influence the international openness of national systems of tertiary education, and analyses the mobility of students into and out of the Czech Republic and the individual EU countries.

2.1 Employment structure in qualification-intensive sectors and demanding professions

The professional and qualification structure of qualification-intensive segments of the economy is a significant factor in international competitiveness and one of indicators of a country's economic potential. A sufficient number of qualified persons and sectors with a high level of contribution to economic production have an important impact on a country's economic development.

The first factor analysed is the employment structure from the viewpoint of the share of professions at various levels of qualification intensity. This involves a comparison of the situation in the Czech Republic and the EU – not only from this point of view but also because of employment in high-tech manufacturing and knowledge-intensive services. The survey focuses on the development of individual indicators for the years 2000-2006 in the Czech Republic and the EU-27 countries. In some cases, only certain member states were chosen for a comparison. This was done because not all data were always available for all member countries, or because some countries have due to their unique situation such different results that a comparison with the Czech Republic would not offer any useful information.

Movement of employment in professions and their qualification structure

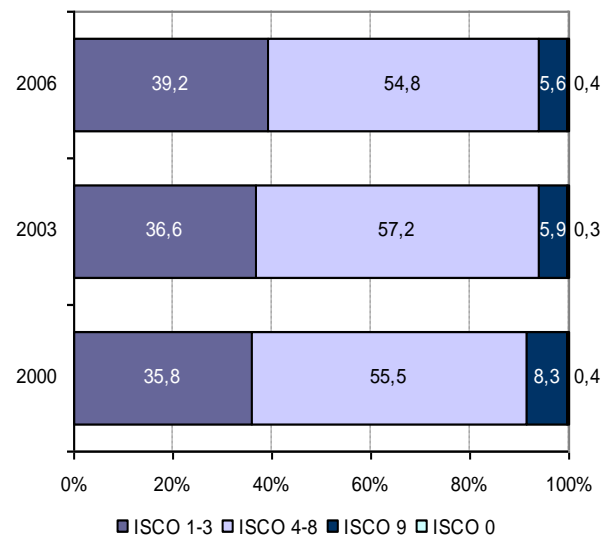
The analysis of employment in professions and of their level of qualification intensity is based on the ISCO-88 International standard classification of occupations. Occupation is understood as a specific activity or set of tasks and obligations performed by a worker. The system identifies 10 major groups (0-9) which are further subdivided. Professions may be identified in exact detail up to a four-digit numerical key.

The major ISCO groups can be organised by their level of qualification intensity into three categories: (i) – demanding professions (ISCO 1-3) (ii) – medium demanding professions (ISCO 4-8) and (iii) – elementary professions (ISCO 9) (for overview see box 2 in chapter 1.1). Members of the armed forces (ISCO 0) are not categorised because their qualification intensity can not be specified by the classification system.

On the basis of this categorisation, in 2000-2006 the Czech Republic showed an increase in employment in

demanding ISCO groups. In this period the number of people working in groups 1-3 as a share of total employment increased by 3.4 percentage points, reaching almost 40%. This increase was reflected primarily in a decrease in the share of less demanding employment in the ISCO 9 group (by 2.7 percentage points). The number of workers in medium demanding professions remained quite high (an almost 55% share) which will be analysed below in relation to developments in other European countries.

Figure 1: Development of employment in the Czech Republic by major ISCO groups (in %)



Source: EUROSTAT (2007c), averages for each year.

The growth of **employment in the ISCO 1-3 groups** reflects the increased qualification intensity of the Czech economy. These groups contain many professions which require university education (ISCED 5A, 6) (see box 2 in chapter 1.1).

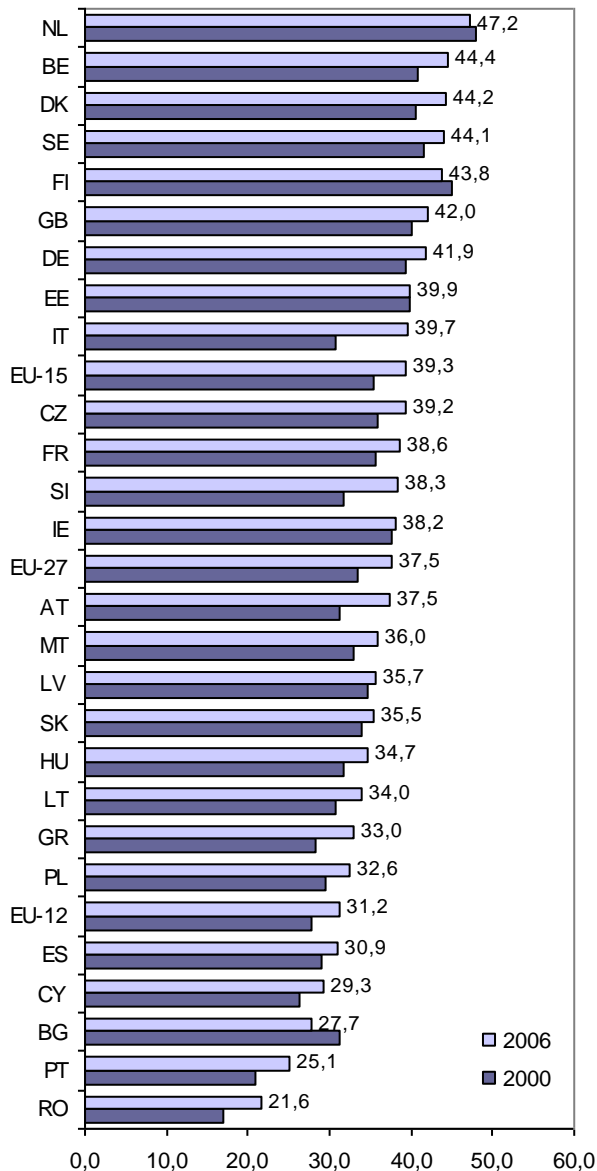
During the period under review the Czech Republic showed a development similar to the aggregate data for the entire EU-27. Increased employment in the ISCO 1-3 groups is a universal phenomenon and in the years 2000-2006 was recorded to varying extents in all countries of the European Union except for Ireland. It is influenced in particular by the individual sectors' employment structure, the initial share of these groups on total employment, the country's level of attractiveness for investors (a key factor for the creation of new jobs) and the economy's development priorities from the labour market point of view and the government's education policy.

Within the European Union the Czech Republic has the tenth highest number of ISCO 1-3 groups as a share of total employment – the same as in 2000 (see table 1A in Annex). In 2006 the ISCO 1-3 groups' share of total employment in the Czech Republic was similar to the EU-15 figure and was significantly better than the EU-27 average as well as the figure for the new EU states which joined in 2004 and 2007 (EU-12).

Among new member states the most knowledge-oriented economy is considered to be that of Estonia

(8th place) where the 2006 level of ISCO 1-3 employment (39.9%) was very close to that in the Czech Republic. In recent years rate of job creation in sectors which produce a higher value added and which create a higher share of jobs requiring tertiary education has been on the rise.

Figure 2: ISCO 1-3 as share of total employment (in %)



Source: EUROSTAT (2007c), averages for each year.

The individual subgroups within ISCO 1-3 (see box 1) developed at different rates. In the years 2000-2006, there was a significant number of people working in particular in ISCO 31 and 34 in the Czech Republic.

For the Czech Republic, the values for these two groups exceeded the average for both western European and eastern European EU members. In mid-2006, the share of ISCO 34 (other associate professionals) was 10.4% of total employment. In view of the high level of heterogeneity of professions included into this category, however, it is not possible to clearly determine any overarching trend influencing growth.

Box 1: Two-digit categorisation of professions in the ISCO 1, 2 and 3 groups

The occupational classification system used by the ČSÚ further divides the ISCO 1-3 groups into:

- ISCO-11 Legislators, senior officials
- ISCO-12 Corporate managers (including persons who manage enterprises or organisations, or departments, requiring a total of three or more managers)
- ISCO-13 Managers of small enterprises (including persons who manage enterprises or organisations, or departments, on their own behalf and with the assistance of no more than one other manager classified in this group)
- ISCO-21 Physical, mathematical and engineering science professionals
- ISCO-22 Life science and health professionals
- ISCO-23 Teaching professionals
- ISCO-24 Other professionals
- ISCO-31 Physical and engineering science associate professionals
- ISCO-32 Life science and health associate professionals
- ISCO-33 Teaching associate professionals
- ISCO-34 Other associate professionals

The second most significant group in terms of employment was ISCO 31 (physical and engineering science associate professionals). This group's share of total employment is related to the development of industry which continues to hold a high share of employment and with the development of certain high-tech fields (ICT). This group, too, had a significantly higher share in the Czech Republic than the European average.

Less significant shifts were observed in ISCO 1. There was a slight decline in the number of people working in ISCO 13 (managers of small enterprises). This may be related to the lower number of active small entrepreneurs. According to available information,⁶ in 2001-2004 their numbers declined from 1,037,000 to 1,015,000 (by 2.1%). In 2000-2006, the Czech Republic showed opposite employment trends than those found in the more developed EU countries, in particular in groups ISCO 12 (CR: +0.69 percentage point, EU-15: -1.26 p.p.), ISCO 13 (CR: -0.52 p.p., EU-15: +0.77 p.p.) and ISCO 32 (CR: +0.6 p.p., EU-15: -0.1 p.p.)

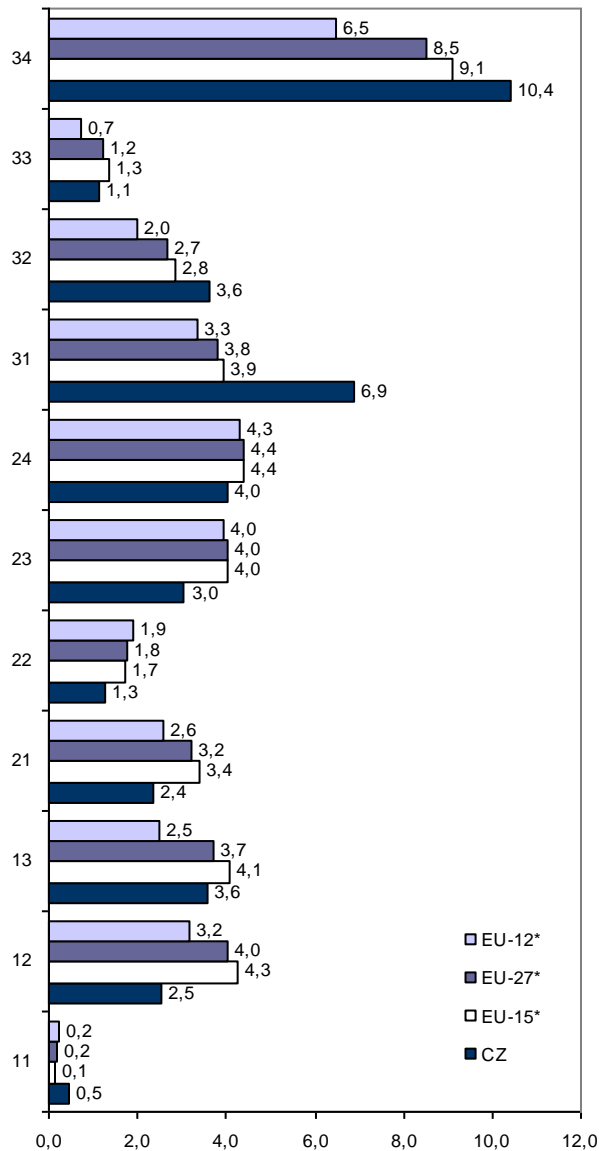
Compared to other EU countries, the Czech Republic showed significantly higher employment only in group 11 (legislators, senior officials).

Research continues to be a weak point of the Czech Republic. Employment is below average in all ISCO 2 groups (which include research professionals). In 2000-2006, in Europe there was an increase in employment particularly in ISCO 24 (other scientists and professionals), while the Czech Republic there was only a very small growth in comparison to other countries. Nevertheless, with a 4% employment share in 2006, ISCO 24 is the third most represented group of ISCO 1-3 professions in the Czech Republic.

Professions classed under ISCO 24 require in particular economically-oriented education. Higher education institutions and tertiary professional schools focused on economics have the second highest number of students in all forms of tertiary education.

⁶ ČSÚ (2005a).

Figure 3: Share of ISCO 1-3 subgroups of total employment (2006, in %)



Note: *Aggregate data does not contain data for Romania.
Source: EUROSTAT (2007c), averages for each year.

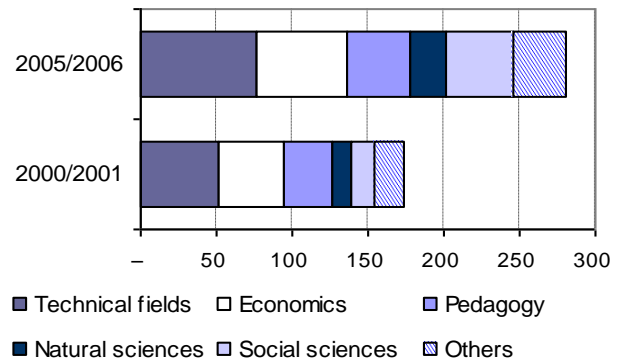
In addition to being influenced by economic factors and employer demand, the development of employment in ISCO 1-3 also results from tertiary education students' preferences in the choice of field of study. From 2000 to 2006, the total number of students at higher education institutions and tertiary professional schools increased by more than 60%. Technical schools recorded a growth of 46%; economic schools, 40%. The fastest growth was in the number of graduates in social sciences, where the number of students increased threefold.

In addition to the share of employment in the ISCO 1-3 groups other factors are tracked as well in the area of human resources for the knowledge economy. One such factor is the share of human resources in science and technology (HRST) which the **Canberra Manual**⁷ defines as persons with tertiary education or persons working in scientific and technical occupations requiring a high level

⁷ OECD, EUROSTAT (1995).

of qualification without being formally qualified. This group may be defined as ISCO 2 and 3.

Figure 4: Number of students in higher education, by fields of education (in thousands)



Note: "Other" includes fields of study in medicine, agriculture, law and the arts.
Source: ÚIV (2006b).

In the Czech Republic, HRST (ISCO 2 and 3 and employed tertiary educated persons) increased from a 33.8% share of total employment in 2000 to 36.7% in 2006. The EU average is higher, however (40.1% for the EU-27 and 42.1% for the EU-15 in 2006). Even among the new member states, the Czech Republic is merely slightly above average (the 2006 aggregate for HRST in the EU-12 is 35.5% - see table 2A in Annex). This comparison is less favourable for the Czech Republic for two reasons. We can see again a significant orientation towards sectors with low value added and low demands on qualifications, as well as a low share of investments and government expenditure into research and development.

The future development of employment in the HRST group depends on several factors. In the coming years, it will be influenced both by the number of students graduating from tertiary education (see figure 4) as well as by the creation of new demanding jobs.

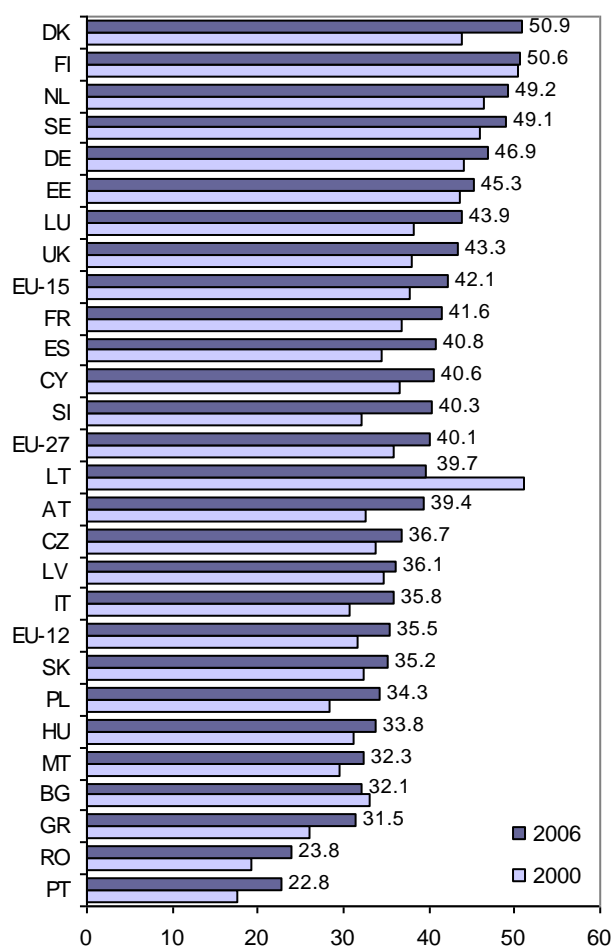
This factor is also significantly influenced by the level and focus of investments. For instance, among investment projects mediated by CzechInvest⁸ in 1993-2006, the share of jobs created in projects with value added⁹ was a mere 14%.

Within the HRST group, the professional group which receives the greatest attention regarding assessment of the economy's qualification intensity are so-called "scientists and engineers" – ISCO 21 (physical, mathematical and engineering science professionals) and ISCO 22 (life science and health professionals).

In an international comparison of this category, the Czech economy's distance from high-tech countries is significant. In this group's share of total employment the Czech Republic reaches neither the EU-15 average nor the EU-27 average (see table 3A in Annex). In fact, the 2006 figure for the Czech Republic (3.7%) is lower than the average for the new EU-12 member states (5.1%). Moreover this group's share of total employment in the Czech Republic has slightly decreased in the period under review.

⁸ www.czechinvest.org.

⁹ Technology centres and strategic services.

Figure 5: HRST as a share of total employment in the 25-64 age group (in %)


Note: HRST=ISCO 2 and 3 + tertiary educated employed persons. Aggregate data for 2006 do not include Ireland. Source: EUROSTAT (2007e), averages for each year.

Of the EU-12 countries, Hungary and Estonia deserve mention as countries which are building their economies on scientific and technological progress; here, the number of scientists and engineers as a share of the total number of employed persons is roughly one-fourth higher than in the Czech Republic.

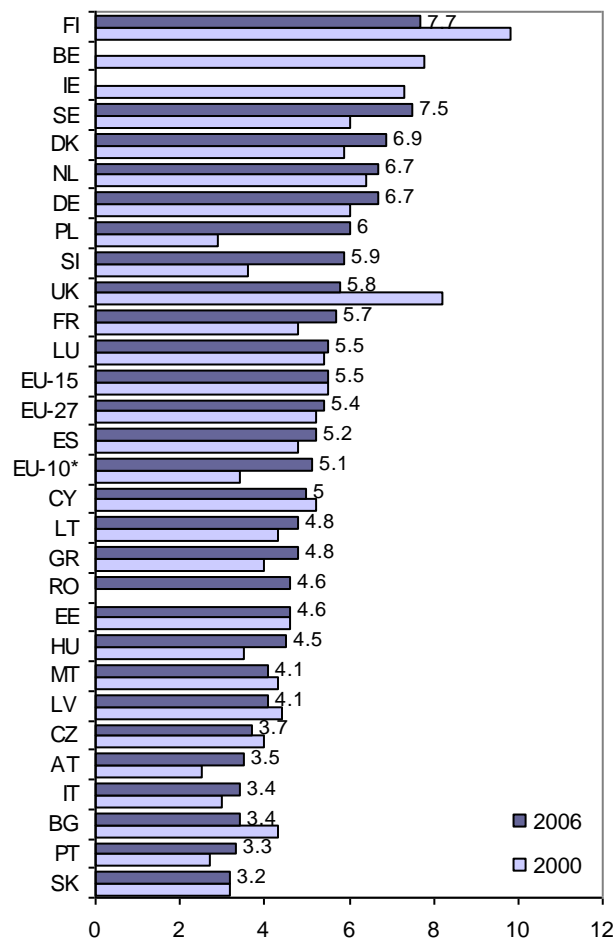
In 2006, scientists and engineers had the greatest share of employment in this group in Poland (6%). From the European point of view the leading countries are the Scandinavian countries, Belgium, Ireland and the Netherlands where the indicator was up to twice as high as in the Czech Republic (a 7-8% share of total employment).

In 2006, the Czech Republic was the sixth worst EU-27 country in this indicator – a significant drop since 2000, when the country placed 17th.

The professional structure in the Czech Republic in 2006 further shows a **high share of persons employed** in groups **ISCO 4-8** (see figure 1) – a reflection of the traditionally high share of industrial production requiring qualified blue-collar workers and the historically younger trend of growth in professional services.

Groups ISCO 4-8 are labelled as medium demanding. They usually require upper secondary education with apprenticeship certificate (ISCED 3c) or school-leaving

examination (“maturita”-ISCED 3A) and, except for lower positions in the tertiary sector (services, sales), represent the main part of employees in industry. (see Box 2 in chapter 1.1).

Figure 6: Scientists and engineers as a share of total employment in the 25-64 age group (in %)


Note: *New member states joining in 2004 (does not include Romania and Bulgaria). Source: EUROSTAT (2007e), averages for each year.

The Czech economy's greater orientation towards the development of industry has enabled the Czech Republic to maintain employment in this group at a relatively high level while in other European countries it has fallen much more rapidly. Neighbouring Slovakia has gone through a similar development as the Czech Republic.

Table 1: Decline in ISCO 4-8 as a share of total employment (in %)

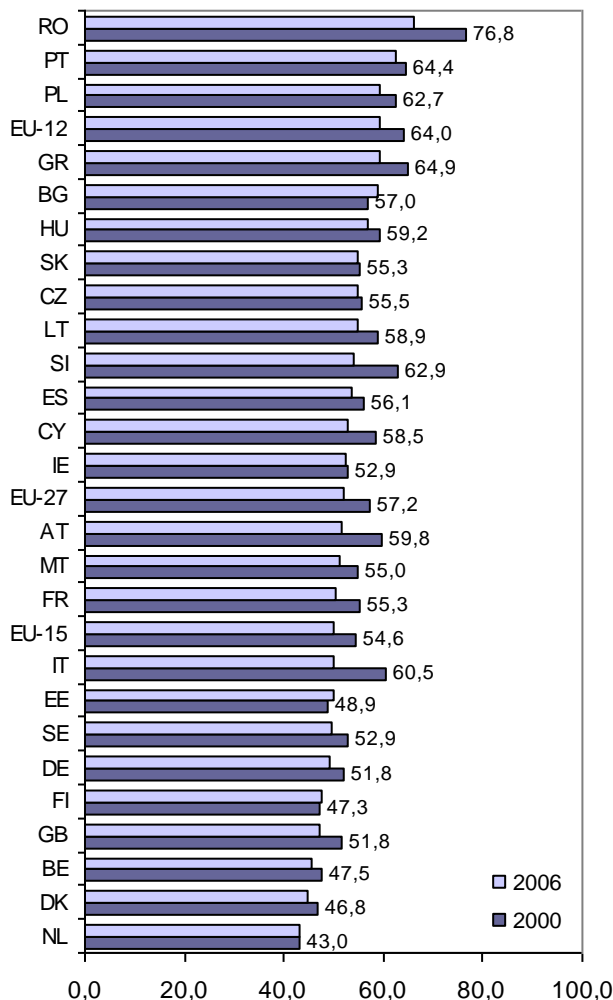
Country	Change 2000-2006 in pc
EU-27	-5.1
EU-15	-4.5
EU-12	-4.8
Czech Republic	-0.7
Slovakia	-0.3

Source: EUROSTAT (2007c), averages for each year.

The new EU members are characterised by a higher share of employment in ISCO 4-8, as well as by the fact that this share decreased more quickly in 2000-2006 than

in the EU-15 countries. The Czech Republic and Slovakia represent two exceptions to this trend. Both countries have founded their economic growth on significant support of foreign investment that would create a large number of jobs in industry. The growth in industrial employment helped to maintain a large percentage of jobs in ISCO 4-8 despite the growing demand for professions with higher educational requirements.

Figure 7: ISCO 4-8 as a share of total employment (in %)



Source: EUROSTAT (2007c), averages for each year.

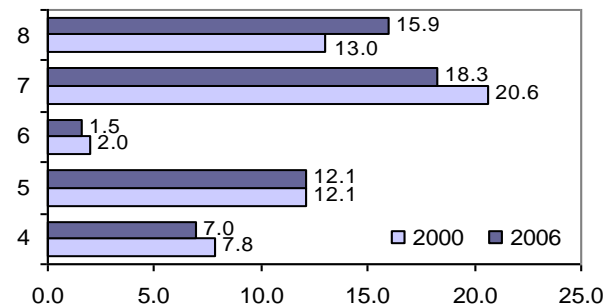
In the Czech Republic ISCO 4-8 category is headed by group 7 (18.3% of total employment in 2006). However this group's share is dropping, (by 2.7 percentage points. in 2000-2006). An overwhelming number of employees in this group are extraction and building trade workers (group 71 or more precisely 712) and metal and machinery workers (group 72).

In 2000-2006, these groups' share of total employment dropped by roughly 1 percentage point. One of the reasons may be the decreased interest in studying related fields on secondary education level. We are also seeing a decrease in the extent of professional manual labour in industry and advancing automatisisation with increased demands on machine operation.

A decline can also be witnessed in ISCO 6 which is related in particular with low interest in agricultural, forestry

and related work and with the decreasing significance of these sectors in the Czech economy.

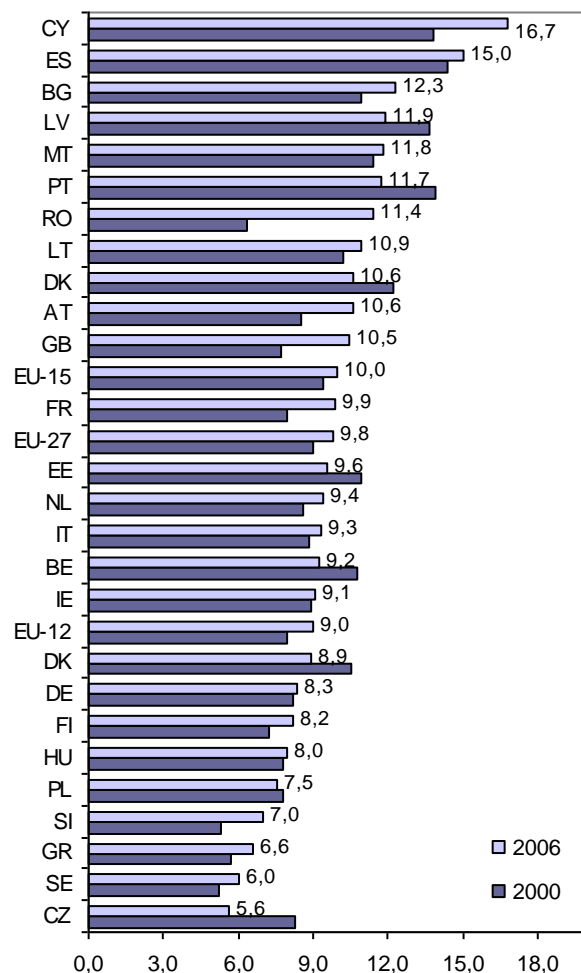
Figure 8: Development of ISCO 4-8 as a share of total employment in the Czech Republic (in %)



Source: EUROSTAT (2007c), averages for each year.

On the other hand, a growth trend was recorded in group ISCO 8 (Plant and machine operators) where the share of total employment grew by 2.9 percentage points. since 2000 to almost 16%. This trend is the result of important investments into industrial sectors with a large number of professions requiring the ability to operate machine technology (the automobile, electronics, machine and plastics industries).

Figure 9: ISCO 9 as a share of total employment (in %)



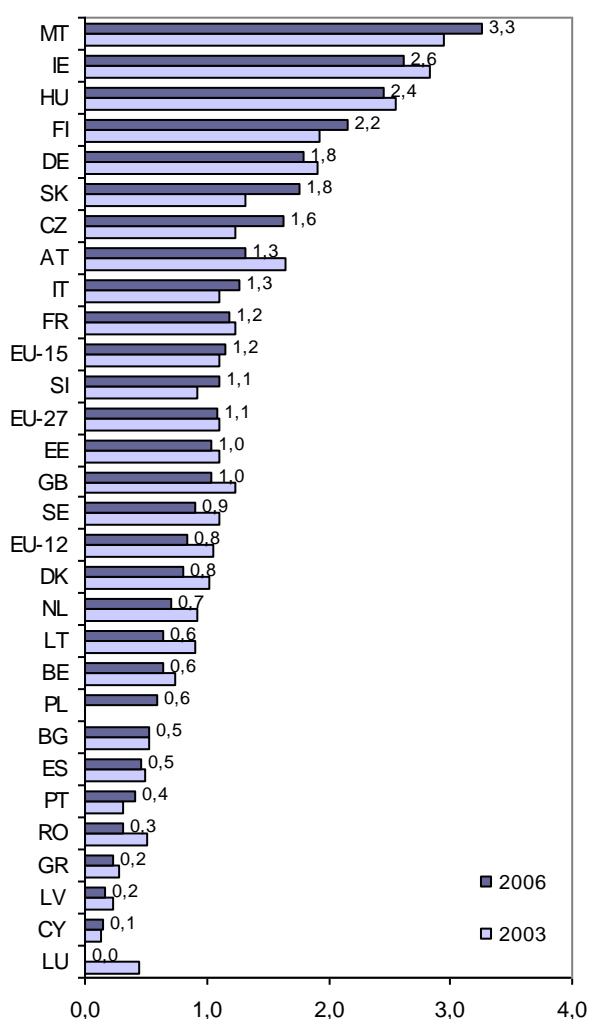
Source: EUROSTAT (2007c), averages for each year.

The years 2000-2006 saw a significant **decline in the share of employment in group ISCO 9** (Elementary occupations). Except for Luxembourg in 2006 the Czech Republic had the lowest share of employees in ISCO 9 within the entire EU. Professions requiring unskilled work are being gradually pushed out of the labour market. This favourable development has been significantly influenced in particular by the restructurisation of the economy and the concurrent increase in requirements for employment, which has led to the gradual decrease in the ability of low skilled persons to succeed in the labour market.

Changes in employment in qualification-intensive sectors and ICT sectors

In this chapter we use “**qualification-intensive**” to label selected sectors in the manufacturing industry and services characterised by an increased share of jobs requiring tertiary education or of professionals and technicians employed in ISCO groups 2 and 3 without such education. Qualification intensity is assessed both in industrial as well as service sectors.

Figure 10: Employment in high-tech manufacturing as share of total employment (in %)



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg
 Source: EUROSTAT (2007c), averages for each year, own calculations.

In the OECD classification system, the manufacturing industry includes three sectors classified as “**high-tech manufacturing**” and another five sectors labelled as “**medium high-tech manufacturing**”. Their precise categorisation may be found in box 2.

Within the EU the Czech Republic stands out in that its manufacturing industry creates a large percentage of jobs – more than one fourth of all jobs. The EU average is less than one fifth.

As a result, in an international comparison the Czech Republic shows a higher share of employment in high-tech manufacturing and a lower share in knowledge-intensive service sectors (see table 4A in Annex).

However, the Czech manufacturing industry continues to be overwhelmingly tilted towards sectors with low value added and generally with lower qualification requirements on the labour force.

High-tech sectors in the Czech Republic are experiencing different levels of development. While computer production is one of the sectors with the greatest growth dynamics (in 2000-2005, the number of jobs increased by more than 5,700 new jobs, representing an increase of 264%), the remaining two sectors are only growing slowly.

Box 2:

OECD classifications divide the high-tech manufacturing industry at the level of the double-digit NACE¹⁰ into two main groups:

High-tech sectors of the manufacturing industry:

Manufacture of office machinery and computers (NACE 30)
 Manufacture of radio, television and communication equipment and apparatus (NACE 32)
 Manufacture of medical, precision and optical instruments, watches and clocks (NACE 33)

Medium high-tech sectors of the manufacturing industry:

Manufacture of chemicals and chemical products (NACE 24)
 Manufacture of machinery and equipment not elsewhere classified (NACE 29)
 Manufacture of electrical machinery and apparatus not elsewhere classified (NACE 31)
 Manufacture of motor vehicles, trailers and semi-trailers (NACE 34)
 Manufacture of other transport equipment (NACE 35)

In manufacture of telecommunication equipment sector 1,210 new jobs were created (an increase of 3.7%) and the manufacture of medical and precision instruments sector added 1,652 jobs (a growth of 8% in five years)¹¹ (see figure 11).

We may expect that in the coming years, the Czech Republic will further increase its share of employment in high-tech sectors.

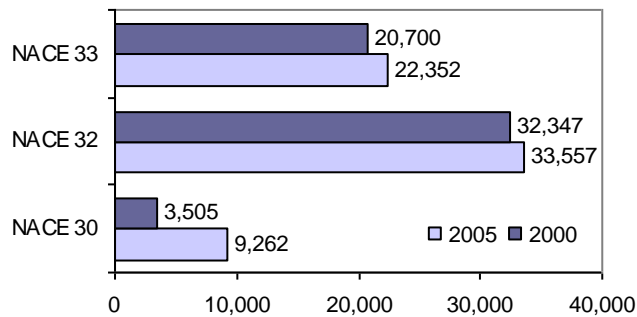
In particular the manufacture of radio, television and communication equipment and apparatuses recorded

¹⁰ According to the OECD definition, a full listing of these sectors also includes NACE 24.4 – Manufacture of pharmaceuticals, medicinal chemicals and botanical products (pharmaceutical industry) and NACE 35.3 – Manufacture of aircraft and spacecraft. The methodology used for statistical analysis, however, allows us to gain comparable data for all EU member states only for double-digit NACE classes. For this reason, these two fields are not included in the analysis of high-tech sectors.

¹¹ ČSÚ (2007c), Registered number of employees.

significant investments that should add more than 10,000 new jobs to the sector over the next 10 years.

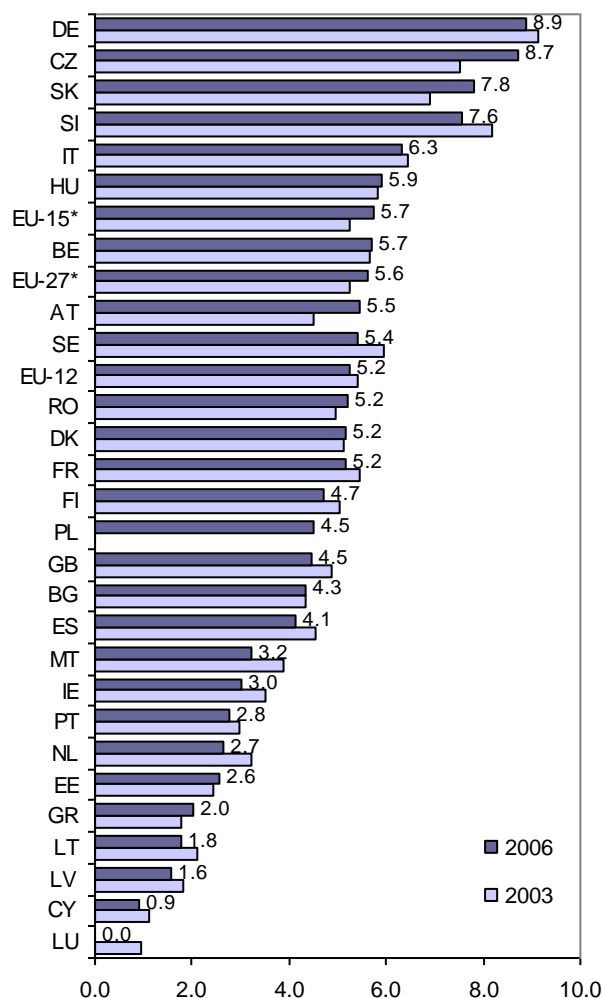
Figure 11: Development of employment in high-tech sectors in the Czech Republic (persons)



Source: Ministry of Industry and Trade (2006).

Among medium high-tech manufacturing, the Czech Republic has the second largest share of total employment of all EU members, thus approaching first-place Germany (see table 5A in Annex).

Figure 12: Employment in medium high-tech manufacturing as a share of total employment (in %)



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg
 Source: EUROSTAT (2007c), averages for each year, own calculations.

As in neighbouring Slovakia, the rate of employment growth in this group is significantly influenced by ongoing investments into automobile manufacture and related suppliers. According to CzechInvest, newly created jobs in the automotive industry represented a total 34.8% of new jobs created as part of projects supported within the framework of the Act on Investment Incentives.

Among the EU-12 countries, in the 2003-2006 period there was a more than five-fold growth in employment in these sectors. The Czech Republic and Slovakia have the most important share in this development.

In most "knowledge economies" (Finland, Ireland, Estonia, Sweden), employment in this group has recorded stagnation or a decline and is at a markedly low level. With the growth in the price of labour in the Czech Republic, we may expect that this group's share of total employment will no longer increase and will rather show a slight decline over the coming years.

When analysing investment projects over time, we can already see a gradual increase in the share of high-tech investments requiring a higher average level of employee qualification. In particular, there is increased investment into knowledge-intensive service sectors.

The term "knowledge-intensive services" covers all service sectors with higher qualification requirements on professions. This is subdivided into four subgroups (see box 3).

Box 3: Knowledge-intensive service sectors

OECD classifications divide knowledge-intensive service sectors into four main parts:

High-tech services¹²:

Post and telecommunications – NACE 64,
 Computer and related activities – NACE 72
 Research and development - NACE 73

Market services:

Water transport - NACE 61,
 Air transport – NACE 62,
 Real estate activities – NACE 70,
 Renting of machinery and equipment without operator and of personal and household goods – NACE 71
 Other business activities – NACE 74

Financial services:

Financial intermediation, except insurance and pension funding – NACE 65,
 Insurance and pension funding, except compulsory social security – NACE 66
 Activities auxiliary to financial intermediation – NACE 67

Other knowledge-intensive services:

Education – NACE 80,
 Health and social work – NACE 85
 Recreational, cultural and sporting activities – NACE 92

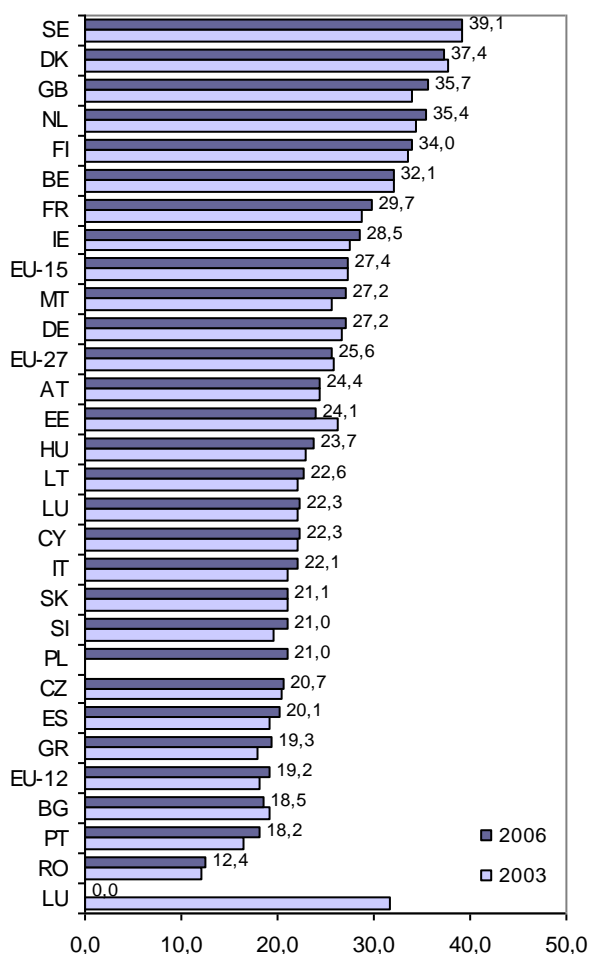
The share of knowledge-intensive services of total employment is an important indicator of an economy's global competitiveness and level of development. Within the EU, the highest levels are found in the Scandinavian countries, which employ more than one third of all employed

¹² High-tech services are marked by a high percentage of ICT professions, in particular NACE 64 and 72. Besides high-tech services, other important "ICT professions" include financial services, where the share of ICT specialists is three times higher than the economy's average.

persons in knowledge-intensive service sectors (see table 6A in Annex).

Other countries where more than 30% of employed people work in this group include the Netherlands, Great Britain and Belgium. The Czech Republic (20.7%) is only slightly above the EU-12 (new member states) average, which is significantly influenced by the low value for Romania (12.4%). Except for Bulgaria and Romania, all other EU-12 countries have a higher orientation towards knowledge-intensive services than the Czech Republic.

Figure 13: Employment in knowledge-intensive services as a share of total employment (in %)



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg

Source: EUROSTAT (2007c), 2nd quarter data, own calculations.

The Czech Republic's poor position is again the result of the significant level of employment in industry and also partially the role played by the large share of manufacturing investments in creating new jobs. Among all EU countries, the Czech Republic's level of employment in knowledge-intensive services places it in 22nd place.

If we look closer at the employment structure in these types of services, we see that highly developed economies have a significantly higher level of employment in other knowledge-intensive services (for instance, education).

According to the EUROSTAT indicators, in 2003-2006 the high-tech services' share of total employment in the Czech Republic decreased slightly (from 3.4% to 3%).

Table 2: Share of employment in knowledge-intensive services in selected EU countries (2006, in %)

	High-tech services	Market services	Financial services	Other knowledge-intensive services
CZ	3.0	1.1	1.9	14.7
EU-12	2.4	1.0	1.8	14.0
EU-15	3.4	1.6	3.2	19.2
DE	3.4	1.4	3.5	18.9
FI	4.7	2.6	1.9	24.8
SE	5.0	2.3	1.9	29.9
IE	3.8	1.4	4.3	19.0

Source: EUROSTAT (2007c), average for each year, own calculations.

It is necessary, however, to take into consideration the processes currently underway in the individual sectors within this group, in particular the restructuring of large employers in communications and related processes of outsourcing (the purchase of services which the company had previously provided itself, which influences total employment in these services as well as its internal structure).

Significant growth in the Czech service sector, on the other hand, was recorded in the area of computer technology. Demand for IT services and the country's growing significance as a service centre in the area of computer technology has had a positive impact on employment in the NACE 72 group, which has increased by more than one third over three years, to almost 43,000 people.

Overall, it is possible to say that despite the large number of "assembly" plants, the inflow of foreign investments is helping to improve the qualitative and technology structure of both industry and services. A comparison of investments mediated by CzechInvest shows a significant increase in more demanding projects with higher requirements on the labour force's level of qualifications.

Table 3: Structure of foreign investment in the Czech Republic by project's level of technology (in %)

Types of investments 1999	
Manufacturing industry	99
Other investments	1
Types of investments 2006	
Manufacturing industry	75
Strategic services	17
Technology centres	8

Source: CzechInvest (www.czechinvest.org).

The development of high-tech services and the ICT sector in the Czech Republic is significantly dependent on the supply and quality of employees. According to EUROSTAT survey, the Czech ICT sector (see box 4) employed 3.6% of total employment – more than the EU average.

Box 4 – Division of the ICT sector according to ISIC Rev.3 (International Standard Industrial Classification)

The ICT sector includes a total of 11 subdivisions; all except one are defined on the basis of the four-digit NACE classification system:

Manufacturing industry:

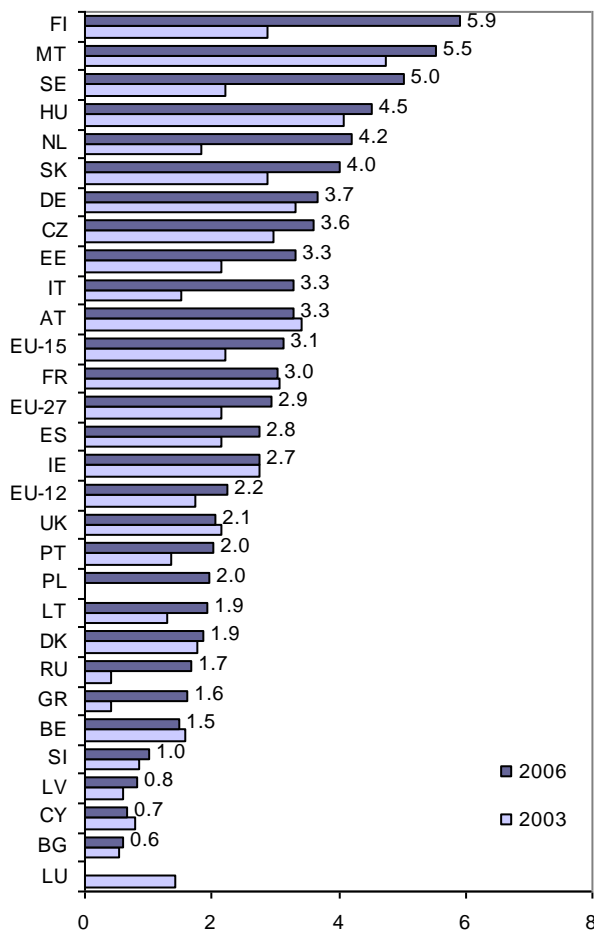
- 3000 – Manufacture of office machinery and computers
- 3130 – Manufacture of insulated wire and cable
- 3210 – Manufacture of electronic valves and tubes and other electronic components
- 3220 – Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
- 3230 – Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
- 3312 – Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
- 3313 – Manufacture of industrial process control equipment

Services:

- 5150 – Wholesale of machinery, equipment and supplies
- 6420 – Telecommunications
- 7123 – Renting of office machinery and equipment (including computers)
- 72 – Computer and related activities

The Czech ICT sector's share of total employment is the 8th highest in the EU.

Figure 14: Employment share of ICT sector (in %)



Note: Aggregate data for 2003 do not include Poland, 2006 data do not include Luxembourg
 Source: EUROSTAT (2007a), averages for each year.

The share of employment in ICT is growing even faster in neighbouring Slovakia than in the Czech Republic; Hungary also has a significantly higher share of ICT workers. Further development of the Czech ICT sector and employment in this sector are supported by EU development programmes from the Operational Programme Enterprise and Innovation.

Currently, in the Czech Republic, there is a demand for workers with ICT qualifications significantly higher than supply. This has a negative effect on the country's attractiveness for foreign investors in this sector and is significantly accelerating the growth of wages in these professions at the same time. Services in the field of computer technology are a sector – both among high-tech services and within the economy as a whole – with relatively high average wages.

In 2006, more than 91,000 IT professionals¹³ worked in the Czech Republic. Most of them were employed in the following sectors: telecommunications (NACE 64.2), computer and related activities (NACE 72) and financial intermediation (NACE 65-67).

As shown by figure 15, the only significant branch of manufacturing is the manufacture of electronic and optical instruments (NACE 30-33), where the share of ICT specialists reaches 1.9% of the total number of workers. In 2000-2005, almost all sectors recorded a growth in the number of ICT specialists as a share of the total number of employed people, with the greatest growth in financial intermediation (almost doubling from 5.1% in 2000 to 9.7% in 2006).

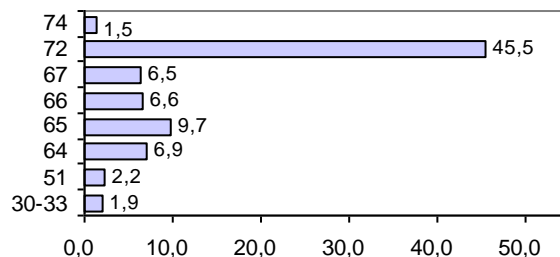
Box 5 – Employment in ICT fields (ISCO classification)

in the triple-digit classification of occupations used by the Czech Statistical Office, ICT professions are composed of a total of four groups:

- 213 – Computing professionals
- 312 – Computer associate professionals
- 313 – Optical and electronic equipment operators
- 724 – Electrical and electronic equipment mechanics and fitters

From the viewpoint of qualification intensity, groups 213, 312 and 313 are highly qualification-intensive. Performing these professions requires tertiary education, in some cases at least secondary education with ("maturita"). The professions in group 724 have lower qualification requirements. It is usually enough for workers to have completed secondary school with school-leaving exam ("maturita") or to have apprenticeship training in the field.

Figure 15: Share of ICT professionals in companies with more than 10 employees (selected NACE sectors, 2006, in %)



Source: ČSÚ (2006b).

¹³ ČSÚ (2006f)

Employment is not developing at the same rate in all key ICT sectors. In services for computer and related activities it has increased each year while the number of employees in telecommunications and financial intermediation has fluctuated. Nevertheless, the market has recorded a constant growth in the demand for ICT specialists that has not been properly satisfied. In addition, there is a high level of demand for such professions in other EU countries as well. This has created the conditions for these professionals' job migrations, in particular into western Europe where wage conditions are often more advantageous. In view of the profession's technological character and the use of English, it is easier for such professionals to find employment abroad than other workers.

Box 6: Outcomes of study of Competitiveness of Tertiary professional school and University Graduates in IT Fields in the labour market

In late 2006/early 2007, the Czech Society for Systems Integration, the Association for an Information Society, the Czech Association of Managers in Information Technology and the University of Economics in Prague implemented a project focused on evaluating supply and demand on the market for ICT specialists in the Czech Republic. One of the study's main conclusions was the finding that the current supply of ICT graduates is capable of satisfying only one half of the demand generated by the labour market, and that the annual surplus of demand over supply is around 2,000 positions, most of them requiring tertiary education.

In the coming years, the demand for ICT workers is expected to continue to grow. Experts¹⁴ estimate that by 2010 the market will require up to 4,000 new ICT employees each year.

Factors in the lack of compliance between qualifications and a profession's demands

The level of qualification intensity of jobs testifies to a country's level of economic development and its orientation towards a knowledge economy. Ideally jobs would be performed by persons with the required level of qualification, but actual practice may be somewhat different. It may happen that the qualification requirements for a job are higher than the worker's level of education or that the worker is overqualified for the position in question. Both cases of lack of compliance have negative impacts. In the first case, there is the risk of lower work efficiency, which may cause harm to the employer. This situation may be corrected through increased investments into continuing education and employee training. In the second case, there is the risk of reduced motivation for work, the employee is usually paid less, and if he spends a long time working in a position with lower requirements his initial level of qualifications may decrease as well. Compliance between the employee's level of qualification and the requirements of the job in question is an indicator of the effective allocation of work.

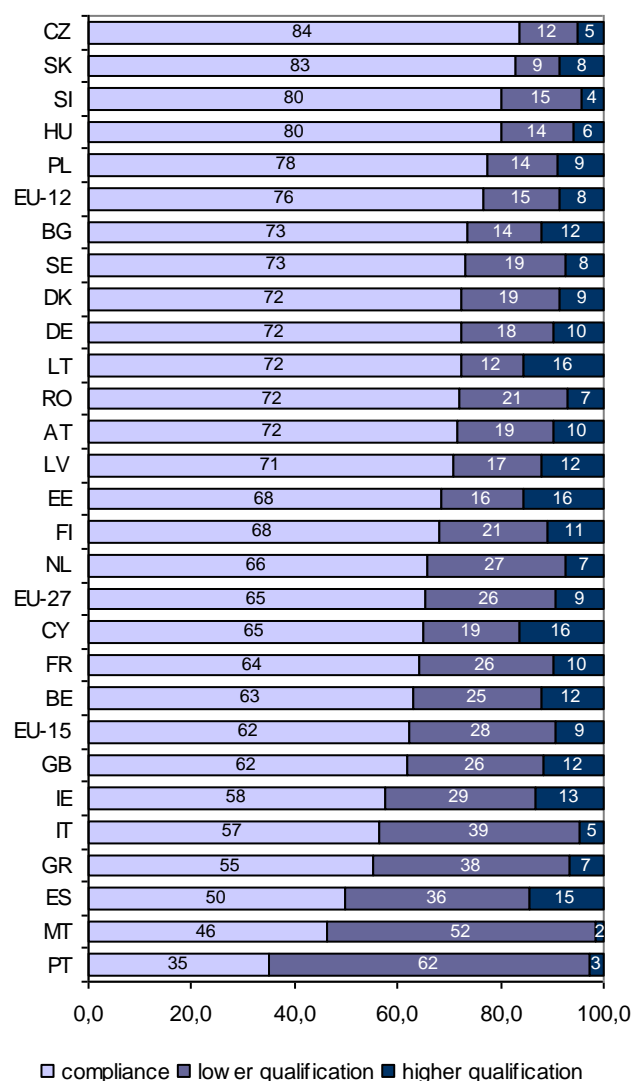
This study's detection of the lack of compliance between requirements and qualifications is based on the assumption that ISCO 1 and 2 professions should be performed by workers with tertiary education (ISCED 5,6), ISCO 3 by workers with tertiary or upper secondary education (ISCED 3-6), ISCO 4-8 by workers with upper secondary education (ISCED 3), and ISCO 9 by workers with primary or lower secondary education (ISCED 0-2). Considering

¹⁴ See Box 6.

the significant level of simplification in methodology resulting from the lack of access to more detailed categorised data, we should consider the following data and analysis performed on the basis of this data to be of a merely orientational nature.

In a comparison of EU countries, the Czech Republic fared very well. The measured lack of compliance in 2006 showed that for 84% of working people, the professional requirements of their current occupation corresponded to their level of qualification. This data are far above the EU-27 and EU-15 average and places the Czech Republic in the first place within the EU.

Figure 16: Comparison of qualifications of employed with the professional requirement of their occupation (2006, in %)



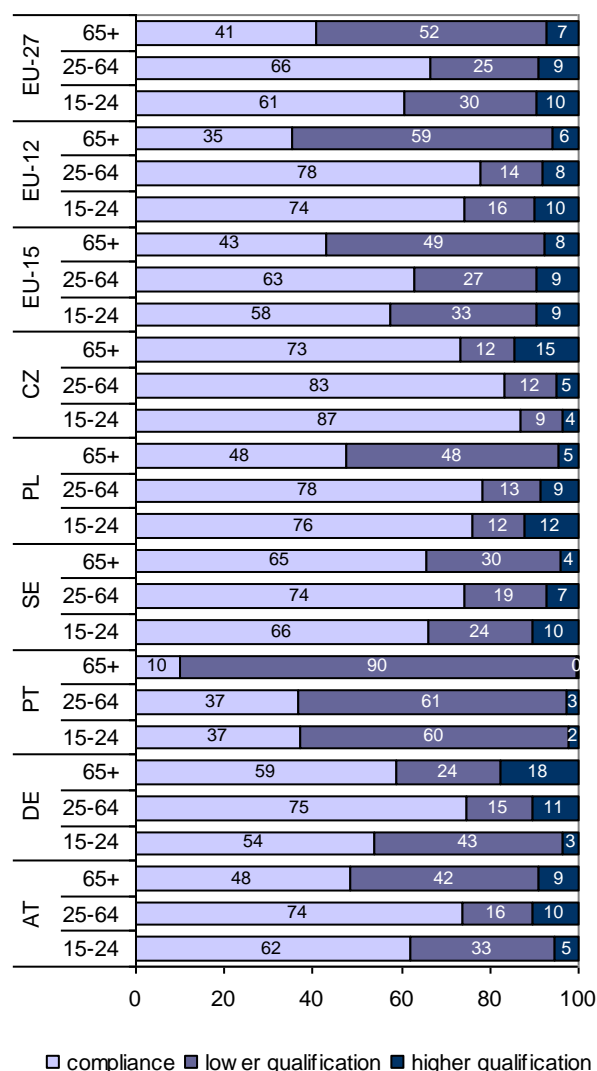
Note: Aggregates are created only from available data for the given year and contain only employed persons. Members of the armed forces and missing answers have been excluded. Source: EUROSTAT (2007c), data for 2nd quarter.

The number of positions where qualifications are in compliance with professional requirements has been increasing slightly. In 1998 there were only 79.5% such job positions in the Czech Republic, while in 2006 this figure was 84%. The measurements for 2006 showed that 11.5% of employed persons in the Czech Republic worked in posi-

tions for which they had an insufficient level of qualifications (see table 7A in Annex). This is only a slight change over 1998, when there were 14.5% such people.

The development of these indicators may be influenced by the current rate of unemployment or the number of candidates for each available position. The current long-term decrease in unemployment in the Czech Republic has improved the chances of employees for gaining better job positions, while companies have been increasingly forced to make compromises and to hire employees despite an insufficient level of qualification.

Figure 17: Comparison of employee's qualifications with the professional requirement of their occupation by age group (2006, in %)



Note: Aggregates are created only from available data for the given year (does not include Luxembourg).
Source: EUROSTAT (2007c), average for 2006.

The data also showed that only 5% of employees in the Czech Republic were “overqualified” for the work they performed. This is one of the lowest figures in the entire EU. In addition, this trend has shown a slight declining tendency – in 1998 there were 6.1% of such employees. In relation to the expected development in the labour market, it is likely that this share will continue to decline.

The new EU members from Central and Eastern Europe have a higher level of compliance between qualifications and the profession's requirements.

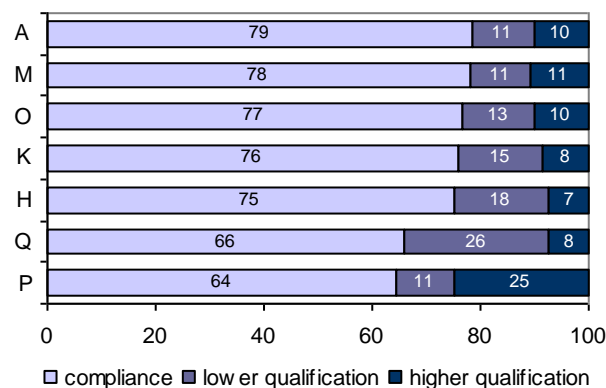
The list is led by the Czech Republic, Slovakia, Slovenia, Hungary and Poland. In western Europe (EU-15), the 2006 share of jobs performed by insufficiently qualified workers was 28.1%; the greatest problems continue to be in southern Europe (Portugal, Italy, Greece and Spain).

The Nordic countries, Germany, Great Britain and Austria also have a higher level of compliance between qualifications and job requirements.

If we look at **the influence of age on lack of compliance**, we find that the required qualification intensity of job positions is met above all by young people, while the compliance between required qualifications and offered level of employment decreases with age.

Among Czech workers older than 65, there has been a rapid decline in the number of people with proper qualifications and an increase in the number of overqualified workers. This situation is a reflection of the fact that working retirees in the Czech Republic frequently perform work which is under their qualification. This does not necessarily mean, however, that their access to the labour market is somehow hindered. In fact, at their age they may find less demanding work with lower work requirements perfectly suitable and a sufficient source of extra income on top of their pensions. It is unusual for Czech workers under 64 to perform work below their level of education. There is a significant worsening among the oldest age categories. A similar situation is found in neighbouring Germany, where 18% of the oldest workers are overqualified for their work. The Czech Republic, on the other hand, has the highest compliance of qualifications with professional requirements among young workers (age 15-24).

Figure 18: Sectors in the Czech economy with the lowest compliance between qualifications and professional requirements (in %)



Note: Aggregates are created only from data available in each year.
Source: EUROSTAT (2007c), average for 2006.

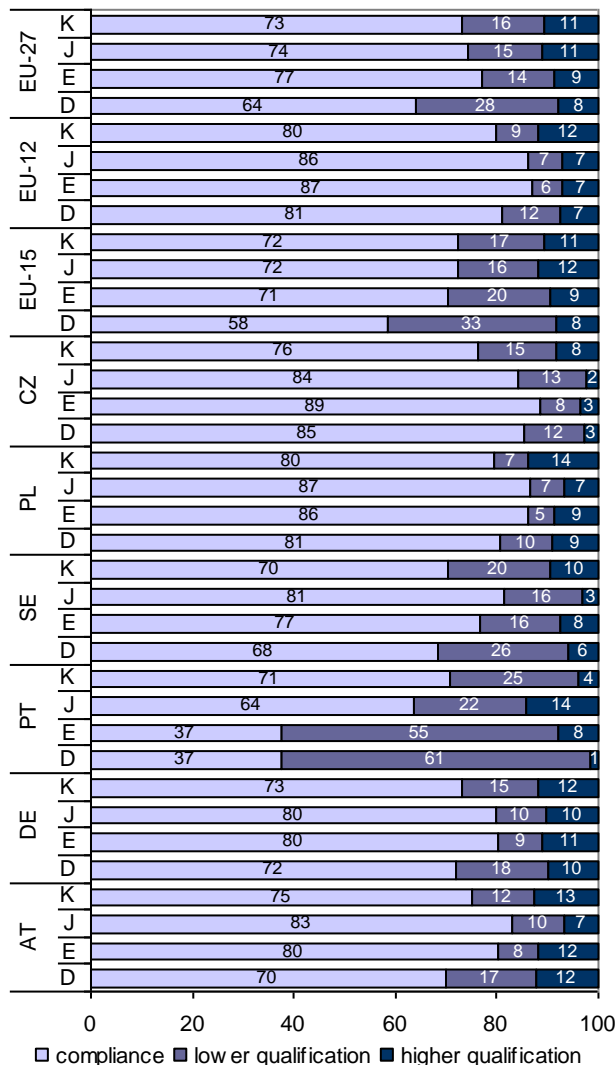
It is also possible to assess **lack of compliance from the individual economic sectors point of view**. Of the basic NACE categories (17 sectors, see box 7), 11 sectors have a level of compliance between qualifications and professional requirements higher than 80%. Only two sectors have a level of compliance lower than 70%, although neither is of key economic importance or employs a significant number of people (see figure 18).

Box 7: Economic sectors (NACE classification)

The Czech version of NACE classifications as defined by the Czech Statistical Office includes a total of 17 main sectors:

- A – Agriculture, hunting and forestry
- B – Fishing
- C – Mining and quarrying
- D – Manufacturing
- E – Electricity, gas and water supply
- F – Construction
- G – Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
- H – Hotels and restaurants
- I – Transport, storage and communications
- J – Financial intermediation
- K – Real estate, renting and business activities
- L – Public administration and defence; compulsory social security
- M – Education
- N – Health and social work; veterinary activities
- O – Other community, social and personal service activities
- P – Activities of households
- Q – Extra-territorial organizations and bodies

Figure 19: Comparison of workers' qualifications with professional requirement in selected countries for selected economic sectors (2006, in %)

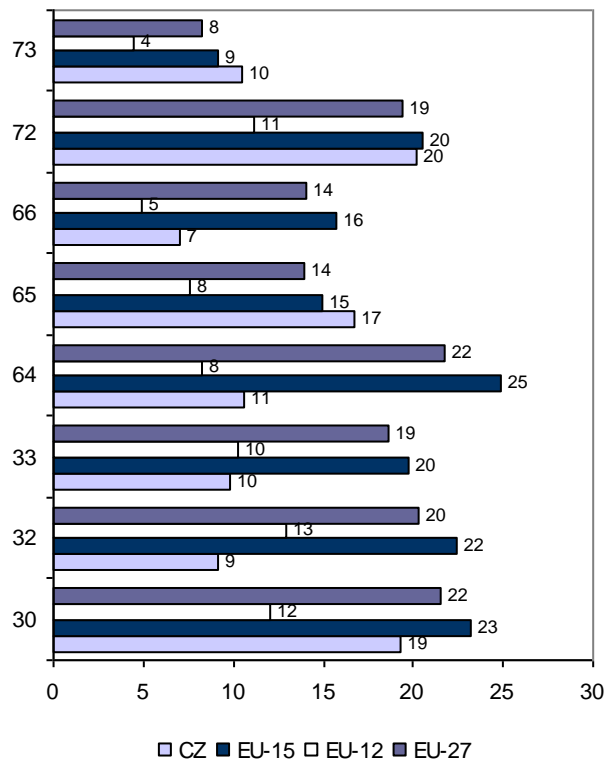


Note: Aggregates are created only from data available in each year (does not include Luxembourg).
Source: EUROSTAT (2007c), average for 2006.

We generally find a lower level of compliance for service sectors, which are also characterised by a larger number of workers with insufficient qualifications.

Worth noting is the knowledge-intensive sector K, which has the fourth lowest level of compliance and is the third worst sector in terms of workers' insufficient qualifications. This lack of compliance indicates that the Czech Republic has a problem with competitiveness in high-tech sectors. If we compare the situation in the Czech Republic and the EU-12 countries with the more advanced western European economies (see figure 19), we can find a different level of lack of compliance for certain sectors and countries. Generally speaking, manufacturing (D) has a higher compliance of qualifications with work requirements in the EU-12 countries (81%) than in the EU-15 countries (58%). This again confirms the fact that the Central and Eastern European countries are focused more on employment in industry. The EU-12 countries (including the Czech Republic) also have an exceptionally high level of compliance in the energy supply sector (E – 87%). The gap between the EU-15 countries and new member states is smaller for knowledge-intensive services (sectors J and K – see table 8A in Annex).

Figure 20: Share of jobs in qualification-intensive sectors held by workers with insufficient qualifications (2006, in %)



Note: Aggregates are created only from data available in each year.
Source: EUROSTAT (2007c), average for 2006.

If we analyse the lack of qualified workers by more detailed NACE classifications, the Czech Republic does quite well as compared to the EU average. For knowledge-intensive and high-tech sectors, the share of jobs held by workers with insufficient qualifications is generally below the EU-15 and EU-27 averages. The Czech Republic fared worse in Research and development (NACE 73) and Financial intermediation except insurance (NACE 65). In NACE sectors 32, 33, 64 and 66, on the other hand, the

situation in the Czech Republic was significantly better. In general, however, the Czech Republic is closer to the EU-15 average and significantly lags behind the EU-12 average.

2.2 Earnings and qualification intensity of work

Wage, as the price of work, reflects the difficulty, qualification intensity, work experience and complicated nature of performing a particular job. At the same time, however, it reflects a balance or imbalance in the labour market for the individual professions or within a certain field of activity, as well as other difficult-to-identify factors. Wage relations retroactively influence decisions made by current and future participants in the labour market: employers' decision on hiring new workers, individuals' decision regarding labour market participation, and students' decision regarding their future professional career. Under certain circumstances, wage relations can thus act as an incentive for increasing one's qualifications or for shifting employees into segments of the economy with a potential for future development.

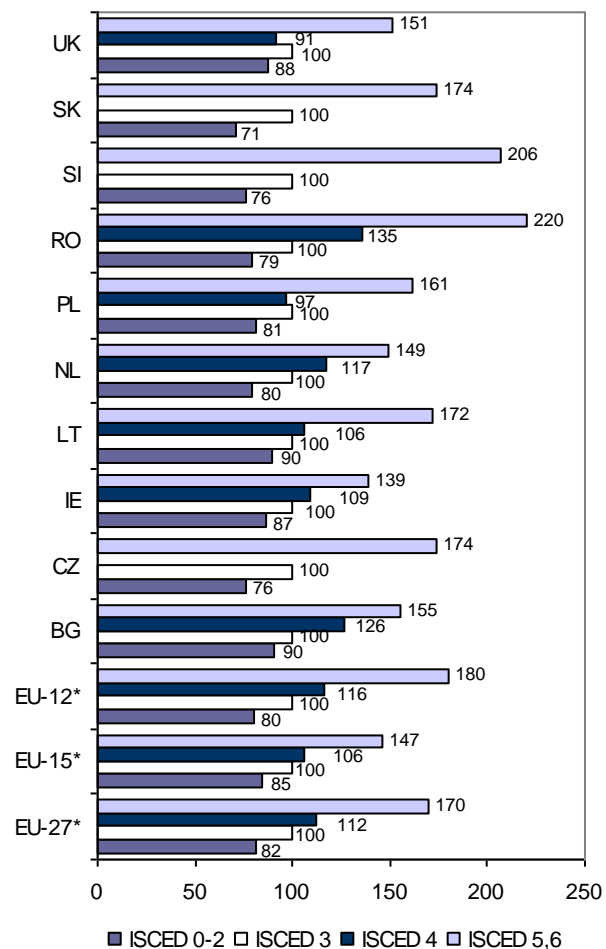
The Czech Republic is commonly characterised as a country with low income inequalities. This comparison is usually performed on the basis of the so-called Gini coefficient – which, however, compares the nature of income distribution among individual population groups rather than differences in wages and their dispersion. This subchapter thus aims at wage dispersion, which is an important factor for assessing the level to which higher qualifications and education are rewarded. The analysis also focuses on wage relations among the individual economic sectors and professions and on the level to which wages reflect the knowledge or technological intensity of a particular activity.

Earning differentiation by level of education

A higher level of qualification allows an individual to perform more demanding work associated with a higher level of productivity and higher benefits for the employer. All this is generally reflected in higher earnings. However, wage relations also reflect any imbalances between supply and demand in the labour market. Here, the focus is not just on the level of compliance within individual educational categories, but also on the structural compliance of supply and demand for individual professions.

The available data (see figure 21) from the 2002 international EUROSTAT survey show that, on average, the earnings of employees with tertiary education are roughly one-half higher than those of employees with upper secondary education. Upper secondary school graduates earn roughly 20% more than people with primary or lower secondary education. The new EU member states show greater earning differences among the individual employee qualification categories than the EU-15 countries. In the new member states, people with tertiary education have much better incomes than in the EU-15 countries. To a certain level, today's high earning differences in Central and Eastern Europe is a reaction to the previous wage-levelling during "real socialism". However, it also reflects the current lack of highly qualified workers for the quickly expanding economy.

Figure 21: Average earnings by education (2002, in %)



Note: 100 % = average monthly wage of employees with secondary education (ISCED 3). ISCED 0-2 – basic and lower education, ISCED 4 Data do not include wages of workers in agriculture, fishing and working households. *EU-27, EU-15, EU-12 – unweighted arithmetic mean from available data (only the countries listed). Source: EUROSTAT (2002b).

The Czech Republic is among the group of countries with the greatest differences in earning levels, even if compared to other new EU members (Poland, Lithuania, Bulgaria). In 2002, workers with tertiary education earned 74% more than workers with secondary education (average figure for workers with apprenticeship certificate and those with school-leaving examination - "maturita"). A somewhat greater gap existed between upper secondary education and primary or lower secondary education. Tertiary education in the Czech Republic clearly offers graduates a higher wage premium than in most other European countries. This testifies to a certain imbalance in the labour market and a high demand for tertiary educated professionals which still has not been completely satisfied.

Earning differences within educational groups

The direct relation between increased level of education and higher earnings applies as a general rule for working people as a whole. The extent to which wages rise in relation to education is not necessarily the same in all cases, however. The wage range in which individuals with the same level of education can have different wages is

influenced by many factors, including the individual's personal characteristics and institutional factors.

Individual factors are associated in particular with real individual's skills and attitude, which affect his position at work and which is legitimately reflected in income levels. Some studies have shown that more than one half of the wage differences can be explained just by individual characteristics.

Varying length of practical experience is another factor influencing the earning differences. Skills gained while performing a job clearly extend the knowledge learned during one's initial education and are rewarded by the labour market. Also important are the competencies acquired by participation in continuing education.

In term of institutional factors, countries with more centralised wage negotiations clearly have a closer relation between a profession's status, required education and income. This leads to a smaller variability of wages within the specific qualification category. It also depends on labour market policy, on economic conditions, the nature of sector in which the person is employed, and whether it is in the private or public sector etc.

Last but not least, there are influences related to negative practices in hiring and evaluating employees – prejudices or discrimination on the basis of sex, age or social background.

The OECD compared income differences within educational groups in selected countries. These differences were expressed as the share of people with the same level of education who are situated on the margins of the income ladder in the country. The bottom boundary was formed by incomes which were less than half of the median wage, the upper boundary was incomes which were more than twice the median level.

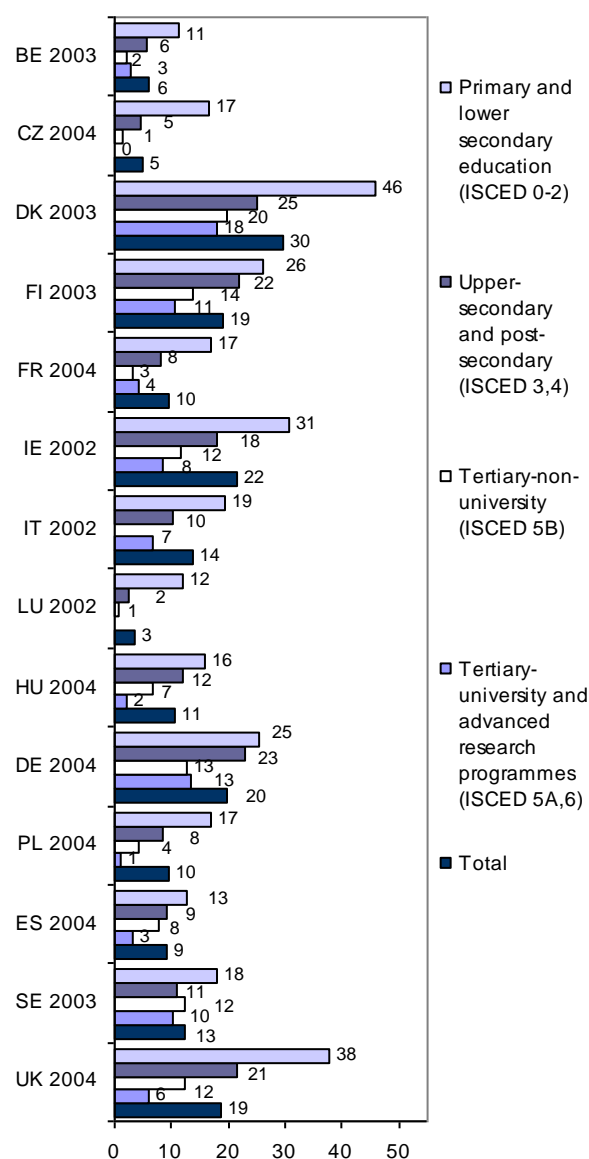
The individual educational categories showed different wage range. The greatest range of wages was found among both extreme educational categories – i.e., among persons with primary or lower secondary education (ISCED 0–2) and among persons with tertiary-university education (ISCED 5A). Although some persons with primary or lower secondary education are situated in the highest income category, in most countries their income is significantly below the median. The same, only in the reverse, applies to people with tertiary education (see figures 22 and 23).

These fundamental earning relations are also found in the Czech Republic, although employees with primary or lower secondary education are not shifted as much towards lower wages as in other countries – in the Czech Republic, only 16.5% of workers in this educational category earn less than one half of the median wage, while in other countries this figure is 30-40%.

However among persons with university education (ISCED 5A), the Czech Republic shows a significant shift towards higher income brackets. Except for Luxembourg, the Czech Republic is the only analysed country where almost nobody with university education earns a low income. Wage differences among these workers are exclusively in the upper income brackets. In other countries such as Denmark, Germany, Finland and Sweden, 10% or more of all employees with university education earn less than one half of the median income. In these

countries, there apparently is a certain (either overall or structural) imbalance between supply and demand for these qualifications. Workers who do not find acceptable work thus apparently are performing jobs that are below their level of qualification. At the same time, competition in the labour market is lowering graduates' salaries for their first employment. These factors are not widespread in the Czech Republic so far, which is reflected in the favourable wage position of tertiary educated individuals.

Figure 22: Number of persons in the lowest income category by level of education



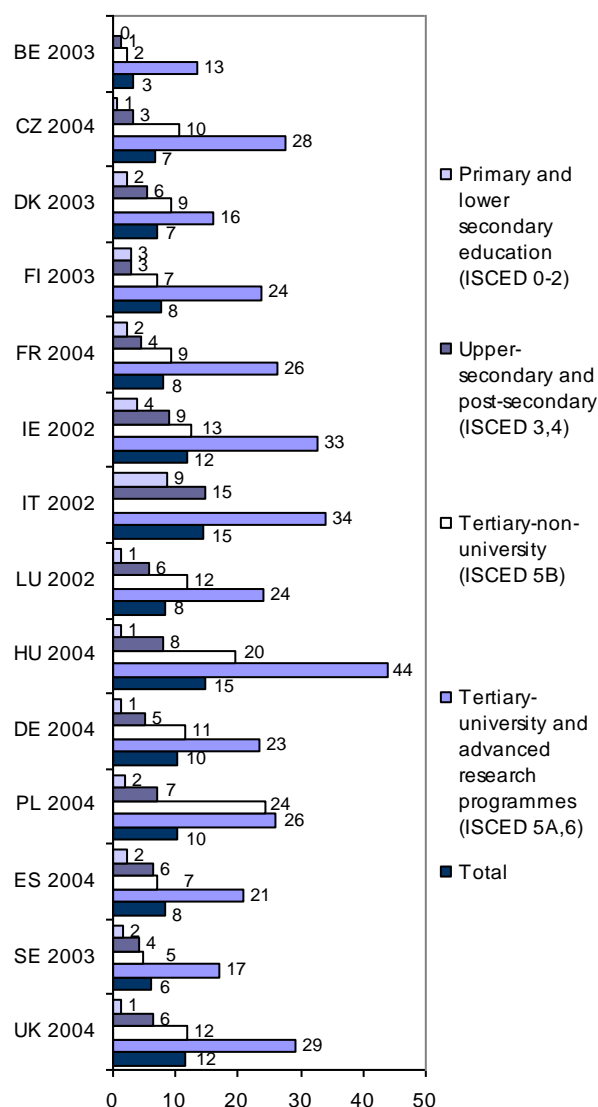
Note: Number of persons earning less than 1/2 of the country's median income.

Source: OECD (2006a).

In the Czech Republic, educational groups representing upper secondary (ISCED 3) and tertiary non-university education (ISCED 5B, in the Czech Republic, this level corresponds to tertiary professional schools) show relatively little wage diversification in comparison to the selected EU countries. This applies in particular for people with upper secondary education; in the Czech Republic, their wages remain in the middle brackets. This testifies to the fact that other factors such as sector, type of profes-

sion, age etc. have less influence on this group's income than in other countries.

Figure 23: Number of persons in the highest income category by level of education



Note: Number of persons earning more than twice the country's median income.
Source: OECD (2006a).

Returns to education

The returns to education are usually assessed in two dimensions: the individual and the social dimension. Individual return is assessed as the relative income of workers with different levels of education. The individual's costs are usually expressed as the costs spent by a person in relation to education, including lost earnings. The individual benefit from the attained level of education is higher income. The calculations performed as a part of the OECD's international comparison¹⁵ for 2003 show that the annual individual rate of return to tertiary education ranges from 22.6% to 8%.

¹⁵ OECD (2006a).

The results of the OECD calculations show that in most countries the rate of return to education for persons with secondary and tertiary education is high enough for education to be an attractive path for increasing one's standard of living. An excessively high rate of return means that there is a lack of employees with the relevant level of education, which pushes up these workers' wages. This situation may be temporary, since a high rate of return may subsequently attract a large number of people into this educational programmes. The speed of adjustment, however, depends on the capacity of the educational system and on how well the labour market is able to absorb changes in the supply of qualified people. The adjustment process may also be positively influenced by a well-functioning guidance and counselling system which provides pupils, students and parents with information on employment opportunities and on wages for certain qualification levels in the individual professions.

High differences in returns to education can also occur on a relatively stable and balanced labour market, for instance if marginal rates are significantly lower than average. This occurs if an increasing number of students is connected with lowering study abilities and decreasing motivation to study. The return to education for students with weak capabilities is probably below average. In such a case, a higher rate of return can thus be interpreted as a certain profit resulting from a better predisposition to studying and better volitional qualities such as limited resources. In this case, financial support which promotes increased participation in education has little impact and essentially will do little to influence the quality of students. Much more effective can be an educational policy focused on increasing the quality of the educational system and improving students' literacy.

The rate of returns to education was determined for the Czech Republic¹⁶ using the so-called Mincer method. This allows us to calculate the average rate of return for one year of education. Using the data for hourly wages for 2000-2002, it is estimated that the average rate of return is around 10% for each year of education (around 11% for men and around 9% for women). It was shown that this level is relatively high compared to other countries. The highest level was achieved in tertiary education, which was more than 50% higher than the rate of return in Austria or Germany, i.e. countries which have a relatively similar educational system and remuneration practises in the labour market. Until 2002, the difference in rate of return for tertiary education increased in comparison to other educational levels.

Earnings in qualification-intensive sectors

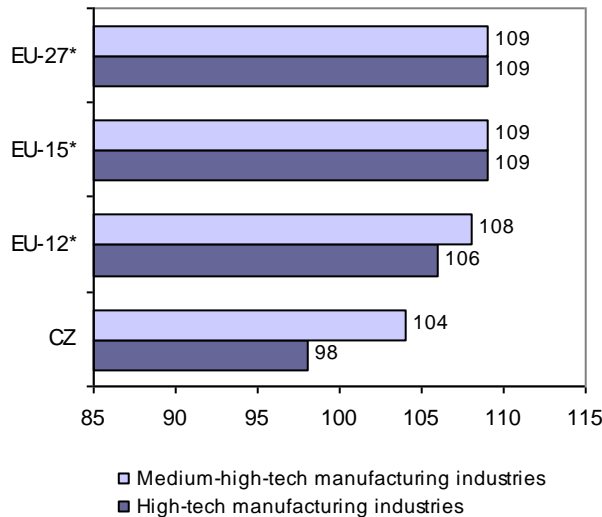
Wage differentiation in favour of higher levels of education and more complicated work should have as a result that qualification-intensive sectors and demanding professions will offer higher wages than less demanding sectors. A comparison of wage relations in these sectors with earnings in other sectors can also indicate whether these sectors or professions offer certain wage advantages in order to attract employees for the sector's further development.

Qualification-intensive sectors are defined on the basis of EUROSTAT classifications as high-tech branches of the

¹⁶ Jurajda, Š: (2005).

manufacturing industry (see box 2) and knowledge-intensive services (see box 3).

Figure 24: Average earning in high-tech manufacturing as compared to average earning in manufacturing as a whole (2002, in %)



Note: * unweighted arithmetic mean; earning in manufacturing as a whole = 100 %; EU-12 excl. Malta.
Source: EUROSTAT (2002a), own calculations.

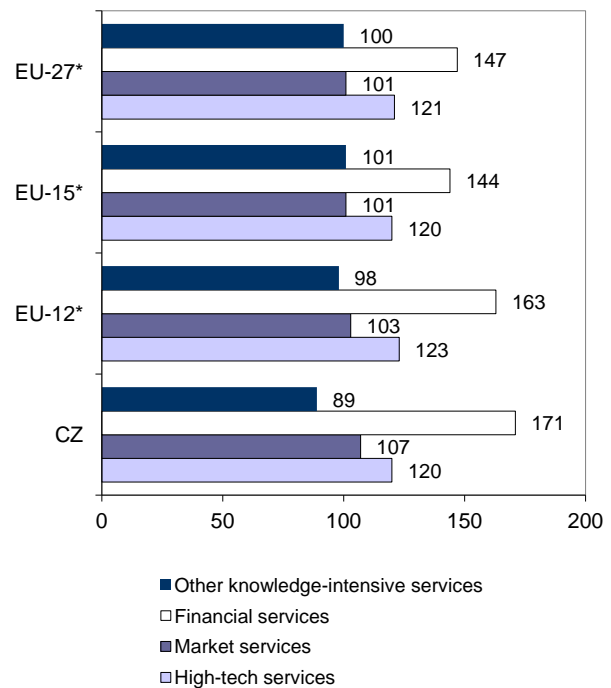
Average EU earnings in **high-tech manufacturing** are roughly 9% higher than in manufacturing as a whole. A similar situation is found in medium high-tech manufacturing. In fact, in some countries the average earning for workers in medium high-tech manufacturing is higher than in high-tech fields. This applies in particular for the new member states including the Czech Republic (see figure 24 and in more detail Table 10A in the Annex). Among other things, this reflects the fact that in these countries there are more allocated lower stages of high-tech manufacturing, which is also reflected in lower incomes.

In all European countries, **average earnings in knowledge-intensive services** are higher than in high-tech manufacturing (see Table 10A in the Annex). This results in particular from the fact that unlike manufacturing activities, which despite their high level of technology require a relatively significant amount of operating and auxiliary personnel. On the other hand activities in knowledge-intensive services are more dependent on qualified work. If, however, we compare the earning levels of services and industry from the point of view of comparable employee qualification structures, services no longer hold such a clear lead. Although there are roughly one third more tertiary educated workers in services than in high-tech manufacturing, earnings are higher by only about one fifth.

In knowledge-intensive services (see figure 25), in all European countries the highest wages are found in the **financial sector**, where average earnings are almost one half higher than overall earnings in services. They are also one fifth higher than earnings in high-tech services. The financial sector's advantages are even more distinct in the new member countries, with the greatest difference being in the Czech Republic. Earnings in the Czech financial sector are 71% higher than

average earnings in services, 42% higher than in high-tech services.

Figure 25: Average earning in knowledge-intensive services as compared to average earning in services as a whole (2002, in %)

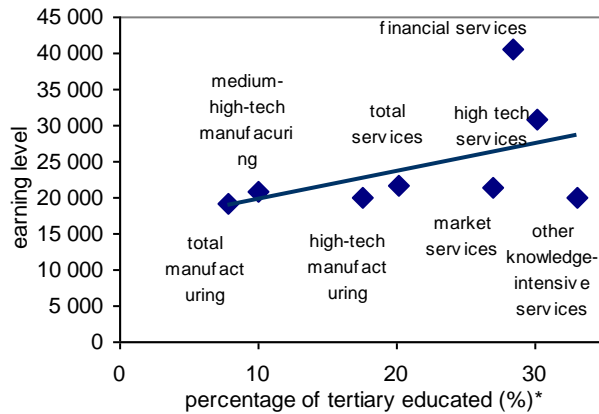


Note: * unweighted arithmetic mean; earning in services as a whole = 100 %; EU-12 excl. Malta.
Source: EUROSTAT (2002a), own calculations.

The Czech Republic shows a certain overrate of work in financial services and underrate in other knowledge-intensive services such as education, health and social work, and cultural services. Earnings for these activities, which are for the most part financed from public resources, are below the average for services in all countries. In the Czech Republic, however, this difference is more distinct than in the EU-15 countries as well as in the new member states. Compared to other services in the Czech Republic, wage premium for market services for companies is relatively higher than the EU average. The earning position of high-tech services in the Czech Republic roughly corresponds to the EU average for this sector.

A comparison of earning levels in the individual sectors with the number of tertiary educated workers as a share of all workers in the given sector shows clear wage under-rate in non-financial knowledge services (see figure 26). Considering the wage relations in the Czech Republic among individual qualification-intensive sectors in both industry and services as well as in financial services, it is likely that non-financial services cannot offer similar earnings as the financial sector. This definitely plays a role in the hiring of top educated professionals in other sectors (in particular management, economic and ICT professions). At the same time, the existing wage relations are one important piece of information for young people choosing their study field. This can lead to a preference for financial and economic fields of study over technical fields and natural sciences.

Figure 26: Comparison of earning levels and number of tertiary educated persons in qualification-intensive sectors in the Czech Republic (2006)

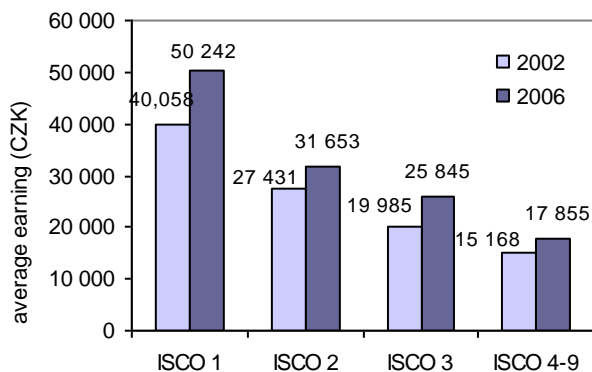


Notes: * total employment in the sector = 100 %. Earning data include non-financial entities with 20 or more employees and financial entities and state institutions of all sizes.
Source: ČSÚ (2007a), 2nd quarter; own calculations.

Earnings in demanding professions in the Czech Republic

From the wage relations point of view it is important to analyse the earning position held by workers in highly specialised and demanding jobs. This includes ISCO-88 groups 2 (scientists and professionals) and 3 (technicians, healthcare and educational employees and employees in related fields). These professions are of key importance for the development, application and use of modern technologies in the economy. It is also useful to include into the analysis the group of specialists in managerial and leading positions and related professions in the public and private sectors (ISCO 88, group 1)..

Figure 27: Average monthly earnings by individual ISCO qualification groups (in CZK)



Note: Includes employees working more than 30 hours a week.
Source: ČSÚ (2003a, 2007a).

ČSÚ data on employee earnings indicate that people in demanding professions earn on average 50% to 180% higher wages than professions with fewer or no demands on qualifications (ISCO 4-9). Wage relations are unambiguously tilted in favour of workers in group ISCO 1. Remuneration for qualified work performed by scientists and professionals (ISCO 2) and technicians (ISCO 3) is significantly lower.

The development of earnings in recent years (2002-2006) continues to strengthen the leading position of managerial professions in group ISCO 1 (5.8% growth) (see Table 12A in the Annex). The earnings of technical and associated professions also grew faster than average (by 6.6%), apparently as a result of increased demand for these professions in the manufacturing industry, although their overall position was only partially influenced by this fact. Earnings of scientists and professionals not increased as rapidly as the economy's average (3.6%).

Wage relations and their development show that earnings in the Czech Republic do not equally reflect the qualification intensity of work in the individual professional categories. It is clear that significantly higher wages at a comparable level of education are earned by workers in managerial positions. This is understandable in view of higher time demands, the higher level of stress and higher requirements for organisational and other skills required to perform managerial functions, in particular at top levels of management. There still remains the question, however, of wage premium rate in this category as compared to highly demanding professions of scientists and professionals.

2.3 Internationalisation of tertiary education

This subchapter first identifies the decisive factors influencing the internationalisation of tertiary education, as well as the decisive players on the international tertiary education market. It includes an analysis of the mobility of tertiary education students within the EU and focuses specifically on foreign students attending higher education institutions in the Czech Republic and Czech citizens studying abroad.

Like all other economic sectors, tertiary education is influenced by globalisation. Although education has always been one of the sectors most open, i.e. with the lowest level of internal market protection, over the past decade, tertiary education has become significantly even more international in character and we may expect this trend to continue. Not only a deepening of international cooperation among institutions has been there, but we have also seen mutual competition in acquiring students, professors and research grants.

Although the internationalisation of tertiary education is generally considered to be a very positive phenomenon, it does evoke certain concerns arising from the so-called "brain-drain", i.e. the outflow of the most talented students and top academic staff. Especially at risk of losing their intellectual elite are the less developed EU members, but the trend affects the entire EU, which competes for talented students and professors in particular with the United States.

Important exporters on the world and European tertiary education market

Table 4 shows the development of the position of the top exporters in tertiary education. It shows those countries whose share of the total number of students studying in countries of which they are not inhabitants exceeded 5% in 2004. There are data for the main part of the worldwide tertiary education market formed by the number of foreign students in a total of 24 countries in 1998 and 25 countries in 2004. The absolute numbers of foreign students for the years 1998-2004 are shown in table 13A in Annex.

Table 4: Main exporters on the world tertiary education market (%)

	1998	2004	2004-1998
USA	32.5	27.8	-4.7
United Kingdom	15.8	17.7	1.9
Germany	12.9	12.7	-0.2
France	11.2	11.2*	0.0
Australia	8.2	9.7	1.5
Japan	2.7	5.7	3
Canada	2.5	5.5	3
Czech Republic	0.3	0.7	0.4

Note: * 2003. Source: OECD Online Education Database, own calculations

The United States continue to hold an exclusive position on the world tertiary education market, although their position weakened between 1998 and 2004, primarily due to the influence of Japan, Canada and to a lesser degree the United Kingdom. In the year 2004, the United States had about 28% share in this market. They were followed by EU countries such as the United Kingdom (18%), Germany (13%) and France (11%). In the period under review, the Czech Republic improved its international competitive position, with its share reaching almost one per cent. Nevertheless, due to its limited capacity the country cannot reach similar position as the main players. This capacity is to a significant extent predetermined by the country's size and its level of economic development, as well as by its language, which is not a world language. If the Czech Republic wishes to increase its attractiveness for foreign students, it will have to expand its educational offer particularly in the English language, which is becoming the decisive language in tertiary education.

Table 5: Main exporters on the European tertiary education market (%)

	1998	2005	2005-1998
Germany	28.6	27.0	-1.6
United Kingdom	32.5	23.6	-8.8
France	10.9	9.5	-1.4
Austria	6.3	5.7	-0.6
Belgium	5.7	5.6	-0.1
Czech Republic	0.7	2.6	1.9

Note: * 1999. Includes ISCED 5-6. Source: EUROSTAT, Mobility of students in Europe, own calculations

Table 5 offers an overview of the situation on the **European tertiary education market**. It shows those countries whose share of the European tertiary education market exceeded 5%. The European tertiary education market is defined by the total number of students from the EU-27 countries, the European Economic Area and Candidate countries¹⁷ studying in any of these countries of which they are not citizens. A decisive share of the European tertiary education market is held by Germany and the United Kingdom. In the year 2005, Germany's share was 27%, that of the United Kingdom 24%. Other significant positions were held by France (10%), Austria (6%) and Belgium (6%). The Czech Republic's share was slightly less than 3%, which is comparable to Spain. The

absolute numbers of foreign students in the individual countries are shown in table 14A in Annex.

Even though these five countries continue to hold an exclusive position within the EU, in the years 1998-2005 their positions weakened.. The most significant decline (by almost 9 percentage points) was seen with the United Kingdom. This means that students' target countries are increasingly other EU member countries, particularly Sweden and the Netherlands, there was the greatest increase in the share of foreign students over the analysed period (by almost 2 percentage points to slightly less than 4%). Since neither of the countries speaks a world language, it is clear that higher education institutions expanded their educational programmes or at least course offer available in one of the world languages. Since English is increasingly becoming the language of tertiary education, we may assume that this is the language they focused on.

Mobility of students within the EU

Students' mobility can be expressed using two indicators published by EUROSTAT. The first is the inflow rate of foreign students into a country and is defined as the share of students without citizenship on the whole number of students in given country. The second indicator is the outflow rate of students leaving to study abroad, expressed by the share of students studying abroad¹⁸ on the whole number students with the given citizenship. The values for these two indicators for each country for the year 2004 are contained in figure 28.

Based on the ratio of these two indicators, the EU countries can be divided into two groups. In 2004, ten countries of the EU-27 had a higher share of foreign students than citizens studying abroad. The greatest difference was for Austria, where the share of foreign students was 12.5% of all students of tertiary education in Austria; the share of Austrians studying abroad was a mere 5.3% of all Austrian students. The Czech Republic is also a member of this group; the difference between the two indicators was 1 percentage point (2.8% vs. 1.8%).

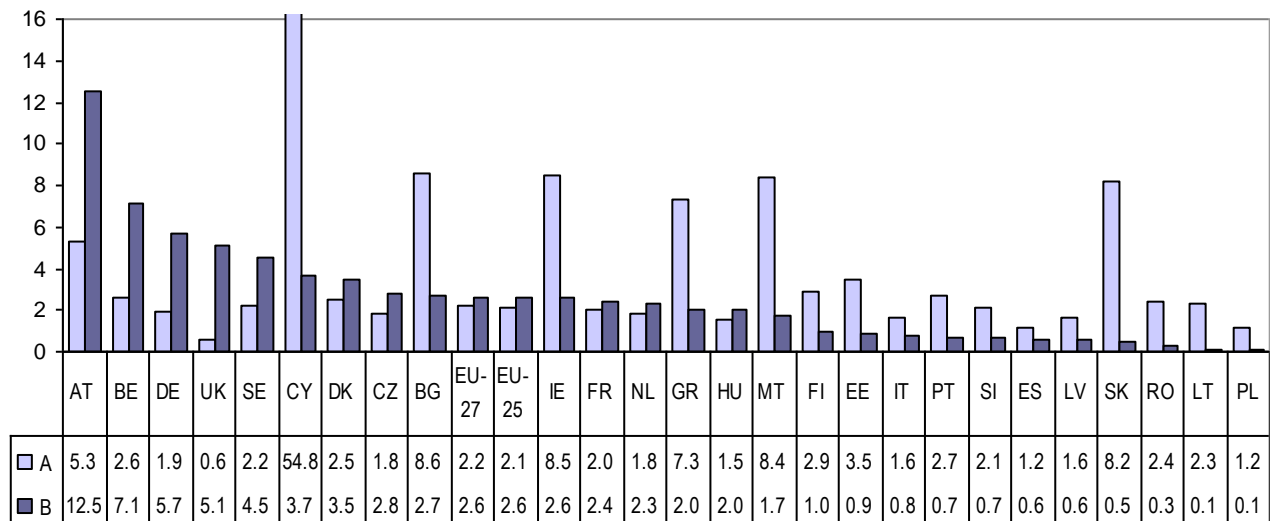
The second group of countries is composed of those countries with a higher share of students studying abroad than the share of foreign students. This group consists of 16 countries of the EU-27 (data for Luxembourg are not available). A large difference is a sign of an imbalance between supply and demand in tertiary education, specifically of relatively stronger demand than supply. In this regard, the least favourable situation was in Cyprus, with more Cypriots studying abroad in 2004 than on Cyprus itself (54.8%), while the share of foreign students was a mere 3.7%. Other countries in this group are the new member states (except for the Czech Republic and Hungary) as well as southern states but also Finland, Ireland and Italy.

Students' mobility within the EU is expected to bring an increased quality of education and to contribute to "European citizenship", which is associated with mutual understanding and knowledge of the language and culture of the other member countries.

¹⁷ This includes the following countries: Norway, Iceland, Liechtenstein, Croatia, Macedonia and Turkey.

¹⁸ Since the individual member states do not have exact data on students studying abroad, the number of students studying abroad is counted from the number of foreign students of each nationality.

Figure 28: Openness of tertiary education (% , 2004)



Note: Includes ISCED 5-6. A - students studying in another EU country (as % of all students); B - inflow of students from EU (as % of all students in the country); data for Germany, Slovenia and Romania do not include doctoral students; data for Belgium do not include data on private independent institutions and the German-speaking community. Source: EUROSTAT. Population and social conditions. table code educ_thmob date 26.6.2007)

Teaching professionals' opinions regarding student mobility

Students' mobility receives relatively strong support from teaching professionals, i.e. instructors at higher education institutions. This is proven by the results of a Eurobarometer survey conducted in early 2007 under the name "Perceptions of tertiary education reforms".

Box 8: Eurobarometer – Perception of tertiary education reforms

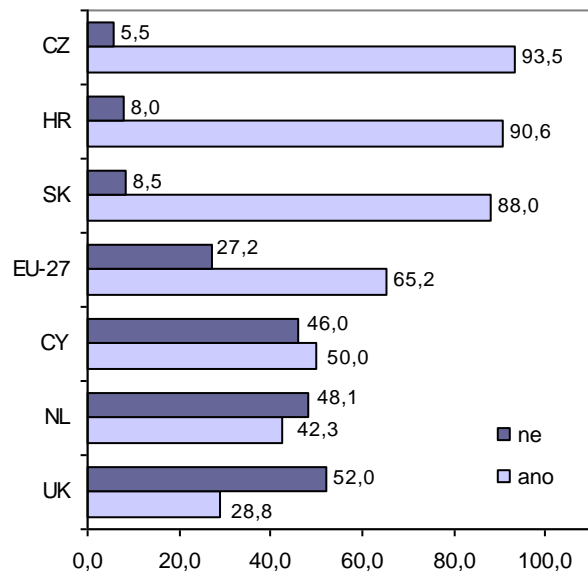
The aim of the survey, which was conducted in the EU-27 countries, Croatia, Turkey, Norway and Iceland, was to determine how teaching professionals at higher education institutions perceive the current situation in tertiary education and what attitudes they hold towards current or planned tertiary education reforms. The telephone survey was conducted using WebCATI (web-based computer assisted telephone interviewing). The target group included randomly selected rectors, deans and teaching professionals with varying pedagogical titles (professors, assistant professors, lecturers and doctoral candidates) from randomly selected institutes. The total number of interviews was about 5,800, with the number of interviews in each country dependent on the country's size (from 50 to 250 interviews). Some 200 interviews were conducted in the Czech Republic.

Respondents stated whether they agree or disagree with presented statements, using a scale of four responses – strongly agree, agree, disagree, strongly disagree – plus don't know. The survey determined the level of agreement or disagreement with statements related to (a) the three-cycle system of tertiary education and European quality standards, (b) adult education, joint degrees, student mobility and study programmes, (c) management and funding, (d) involvement of other institutes/companies into higher education reform.

As shown by figure 29, almost two thirds (65%) of EU-27 respondents agree that mobility, i.e. study abroad, should be an obligatory part of **doctoral studies**. The level of support for this idea differs between the old (EU-15) and new member states (EU-12). Some 79% of respondents from the EU-12 were in favour of requiring doctoral candidates to spend at least part of their studies abroad while

for the EU-15, this figure was only 62% (see Table 15A in Annex). The country with the highest level of support was the Czech Republic (94%) while the country with the lowest level of support was the United Kingdom (28%).

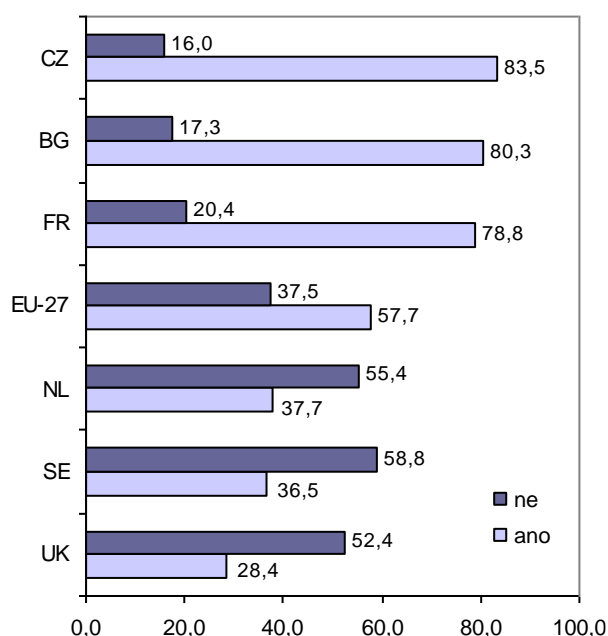
Figure 29: Level of agreement with making mobility an obligatory part of doctoral studies (% , 2007)



Note: remaining answers to 100% represent the answer "don't know". Source: Eurobarometer 2007

When asked if they agreed with making mobility an obligatory part of the curriculum for **all students** of tertiary education, i.e. for students in bachelor and master programmes as well, 68% of respondents from the EU-12 but only 56% from the EU-15 agreed; the EU-27 average was 58%. As with doctoral candidates, the country with the highest level of support was the Czech Republic (84%) and the country with the lowest support was the United Kingdom (29%).

Figure 30: Level of agreement with making mobility an obligatory part of tertiary education (% , 2007)



Note: Includes university education only. Remaining answers to 100% represent the answer "don't know". Source: Eurobarometer 2007

It is clear that requiring students to spend at least part of their studies abroad finds more support when it comes to doctoral candidates than for lower levels of tertiary education. The differences between old and new member states in the level of support for making mobility an obligatory part of the tertiary education curriculum can to some extent be explained by the fact that most of the new member states experienced a relatively long period of directive-based planning. This experience apparently continues to be reflected in the preference of duties over free choice. It may also be related, however, to an unwillingness to make students responsible for composing their own studies and to an unfavourable attitude towards the individualisation of tertiary education.

Opinions on making mobility obligatory also differed in relation to the age of the respondent or how long he or she has been active in the field. For instance, some 71% of respondents from all over the EU-27 with more than 30 years' practice were in favour of making mobility obligatory for doctoral candidates, but only 64% of respondents with less than 10 years' practice agreed. The same was found if including all students of tertiary education, with the figures being 62% and 56%, respectively. These differences may be influenced by the fact that the older generation, which did not experience such a strong internationalisation of tertiary education as the younger generation, has greater trust in the positive influence of foreign experience or that the younger generation wants to leave the decision up to the students themselves.

In term of academic title, the greatest support for making mobility obligatory for doctoral candidates was found among rectors (74%), while the least support was among doctoral candidates themselves (58%). A similar conclusion can be made in relation to all students of tertiary education – again, most in favour were rectors (67%) and least in favour were doctoral candidates (52%).

Foreign students in the Czech Republic

The number of foreign students at higher education institutions (HEI) in the Czech Republic is continually increasing. In the 1995/96 school year, a total of 3,285 students were studying in the Czech Republic in all forms of study at all types of HEI, while in the 2006/07 school year, this figure was 24,641 students. The number of foreign students thus increased 7.5 times. The share of foreign students on the whole number of students at HEI thus increased from 2.2% in 1995/96 to 7.6% in 2006/07. These data are merely orientation in nature, since certain methodological changes occurred in recording the number of foreign students.¹⁹ In 2005/06, more than three fourths of foreign students studied at public HEI (80%).²⁰

From the **foreign students' country of origin** point of view, **the first place is clearly dominated by Slovakia** – in the 2006/07 academic year, there were 16,500 Slovaks studying in the Czech Republic, i.e. about two thirds of all foreign students. Other countries were represented relatively rarely, with the second largest group being Russian citizens (a mere four percent), followed by citizens of Ukraine, Vietnam and the United Kingdom. Table 6 shows the change of representation of the individual countries as compared to the 2000/01 school year.²¹

Table 6: Foreign students at higher education institutions in the Czech Republic (2006/07)

	2000/01		2006/07	
	number	share	number	share
Slovakia	3,501	57.3	16,503	66.9
Russian	164	2.7	1,089	4.4
Ukraine	122	2.0	760	3.1
Vietnam	52	0.9	576	2.3
United Kingdom	241	3.9	419	1.7
Total	6,109	100.0	24,641	100.0

Note: see methodological changes in footnote 14. Source: ČSÚ: Education – Data, tab. c06s07t, own calculations

During the period from 2000/01 to 2006/07 there was a significant increase in the number of Slovak students. In term of the list of the five most frequently represented countries, there was only one change. Greek citizens, who in 2000/01 represented the second largest group of foreign students (426 students), were less likely to study in the Czech Republic in 2006/07 (140 students). Citizens of Vietnam on the other hand – who were only minimally represented in 2000/01 – formed the fourth largest group of foreign students in 2006/07.

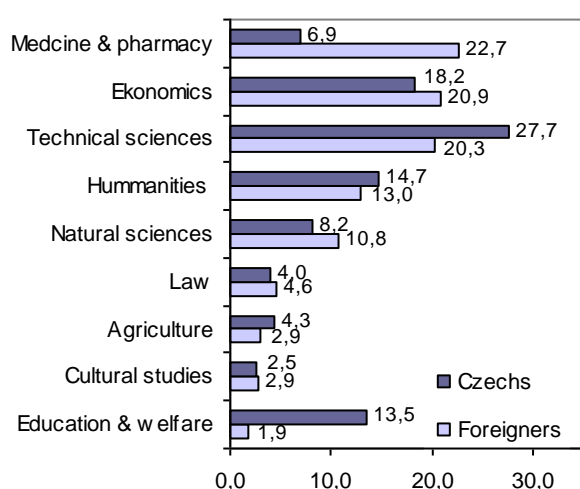
¹⁹ Since the 2004/05 academic year, the number of students has been given by the number of actual persons; prior to this, it was given by the number of degrees being studied for, meaning that one student could be counted multiple times. Until 2005/06, the number included only students physically attending bachelor and master study programmes (except for state higher education institutions – Ministry of Defence and Ministry of Interior – where all students are counted). Since 2005/06, all foreign students have been counted regardless of form of study.

²⁰ Source: ČSÚ: tab.c06a04t

²¹ The 2000/01 academic year was used as a basis because the total number of foreign students does not include students with Slovak citizenship who began their studies prior to 1993, i.e., the division of Czechoslovakia. It may be assumed that by 2001/02 all these students had already finished their studies.

Foreign students study practically all **fields of study** offered by HEI in the Czech Republic, although the greatest interest is in three fields (nearly two thirds of foreign students at public HEI study in these fields): healthcare, medicine and pharmacy (22.7%), economics (20.9%) and technical sciences (20.7%). As can be seen from figure 31, the most frequently represented fields are similar to those studied by Czech students. Of the three most frequently studied fields, two are the same for Czech and foreign students: technical sciences (27.7%) and economics (18.2%). The third most frequently studied field among Czech students is humanities and social sciences (14.7%).

Figure 31: Students at public HEI by field of study (% , 2005)



Source: ČSÚ: Education – Data, tab. c06a04t, own calculations

Foreign students' top fields of choice were different at private higher education institutions than at public institutions. This is because private HEIs do not offer the whole spectrum of fields of study. In 2006/07, foreign students most frequently studied economics (62%), followed by education, teacher training and social welfare (20%) and humanities and social sciences (14%). The remaining 4% of students studied technical sciences (2%), law (1%) and natural sciences (1%). The order of fields of study is similar as with Czech citizens.²²

Table 7: Students at HEI by the city in which they are studying (% , 2006/07)

	foreigners/ foreigners	Czechs/ Czechs	foreigners/all students
Praha	56.9	35.6	11.6
Brno	21.2	21.1	7.7
Ostrava	6.3	9.1	5.4
Olomouc	4.6	6.0	6.0
Plzen	3.3	5.9	4.3

Source: ČSÚ: Education – Data, tab. c06a05t, own calculations

The spatial dispersion of tertiary education is reflected in the concentration of students in the individual cities. In the 2006/07 academic year, more than one half of foreign students studied in Prague (57%) and more than one fifth studied in Brno (21%). Other significant destinations in-

cluded Ostrava, Olomouc and Plzeň, with slightly less than 15% of foreign students.

Table 7 clearly shows that the students' choice of towns is similar for Czech and foreign students. Students with Czech citizenship are not so concentrated in Prague; for them, regional schools play a greater role. If we look at the share of foreign students on the whole number of students at higher education institutions, the only difference is in the order of towns: Olomouc had a higher share than Ostrava.

In many countries, foreign students represent an important source of income for HEIs. This is definitely not the case of public higher education institutions in the Czech Republic, since only an insignificant fraction of such students pay for their education. Foreigners may study at public schools for free if they can pass Czech language entrance exams. One exception are Slovaks, who – on the basis of bilateral agreement – can perform their entire education free of charge in Slovak.

According to the Act on Higher Education Institutions,²³ public HEI set fees for bachelor, master and doctoral programmes performed in a foreign language. Interested students who have not mastered Czech may pay to participate in specialised accredited study programmes in English offered by higher education institutions or may study within the framework of exchange programmes or scholarships (see below).

Table 8: Self-paying foreign students at HEI in the Czech Republic (2006/07)

	number		share of self-paying	
	students	self paying	A	B
United Kingdom	419	372	88.8	18.3
Portugal	277	266	96.0	13.1
Norway	244	209	85.7	10.3
Greece	140	93	66.4	4.6
Germany	256	80	31.3	3.9
Total	24,641	2,037	8.3	100.0

Note: A-self-paying students as share of all students from the given country, B- self-paying students as share of all self-paying students. Source: ČSÚ, Education – Data, tab. c06s07t, own calculations

Foreign **self-paying** students attending HEI in the 2006/07 academic year represented about 8% of all foreign students, i.e. about 2,000 paying students. The share of foreign paying students decreased almost threefold as compared to 2000/01, from 22% to the already mentioned 8%. A comparison of the data contained in tables 6 and 8 shows that the most frequently represented students (table 6) make use of the possibility of studying free of charge in Czech. Citizens of Russia and Ukraine have the advantage of speaking a related language, while Vietnamese citizens at Czech schools are primarily children who have passed lower levels of education in the Czech Republic and who have no problems with the Czech language. The available data do not allow us to deduce whether self-paying students are studying at public or private schools.

The greatest share of paying students was from EU member states, with one exception being students from

²² Source: ČSÚ: Education – Data, tab. c06a04t, own calculations

²³ Sec. 58(5) of Act No. 111/1998

Norway. British students represented 18% of self-paying students, Portuguese 13%. An overview of the top five countries of origin of paying students is offered by table 8, which also shows the share of self-paying students on the total number of students from each country. Except for students from Greece, who may be descendants of the post-war wave of immigrants and can thus study in Czech, we may assume that students from other countries participate in courses/programmes proceeded in a foreign language. These are students who are studying in the Czech Republic as part of exchange programmes or scholarships, which is most frequently used by students from Germany. In fact, exchange programmes and scholarships between the Czech Republic and Germany are well developed, as can also be seen from the number of Czech students studying in Germany (see table 9).

Most foreign students finance their studies and daily needs with the help of **scholarships** offered on the basis of bilateral agreements or through the EU-funded Socrates/Erasmus programme. The Czech Ministry of Education, Youth and Sports provides two kinds of scholarships. **Reciprocal scholarships** are intended for students from abroad who are interested in spending no more than two semesters studying in the Czech Republic. Reciprocal stays take place on the basis of annually renewed agreements with individual HEI which clearly define the number of students and the length of their stay.

Government scholarships are provided to foreigners as part of foreign development aid. They are used for HEI studies in bachelor, master and doctoral programmes. Each year, the Ministry of Foreign Affairs and Ministry of Education establish quotas for each country, with the overall quota determined by the relevant government resolution. Currently, this programme includes 250 scholarships a year with the quota usually filled to around 80%.²⁴ The main reason for the relatively low level of interest is the fact that most study programmes are offered in Czech. Language does represent a fundamental barrier even though interested students participate in a year-long language course. The Ministry of Education is attempting to promote study of the Czech language abroad in order to increase foreign students' interest in passing their studies in the Czech language.

Czech citizens studying abroad

The number of students studying abroad is calculated by EUROSTAT from records on the number of foreign students in each country by adding up all students of one nationality reported by the individual countries. There is thus relatively reliable information on the number of students studying in EU countries but not on the number studying elsewhere. Besides recipients of reciprocal scholarships this includes recipients of scholarships provided as part of inter-university agreements, as well as self-paying students who finance their studies from their personal resources. The number of foreign scholarships available for Czech students is not enough to cover interest in studying abroad.

Even though interest in studying abroad continues to significantly exceed available scholarship the number of Czech citizens studying abroad is increasing each year.

²⁴ Source: Doubrava, L.: How do foreign students gain scholarships? in Učitel'ské noviny No.2, 2005

(see Table 16A in Annex). In 2004, the number of Czechs studying in the EU-27 countries was almost 5,400 – more than twice as many as in 1998. This is a reflection not only of the expanded possibilities for receiving scholarships related to the Czech Republic's accession to the EU but also of the country's improved economic situation, which allows some parents to pay for their children's study abroad on their own.

There are no data available that allow us to perform a similar analysis as the one performed for foreigners studying in the Czech Republic, i.e. to determine the share of self-paying students and the fields of study. From the **geographical destination** point of view, in 2004 most Czech students studied in Germany (46%) and France (12%). Table 9 shows the changes in destination between 1998 and 2004. The table includes all countries which were among the top five destinations for Czech students in at least one of these two years. The order of countries is determined by the situation from 2004.

Table 9: Czech students at foreign HEI

	1998		2004	
	number	share	number	share
Germany	1,082	50.0	2,483	46.1
France	207	9.6	662	12.3
Austria	223	10.3	500	9.3
Slovakia	287 ¹⁾	8.9 ¹⁾	443	8.2
United Kingdom	250	11.5	359	6.7
Poland	250	11.5	208	3.9
Total	2,165	100.0	5,390	100.0

Note: ¹⁾ data from the year 2000. Source: EUROSTAT. Population and social conditions. table educ_enr18. 23.7.2007

Germany is in the first place in both years although its share of Czech students studying abroad decreased from 50% to 46%. Except for France, all countries' share fell. The most dramatic example being Poland. Interest in study abroad was more equally distributed across the EU-27 countries in 2004 than in 1998. The greatest increase was in Sweden, whose share rose from less than 1% to almost 7%. Outside the EU-27, Czech citizens were most likely to study in the United States (about 1,200 students in 2003) and Switzerland, where 185 students studied in 2004 (see Table 16A in Annex).

If study abroad is to increase graduates' quality of education then they will have to study in countries or at institutions where the quality of tertiary education is better than that found at home. If this is not the case then mobility at least helps to improve language skills and to get to know and understand other cultures.

It is very difficult to perform a comprehensive evaluation of the quality of tertiary education – not just because of the need to find the right indicators but also because tertiary education is provided by many different institutions whose quality varies not only among different fields of study but also within them.

The question of the **quality of tertiary education** in the individual countries is addressed by the World Competitiveness Yearbook published by the International Institute for Management Development (IMD). The Yearbook assesses the quality of tertiary education on the basis of a questionnaire answered by some four thousand respondents from 60 analysed countries. Respondents answered

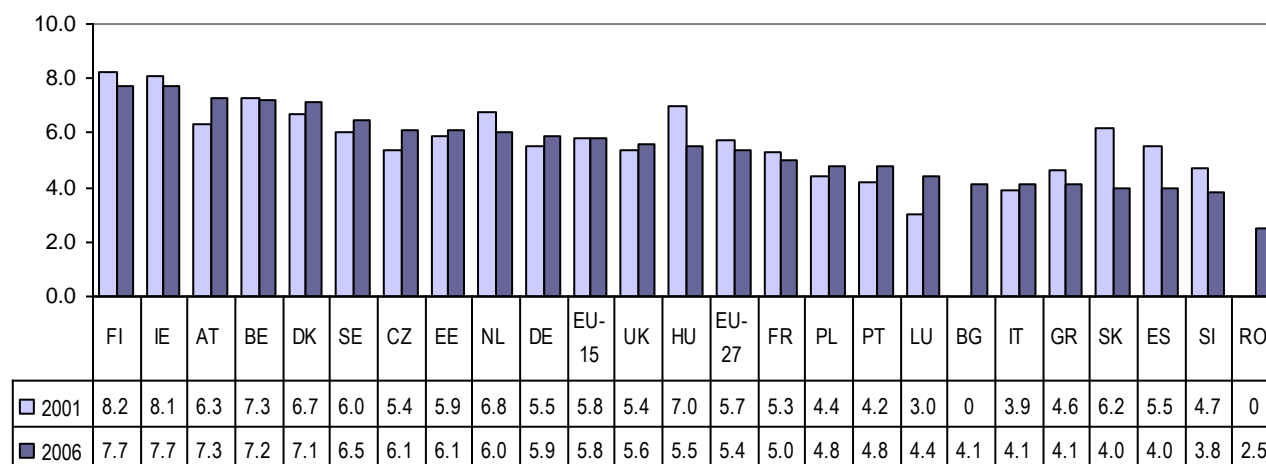
the question “How does the quality of tertiary education reflect the needs of a competitive economy” on a six-point scale, where 1 equals low quality and 6 equals high quality. The responses are converted into an average value for each country and the data are subsequently transferred onto a ten-point scale.

Figure 32 shows the assessment of tertiary education in individual countries for the years 2001 and 2006. In 2006, the Czech Republic did quite well in the international comparison. The assessed quality of tertiary education was higher than the EU-27 and EU-15 averages, and there was a significant positive shift over the year 2001. While in 2001, the country scored 5.4 points on the ten-point scale, the 2006 score was 6.1 points. This 0.7 point improvement was the third best in the EU, after Luxembourg and Austria – a positive signal for all prospective students.

On the other hand, a decrease in the assessed quality of tertiary education should be considered a warning sign for educational institutes and governments. This is particularly the case for countries with a decline of more than 1 point. i.e. Slovakia (2.2 points), Hungary and Spain (1 point).

If we compare the assessed quality of tertiary education in the countries which are the most frequent destinations for Czech citizens with the assessed quality of tertiary education in the Czech Republic we cannot reach a very positive conclusion. The assessed quality of tertiary education was significantly higher only in Austria and on a comparable level in Germany. but lower in France and Slovakia. Here we should emphasise that this is merely an orientation comparison and that other methods of assessment could reach different conclusions regarding the quality of tertiary education.

Figure 32: Quality of tertiary education in the years 2001 and 2006 (points)



Note: highest quality = 10. lowest quality = 1; EU-27, EU-15 unweighted arithmetic mean from available data; data for Cyprus, Lithuania, Latvia, Malta are not available. Source: IMD: World Competitiveness Year Book, indicator code: 4.5.08

Table 1A: ISCO 1-3 as a share of total employment (%)

	EU-27*	EU-15*	EU-12	Belgium	Bulgaria	Czech Republic	Denmark	Estonia	Finland	France	Ireland	Italy	Cyprus	Lithuania	Latvia
2000	33.4	35.5	27.8	40.8	31.2	35.8	40.6	39.9	44.9	35.6	37.6	30.7	26.4	30.7	34.6
2006	37.5	39.3	31.2	44.4	27.7	39.2	44.2	39.9	43.8	38.6	38.2	39.7	29.3	34.0	35.7

	Hungary	Malta	Germany	Netherlands	Poland	Portugal	Austria	Romania	Greece	Slovakia	Slovenia	Spain	Sweden	United Kingdom
2000	31.8	32.9	39.4	47.9	29.5	21.0	31.3	16.8	28.4	34.0	31.8	29.1	41.7	40.1
2006	34.7	36.0	41.9	47.2	32.6	25.1	37.5	21.6	33.0	35.5	38.3	30.9	44.1	42.0

Source: EUROSTAT (2007c), annual averages.

Table 2A: Human resources in science and technologies as a share of total employment in the 25-64 age group (%)

	2000	2006
EU-27	35.9	40.1
EU-15	37.8	42.1
EU-10	31.7	35.5
Austria	32.5	39.4
Bulgaria	33.1	32.1
Cyprus	36.6	40.6
Czech Republic	33.8	36.7
Denmark	43.8	50.9
Estonia	43.6	45.3
Finland	50.3	50.6
France	36.8	41.6
Germany	44.1	46.9
Greece	26.1	31.5
Hungary	31.2	33.8
Italy	30.6	35.8
Latvia	34.6	36.1
Lithuania	51.1	39.7
Luxembourg	38.2	43.9
Malta	29.5	32.3
Netherlands	46.5	49.2
Poland	28.3	34.3
Portugal	17.6	22.8
Romania	19.2	23.8
Slovakia	32.3	35.2
Slovenia	32.1	40.3
Spain	34.4	40.8
Sweden	45.9	49.1
United Kingdom	38.0	43.3

Note: The table does not include data for Belgium. Aggregates in 2006 do not include data for Ireland.

Source: EUROSTAT (2007c), averages for each year.

Table 3A: Scientists and engineers as a share of total employment in the 25-64 age group (%)

	2000	2003	2006
EU-27	5.2	5.0	5.4
EU-15	5.5	5.3	5.5
EU-12*	3.4	3.7	5.1
Austria	2.5	2.5	:
Belgium	7.8	8.7	3.4
Bulgaria	4.3	3.2	3.7
Cyprus	5.2	5.1	6.9
Czech Republic	4.0	3.6	4.6
Denmark	5.9	6.0	7.7
Estonia	4.6	3.7	5.7
Finland	9.8	7.6	:
France	4.8	5.4	3.4
Germany	6.0	6.2	5.0
Greece	4.0	3.9	4.8
Hungary	3.5	4.1	4.1
Ireland	7.3	8.5	5.5
Italy	3.0	3.0	4.5
Latvia	4.4	4.0	4.1
Lithuania	4.3	3.7	6.7
Luxembourg	5.4	3.9	6.7
Malta	4.3	3.8	6.0
Netherlands	6.4	6.5	3.3
Poland	2.9	3.6	3.5
Portugal	2.7	2.6	4.6
Romania	:	:	4.8
Slovakia	3.2	3.0	3.2
Slovenia	3.6	5.0	5.9
Spain	4.8	5.1	5.2
Sweden	6.0	6.6	7.5
United Kingdom	8.2	5.4	5.8

Note: * does not include data for Romania and Bulgaria.

Source: EUROSTAT (2007c), averages for each year.

Table 4A: Employment in high-tech manufacturing sector as a share of total employment (%)

	2003	2006
EU-27*	1.1	1.1
EU-15*	1.1	1.2
EU-12	1.0	0.8
Austria	1.6	1.3
Belgium	0.7	0.6
Bulgaria	0.5	0.5
Cyprus	0.1	0.1
Czech Republic	1.2	1.6
Denmark	1.0	0.8
Estonia	1.1	1.0
Finland	1.9	2.2
France	1.2	1.2
Germany	1.9	1.8
Greece	0.3	0.2
Hungary	2.5	2.4
Ireland	2.8	2.6
Italy	1.1	1.3
Latvia	0.2	0.2
Lithuania	0.9	0.6
Luxembourg	0.5	0.0
Malta	2.9	3.3
Netherlands	0.9	0.7
Poland	0.0	0.6
Portugal	0.3	0.4
Romania	0.5	0.3
Slovakia	1.3	1.8
Slovenia	0.9	1.1
Spain	0.5	0.5
Sweden	1.1	0.9
United Kingdom	1.2	1.0

Note: In 2003 the aggregates do not include data for Poland, in 2006 for Luxembourg. Source: EUROSTAT (2007c), averages for each year., own calculations.

Table 5A: Employment in medium high-tech manufacturing sector as a share of total employment (%)

	2003	2006
EU-27*	5.3	5.6
EU-15*	5.2	5.7
EU-12	5.4	5.2
Austria	4.5	5.5
Belgium	5.7	5.7
Bulgaria	4.4	4.3
Cyprus	1.1	0.9
Czech Republic	7.5	8.7
Denmark	5.1	5.2
Estonia	2.5	2.6
Finland	5.0	4.7
France	5.4	5.2
Germany	9.1	8.9
Greece	1.8	2.0
Hungary	5.8	5.9
Ireland	3.5	3.0
Italy	6.4	6.3
Latvia	1.8	1.6
Lithuania	2.1	1.8
Luxembourg	1.0	0.0
Malta	3.9	3.2
Netherlands	3.2	2.7
Poland	0.0	4.5
Portugal	3.0	2.8
Romania	4.9	5.2
Slovakia	6.9	7.8
Slovenia	8.2	7.6
Spain	4.5	4.1
Sweden	5.9	5.4
United Kingdom	4.9	4.5

Note: In 2003 the aggregates do not include data for Poland, in 2006 for Luxembourg. Source: EUROSTAT (2007c), averages for each year., own calculations.

Table 6A: Employment in knowledge-intensive services as a share of total employment (%)

	2003	2006
EU-27*	25.8	25.6
EU-15*	27.3	27.4
EU-12	18.2	19.2
Austria	24.4	24.4
Belgium	32.1	32.1
Bulgaria	19.1	18.5
Cyprus	22.0	22.3
Czech Republic	20.5	20.7
Denmark	37.6	37.4
Estonia	26.4	24.1
Finland	33.4	34.0
France	28.8	29.7
Germany	26.6	27.2
Greece	17.9	19.3
Hungary	22.9	23.7
Ireland	27.5	28.5
Italy	21.0	22.1
Latvia	22.0	22.3
Lithuania	22.0	22.6
Luxembourg	31.7	0.0
Malta	25.7	27.2
Netherlands	34.4	35.4
Poland	0.0	21.0
Portugal	16.4	18.2
Romania	12.1	12.4
Slovakia	21.1	21.1
Slovenia	19.6	21.0
Spain	19.2	20.1
Sweden	39.1	39.1
United Kingdom	34.0	35.7

Note: In 2003 the aggregates do not include data for Poland, in 2006 for Luxembourg.
Source: EUROSTAT (2007c), average for year 2006, own calculations.

Table 7A: Comparison of qualification of employed persons with professional requirement of their occupation in 2006 (%)

	compl.	lower ^a	higher
EU-27	65.3	25.5	9.2
EU-15	62.2	28.4	9.4
EU-12	76.5	15.2	8.4
Austria	71.7	18.6	9.7
Belgium	62.9	25.1	12.0
Bulgaria	73.4	14.3	12.2
Cyprus	65.1	18.7	16.2
Czech Republic	83.5	11.5	5.0
Denmark	72.4	19.1	8.5
Estonia	68.4	15.9	15.7
Finland	68.2	20.7	11.1
France	64.3	26.0	9.7
Germany	72.4	17.7	9.9
Greece	55.3	38.0	6.7
Hungary	80.2	14.2	5.7
Ireland	57.6	29.3	13.1
Italy	56.5	38.9	4.5
Latvia	70.8	17.3	12.0
Lithuania	72.3	12.2	15.5
Malta	46.3	52.1	1.6
Netherlands	65.6	27.0	7.4
Poland	77.6	13.5	8.9
Portugal	35.0	62.4	2.6
Romania	71.9	21.1	7.0
Slovakia	82.9	8.6	8.5
Slovenia	80.3	15.3	4.5
Spain	49.7	35.7	14.5
Sweden	73.0	19.4	7.6
United Kingdom	61.8	26.4	11.8

Note: a - „Lower“ means that the qualification of an employed person is lower than professional requirements of his occupation. „Higher“ means that the qualification of an employed person is higher than professional requirements of his occupation. The aggregates are calculated from available data (do not include Luxembourg).
Source: EUROSTAT (2007c), average for year 2006.

Table 8A: Comparison of qualification of employed persons with professional requirement of their occupation in selected countries by selected NACE branches in 2006 (%)

	NACE	complied	lower ^a	higher
EU-27	D	64.1	27.8	8.1
	E	77.0	14.4	8.6
	J	74.2	14.6	11.2
EU-15	K	73.1	16.2	10.6
	D	58.4	33.3	8.3
	E	70.5	20.0	9.5
EU-12	J	72.3	15.8	11.9
	K	72.2	17.3	10.5
	D	80.9	11.7	7.4
Austria	E	86.9	5.9	7.2
	J	86.2	6.7	7.1
	K	79.8	8.5	11.7
Czech Republic	D	70.2	17.4	12.4
	E	80.1	7.9	12.0
	J	83.1	10.2	6.7
Germany	K	75.0	12.4	12.6
	D	85.3	11.7	2.9
	E	88.6	7.9	3.5
Poland	J	84.4	13.4	2.3
	K	76.1	15.4	8.5
	D	71.9	18.2	9.8
Portugal	E	80.1	9.0	10.9
	J	79.7	10.1	10.2
	K	73.2	14.9	11.9
Sweden	D	80.7	10.3	9.1
	E	86.0	5.2	8.8
	J	86.7	6.6	6.7
United Kingdom	K	79.6	6.5	13.8
	D	37.4	61.2	1.5
	E	37.4	54.7	7.9
EU-12	J	63.7	21.9	14.4
	K	70.7	25.2	4.1
	D	68.3	25.9	5.8
EU-15	E	76.7	15.8	7.5
	J	81.3	15.5	3.2
	K	70.3	20.1	9.5

Note: The aggregates are calculated from available data (do not include Luxembourg).
Source: EUROSTAT (2007c), average for year 2006.

Table 9A: Average monthly earnings in selected European countries by education attained and their relations (EUR, %, year 2002)

	EUR					Relation of earnings (ISCED3 = 100%)			
	Total	ISCED 0-2	ISCED 3	ISCED 4	ISCED 5,6	ISCED 0-2	ISCED 3	ISCED 4	ISCED 5,6
EU-27*	1,115	823	991	1,252	1,553	81.6	100	111.7	170.3
EU-15	2,451	1,831	2,383	2,551	3,515	76.8	100	107	147.5
Bulgaria	147	114	127	160	197	90.1	100	126.3	155.4
Czech Republic	486	333	439	:	764	76	100	:	174.2
Ireland	2,641	1,966	2,267	2,464	3,160	86.7	100	108.7	139.4
Lithuania	324	224	249	264	427	89.9	100	106	171.6
Netherlands	2,456	1,842	2,313	2,713	3,443	79.6	100	117.3	148.9
Poland	578	438	541	524	873	81	100	96.8	161.3
Romania	194	125	159	215	349	78.8	100	135.3	219.9
Slovakia	996	650	857	:	1,768	75.9	100	:	206.3
Slovenia	345	213	302	:	526	70.5	100	:	174.2
United Kingdom	2,979	2,328	2,657	2,427	4,020	87.6	100	91.4	151.3

Note: 100 % = average monthly earning of employees with secondary education (ISCED 3). Does not include earnings of employees in agriculture, fishing and private households* EU-27 – unweighted arithmetic average of available data (listed countries only).
Source: EUROSTAT (2002b).

Table 10A: Average annual earnings in high-tech industries and knowledge-intensive services (EUR)

	Total manu- facturing sector	High-tech manufacturing sector	Medium high- tech manu- facturing sector	Total services	High-tech services	Market services	Financial services	Other knowledge- intensive services
Austria	33,496	40,392	35,831	31,941	36,459	35,698	45,785	:
Belgium	30,718	38,500	34,688	31,378	36,133	32,473	43,983	:
Bulgaria	1,697	1,756	1,959	1,889	2,454	1,610	4,047	1,785
Cyprus	17,169	:	15,021	23,904	25,673	26,719	27,775	:
Czech Republic	6,688	6,552	6,936	7,270	8,733	7,754	12,427	6,476
Denmark	39,809	37,818	40,664	40,740	51,351	43,545	:	:
Estonia	4,601	4,770	5,531	5,101	6,773	5,253	11,230	:
Finland	31,208	35,430	31,930	30,963	33,336	31,661	35,516	:
France	29,285	34,597	32,243	29,444	35,625	32,316	42,597	:
Germany	36,719	41,190	41,459	33,275	41,670	31,367	45,676	:
Greece	17,143	20,905	19,601	18,262	23,524	18,538	27,321	15,899
Hungary	5,683	5,732	6,829	5,777	8,518	6,184	11,621	5,252
Ireland	32,455	34,317	33,229	34,962	35,420	34,966	40,897	38,232
Italy	24,449	27,033	26,547	27,354	26,538	24,312	42,451	:
Latvia	3,401	3,031	3,658	3,626	5,725	3,707	8,571	:
Lithuania	3,842	4,639	4,730	4,061	5,238	4,459	8,235	3,551
Luxembourg	35,631	26,934	36,371	39,918	50,037	32,570	61,012	:
Netherlands	33,994	38,086	38,207	34,988	38,160	36,091	46,598	36,767
Poland	6,395	7,829	7,390	6,973	9,895	6,860	11,270	6,177
Portugal	11,314	15,189	15,457	15,911	24,112	17,774	26,910	:
Romania	1,914	2,432	2,386	2,520	3,730	2,120	6,143	2,493
Slovakia	4,958	5,316	5,918	5,367	5,325	5,834	9,733	4,588
Slovenia	10,544	10,475	12,207	13,788	17,044	12,048	20,036	16,411
Spain	21,707	25,402	25,345	21,373	28,466	18,916	37,776	22,407
Sweden	29,854	:	31,089	32,480	42,956	32,078	:	:
United Kingdom	38,207	39,782	41,782	36,661	48,191	41,162	59,495	34,246
EU-12*	6,081	5,253	6,597	7,298	9,010	7,504	11,917	5,842
EU-15*	29,733	32,541	32,296	30,643	36,799	30,898	42,771	29,510
EU-27*	19,726	21,171	21,423	20,766	25,042	21,001	28,629	14,945

Note: * unweighted arithmetic average of available data, does not include data for Malta.
Source: EUROSTAT (2002a, 2007e), own calculations.

Table 11A: Distribution of the 25-to-64-year-old population by level of earnings and educational attainment

			Level of earnings					All categories
			At or below half of the median	More than half the median but at or below the median	More than the median but at or below 1.5 times the median	More than 1.5 times the median but at or below 2.0 times the median	More than 2 times the median	
Belgium	2003	ISCED 1+2	11.4	58.9	26.2	3.1	0.5	100.0
		ISCED 3+4	5.5	52.8	33.9	6.5	1.3	100.0
		ISCED 5B	1.9	36.6	48.7	10.6	2.1	100.0
		ISCED 5A	2.8	17.2	39.2	27.5	13.3	100.0
		All levels of education	6.0	45.4	35.6	9.8	3.2	100.0
Czech Republic	2004	ISCED 1+2	16.5	66.8	14.2	1.8	0.6	100.0
		ISCED 3+4	4.7	49.5	35.0	7.6	3.2	100.0
		ISCED 5B	1.4	35.5	39.4	13.2	10.5	100.0
		ISCED 5A	0.3	10.6	39.9	21.6	27.6	100.0
		All levels of education	5.0	45.0	33.9	9.3	6.8	100.0
Denmark	2003	ISCED 1+2	45.8	23.0	24.0	5.0	2.2	100.0
		ISCED 3+4	25.0	23.1	36.0	10.3	5.6	100.0
		ISCED 5B	19.8	14.9	37.7	18.4	9.3	100.0
		ISCED 5A	17.8	13.1	35.1	18.0	15.9	100.0
		All levels of education	29.7	20.3	32.2	10.8	7.0	100.0
Finland	2003	ISCED 1+2	26.0	36.8	27.5	6.9	2.8	100.0
		ISCED 3+4	21.9	36.3	31.1	7.8	2.9	100.0
		ISCED 5B	13.9	27.5	39.5	12.1	7.0	100.0
		ISCED 5A	10.6	15.9	27.1	22.8	23.6	100.0
		All levels of education	19.1	30.9	31.1	11.3	7.6	100.0
France	2004	ISCED 1+2	17.1	52.0	23.3	5.4	2.3	100.0
		ISCED 3+4	8.2	46.9	31.9	8.6	4.4	100.0
		ISCED 5B	3.3	28.2	41.0	18.4	9.1	100.0
		ISCED 5A	4.1	16.6	32.1	20.9	26.4	100.0
		All levels of education	9.5	41.3	30.5	10.8	7.9	100.0
Germany	2004	ISCED 1+2	25.2	38.6	29.5	5.3	1.4	100.0
		ISCED 3+4	23.0	33.9	30.0	7.9	5.3	100.0
		ISCED 5B	12.7	27.8	28.7	19.3	11.5	100.0
		ISCED 5A	13.4	18.3	24.1	20.9	23.2	100.0
		All levels of education	19.7	30.0	28.2	12.0	10.2	100.0
Hungary	2004	ISCED 1+2	16.0	64.0	15.6	3.0	1.3	100.0
		ISCED 3+4	12.2	43.6	25.9	10.3	8.0	100.0
		ISCED 5B	6.8	25.4	34.2	13.9	19.6	100.0
		ISCED 5A	2.2	6.8	21.9	25.1	43.9	100.0
		All levels of education	10.7	39.3	23.1	12.2	14.7	100.0
Ireland	2002	ISCED 1+2	30.8	34.4	23.9	7.2	3.8	100.0
		ISCED 3+4	18.0	33.8	26.0	13.3	8.9	100.0
		ISCED 5B	11.7	32.0	28.7	14.9	12.6	100.0
		ISCED 5A	8.3	14.7	21.4	22.8	32.7	100.0
		All levels of education	21.5	29.8	23.9	12.8	12.0	100.0
Italy	2002	ISCED 1+2	19.5	42.3	22.2	7.5	8.5	100.0
		ISCED 3+4	10.1	35.0	29.3	10.8	14.9	100.0
		ISCED 5B	:	:	:	:	:	:
		ISCED 5A	6.8	19.9	27.4	11.8	34.1	100.0
		All levels of education	13.8	36.2	25.9	9.5	14.6	100.0

Table 11A: continuation

			Level of earnings					
			At or below half of the median	At or below half of the median	At or below half of the median	At or below half of the median	At or below half of the median	At or below half of the median
Luxembourg	2002	ISCED 1+2	12.1	60.1	21.6	4.9	1.3	100.0
		ISCED 3+4	2.3	52.2	28.0	11.7	5.8	100.0
		ISCED 5B	0.6	28.6	41.7	17.2	11.8	100.0
		ISCED 5A	0.0	14.4	36.6	24.9	24.1	100.0
		All levels of education	3.5	45.4	30.0	13.0	8.2	100.0
Netherlands	2002	ISCED 1+2	26.9	37.9	29.0	5.0	1.3	100.0
		ISCED 3+4	17.4	36.5	33.2	9.3	3.6	100.0
		ISCED 5A+5B	8.3	20.8	30.5	21.9	18.6	100.0
		All levels of education	17.4	32.6	31.3	11.6	7.1	100.0
		ISCED 1+2	17.0	54.4	21.0	5.7	1.9	100.0
Poland	2004	ISCED 3+4	8.5	44.7	29.1	10.7	7.0	100.0
		ISCED 5B	4.2	27.9	28.0	15.6	24.3	100.0
		ISCED 5A	1.2	16.6	35.6	20.8	25.8	100.0
		All levels of education	9.6	41.0	27.6	11.4	10.4	100.0
		ISCED 1+2	12.8	50.8	29.0	5.2	2.2	100.0
Spain	2004	ISCED 3+4	9.3	42.6	31.6	10.2	6.3	100.0
		ISCED 5B	7.8	43.8	30.6	10.6	7.1	100.0
		ISCED 5A	3.3	22.8	33.2	19.9	20.7	100.0
		All levels of education	9.1	41.0	30.9	10.7	8.4	100.0
		ISCED 1+2	18.0	44.4	31.3	4.7	1.6	100.0
Sweden	2003	ISCED 3+4	11.0	42.2	34.8	8.0	4.1	100.0
		ISCED 5B	12.4	31.3	39.6	11.7	4.9	100.0
		ISCED 5A	10.1	20.4	36.6	15.9	16.9	100.0
		All levels of education	12.5	37.5	34.8	9.2	6.1	100.0
		ISCED 1+2	37.9	44.7	13.3	2.7	1.4	100.0
United Kingdom	2004	ISCED 3+4	21.4	37.4	25.5	9.4	6.3	100.0
		ISCED 5B	12.3	30.2	28.8	16.9	11.9	100.0
		ISCED 5A	6.1	15.9	24.9	23.9	29.1	100.0
		All levels of education	18.6	32.6	24.3	12.9	11.7	100.0

Note: (:) data are not available.

Source: OECD (2006a).

Table 12A: Average monthly earnings in major ISCO groups by education attained

	2002				2006				Average growth rate (%)			
	1	2	3	4-9	1	2	3	4-9	1	2	3	4-9
TOTAL	40,058	27,431	19,985	15,168	50,242	31,653	25,845	17,855	5.8	3.6	6.6	4.2
Primary or lower secondary (ISCED 0-2)	19,724	17,519	17,237	12,991	26,448	25,111	22,029	15,026	7.6	9.4	6.3	3.7
Upper secondary with apprenticeship certificate (ISCED 3c)	18,071	16,771	17,732	15,277	23,596	25,351	23,868	17,975	6.9	10.9	7.7	4.1
Upper secondary and post-secondary with school leaving certificate (ISCED 3A,4)	30,055	22,348	19,118	16,296	37,411	27,480	24,606	19,333	5.6	5.3	6.5	4.4
Tertiary non-university + Bachelor (ISCED 5B,5A)	39,620	22,930	19,094	17,871	46,414	27,330	25,796	20,925	4.0	4.5	7.8	4.0
Master and advanced research programmes (ISCED 5A,6)	53,978	30,046	26,879	20,329	70,057	34,791	34,766	24,663	6.7	3.7	6.6	5.0

Note: Average monthly earnings in CZK. Includes employees with 30 or more weekly working hours. Source: ČSÚ (2003a, 2007a).

Table 13A: Foreign students at tertiary education institutions (ISCED 5-6)

	1998	1999	2000	2001	2002	2003	2004
Australia	109,437	117,485	105,764	120,987	179,619	188,160	199,284
Austria	28,447	29,819	30,382	31,682	28,452	31,101	33,707
Belgium	:	36,137	38,799	38,150	40,354	41,856	37,091
Canada	32,890	35,543	40,033	:	:	:	112,816
Czech Republic	4,074	4,583	5,698	7,750	9,753	12,474	14,923
Denmark	11,022	12,321	12,871	12,547	14,480	18,120	17,160
Finland	4,331	4,847	5,570	6,288	6,760	7,361	7,915
France	148,000	130,952	137,085	147,402	165,437	221,567	:
Germany	171,150	178,195	187,032	199,132	219,039	240,619	260,314
Greece	:	:	:	:	:	12,456	:
Hungary	6,636	8,869	9,904	11,242	11,783	12,226	12,913
Ireland	6,904	7,183	7,413	8,207	9,206	10,201	:
Island	194	207	403	421	472	580	489
Italy	23,206	23,496	24,929	29,228	28,447	36,137	40,641
Japan	35,700	56,552	59,691	63,637	74,892	86,505	117,903
Korea	2,538	2,869	3,373	3,850	4,956	7,843	10,778
Luxembourg	559	652	:	:	:	:	:
Netherlands	..	13,619	14,012	16,589	18,888	20,531	21,259
New Zealand	5,912	6,900	8,210	11,069	17,709	26,359	68,904
Norway	5,790	9,004	6,990	8,834	7,679	8,247	9,683
Poland	5,443	5,693	6,126	6,659	7,401	7,617	8,118
Portugal	:	:	11,177	:	:	15,483	16,155
Slovakia	:	1,599	1,570	1,690	1,643	1,651	1,640
Spain	29,000	32,954	40,689	39,944	44,860	53,639	41,734
Sweden	12,579	19,567	20,805	26,304	22,859	25,523	36,458
Switzerland	24,344	25,258	26,003	27,765	29,301	32,847	35,705
Turkey	18,662	19,816	17,654	16,656	16,328	15,719	15,298
United Kingdom	209,550	209,513	222,936	225,722	227,273	255,233	364,271
USA	430,786	451,934	475,169	475,169	582,992	586,316	572,509

Note: (:) data are not available.
Source: OECD (2007b).

Table 14A: Foreign students of tertiary education (ISCED 5-6) from EU-27, EEA and candidate countries (thousands)

	1998	1999	2000	2001	2002	2003	2004	2005
EU-27	327.5	381.1	371.0	388.0	395.1	425.3	446.4	450.7
EU-25	316.0	369.8	360.7	378.4	387.4	417.5	438.3	442.4
Austria	20.7	22.0	23.3	24.2	22.2	24.0	25.7	25.1 ⁱ
Belgium	:	21.0 ⁱ	22.5 ⁱ	22.6 ⁱ	23.7 ⁱ	22.2 ⁱ	26.1 ⁱ	6.4
Bulharsko	6.0	6.2	6.0	6.2	4.9	5.8	6.2	11.8
Cyprus	:	0.3	0.3	0.4	0.4	0.5	0.5	8.7
Czech Republic	2.2	2.4	3.1	4.8	6.0	8.0	8.9	:
Denmark	4.4	4.9	4.7	5.2	5.6	6.7	7.3	3.1
Estonia	0.6	0.7	0.7	0.5	0.3	0.8	0.6	42.9
Finland	1.8	1.8	2.2	2.5	2.6	2.8	2.9	0.2
France	35.6	36.6	38.0	38.1	38.5	46.5	46.4	:
Germany	93.6	97.5	101.0 ⁱ	105.9 ⁱ	113.5 ⁱ	119.8 ⁱ	125.4 ⁱ	0.3
Greece	:	:	:	:	7.4	10.6	12.0	16.3
Hungary	3.8	4.1	:	7.1	7.5	7.9	8.2	0.6
Chorvatsko	:	:	:	:	:	0.2	0.2	0.2
Ireland	3.5 ⁱ	3.4 ⁱ	3.8 ⁱ	4.2 ⁱ	4.1 ⁱ	4.3 ⁱ	4.8	0.3
Island	0.1	0.2	0.3	0.3	0.4	0.4	0.3	1.0
Italy	15.7	13.2	12.2	14.0	13.1	15.6	16.6	:
Latvia	0.1	0.1	0.4	0.5	0.6	0.7	0.7	8.7
Lichtenštejnsko	:	:	:	:	:	:	:	0.1
Lithuania	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2
Luxembourg	0.5	0.6	0.6	:	:	:	:	121.6 ⁱ
Makedonie	0.1	0.1	0.1	0.1	0.1	0.0	0.1	18.5
Malta	:	0.1	0.1	0.1	0.2	0.1	0.1	5.1
Netherlands	:	7.5	7.8	9.5	11.0	11.9	12.3	2.6
Norway	2.9	3.1	3.8	4.1	4.3	4.5	4.9	2.8
Poland	1.7	1.8	1.9	2.1	2.2	2.2	2.2	25.8
Portugal	:	:	2.2	2.6	:	2.7	2.7	1.9
Romania	5.5 ⁱ	5.1 ⁱ	4.3 ⁱ	3.4 ⁱ	2.8 ⁱ	2.0	1.9	13.1
Slovakia	:	:	0.7	0.8	0.7	0.7	0.8	0.8
Slovenia	0.3 ⁱ	0.3 ⁱ	0.4 ⁱ	0.5 ⁱ	0.6 ⁱ	0.6 ⁱ	0.7 ⁱ	0.8 ⁱ
Spain	17.4	19.2	7.0	7.2	7.4	8.3	10.9	12.3
Sweden	7.7	13.2	14.2	14.9	15.9	17.4	18.7	18.8
Turkey	:	2.2	5.6	5.3	2.8	2.8	2.9	2.9
United Kingdom	106.3	119.2	113.4	110.6	103.6	103.0	103.6	106.5

Note: (:) data are not available; (i) data for ISCED 6 students is missing.
Source: EUROSTAT (2007a).

Table 15A: Mobility in the tertiary education (2006)

	Mobility should be an obligatory part in the curriculum					
	for all students			for doctoral candidates		
	yes	no	NA	yes	no	NA
EU-27	57.7	37.5	4.8	65.2	27.2	7.6
EU-15	55.5	40.3	4.2	62.1	30.3	7.6
EU-12	67.6	25.2	7.3	79.1	13.5	7.4
Austria	65.0	32.5	2.5	67.5	30.5	2.0
Belgium	44.8	45.4	9.9	57.7	26.6	15.8
Bulgaria	80.3	17.3	2.4	86.0	11.5	2.4
Croatia	68.9	29.7	1.4	90.6	8.0	1.4
Cyprus	48.0	50.0	2.0	50.0	46.0	4.0
Czech Republic	83.5	16.0	0.5	93.5	5.5	1.0
Denmark	70.1	27.0	2.9	65.2	12.3	22.5
Estonia	45.1	53.0	2.0	68.6	28.4	2.9
Finland	48.0	49.5	2.5	63.2	30.9	5.9
France	78.8	20.4	0.8	71.2	17.2	11.6
Germany	48.0	50.8	1.2	57.1	38.4	4.4
Greece	51.8	42.9	5.4	75.0	16.1	8.9
Hungary	64.7	27.4	8.0	76.7	13.9	9.5
Ireland	42.6	52.0	5.4	52.9	41.6	5.4
Italy	77.8	20.7	1.6	86.5	9.9	3.6
Latvia	76.0	21.0	3.0	85.0	9.0	6.0
Lithuania	58.0	34.0	8.0	76.0	15.5	8.5
Lucembourg	64.7	33.3	2.0	56.9	37.3	5.9
Malta	58.8	33.4	7.8	82.3	13.8	3.9
Netherlands	37.7	55.4	6.9	42.3	48.1	9.6
Poland	62.6	25.7	11.7	75.9	12.8	11.3
Portugal	60.0	36.1	3.9	71.7	25.1	3.1
Romania	74.0	22.8	3.1	78.7	18.1	3.1
Slovakia	75.0	20.5	4.5	88.0	8.5	3.5
Slovenia	69.0	27.0	4.0	84.0	13.0	3.0
Spain	62.7	35.1	2.3	75.1	24.2	0.8
Sweden	36.5	58.8	4.6	60.8	36.1	3.1
United Kingdom	28.4	52.4	19.2	28.8	52.0	19.2

Note: KN/NA /did not replay.

Source: EC EUROBAROMETER (2007).

Table 16A: Students with Czech citizenship studying abroad

	1998	1999	2000	2001	2002	2003	2004
EU-27	2,165	2,750	3,234	3,780	4,317	4,990	5,390
EU-25	2,165	2,746	3,231	3,776	4,313	4,983	5,375
Austria	223	341	329	393	396	439	500
Belgium	:	33	41	29	45	56	71
Bulgaria	0	4	3	4	4	7	5
Croatia	:	:	:	:	:	0	1
Cyprus	:	:	:	0	0	4	5
Denmark	5	8	9	9	22	22	24
Estonia	0	1	1	0	0	0	0
Finland	10	12	16	25	41	47	46
France	207	250	330	371	448	585	662
Germany	1,082	1,235	1,391	1,714	2,059	2,337	2,483
Greece	:	0	:	0	6	7	6
Hungary	17	26	:	6	16	23	15
Ireland	3	2	6	17	21	21	26
Island	0	0	5	4	4	6	7
Italy	87	76	67	104	99	136	152
Japan	20	16	22	33	28	32	37
Latvia	1	0	0	5	6	4	4
Lithuania	:	-	-	-	-	-	3
Malta	:	4	2	1	0	0	0
Netherlands	:	26	33	44	56	60	55
Norway	14	14	17	30	35	36	40
Poland	250	251	265	229	229	242	208
Portugal	0	0	1	0	:	7	0
Romania	-	-	-	0	0	-	10
Slovakia	:	:	287	287	305	316	443
Slovenia	0	4	2	8	5	6	1
Spain	17	80	78	20	25	46	69
Sweden	13	98	91	102	137	190	243
Switzerland	:	:	:	:	137	164	185
Turkey	:	0	0	0	0	0	1
United Kingdom	250	299	282	412	397	435	359
USA	688	842	869	964	1,163	1,180	:

Note: (:) data are not available.

Source: EUROSTAT (2007d).

Conclusion

The quality of human resources as a factor of an economy's competitiveness was studied in two basic sections respecting the division of previous yearbooks – lifelong learning and human resources for the knowledge economy. Each of these two sections features selected sub-topics that update findings from prior research with new information. The selected sub-topics thus represent only part of the issue at hand.

Lifelong learning

Employability for one's entire productive life increasingly requires supplementing and deepening one's qualifications or changing the qualifications gained during one's initial education. The significance of continuing education is growing along with the increased speed of technological progress, since knowledge acquired during one's initial education may become outdated – an even greater threat with the continued rise in retirement age. In the Czech Republic, the adult population (aged 25-64) participates in formal and non-formal education significantly less than in economically advanced countries: In 2006, 6% of all adults participated in education, i.e. it was about half the EU-15 average and two thirds the EU-27 average.

Participation in education differs significantly by position on the labour market. In the Czech Republic, employed people participate more frequently in education than the unemployed, although both groups participate less than the EU-27 average. According to the Labour Force Survey data, the EU-27 average for 2006 was 11% of employed and 8% of unemployed people, while the Czech figures are a mere 6% and 3%, respectively. The unemployed had a higher rate of participation than employed individuals in ten EU-27 countries – a group which included both economically advanced countries (Denmark) as well as less advanced countries (Latvia). These countries pay close attention to re-training, advisory systems and effective tools for encouraging the unemployed to participate in education.

In all EU-27 countries, women participated in education more than men, regardless of their position on the labour market. In the Czech Republic, 8% of employed women and 6% of employed men participated in education; for the unemployed, the figures were 5% of women but only 2% of men. Participation in education also differs significantly by a particular profession's demands on qualifications. In all EU-27 countries, persons in demanding professions participated in education more frequently than those in less demanding professions – the EU-27 average for 2006 was 15% of persons in demanding professions, but only 6% of persons in less demanding professions. The difference was even more dramatic in the Czech Republic, almost fourfold (12% vs. 3%).

Participation in non-formal education is significantly related to level of formal education. In the EU-27 in 2006, persons with primary or lower secondary education (ISCED 0-2) participated at around one half the level of persons with upper secondary education (ISCED 3), whose rate of participation was one half that of people with tertiary education (ISCED 5-6). In the Czech Republic, the differences between the different educational categories were even more pronounced (0.6%, 3.3% and 13.8%). This means that the negative approach to education ingrained in persons with a low level of initial

education has not been effectively overcome. It has disfavoured implications to their competitiveness on the labour market.

The fact that the various social groups of the adult population have different participation in continuing education reflects a certain imbalance in access to this education. From the point of view of employability and the ability to succeed on the labour market, particularly at risk are those people who do not participate in any education. According to a survey of individuals conducted by the National Observatory of Employment and Training in 2005, this includes: three fourths of people older than 55; 80% of people with primary or lower secondary education (ISCED 0-2); 70% of people with upper secondary education with apprenticeship certificate (ISCED 3C); three fourths of people with a net personal income of less than CZK 10,000; two thirds of operational workers; three fourths of skilled and unskilled blue-collar workers; two thirds of the unemployed; three fourths of stay-at-home mothers; two thirds of people living in towns with fewer than 5,000 inhabitants. We may thus summarise that the typical non-participant in education is someone who faces barriers to access to continuing education, has achieved only primary or lower secondary education, is aged 55-64, has an income of less than CZK 10,000, is not economically active and lives in a town with fewer than 5,000 inhabitants.

Reasons why people do not participate in continuing education are most commonly related to their attitudes and motivation (the feeling that one's education is sufficient or that continuing education will not have the desired effects), to high financial costs and lack of time. A factor analysis revealed that people who do not participate in education can be divided into two basic groups: (1) those who are interested in continuing education but who cannot realise this interest due to "actual barriers" (external barriers related to offer); (2) those who are not interested in continuing education due to their attitudes or personal situation.

1) **The group aspiring to continuing education** is characterised by the fact that they consider their education to be insufficient, are not satisfied with it, and are interested in continuing education. They sense so-called objective (actual) barriers existing in the world outside of them. These are primarily high prices of educational courses, insufficient information on education opportunities and insufficient supply of training courses.

This group includes clerks, lower professionals and people aged 35-44. These barriers also affect people with upper secondary education with school-leaving certificate ("Maturita") (ISCED 3A), people with average income (CZK 10,000-15,000) and people living in towns with fewer than 5,000 inhabitants (who consider the main barrier to be poor transport connections); women also state that they are affected by these barriers more frequently than men. These social groups require approaches with a focus on financial support, better access to information and counselling services. This group also includes the unemployed, although for many unemployed persons these barriers are accompanied by their having given up on continuing education (see below).

2) The group of people who are **not interested in continuing education** can be divided into three subgroups:

Subgroup 2.1 is those who have **given up on continuing education**. Under certain circumstances, this group would like to receive education, but they do not believe that education can offer any usefulness. On the other hand, they do not trust themselves to manage such education. They have had overwhelmingly negative experiences with education, do not enjoy learning and find education too demanding. In addition to the unemployed, this group also includes skilled and unskilled blue-collar workers. These people are often found on the secondary labour market, frequently change employment and have low incomes. Their current level of education offers only little way out of this situation.

Subgroup 2.2 **cannot participate** in continuing education, usually because of lack of time and the need to care for the family. This group would like to participate in continuing education and considers its education to be insufficient. Actual barriers do not play too great a role in their inability to participate, but they cannot find the time for learning. Although this reason is found more among women, it is also common for the younger age group (25-34) in general. This is the period in which people are starting their families and are caring for young children, which is the most demanding time in terms of the family's financial security. The group of people who cannot participate in education because of lack of time also includes entrepreneurs with employees, higher professionals and clerks, for whom the lack of time is the result of long working hours and work-related duties.

Subgroup 2.3 **does not require education** because they consider their education to be sufficient. This group generally feels no actual barriers to access to education, but also has no interest in education since its members consider their education to be sufficient. This group includes managers, higher professionals and tertiary educated people. We should add that these attitudes are found only among the around 30% of respondents from these groups who are not participating in education. Otherwise, these groups have the highest level of participation in continuing education (more than 70%).

An analysis of the survey of individuals revealed that, in addition to actual barriers related to finances, balancing one's working and family life, the quality of available education courses, and guidance services, a large problem is unwillingness to participate in continuing education. This unwillingness can result both from a self-complacency as well as resignation. Combined with real barriers, the population's negative attitudes thus create a vicious circle for which the Czech policy should find an effective escape as soon as possible in order to avoid a situation in which the only thing the Czech Republic has to offer is a low-cost workforce.

Rapidly changing demands for knowledge and skills have made **the development of human resources and training in companies** an absolute necessity. Companies cannot rely solely on the labour market and must develop certain activities on their own – both for newly hired workers as well as for existing employees. In 2006, companies' willingness in the Czech Republic to invest in training and employee development was at the same level as the EU-27 average. A comparison with the advanced EU countries is not as favourable, however.

According to a survey by the World Economic Forum, in 2006 the willingness of companies in the Czech Republic to invest in developing employees' qualifications was 4.7 points, while Sweden and Denmark had 5.9 points out of a total 7 points.

Innovating companies in the Czech Republic are more aware of the importance of human resources than non-innovating companies. Some 8.4% of innovating companies listed human resources as a limiting factor which highly influences their development, while this figure was only 6.1% among non-innovating companies. The influence of a shortage of qualified employees on a company's innovating activities is felt strongest by medium-sized innovating companies; least affected are small companies with no more than 49 employees.

When innovating companies in the Czech Republic are not able to find new employees with the proper skills, 85% of them provide for employee development through courses and/or self-learning, i.e., access to the internet, professional resources, participation in conferences. They most frequently make use of courses provided by external agencies (48% of companies), followed by in-house courses (47%) and self-learning (36%). Large innovating companies are the most active in training new employees: only 4% of companies with more than 250 employees do not focus on this issue. On the other hand 32% of companies with 49 or fewer employees do not pay attention to this issue. Companies which do not care of new employees are either able to hire workers with the required level of qualifications or rely on the workers' own initiative in supplementing missing knowledge and skills.

In innovating companies, the primary focus of employee training through professional courses was on technicians, followed by professionals. Workers in unskilled positions and managers and senior officials received the least amount of courses. Companies prefer to train employees in-house instead of outside the company. Even though almost one third of innovating companies (31%) are part of a group or network of companies, only a relatively small proportion of companies take advantage of this fact in educating their employees. Depending on employee category, some 12-18% of companies make use of this possibility. In view, of among other things, public funding for network activities, we may expect this type of education to continue to develop among companies. Currently, it is most focused on managers and senior officials (ISCO 1).

Roughly one third of innovating companies which educate their employees do not inspect the quality of education. The quality of education is most frequently inspected by large companies (82%) and strategic innovating companies (76.1%). Small companies (42%) and adoptive innovating companies (42.5%) focus least on this activity.

From the point of view of expected future development in the intensity of training, almost 86% of innovating companies anticipate further growth, while about 14% anticipate a reduction in education activities. The reason for this negative trend is apparently unfulfilled expectations from training or poor experiences with the quality of training, resulting in the conviction that train-

ing represents an inefficient expenditure of resources and a waste of valuable employee's working time.

Human resources for the knowledge economy

The **occupation and qualification structure** of knowledge-intensive segments of the economy is a significant factor in competitiveness. Thanks to the dynamic growth in the share of jobs in the high demanding ISCO occupation categories – 1 (legislators, managers and senior officials), 2 (professionals) and 3 (technicians and associate professionals) – the Czech Republic's economy is developing at an average rate and is in tenth place in the EU in terms of this group's share of total employment. In recent years, there has been an increase in new jobs in these groups, most often however in NACE 31 (manufacture of electrical machinery) and 34 (manufacture of motor vehicles), which usually do not require tertiary education.

A closer look at employment in ISCO 1, 2 and 3 further shows that a significant weak point of the Czech economy is the low share of workers in research and development (represented in particular by ISCO 21 - physical, mathematical and engineering science professionals and ISCO 22 – life science and health professionals). In an international comparison of this category, the Czech economy lags significantly behind high-tech oriented countries. The Czech figure for 2006 (3.7%) is significantly lower than the average for the new member states (5.1%), and is the sixth lowest for the EU-27. What is more, this group's share of total employment in the Czech Republic showed a decline in the period under review.

The Czech Republic has been able to maintain a relatively high level of employment in medium demanding occupations (ISCO 4-8), most of which require apprenticeship certificate (ISCED 3C) or school-leaving examination ("maturita") (ISCED 3A). These categories' share of the total number of employees in the economy is relatively high in comparison to other EU member states (eighth highest in the EU), a situation which is significantly influenced by the high number of employees in manufacturing. The Czech manufacturing industry creates more than 28% of all jobs in the economy, while the EU average is a mere 18%. High growth of employment was especially in ISCO 8 (Plant and machine operators and assemblers), where we see the influence of investments into sectors such as the automotive industry and electronics industry.

The share of workers in jobs not requiring any specialised qualifications (i.e. workers in ISCO 9 – elementary occupations) is relatively low, reaching a mere 5.6% in 2006. In the period under review, there was a significant decline in this figure, in particular as a result of the technological modernisation of industry, restructuring of the economy and related growth in professional demands.

Thanks to the improved qualitative structure of investments in the Czech Republic, the share of employees in high-tech manufacturing sectors has been on the rise. The coming years should see the further growth in qualitative demands of investment projects, which should promote increased employment in the high-tech industries and knowledge-intensive services.

The Czech service sector has begun to show a lack of qualified workers for so-called "high-tech services" and for the ICT sector. In 2006, this sector's share of total employment in the Czech Republic was 3.6%, which is above the EU average. Further growth, however, is

threatened by the excess of demand over supply for these workers. From the point of view of the balanced development of a knowledge society, we must consider one weak point of the Czech Republic its low share of workers in "other knowledge-intensive services" (14.7%), which includes education, healthcare, social work, culture, etc. In the advanced Nordic economies, for instance, this category's share of total employment is almost double.

In term of compliance between employees' qualifications and the requirements of the work they are performing, the Czech Republic fared very well. Its level of compliance (84%) is the highest in the EU. This result has two weak sides, however – compared to the EU-15 countries, the level of compliance declines significantly for workers older than 65, who tend to perform work that is below their level of qualification. This means that, in the Czech Republic, older workers' experiences and qualification potential are not being fully used. Another negative factor is the relatively high lack of compliance between required and actual level of education in knowledge-intensive sectors of the economy (particularly services). Here, employees are more likely to have insufficient qualifications for their work, which negatively influences work productivity and competitiveness.

Wage relations are an important factor in assessing the level to which higher levels of qualification and education are rewarded. It is also important to assess how they reflect a particular level of knowledge and technology intensity of individual professions and sectors of economy.

An international comparison shows that, on average across the EU, the gap between the wages of medium and highly qualified workers is around 50% and between the medium and lowest level is around 20%. New EU members recorded greater differences in wages among the various qualification categories than the EU-15 countries. In the new member states, people with tertiary education had a much better wage position than in the EU-15 countries. The Czech Republic has one of the greatest differences in wage levels in relation to education, even when compared to other new members – here, tertiary education clearly results in a higher level of wage premium than in other European countries. This testifies to a certain imbalance on the labour market and a high demand for tertiary-educated specialists which still has not been completely satisfied. In addition to people with a master's degree, other groups that are beginning to see better wage premium are people with a bachelor's degree or graduates of tertiary professional schools. These relatively new educational categories have recently confirmed their position on the labour market and are increasingly in demand by employers, as reflected in the above-average growth in wages.

The direct relation between increased level of education and higher wages applies as a general rule for working people as a whole. The extent to which wages rise in relation to education is not necessarily the same in all cases, however. The wage range in which individuals with the same level of education can have different wages is influenced by many factors, including the individual's personal characteristics and institutional factors. The wage range is the greatest in groups with the lowest and the highest educational level, i.e. people with primary or lower secondary education (ISCED 0-2) and people with tertiary education (ISCED 5,6).

Although some persons with primary or lower secondary education are found in the highest income category, most such people's income is significantly below the median. The same, only in the reverse, applies to people with tertiary education. As in most EU countries, these fundamental wage relations are also found in the Czech Republic, although here employees with low qualification level are not shifted as much towards lower wages. In fact, if we look at income differentiation among persons with university education (ISCED 5A), the Czech Republic shows a significant shift towards higher income brackets. In the Czech Republic, almost nobody with university education earns a low income. This indicates that in the Czech Republic tertiary educated people find a suitable job easier than in many EU-15 countries and have relatively more favourable entry-level wages.

Average EU wages in high-tech manufacturing are roughly 9% higher than in manufacturing as a whole. A similar situation is found in medium high-tech manufacturing. In fact, in some countries the average wage for workers in medium high-tech manufacturing is higher than in high-tech fields. This applies in particular for the new member states including the Czech Republic. Among other things, this reflects the fact that the lower stages of high-tech manufacturing are located in these countries which is also reflected in lower incomes.

In knowledge-intensive services, the Czech Republic shows a certain overrate of work in financial services and underrate in other knowledge-intensive services such as education, health and social work, and cultural services. Wages for these activities, which are for the most part financed from public sources, are below the average for services in all countries, but in the Czech Republic this difference is more distinct than in the EU-15 or EU-12 countries. Compared to other services, wage premium for market services for companies is relatively higher in the Czech Republic than it is the same relation in most EU countries. The wage position of high-tech services in the Czech Republic roughly corresponds to the EU average for this sector.

From the wage relations point of view, it is important to analyse the wage position held by workers in highly specialised and demanding jobs. An analysis of the ČSÚ data clearly shows that wage relations are unambiguously tilted in favour of workers in class ISCO 1. Premium for demanding work performed by professionals (ISCO 2) and technicians (ISCO 3) is significantly lower. The development of wage relations indicates that wages do not equally reflect the qualification intensity of work in the individual occupation categories. It is clear that significantly higher wages at a comparable level of education are earned by workers in managerial positions. This is understandable in view of higher time demands, the higher level of stress and higher requirements for organisational and other skills required to perform managerial activities, in particular at top levels of management. There

still remains the question, however, of higher wages in this category as compared to wages in highly demanding scientific and professional occupations.

An important factor influencing the capability of people who should be employed in demanding occupations is the quality of education they received at higher education institutions. An increasingly important role in strengthening the quality of higher education institutions is the globalisation **of education**. This process is influenced by many interrelated factors which increase the mobility of students, instructors and curricula. The globalisation of tertiary education is promoted by international and national initiatives for the financial support of mobility, the removal of barriers to mobility and the strengthening of the competitiveness of the tertiary education system. This process, however, is accompanied by certain fears regarding the outflow of the most talented students and top academic professionals. This brain-drain is a particular threat for the less developed EU members, but affects the entire EU, which competes in particular with the United States for top students and professors. In the Czech Republic, the share of students studying abroad was less than one percent in 2004. The number of foreign students studying in the Czech Republic is greater than the number of Czechs studying abroad.

The number of **foreign students** at Czech higher education institutions continues to increase. In 1995, a total 3,285 foreign students studied all forms of studies at all types of tertiary education programmes; by 2006, this number was 24,641 students. The number of foreign students as a share of the total number of students thus increased from 2.2% to 7.6%. The most numerous group of foreign students – roughly two thirds – is from Slovakia. In 2006, foreign students who paid for their own education represented about 8% of all foreign students. The rest take advantage of opportunities for studying free of charge by passing entrance exams in Czech or Slovak, or by making use of reciprocal scholarships. Foreign students study practically all educational fields offered by higher education institutions in the Czech Republic. In 2006, the greatest foreign students' interest was in healthcare, medicine and pharmacy (22.7%), economics (20.9%) and technical sciences (20.7%).

Although the number of Czech citizens **studying abroad** has been increasing each year, the interest in studying abroad continues to significantly exceed available scholarships. In 2004, there were almost 5,400 Czechs studying in the EU-27 countries – more than twice the number in 1998. Almost one half are studying at higher education institutions in Germany. Process of globalisation of Czech higher education institutions is still at a very beginning stage. The supply of education programmes in other languages than Czech is very limited which hampers student exchange. The opportunities for Czech students to study abroad are insufficient.

Challenges for the Czech Republic

The increased speed of scientific and technological progress and the application of research results in practice is accompanied by an increase in the importance of **lifelong learning**. Knowledge and skills gained during one's initial education become more quickly outdated and not even long-term practical experience can replace the need for continuing education. The importance of continuing education also increases with the increase in retirement age. In an international comparison, the Czech population aged 25-64 participates in further education to a significantly lesser degree than the EU average. It is highly unlikely that the country will meet the goal set by the Lisbon strategy: that by 2010, 12.5% of this age group will participate in further education. This would require doubling the 2006 level of participation within four years.

Participation in continuing education is positively influenced by an individual's initial level of education. People in the Czech Republic who have completed tertiary education participate in continuing education to a greater extent than the EU average, while persons with a lower level of education do so significantly less. Compared to other countries, the Czech Republic has been unsuccessful in changing the negative approach to education gained by some people during initial education. Change is only possible on the long-term horizon, since it requires expanding more active forms of initial and continuing education and individualising education.

From the short-term perspective, it is possible to remove partial **barriers to participation in education**. One such barrier is insufficient access to education or poor orientation in the available offer of continuing education. It is absolutely necessary to increase not only accessibility and improve information regarding the educational offer, but also to provide free individual advisory services for people who are not able to orient themselves in information systems and/or cannot decide on the focus or form of education which most suits their individual possibilities and capabilities. Financial support – for instance in the form of educational vouchers – can be important in overcoming financial barriers.

Also important is the development and implementation of specific educational methods which do not remind participants of school and which are not implemented in a school environment. For a certain part of the population, these factors represent a decisive and insurmountable barrier. Adults should also be able to apply their current skills in the educational process in order to get a tangible sense of the meaning and purpose of their new knowledge. Although the available educational offer, especially in larger towns, is beginning to properly reflect the needs of specific groups of clients, this offer still needs to be expanded in order to increase people's motivation for participating in education. Even if education does not lead to immediate success, e.g. in the form of getting job, it can help the unemployed people gain important knowledge necessary for at least remaining employable and avoiding social exclusion.

A frequently mentioned barrier is lack of time. Although this barrier may frequently be a so-called "substitute" barrier hiding an aversion to learning, for certain groups of people this reason should be taken seriously, in particular parents of small children, who spend a lot of time caring for their families. It is thus important to continue to

develop support services for families which are financially accessible to various income categories. Also important are childcare during education and family-oriented policies that allow individuals to balance working and family life. No less important is a special educational offer geared towards women who are returning to work after raising their children or are looking for a new place on the labour market. Promoting this group's participation in continuing education thus cannot be limited to partial measures in the area of education, but requires a comprehensive family, social and educational policy.

For people who do not have time because of job requirements (entrepreneurs, professionals), an important factor is that they need to be substituted while attending further education. Problems may arise in extremely small companies, where even a short period of absence of certain workers can threaten the company's smooth operation. For such companies, another problem may be the financial affordability of training. These companies should be offered certain financial support and products adapted to their educational needs, including independent learning.

Surveys have shown that there is relatively little awareness in the Czech Republic regarding the need and advantages of updating and expanding one's education. A large part of the population does not feel any need for continuing education and considers its current education to be satisfactory. This situation calls for a good educational campaign targeted at this segment of the population. The previously described activities should be implemented as well (improved educational offer, advisory services). Considering the fact that the pre-retirement age group in particular is very sceptical towards the importance of continuing education in remaining competitiveness on the labour market, activities should focus on employers as well. Many employers suffer from some prejudices towards hiring and training older workers.

A significant part of continuing education is provided by companies. **Training in companies** is significantly influenced by the situation on the labour market, i.e. whether companies are able to find a qualified workforce, the extent of innovations requiring the retraining of a certain segment of employees, and a legislative environment which either directly or indirectly forces companies to educate their employees. Companies' willingness in the Czech Republic to invest into employee development was found to be more positive than the EU-27 average, but below the average for the more advanced EU countries. The situation is positively influenced by foreign investors who introduce approaches to the development of human resources commonly found in parent companies, as well as by the increased number of large companies with more training possibilities than small companies.

Innovating companies' approach to training depends on the type of innovating company. Also, companies do not provide training to the same extent to all employee categories and do not pay sufficient attention to evaluating the quality and benefits of education. Competition and the benefits companies receive from training – even if difficult to quantify – will most likely lead companies to provide an almost optimum form and content of education.

In the Czech Republic, **human resources for the knowledge economy** are characterised by very good availabil-

ity of workers with secondary education. However, the Czech Republic lags behind the EU average in the number of professionals as a share of total employment.

The employment structure in knowledge-intensive sectors and professions shows that, despite much improvement, the Czech Republic continues to be more a manufacturing economy than a knowledge economy. High-tech manufacturing sectors exceed the EU average in their share of employment, but this is primarily the result of the rapid growth of new jobs in computer manufacture (NACE 30), which is rather an assembly sector with a low number of specialised professions as a share of total employment. It is still necessary to increase the number of investment projects that will help to create a higher number of qualified jobs and increase companies' potential for research and innovation.

On the other hand, the Czech Republic lacks qualified workers for many knowledge service sectors, high-tech sectors and the entire ICT sector. The gap between the demand of the labour market and the supply provided by the educational system continues to increase. Schools and employers thus need to work closely together to correlate employer requirements with the structure and content of curricula while at the same time increasing the attractiveness of professions that are indispensable to the development of the knowledge economy. It is also necessary to increase the Czech economy's competitiveness on the international labour market, to find the missing specialists in other developing countries in Central and Eastern Europe and to create the proper conditions for attracting and keeping them in the Czech Republic.

The supply of highly qualified workers is also influenced by the ratio between **wages and the qualification intensity of work**. In the Czech Republic, tertiary education offers a higher level of wage premium than the EU-27 average; the wage differentiation within this educational group is lower. Almost nobody with tertiary education in the Czech Republic earns less than half the median Czech wage. In Denmark, Germany or Finland, for example, this figure is more than 10%, which for some professions reflects excess supply over demand and the necessity to accept a job which does not correspond to one's level of qualifications.

The fact that the Czech Republic is more likely to be the place for lower stages of high-tech manufacturing causes wages in this economic sector to be lower than in medium high-tech sectors. As in all EU countries, the Czech Republic shows wage underrating in knowledge services financed primarily from public resources (education, health and social work, cultural services). Wage premium for comparably demanding work is significantly lower in these areas than in the financial services sector – and this gap is wider in the Czech Republic than in the more advanced EU countries. Low average wages have a negative influence on acquiring specialists for these sectors, which form the social infrastructure of the knowledge economy. This situation may slow down further development. If wages in these services are to be closer to wages in market services, it is absolutely necessary to introduce private funding as well.

Czech wages do not equally reflect the qualification intensity of work. Managers tend to earn significantly higher wages at a comparable level of education, primarily due to higher time demands, level of stress and requirements for

organisational and other specific skills. There still remains the question, however, of higher wages in this category as compared to highly qualification-intensive scientific and intellectual professions.

The **globalisation of tertiary education** should also help to improve the quality of tertiary education. The Czech Republic has been witnessing in particular an increase in the number of foreign students taking advantage of free tertiary education in Czech or Slovak. Because of strains on public budgets and the need to look for savings, it would be appropriate to begin discussing possible changes to the act on tertiary education and international agreements. Except for cases of international aid, if the number of foreign students exceeds the reciprocal exchange, their studies should be at the full rate. If studying at a public university, the costs (i.e., the level of state subsidies for the relevant curricula) should be paid by the state of which the student is a citizen. This income could then be used to expand scholarship programmes for Czech students and thus increase both their numbers as well as their spectrum. Currently, studying abroad is beyond many students' financial capabilities, even with a scholarship.

It is necessary to support efforts by various institutions to increase the quality of education and to expand the available range of courses/programmes offered in foreign languages. Only in this way will it be possible to increase the interest of foreign students from advanced countries in spending at least part of their studies in the Czech Republic, thus making more room for reciprocal studies by Czech students in those countries and achieving a greater level of equivalence between interest in studying abroad and the possibility of spending part of one's studies in another country.

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