Competencies of Poles vis-a-vis the needs of the Polish economy

Key results of the fourth round of the BKL Study in 2013

Edited by

Jarosław Górniak

Polish Agency for Enterprise Development

Warsaw 2014

The publication originated as part of the Study of Human Capital in Poland research project conducted jointly by the Polish Agency for Enterprise Development (PARP) and the Jagiellonian University (Centre for Evaluation and Analysis of Public Policies at the Jagiellonian University (CEiAPP)).

Reviewers:

Professor Michał Federowicz, IBE (Educational Research Institute)
PhD Agnieszka Chłoń-Domińczak

Publisher:

Polish Agency for Enterprise Development / Polska Agencja Rozwoju Przedsiębiorczości
ul. Pańska 81/83
00–834 Warszawa
phone 022 432 80 80
fax: 022 432 86 20
e-mail: biuro@parp.gov.pl
website: www.parp.gov.pl

ISBN 978-83-7633-293-2

Publication co-financed by the European Union from the European Social Fund.

This publication is free of charge.

The publication is available also at the website **www.bkl.parp.gov.pl**

2nd edition

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Foreword

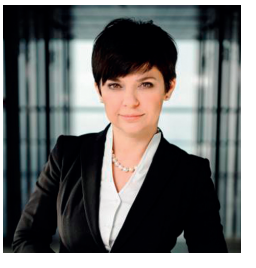
Ladies and Gentlemen,

Our unique project, the Study of Human Capital in Poland (the BKL Study) has been carried out for five years. The data collected under the annual research enable an overall evaluation of the situation in the Polish labour market and also a comprehensive stocktaking of the demand for and supply of competencies. As we are aware that the data collected in the course of our study are an important source of information for the public administration, entrepreneur and academic circles, we work with due diligence to ensure that our research meets the highest quality standards and that the results match the needs and expectations of their recipients.

The rapidly changing employment conditions require us to pursue lifelong learning; therefore, during the fourth round of the BKL Study, the main focus was the analysis of the learning activity of Poles. We sought the answer to questions regarding the reasons for the educational passivity of Poles, as well as the employers' strategy regarding the training of their personnel. The development of school-aged and higher education students is not less important than education of adults. During this round, we researched the students' level of self-assessment of their competencies, as well as the outcomes of public intervention in the form of commissioning fields of study that are strategic for the development of Poland. We have also looked at the opportunities, needs, and barriers to the establishment of strategic cooperation between institutions of higher education and employers.

We hope that this report shall continue to be a valuable source of inspiration during the design of public interventions and the design of strategies for development of human resources in enterprises. The preparatory works for the new programming period are the perfect background for reflection on the opportunities for development of recommendations based on analyses created in the course of the project.

Professor Jarosław Górniak
Jagiellonian University



Bożena Lublińska-Kasprzak
President of the Polish Agency
for Enterprise Development

Introduction

The project *Study of Human Capital* in Poland allows us, for the fourth consecutive year, to present the situation in the Polish market in the various dimensions of relationship between the education and the economy. The whole period since 2010 has been not easy on the entrepreneurs. Poland did manage to avoid recession, but despite that, the overall business conditions were difficult. The increased business risk led to cautious personnel policy at enterprises, whose core was rather to maintain employment levels rather than to clearly expand. The first half of 2013 – the period of collecting data that is the basis of this report – was a particularly difficult time during that whole period. The long-announced economic revival was delayed, so there was no basis to create new jobs. The graduates, arriving into the labour market, more frequently did not find employment. Instead, they moved into the ranks of the unemployed and the emigrants.

The *Study of Human Capital* in Poland contains a reflection of this problem. The percentage of enterprises seeking employees was lower. Usually, new employees were sought for positions already existing at the enterprises. An even larger percentage of companies seeking employees complained of difficulties with finding the right candidates. One could think that, as that the number of unemployed and of job-seekers ready to commence work grew, while the number of companies seeking employees as well as the number of available jobs fell, the situation should be in reverse. This paradox can be explained by increasingly selective hiring processes under the harsher market situation. The companies seek primarily employees who have the necessary knowledge and skills and are able to achieve full work productivity as soon as possible, and who do not require additional investment by the employer. In the third chapter, this hiring policy has been given the name "sieve strategy" and has been identified in most enterprises (72%), as different from the strategy of investing into personnel. This is of course only an analytical differentiation. The economic pressure increasingly induces all enterprises to apply the "sieve strategy." This in turn makes difficult the situation of graduates of various education levels who enter the labour market. They do not possess – because they cannot possess them – the very important skills acquired through experience at the workplace. They usually require a certain preliminary investment and time to achieve their full capabilities. If they have to compete for the dwindling number of jobs with employees who do possess experience and skills gained through work, they lose this competitiveness more frequently.

Remedying this phenomenon is difficult. The system of education has its limits regarding its ability to prepare future employees to work in conditions that they would encounter after graduating from the schools or institutions of higher education. The same factors that hamper the ability of enterprises to invest in their employees also hamper the ability to ensure access to good quality internships for the students, which would allow them to gain certain work experience already in the course of education. The dual training system, cited as the advantage of the German or Austrian education systems, requires an appropriate level of involvement of the enterprises. This is a difficult challenge, because Poland's economy is dominated by very small companies and the business innovation level is low. It is easier to ensure dual training in a situation where the enterprises apply the policy of investing into their employees on a wider scale. The low level of the involvement of adult Poles into education, visible in comparison

with other countries, indicates that the employers are not interested in their employees' increasing their competencies. They do not create conditions supporting further training. Given this situation, it is not easy to find internships or apprenticeships for young apprentices. This situation shall pose a serious risk for public policy under the so-called "guarantees for the young," which assumed that school leavers and graduates would be rapidly offered employment, internships, or training to improve their employability.

We present the results of our research in gradually improving economic conditions. The labour market is also starting to react to the rise in demand. However, the entire European economy, which includes also the open economy of Poland, is still licking its wounds after the recent crisis. It shall need some more time to regain vigour. The key challenge for Poland is to move the economy into the path of innovative development and to build its international competitiveness under these new conditions. This requires institutional challenges, which is innovation in economic policy and other public policies.

The PISA research suggests that the Polish youth - at the age of fifteen - is increasingly better educated. Care should be exerted to ensure that the young people develop their competencies at subsequent stages of education. However, if the conditions in Poland are not favourable for business activity and new, attractive jobs are not created, the educational efforts will channel into the growing stream of emigration for economic reasons. This diagnosis has already become an element of general awareness. The difficulty in moving from the general awareness of a problem to actions meant to change the situation results from the fact that all the formulas only appear to be simple ones.

In the social life, changes in certain areas are linked to changes in conditions for action in others. This leads to a breach of interests, or at least to the need for additional involvement of various groups and individuals. The condition for innovative economy is the ability for social innovations, and these in turn are difficult and require political leadership at various levels and in different areas, in the same manner as innovation in the economy requires entrepreneurship. The ability to achieve evolutionary and apt transformation of institutions determines the competitive advantage of societies and their economies. Those not able to cope with this challenge are removed from the scene of history, eventually.

This publication is published in the company of four other volumes, which review results of research carried out under the Study of Human Capital in Poland in 2013. The other four volumes focus more on the review of research results, while this one also offers an in-depth reflection on selected issues. Traditionally, the first chapter is dedicated to the discussion of the labour market situation from the balance perspective: the relationship between demand for employees and their competencies and their supply. Even the title of the chapter stresses the context of weaker overall economic situation, which has been already pointed out. In this chapter, the authors have introduced a new analytical approach, which allowed them to extract from the available data additional contents, supplementing the image presented in the previous reports.

Chapter Two contains a summary of six sectoral research projects conducted in Krakow in the years 2012 and 2013, under commission from the Krakow City Hall and at the initiative of the city councillors. This undertaking has been given the title *Balance of Competencies and Needs of the Krakow Scientific Centre*. The research focused on demand for competencies presented by higher education (HE) graduates and the ability of institutions of higher education to respond to this demand. We decided to present this summary as a kind of supplement to the contents of the first chapter. Not only due to the fact that the project has been carried out at the same faculty of the Jagiellonian University and at the same research centre (Centre for Evaluation and Analysis of Public Policies), but primarily due to the fact that the sectoral approach brings in new elements to the overview of situation in the labour market and its relationship to education. The *Study of Human Capital*, in its present form, offers a good response to the goals that have been given to it. However, as each research project, it has its limitations resulting from the choices regarding concept and methodology. The Krakow *Balance of Competencies* is complementary towards the *Study of Human Capital*. Chapter Two presents the very interesting results regarding the current demand for competencies and the demand forecast in the perspective of full cycle of higher education – that is, in five years' time. Demand is seen in the dynamically developing sectors of business process outsourcing (BPO) and IT services, in other words, in the modern services sector. On the other hand, the research covered sectors demonstrating other features, such as passive and energy-saving construction,

the power sector, and industries tied to life sciences and selected segments of the creative industries sector. It is worth devoting attention to this chapter, because it presents the key to the "black box" which bears the name "sector-specific professional competencies." The *Study of Human Capital* offers at best a peek inside. Studies of subsequent sectors are continued in Krakow. The centre succeeded at designing, and subsequently perfecting, the methodology for such sectoral studies. In the future, it would be worth including them into a research program that would be a continuation of the *Study of Human Capital* to give them a nationwide reach and cover with them the so-called "intelligent specialities" of Poland and, potentially, of its individual regions. It would be worth extending the research to include jobs that do not require higher education and upper secondary schools.

After the two chapters, which present a "balance approach" to the supply and demand of competencies, Chapter Three presents a multi-aspect analysis of the educational activity of adults. Already the title, which starts with the phrase "trailing behind Europe," identifies the problem faced by the Polish society. This problem is the poor, in comparison to other countries, educational activity of adults. Using scrupulous analysis, the authors of this chapter point out that the reasons for this low activity include the lack of interest among the employers. One of the sources for such a lack of interest is the low innovation of enterprises, but its reasons are more complex, which is similar to the reasons for the low innovation of business. Because the key for education of adults is not the financial barrier, but the motivational barrier of the employers, and in consequence of their employees, the public interventions into adult education bring moderate results, at best.

Two subsequent chapters are dedicated to persons in learning. During the fourth round of the *Study of Human Capital*, we returned to researching students of the last years of upper secondary schools, and last-year students of the first and second-degree higher education. Such research was conducted previously only under the first round of the BKL. This volume presents two analyses based on material gathered in the course of this research.

Chapter Four analyses competences in light of the self-assessment of students of upper secondary schools. The characteristic feature is the relative stability of results from 2010 to 2013. What is more interesting, the correlation between the self-assessment of social competencies, self-organization, or managerial skills, and the social and economic status of parents is practically irrelevant. The differentiation between the social and economic classes of self-assessment is larger when it comes to language or mathematical competencies. It is interesting to observe that, as far as the self-assessment of mathematical competencies is gender-dependent (higher among males), the results of the PIAAC research based on testing those competencies in a similar age group do not indicate such dependency.

The last chapter, Chapter Five, dedicated to students, focuses on analysis of the government-commissioned fields of study (the volume "Students" presents a broader review of results of this research module). Under this round of research, we decided to draw our research sample from all the study areas. Authors of this chapter present the analyses of questionnaires conducted among students of the commissioned majors in comparison with students of similar regular majors, adjusted additionally for certain socio-economic features. The idea was to bring the analysis as close as possible to the rule of the "single difference," which should be the inclusion under the conditions of ordered study major. The authors propose the thesis that the intervention in the form of commissioning particular fields of study did not cause a significant change in comparison to what would have occurred spontaneously – that is, the increased proportion of students in the "strategic" faculties – it only temporarily disrupted the distribution of these students among institutions of higher education, directing them to those institutions which obtained additional support.

We hope that analyses presented in this volume would become, once again, the subject of discussion and reflection among the interested public and decision-makers, and that as a result, they would contribute to the improvement of educational policy, and the various aspects of economic policy, as the economy and education are bound closely through the labour market.

Jarosław Górniak

Core conclusions

Chapter I

Balance of employer needs and labour market potential during recession

- In the spring of 2013, demand among enterprises for new employees shrunk – both in terms of overall readiness to hire new people and the scale of demand. In the previous years, 16-17% of employers were seeking new employees, but in 2013, this percentage dropped to 14%. The total demand for employees also fell by 15% during the first half of 2013, and the employers had 60 000 vacancies less than during the same period of 2012.

- In the spring of 2013, employers who most frequently declared their readiness to hire new employees were primarily large enterprises with stronger development (declaring growth of profits and employment, as well as implementation of certain innovations). These enterprises were dissatisfied with the competencies of existing personnel, especially those operating in the Mazowieckie province, in the construction and transport sector (although it must be stated that employers in those sectors have significantly reduced their demand for employees in comparison to the previous years).

- On a countrywide scale, the most sought-after group of employees were skilled workers (31.9% of jobs offered in 2013), especially construction workers (16.2%). The subsequent places belonged to sales workers and service employees (18.4%), various professionals (14.8%), as well as machine operators, assemblers and fitters, and mostly drivers (12.2 %).

- Among those seeking work, the largest relative surplus of unemployed is observed – as during the previous years – in the category of unskilled workers. The lack of specific qualifications is the main reason for difficulties in finding employment. The service, trade, and office professions also show excessive supply of persons eager to work.

- On the other hand, the relatively largest shortage of workers applies primarily to skilled workers, operators / fitters and specialists. In those categories, the number of persons seeking employment per one vacancy was the lowest.

- The problems with recruitment are not the consequence of lack of information provided in the course of the candidate selection process. On the level of job offers, the employers clearly communicate their requirements, which, in a rational manner, match the complexity of duties to be performed at the position offered. It is the lack of specific qualifications of the applicants (including their lack of motivation to work) that is the core reason for hiring difficulties.

Chapter II

Sectoral balance of competencies – expectations of employers and the outcomes of higher education on the example of Krakow

- In the recent years we have seen an increased interest in the issue of matching the educational offer to the requirements and needs of the labour market. One of the most important diagnosed barriers to cooperation between the business and education sectors is the lack of a "common language" and terms used to describe human capital – as well as the frequent stereotypical perception of the partner in discussion.

- An important attempt to build a bridge between business and institutions of higher education is the *Balance of Competencies and Needs of the Krakow Scientific Centre*, which has been conducted twice already. It also links directly with the BKL study. This research assumes the sectoral perspective, thus supplementing and complementing the countrywide research. It responds to questions regarding the importance and difficulties associated with acquiring specific labour market competencies, the process of their teaching at the institutions of higher education, the perception of tasks of institutions of higher education, and the barriers to establishing cooperation. In the years 2012-2013, the balance of competencies covered the following sectors: IT/ITO, BPO/SSC, creative, power, life sciences, and passive and energy-saving construction.

- On the general level, it can be said that soft (social) skills dominate the competencies cited by employers as the most important. The sectors of passive and energy-saving construction and partly the energy sector are an exception, as there the specific knowledge and specialist skills are more important.

- The lists of the most important competencies vary significantly from sector to sector. The only competence named among the 10 most important competencies in all analysed sectors is *honesty*. Other competencies, listed as particularly important in more than half of the analysed sectors included *care for quality, learning,* and *English language skills.* All these competencies naturally have a transferable nature and are useful in various contexts.

- In terms of competencies of the future, the differences between sectors become even more pronounced. Only four competencies were listed among the 10 most important competencies of the future in more than two sectors: *innovation, initiative, learning,* and *honesty*. There is a tendency for a relative growth of the importance of specific specialist competencies (knowledge and skills), which could be caused by the enterprises embracing specific directions for strategic development and by their reaction to challenges posed by the environment.

- The sectoral differentiation makes itself visible also in terms of difficulties with the acquisition of the most important competencies in the labour market. The research identified certain competencies that, while critical for one sector, can easily determine the competitive advantage of another.

- The juxtaposition of the difficulties of acquiring competencies with the assessment of the degree of their education (obtaining effects of education) at institutions of higher education once again points to fundamental differences between the sectors. In the case of the IT/ITO sector in Krakow, as much as 60% of the top competencies is seen as taught at the institutions of higher education and easily accessible, and 10% as not taught and not available. The largest competencies gap is found in the BPO/SSC sector – as much as 55% of competencies is rated as hard to obtain on one hand, and taught at institutions of higher education on the other.

- The discrepancies between representatives of business and higher education institutions, regarding responsibility for teaching the most important competencies are quite clear, and depending on the sector, they cover from 35% to 60% of these competencies. This phenomenon is largely attributed to the approach to soft skills. In many cases, the employers - despite expecting the candidates to possess certain soft skills - do not share the opinion of the higher education institutions. The institutions assume this obligation to an extent much larger than resulting from business expectations.

Chapter III

Trailing behind Europe – the conditions and strategies for the development of competencies of adult Poles

- During the recent ten years, we did not succeed at changing the patters of educational activity of adults, and we did not succeed in increasing Poles' involvement in learning. In this respect, Poland remains far behind Scandinavian countries, which have been leaders of this area for many years. It does not achieve the average level for all EU members either, and Poland remains behind such countries as the Czech Republic or Estonia.

- The analysis of factors that influence educational activity in EU countries suggests that both the individual and structural conditions in Poland mean that we should not expect rapid and significant changes in the area of adult learning in the near future.

- The patterns of educational activity of adults are similar in all countries of the European Union, including Poland. Those who developed their competencies usually included well-educated persons, who working in specialist professions, in managerial, technical or associate professional jobs, and working in large enterprises and living in large cities. Somewhat higher ratios were noted in the central period of careers and dropped during the pre-retirement period. However, in the case of Poland, the differences between groups demonstrating a high level of learning activity and the more passive groups are larger than the average for other EU countries. The negative situation in this area has not been changed by the support for actions targeted at human capital development, financed from the European Social Fund.

- The available data indicate the ineffectiveness of existing mechanisms that support learning activity with public funds. There is no growth in levels of this activity, nor a levelling of differences between training participation by persons with various education levels, or hired in different positions. As shown by the BKL data, in the years 2010-2013, the activity of Poles in that field almost did not change at all.

- The formal education level, while it is not the key determinant, does constitute a good predictor of the educational activity of adults. The formal education levels among older persons in Poland are lower than the EU average, which may significantly lower the educational activity of persons in older age groups. Certain outlooks for positive changes can be seen in the large percentage of higher education graduates among the younger and middle-aged persons, assuming they would actively continue learning throughout their lifetime. Nevertheless, the factors that stimulate development most often include the work environment and new professional challenges. Well-educated persons, working in professions where the development of one's competencies is not often seen, do display, on the average, slightly higher ratios of educational activity, but they are still low in comparison to persons working in specialist professions.

- The existing patterns of educational activity of Poles suggest that differences between those who already have capital in the form of education and competencies and those who do not possess it may deepen further. This is not favourable – neither from the standpoint of optimum use of competencies, nor from the standpoint of profiting from Poland's development opportunities, nor from the perspective of maintaining harmonious social development. Undoubtedly, the relatively low level of economic activity among Poles is a factor that hinders the increase of involvement in training and learning activity.

- The chief determinants of educational activity are not the individual predispositions, but rather the demands and nature of the job itself, together with opportunities offered by it. The main driver of educational activity could be the employers, who usually finance the training, select employees to participate in them, define their expectations regarding competencies displayed by employees, and also offer the opportunities for development and promotion within the company.

Core conclusions

- Meanwhile, the personnel management strategies applied by Polish employers do not support the development of human capital. Strategic HR management, based on personalized development plans and systematic assessment of competencies, is still under-developed.

- The sieve model applied by employers (by 72% of researched entities) in their personnel strategy, based on selection of employees in the course of recruitment or during employment, is not conductive to stimulating the level of participation in education. This approach, applied especially by stagnant companies, is meant to minimize the costs of investing into personnel.

- The low level of employers' involvement in building the competencies of their personnel, as well as the recruitment and personnel management strategies applied by employers, do not motivate employees to improve their competencies. The lack of this stimulus can be deemed one of the key reasons for the limited educational activity of adult Poles.

Chapter IV

Students of fields strategic for the Polish economy – educational choices, professional strategies, and outlook for the future

- In most cases, the government-commissioned fields of study were not tied to the launch of new teaching offers, but rather to increasing enrolment for the given fields, which usually had an upward profile, meaning that they enjoyed rising popularity among students anyway. Thus, the observed effect of the growing number of students of the strategic fields of study does not necessarily have to be caused by the intervention itself. Probably a large part of the students would have opted more or less for the same majors, even if they did not receive the additional financial support. The growth of the number of students of the commissioned fields was often accompanied by a decline in the number of students of the same majors, but in HE institutions that did not receive subsidies, this clearly points to so-called "academic cannibalism."

- The commissioning of certain fields of study had a larger influence on shifts in educational choices within the groups of study majors and individual HE institutions, and to a lesser extent on shifts between various study profiles. The phenomenon seems to have the features of both the substitution effect (the subsidized study fields gain students at the expense of the same fields elsewhere, not subsidized) and of the idle gear effect (the change in the number of students of technical majors which occurred after the intervention would have occurred anyway, even if no actions were undertaken).

- The largest probability of selecting sciences and engineering specialties is found among students of environment protection and other biological majors, students in economic, administration, and social studies. In this case, the rule can work both ways (economic, administrative, and social majors are seen as attractive for students of sciences and engineering specialties).

- The effect of the commissioning is moderated by the overall assessment of labour market opportunities after graduating the given field. In the long-term perspective, enrolment rises in those fields that ensure a relatively good labour market standing for their graduates. In the case of the commissioned study majors whose graduates experience problems with finding employment, the financial incentive does not have such a strong effect on students, and if it does, it is short-lived.

- For smaller HE institutions, the fact of obtaining financial support from the Ministry of Science and Higher Education is an important factor, boosting their chances to increase enrolment. This effect is usually short-lived and ends when the support offered by the Ministry of Science and

Higher Education is terminated. A reverse trend is observed in the case of technical universities and universities, since those academic centres usually achieve a constant increase of the number of strategic fields' students in the subsequent years.

- Students of the both the commissioned and regular fields of study considered strategic for the Polish economy are similar in many respects, and their assessment of future professional opportunities and satisfaction with the education offered or plans for the future are tied more to the chosen major and the type of HE institution where they study than to the fact of studying a commissioned, subsidized field.

- Despite the fact that the practical application of knowledge acquired during the studies is evaluated similarly by students of both the commissioned and non-commissioned fields, the first group is more convinced that the skills gained in the course of studies would increase their chances for finding a good work, one linked to the education profile. This leads to the conclusion that the increased confidence in the labour market is not tied to the actual skills of the students only, but to the fact itself of studying a commissioned field, which, in the future (according to the beliefs of the students), should guarantee decent work to the graduates.

- Those studying strategic fields have higher salary expectations that all the students in tertiary education. However, the salary requirements of the students of the commissioned and regular fields do not differ significantly. The lowest after-tax salary for which students of fields important from the standpoint of the national economy would agree to work amounts, on the average, to slightly under PLN 2000. Regardless of the field of study, women have lower salary expectations than men. From the perspective of the specific majors, the highest salary expectations are displayed by students of computer science, design, power engineering, mechatronics, automation, and robotics (the lowest expected after-tax salary from PLN 2129 to PLN 2302).

- Students of commissioned fields and of parallel non-commissioned fields to the same extent plan to work outside Poland in the future (about 15% of all respondents). As the research participants declare, this percentage could rise, depending on Poland's economic situation. Another 50% would consider emigration, if job supply in the local labour market turns out insufficient. The highest frequency of readiness for foreign migration is displayed by students of mechatronics and electronics (at other HE institutions), materials engineering (at universities and technical universities), mechanics and machine construction (at other HE institutions), and biotechnology (at universities and technical universities).

Chapter V

"Hard" and "soft" competencies of students of upper secondary schools

- The majority of research regarding competencies of students, carried out in Poland, focuses on measurement of the so-called "hard" competencies, that is, the acquisition, integration, interpretation and practical application of knowledge covered by the teaching syllabus. The largest international initiative of that type is the PISA research of 15-year-old students, conducted regularly by the OECD. Poland has participated in this research since 2000. In 2006, as an exception, this assessment covered also the population of upper secondary schools students. Another international initiative of that type, carried out in Poland (for the first time), was the PIAAC assessment conducted in 2012, which covered the population aged 16 to 65.

- The "hard" skills of upper secondary school students are monitored through external examinations (high school finals and vocational examinations). The research tied to the creation of the Educational Value Added indicator is one of the most important national research initiatives,

Core conclusions

using data collected in this manner. This research focuses on measuring the increase in the knowledge and skills of students between the individual education stages and on analysing conditions for this increase.

- The majority of upper secondary school students assessed their level of most "soft" skills as high. The clearest inter-gender differences regarding these skills were displayed in the self-assessment of interpersonal and office skills (women had a higher self-assessment on the average), and resistance to stress and flexibility of working hours (average higher self-assessment among men). Analysis broken down per school type revealed that the lowest average self-assessment of "soft" skills is reported by students of vocational schools.

- The differentiation in analysis of "hard" skills is larger than in the case of soft skills. The highest assessment was given to computer skills in their general sense, spoken and written Polish language capability, logical thinking, and drawing conclusions. The lowest self-assessment of "hard" skills was reported by the students with respect to skills tied to operation and repair of equipment, specialist use of computer (website design, programming etc.), and performance of advanced mathematical calculations.

- The inter-gender differences regarding self-assessment of "hard" skills turn out to be the most pronounced in the case of competencies with the lowest average assessment (average higher self-assessment among men). Particularly interesting is the fact that the results of the PIAAC assessment conducted in Poland, which tested the level of selected "hard" skills of which the BKL study also asked (e.g. mathematical skills), did not demonstrate significant inter-gender differences in that area.

- The analysis, which took into account the various types of upper-secondary schools as regards cognitive and mathematical competencies, revealed that the students of general upper secondary schools had, on the average, a higher level of self-assessment than did students of the other school types. In the case of computer and technical competencies, the highest self-assessment was displayed by students of upper secondary technical schools and vocational schools.

- The socio-demographic variables employed in this research turned out to be poor predicators for having a high overall self-assessment level of both the "hard" and "soft" skills. This leads to the hypothesis that the reasons for varying self-assessment level regarding these competencies could lie among psychological variables, not included in the BKL study.

- The socio-demographic variables that influenced the high overall self-assessment level of "hard" skills include the following: sex, socio-economic standing (defined as education level of both parents), and type of school attended by the student. The overall high self-assessment of "soft" skills was influenced by having the experience of paid work and the socio-economic status.

Chapter I

Szymon Czarnik, Marcin Kocór, Anna Strzebońska

Balance of employer needs and labour market potential during recession

1. Introduction

The purpose of the Study of Human Capital from the very beginning was to present a comprehensive image of the labour market in Poland and of the changes occurring in it. Especially important is the juxtaposition of information obtained from employers (particularly those seeking potential employees) and information obtained from working age persons who actively seek employment. Comparison of the two tendencies from the years 2010-2013 indicates that conditions in the labour market deteriorated. In the years 2010-2012, demand for employees declared by employers was similar (16-17%), and in 2013 it dropped to 14%. Simultaneously, from 2010 to 2012, the unemployment rate rose from 12% to 13% (Central Statistical Office, 2014). This could have resulted in a deteriorating situation in the Polish labour market during that period, which we shall attempt to demonstrate based on collected data.

This chapter analyses in more detail the conditions prevalent in the Polish labour market in 2013. In line with the tradition of the BKL study reports, we shall present the standpoint of both the employers and job seekers, to combine both perspectives in the form of "balance sheets."

In the first part of the chapter, we present the labour demands of employers and their changes with respect to the previous research period. As the influence of recession differs across the sectors, those analyses focus more on the specific features of the various sectors of the Polish labour market.

The second part presents structure of labour supply in the spring of 2013. Juxtaposition of this data with needs of the employers enables the presentation of a balance of employment during that period.

The third part analyses competencies required by employers from job seekers applying for certain positions, as well as the self-assessment of candidates regarding these competencies. Comparison of these two outlooks shall again be presented in the form of a balance sheet.

Balance of employer needs and labour market potential during recession

The fourth part, closing this chapter, analyses the competence shortages of which the employers complained most frequently in 2013. This information is compared with shortages established during the preceding years.

2. Demand for employees

One of the main indicators illustrating changes in the Polish labour market in the spring of 2013 was the reduced number of employers advertising vacancies. During the previous years, one in six employers declared recruitment plans (16% in the autumn of 2010 and 17% in the spring of 2011 and 2012), whereas in the spring of 2013 such need was reported by one in seven employers. This was not a large change (however, important in statistical terms – chi-square $p < 0.001$), but combined with information on the numbers of vacancies advertised by employers, it clearly shows the situation in the labour market was very different from the one observed during the previous years. So far, we have observed an annual, gradual increase of demand for employees under the BKL study. Starting from autumn of 2010, in each of the subsequent research periods (at more or less annual intervals), the employers were seeking about 5% employees more. In 2010, they declared the will to hire additional 560 000 persons, in the spring 2011 this number rose to 590 000 thousand, and in the spring of 2012 to 610 000. Meanwhile, after another year, this demand dropped by as much as 15%, to 550 000, which was more or less the same as the situation observed when the research commenced (as a reminder, it started in the autumn, where the demand for labour and seasonal jobs is not as large as in the springtime). This change is very significant.

This data is confirmed in public statistics on the number of employed Poles (GUS, 2013, 2014a, 2014c; NBP, 2013). The data shows that as of Q1 of 2011, the number of employed started dropping, to reach its minimum at the end of Q1 of 2013. According to quarterly forecasts published by the Manpower Group (2012, 2013a), views of employers on employment were the worst since the start of this research – for the first time the employers were planning to terminate more persons than to hire new ones, in both quarters. The data of the GUS on the number of new offers registered at the labour offices confirmed that the interest of employers in search for new employees dropped. This was also confirmed by the forecasts of employers, who, for Q1 and Q2 of 2013, still planned more reductions than increases of employment (NBP, 2013).

To check what factors influence the readiness to take on new employees, logistic regression[1] was performed with the answer to the question, "Does your business currently seek people to work at any post?" as a dependent variable with explaining factors being the business' development phase, employment volume, assessment of employee competencies, administrative region, and main field of operation.

The presented data (Table I.1) suggest that the factors with the largest influence on readiness to hire new employees included the business' development phase, employment volume, and dissatisfaction with competences of current employees. For strongly developing companies, the odds[2] that they would recruit were five times larger than for stagnant ones (in the spring of 2013 exp(B) = 5.018, which was a slight increase compared to the previous rounds).[3] This change is small and most probably due to the fact that even though during the recession all employers reduced their employment needs, the decline was relatively smallest in the strongly developing businesses (especially in comparison to the stagnant ones). It is worth noting that the number of strongly developing businesses dropped in 2013, compared to the same period of the previous year (from 7% to 6%, while the number of stagnant ones rose). This

[1] Due to the nature of variables, the analysis covered only enterprises, omitting various institutions (organs of government administration, local self-governments, mutual insurance societies, state organisational units, self-government organisational units, cooperatives, higher education institutions, independent public medical facilities, and funds).

[2] Odds indicate the average number of companies seeking employees per one company that does not seek employees. Odds should be clearly distinguished from probabilities. As a matter of fact, if p is a probability that a firm seeks employees, odds can be defined as p/(1-p).

[3] The abbreviation "exp(B)" means the number e raised to the power equal to the regression ratio – this value tells how many times (how) the chance that the company seeks employees changes under the influence of the given factor. In that case, this value indicates that the chance of finding such company in the group of strongly developing companies is about 5 times larger than in the group of stagnant companies (under control of all remaining predictors used in the analysis).

strengthens the conclusion on the large hiring potential of such businesses; if under conditions of worsening demand for employees, they are still able to offer vacancies.

Demand for employees

The employment volume, similarly as under the previous rounds of the study, determined the hiring readiness – the larger the company, the more frequently it declared advertising vacancies, comparing this to employment needs of businesses with up to 10 employees (in the spring of 2013, exp(b) for businesses with 50 to 249 employees = 1.775, businesses with 250 to 499 employees = 3.093 – in the case of the two remaining business sizes it was larger than 1, but statistically insignificant). In that case, we notice a reduced influence of the business size on its employment needs, which shows that the change of situation in the labour market during that period afflicted most businesses.

The influence was similarly obvious in the case of competences of existing employees. Those employers who had a negative opinion on the competences were three times more likely to offer vacancies in comparison with those who were satisfied (in the spring of 2013 exp(B) = 3.039). The situation was similar across all study years.

The influence of administrative region on the probability of offering vacancies was not so obvious. It is worth examining the years individually, as significant changes were observed. The reference category was the Mazowieckie administrative region – the region where the largest number of vacancies was advertised. In most cases, the chances that businesses in other regions of Poland spoke of recruitment plans were smaller than in the Mazowieckie province (chances smaller than 1). In the spring 2011, somewhat larger chances for recruitment were declared by employers from the Łódzkie and Pomorskie provinces (exp(B) at 1.528 and 1.449, respectively). In the following year, more employers in the Małopolskie and Podlaskie provinces were advertising vacancies (in this latter case, the dependency was statistically insignificant – exp(B) at 1.215 and 1.308, respectively). During the last year of the study, only in the Podkarpackie province, the odds for employment were better than in the Mazowieckie province (exp(B) = 1.298). Moreover, it is difficult to observe larger effects due to significant variation between the years.

The last of the analysed factors was the main field of operation. The reference category was the construction and transport sector. As it turns out, in all years of the study, employers operating in other sectors have shown smaller odds for new recruitment (exp(B) values under 1). Only in the case of the private education sector, in 2010 and 2012, employers engaged in such businesses have shown higher odds for advertising vacancies than those from the construction and transport sector (exp(B) at 1.385 and 1.616, respectively, although in the first case it was statistically insignificant). However, given the significant dynamics of this sector, this result should be viewed with caution.

Table I.1. Results of the model of logistic regression predicting whether a company is advertising vacancies

Variables	Exp(B)	2010	2011	2012	2013
	Constant	0.171***	0.114***	0.113***	0.091***
	(Reference: stagnant)	***	***	***	***
Development phase	Poorly developing	1.353***	1.805***	1.791***	1.655***
	Mildly developing	2.326***	2.579***	2.512***	2.250***
	Strongly developing	2.537***	4.337***	4.556***	5.018***
	(Reference: 1-9)	***	***	**	***
Employment volume	10-49	1.331**	1.086	1.211	1.238
	50-249	1.883***	1.822**	2.071*	1.775*
	250-499	3.488***	3.731***	3.268**	3.093***
	500+	5.555*	4.523	4.688	4.675
Assessment of employee competences	(Reference: satisfied) ***		***	***	***
	Require supplementary training	1.749***	1.856***	1.981***	2.065***
	Unsatisfied	3.567***	3.138***	2.947***	3.039***
	(Reference: Mazowieckie)	***	***	***	*
	Dolnośląskie	0.572***	0.912	1.100	0.885
	Kujawsko-pomorskie	0.712*	0.784	0.661**	0.842
	Lubelskie	0.913	0.984	0.770*	0.989
	Lubuskie	0.797	1.011	0.963	0.899
	Łódzkie	0.764*	1.528***	0.853	0.872
	Małopolskie	1.035	1.013	1.215*	0.797
Administrative region	Opolskie	0.951	1.093	0.595**	0.856
	Podkarpackie	0.830	0.847	0.952	1.298*
	Podlaskie	1.097	0.946	1.308	0.755
	Pomorskie	0.867	1.449***	1.043	0.877
	Śląskie	0.834	0.983	0.960	0.979
	Świętokrzyskie	0.472***	1.106	0.855	0.657*
	Warmińsko-mazurskie	0.699*	1.232	0.732*	1.013
	Wielkopolskie	0.610***	1.083	0.923	0.959
	Zachodniopomorskie	0.860	1.326*	0.978	0.908
	(Reference: Construction and transport)	***	***	***	***
	Trade, hospitality and food service	0.552***	0.675***	0.590***	0.758***
Main field of operation	Specialist services	0.738***	0.637***	0.801***	0.772***
	Private education	1.385	0.387***	1.616*	0.605***
	Human health and social work activities	0.792*	0.494***	0.653***	0.588
	Manufacturing and mining	0.707***	0.747***	0.810**	0.870
	Cox&Snell's R-squared	0.053	0.060	0.063	0.056
Model summary	Nagelkerke's R-squared	0.087	0.098	0.104	0.099
	McFadden's R-squared	0.040	0.048	0.051	0.049
	Likelihood ratio test significance	***	***	***	***
	N	9326	10474	10723	10761

*significance levels: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.*

Source: BKL Employer Study 2010–2013.

A look at recruitment needs without analysis of the structure of demand does not allow an evaluation of how the change in economic situation influenced the labour market. Table I.2 presents the demand declared by employers from different sectors[4] for specific employees. Before discussing the results, it is necessary to note that the presented population estimates are only an approximation of the population values and should not be treated as exact measures of actual needs of employers.[5] In general, in the years

[4] The Polish Classification of Activities (PKD) was simplified for the purpose of the studies on the basis of the CHI-chaid decision trees, into six more general categories. This clustering is applied to all analyses performed under the Study of Human Capital (the BKL Study). In addition, under study of employers the education category was further broken down into public and private.

[5] This results both from the declarative nature of this data and from the relatively severe variance of the weights used in the analysis. However, given the random nature of the sample (and its large size), this data enables accurate estimation of trends observed in the Polish labour market.

Demand for employees

2011-2012, demand for particular occupations was very stable,[6] and then it changed in the spring of 2013 by dropping significantly. This decline was felt the most by employees from the sectors of construction and transport, specialist services, and human health and social work activities. In the remaining sectors, demand for employees was on a similar level as a year earlier.

Table I.2. Job groups (ISCO-1)[7] sought by employers (in thousands of jobs), broken down per sector (data estimates for entire population)

		Manufacturing and mining	Construction and transport	Trade, hospitality and food services	Specialist services	Public education	Private education	Human health and social work activities	Total
2013	1 MANA	1.4	0.7	1.6	2.0	0.0	0.2	0.0	6.0
	2 PROF	6.3	1.8	11.8	37.0	4.8	3.2	10.9	75.9
	3 ASSO	4.1	4.0	16.0	19.6	0.2	0.2	4.4	48.4
	4 CLER	1.8	4.0	9.3	9.6	0.2	1.6	2.4	28.8
	5 SERV	4.9	4.0	59.2	23.1	0.4	1.9	0.7	94.2
	7 CRAF	40.5	81.6	29.9	10.2	0.0	0.0	0.7	163.0
	8 OPER	12.7	24.7	19.2	5.3	0.0	0.0	0.5	62.4
	9 ELEM	5.0	13.4	15.3	3.6	0.2	0.2	1.0	38.8
	Total	**76.8**	**134.1**	**163.1**	**110.5**	**5.8**	**7.3**	**20.7**	**518.2**
2012	1 MANA	1.4	2.1	1.1	2.0	0.0	0.0	0.3	6.9
	2 PROF	7.0	8.0	13.2	45.6	3.5	3.6	29.6	110.5
	3 ASSO	6.3	7.0	15.7	28.0	0.1	1.9	10.5	69.6
	4 CLER	0.8	4.1	7.9	7.8	0.1	0.6	1.3	22.6
	5 SERV	2.5	2.2	65.3	25.2	0.1	2.1	3.2	100.6
	7 CRAF	44.4	115.9	28.6	13.4	0.0	0.0	0.0	202.3
	8 OPER	10.9	40.1	19.1	3.5	0.0	0.0	0.0	73.6
	9 ELEM	4.9	13.4	14.6	3.9	0.1	0.0	3.1	40.0
	Total	**78.3**	**192.8**	**166.2**	**129.4**	**4.0**	**8.7**	**48.0**	**627.4**
2011	1 MANA	0.6	3.5	2.2	4.5	0.0	0.0	0.0	10.9
	2 PROF	5.6	20.1	7.2	26.0	4.2	1.2	20.3	84.6
	3 ASSO	4.3	10.6	21.0	29.7	0.2	0.1	7.7	73.6
	4 CLER	6.4	1.9	9.0	9.1	0.1	0.3	0.4	27.2
	5 SERV	4.2	4.0	61.8	27.7	0.3	0.1	1.7	99.7
	7 CRAF	44.2	100.6	37.4	11.3	0.1	0.2	0.1	193.8
	8 OPER	11.2	36.6	16.8	1.8	0.0	1.4	0.0	67.8
	9 ELEM	5.4	18.9	10.8	2.0	1.0	0.7	0.5	39.2
	Total	**82.0**	**196.2**	**167.4**	**112.7**	**5.9**	**3.9**	**30.8**	**598.8**
2010	1 MANA	2.2	2.5	2.7	3.2	0.0	0.0	0.0	10.7
	2 PROF	4.9	7.4	20.0	52.0	2.6	4.0	28.3	119.2
	3 ASSO	7.3	7.5	29.0	17.3	0.3	0.6	3.8	65.9
	4 CLER	3.9	4.8	17.0	15.6	0.2	0.1	4.0	45.5
	5 SERV	3.2	3.3	45.4	40.6	0.1	0.2	6.7	99.5
	7 CRAF	39.4	70.5	19.3	6.1	0.1	0.4	0.1	135.9
	8 OPER	13.6	37.7	9.1	6.4	0.0	0.5	0.0	67.3
	9 ELEM	5.7	5.2	10.0	1.7	0.2	0.1	0.5	23.3
	Total	**80.3**	**138.9**	**152.6**	**143.9**	**3.5**	**5.9**	**43.3**	**568.5**

Source: BKL Employer Study 2010–2013.

[6] Data from 2010 is not fit for direct comparison due to the fact that research during the first round was conducted in the autumn. This meant that the needs of employers differed from those recorded during other rounds.

[7] The chapter uses ISCO-1 and ISCO-2 abbreviations to denote the first and second level of ISCO classification (the so-called major and minor ISCO categories).

Balance of employer needs and labour market potential during recession

Analysis of the changes from the perspective of professions in demand among the employers shows that the number of offered vacancies dropped in practically all professions.[8] The only exception was the slight increase of demand for office employees. The largest reductions were seen among specialists, technicians and associated professional jobs (reduction by 30%), and among skilled workers (19%), and operators and fitters (15%). Demand for unskilled workers, including sales and service workers, remains on a similar level; these categories of employees appear to be necessary regardless of changes in the overall economic situation, which is confirmed by similar numbers of declared demand for employees representing these categories across all the years of the BKL study.

Employers from the construction and transport sector, who cut down their recruitment the most, declared smaller demand primarily for skilled workers (tile layers, plasterers, fitters of sanitary installations, wallboard fitters, floor layers, electricians, and other construction workers), as well as specialists, technicians and associate professionals (architects, environment engineers, accountants and HR professionals). This was clearly the consequence of stagnation in the construction sector. In the case of the two other sectors where the number of advertised vacancies dropped visibly, specialist services and the human health and social work activities, the reduced demand was felt primarily by specialists and associate professionals (architects, doctors of various specialties, nurses, cosmetologists, marketing and advertising specialists, sales specialists, psychologists, accountants, and sales representatives).

This outlook on the situation is corroborated also by other data. Research conducted by the Central Statistical Office (GUS, 2014c) shows that, during Q1 and Q2, the number of employees dropped significantly in construction (by 8.7%), in the electricity, gas, steam and hot water supply (by 5.9%), in the real estate services sector (by 4.1%), and in the insurance and finance sector (by 2.4%). Forecasts of employment in the various sectors, obtained through the research conducted by the Manpower Group (2012, 2013a), show in turn that, in Q1 and Q2 of 2013, more vacancies than reductions were declared by employees representing the commerce, transport and the public sector. In other sectors, the forecasts were negative, indicating more reductions than vacancies.

3. Balance of supply and demand for employees

As in the previous years, data on professions in demand among employers are juxtaposed with data on active job seekers.[9] We propose two approaches: In the first one, we analyse seven broadly defined occupational categories from the first level of ISCO classification (major occupational categories), presenting the differences among the individual administrative regions. In the second approach, we move on to 32 professions defined in more detail, on the second level of ISCO (sub-major occupational categories), again presenting differences among the regions of Poland.[10]

On a countrywide scale, the most sought-after group of employees were skilled workers (31.9% of jobs offered in 2013). The subsequent places belonged to sales workers and service employees (18.4%), various professionals (14.8%), as well as machine operators, assemblers / fitters, and mostly drivers (12.2%). In most of the administrative regions (provinces), the structure of demand is similar to the nationwide one, since differences appear in certain professional categories in certain provinces, e.g. the following:

- the Małopolskie and Mazowieckie provinces (larger demand for professionals, lower for skilled workers);
- Świętokrzyskie (higher-than-average demand for skilled workers, much lower for operators / fitters, sales and service workers);

[8] As the space in this report is limited, detailed data regarding changes in the trends for sought-after employees can be found in Kocór, Strzebońska 2013.

[9] Other than the previous round, this time we excluded from analysis those job seekers who were employed at the time of conducting the study. This change was justified by the need to adjust the balance to achieve larger symmetry: persons changing work will indeed fill the vacancy in the company to which they transfer, but they will simultaneously produce a vacancy in the company they leave.

[10] In the case of more detailed definition of occupations, it is not possible to conduct the analysis on the administrative region (province) level due to falling numbers.

- Lubuskie and Opolskie (relatively low demand for specialists, higher for associate professionals); and,
- Kujawsko-pomorskie and Łódzkie (relatively high demand for sales and service workers, relatively lower for associate professionals).

Table I.3. Occupational structure of demand for employees (ISCO-1)

Administrative region	2 PROF	3 ASSO	4 CLER	5 SERV	7 CRAF	8 OPER	9 ELEM	Total
Dolnośląskie	10.8	8.5	7.7	14.7	37.4	10.2	10.7	100.0
Kujawsko-pomorskie	12.1	3.6	5.6	27.4	30.9	15.2	5.2	100.0
Lubelskie	15.2	5.3	4.7	16.1	30.2	24.0	4.6	100.0
Lubuskie	6.6	16.5	6.5	16.3	30.3	20.0	3.8	100.0
Łódzkie	13.7	6.4	6.0	24.3	33.6	13.1	3.0	100.0
Małopolskie	23.6	8.3	3.3	21.8	23.0	17.6	2.3	100.0
Mazowieckie	20.6	9.6	9.8	20.1	16.3	13.6	10.1	100.0
Opolskie	7.0	17.6	4.3	21.5	43.4	4.3	1.9	100.0
Podkarpackie	17.4	13.8	5.6	12.8	34.5	12.9	2.8	100.0
Podlaskie	17.1	7.4	2.6	21.4	31.0	11.4	9.1	100.0
Pomorskie	13.6	12.6	3.6	20.2	29.7	9.9	10.4	100.0
Śląskie	16.6	13.7	4.5	21.5	30.6	5.5	7.5	100.0
Świętokrzyskie	16.9	9.6	3.8	8.4	50.2	4.4	6.7	100.0
Warmińsko-mazurskie	10.3	12.5	7.6	14.7	24.3	14.5	16.0	100.0
Wielkopolskie	14.6	5.2	4.5	13.8	43.9	8.5	9.5	100.0
Zachodniopomorskie	12.4	9.3	7.4	16.3	29.2	12.7	12.7	100.0
Country total	14.8	9.5	5.6	18.4	31.9	12.2	7.6	100.0

Source: BKL Employer Study 2013.

Demand for the more precisely defined occupational categories from ISCO-2 is presented in Table I.4. It shows two predominant categories: construction workers (16.2%) and sales workers (12.0%). In the case of specialists, demand was spread more or less evenly across several categories. Demand for business and administration professionals was reported slightly more frequently, especially in the Southern and Eastern regions.

Table I.4. ISCO-2 occupational structure of demand for employees

ISCO-1	ISCO-2	Central	Southern	Eastern	North-Western	South-Western	Northern	Country total
2 PROF	21 Science and engineering professionals	1.9	1.8	1.3	2.6	1.1	2.1	1.9
	22 Health professionals	3.1	1.3	5.3	2.2	1.1	1.3	2.4
	23 Teaching professionals	1.2	6.1	2.3	1.0	0.3	1.9	2.2
	24 Business and administration professionals	3.4	6.5	5.8	3.7	4.0	3.7	4.5
	25 Information and communications technology professionals	6.4	3.4	1.7	1.3	3.7	2.8	3.1
	26 Legal, social and cultural professionals	1.9	1.2	0.8	2.3	0.1	0.7	1.3
3 ASSO	31 Science and engineering associate professionals	2.7	0.2	0.6	1.0	3.1	2.3	1.5
	32 Health associate professionals	1.3	0.1	1.7	1.1	0.1	0.0	0.7
	33 Business and administration associate professionals	4.1	6.8	6.5	4.8	3.2	6.3	5.4
	34 Legal, social, cultural and related associate professionals	0.2	3.5	0.5	1.7	4.5	0.8	1.7
	35 Information and communication technicians	0.1	1.1	0.5	0.0	0.0	0.4	0.4
4 CLER	41 General and keyboard clerks	2.8	1.3	1.5	1.0	0.1	1.7	1.4
	42 Customer service clerks	1.7	0.9	1.5	3.2	2.9	1.0	1.9
	43 Numerical and material recording clerks	3.0	1.4	1.8	1.3	3.3	2.7	2.1
	42 Other clerical support workers	0.8	0.6	0.0	0.5	0.8	0.0	0.4
5 SERV	51 Personal service workers	5.4	6.9	6.5	4.7	6.2	8.6	6.3
	52 Sales workers	17.6	14.3	8.1	10.1	9.7	12.5	12.0
	53 Personal care workers	0.0	0.6	0.3	0.6	0.4	0.4	0.4
	54 Protective services workers	0.0	0.6	0.1	0.1	0.4	0.2	0.2
7 CRAF	71 Building and related trade workers (excluding electricians)	9.2	9.8	20.5	23.3	19.9	13.3	16.2
	72 Metal, machinery and related trades workers	5.6	10.4	8.7	7.5	7.1	5.7	7.5
	73 Handicraft and printing workers	0.2	0.1	0.2	0.4	0.9	0.6	0.4
	74 Electrical and electronic trades workers	6.3	3.5	3.3	2.5	7.5	1.4	3.8
	75 Food processing, wood working, garment and other craft and related trades workers	2.4	3.3	2.7	4.1	4.3	8.3	4.2
8 OPER	81 Stationary plant and machine operators	3.4	1.1	2.3	2.0	1.3	1.3	1.9
	82 Assemblers	0.0	1.3	1.4	0.9	0.1	0.2	0.7
	83 Drivers and mobile plant operators	9.0	6.5	10.2	8.0	6.1	9.9	8.4
9 ELEM	91 Cleaners and helpers	1.1	1.1	0.5	0.3	3.4	0.8	1.0
	92 Labourers in agriculture/forestry/ fishery	1.2	0.0	0.0	1.4	0.0	0.0	0.5
	93 Labourers in mining, construction, manufacturing and transport	2.7	3.9	1.2	5.3	2.4	6.3	3.8
	94 Food preparation assistants	0.5	0.0	0.9	0.9	2.0	2.4	1.1
	96 Refuse workers and other elementary workers	0.8	0.3	1.3	0.5	0.2	0.0	0.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Administrative regions (provinces) comprising the supra-regions: Central (Mazowieckie, Łódzkie), Southern (Małopolskie, Śląskie), Eastern (Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie), Northwestern (Lubuskie, Wielkopolskie, Zachodniopomorskie), South--Western (Dolnośląskie, Opolskie), Northern (Kujawsko-Pomorskie, Pomorskie, Warmińsko-Mazurskie).

Source: BKL Employer Study 2013.

Balance of supply and demand for employees

The occupational structure of the unemployed (not currently employed, but actively seeking job) is presented in Table I.5. Similarly as in the previous years, the three categories generating the largest number of queries in the labour market, on a nationwide scale, were the services and trade professions (category 5), skilled workers (category 7) and unskilled workers (category 9). This applies to most provinces, but as usual, there are some exceptions to the rule:

- in the Małopolskie province the share of specialists seeking employment is particularly high;
- in the Opolskie province there is excessive supply of skilled workers; and,
- unskilled workers are looking for work relatively the most frequently in the Warmińsko-Mazurskie province, while their share in the Wielkopolskie province is very slight.

Table I.5. ISCO-1 occupational structure of the unemployed

Administrative region	2 PROF	3 ASSO	4 CLER	5 SERV	7 CRAF	8 OPER	9 ELEM	Total
Dolnośląskie	7.8	5.3	5.6	27.6	29.3	6.3	18.2	100.0
Kujawsko-pomorskie	5.2	13.0	5.4	28.4	20.6	6.6	20.9	100.0
Lubelskie	13.9	9.2	8.0	16.5	26.5	9.6	16.3	100.0
Lubuskie	8.1	8.9	14.1	25.3	21.1	9.1	13.4	100.0
Łódzkie	10.8	8.2	6.6	22.4	22.5	9.5	20.1	100.0
Małopolskie	18.2	11.7	7.4	21.7	16.6	5.8	18.5	100.0
Mazowieckie	9.5	9.5	11.3	13.6	21.8	10.4	24.0	100.0
Opolskie	13.8	9.4	10.4	15.3	30.9	5.6	14.5	100.0
Podkarpackie	10.1	10.7	9.6	21.5	25.5	3.3	19.3	100.0
Podlaskie	9.8	11.2	9.7	21.7	12.9	10.6	24.1	100.0
Pomorskie	6.8	6.0	10.1	23.7	24.5	6.5	22.5	100.0
Śląskie	5.4	10.3	8.0	29.3	21.2	3.3	22.4	100.0
Świętokrzyskie	10.2	7.4	8.4	30.6	22.3	5.4	15.6	100.0
Warmińsko-Mazurskie	4.2	9.3	6.0	25.1	15.1	5.5	34.7	100.0
Wielkopolskie	10.2	17.4	9.1	23.4	25.3	7.3	7.2	100.0
Zachodniopomorskie	5.1	15.1	9.0	20.3	24.2	3.1	23.2	100.0
Country total	9.3	10.1	8.5	22.8	22.5	6.8	20.1	100.0

Due to the low counts, the managerial (category 1 –MANA) and agricultural (6 - AGRI) were excluded.

Category 9 (ELEM) includes persons declaring they would be interested in an unspecified "physical labour."

Respondents who declared that they seek "any employment" (about 17% of all respondents) were omitted.

Source: BKL – Population Study 2013.

Table I.6 presents the labour supply structure based on ISCO-2. It is worth noting that in the category of skilled workers, aside from construction workers, there is a significant share of job-seeking mechanics (category 72) and the workers in food processing, wood working, garment and other craft and related trades (category 75).

Table I.6. ISCO-2 occupational structure of the unemployed

ISCO-1	ISCO-2	Central	Southern	Eastern	North-Western	South-Western	Northern	Country total
2 PROF	21 Science and engineering professionals	2.2	1.7	2.3	1.8	1.2	1.0	1.8
	22 Health professionals	1.2	1.6	1.8	0.0	2.2	0.3	1.2
	23 Teaching professionals	3.2	3.7	3.8	2.5	2.4	3.5	3.3
	24 Business and administration professionals	1.3	1.5	0.9	1.1	0.0	0.3	0.9
	25 Information and communications technology professionals	0.8	0.6	1.1	1.2	0.0	0.7	0.8
	26 Legal, social and cultural professionals	2.1	2.4	1.5	2.2	3.9	0.3	1.9
3 ASSO	31 Science and engineering associate professionals	1.2	3.4	3.1	3.1	1.6	4.3	2.8
	32 Health associate professionals	1.2	3.5	1.0	0.6	0.0	0.7	1.3
	33 Business and administration associate professionals	1.8	3.0	2.9	9.4	3.7	4.6	3.9
	34 Legal, social, cultural and related associate professionals	2.5	1.7	1.4	3.0	0.6	0.9	1.7
	35 Information and communication technicians	3.0	0.0	1.4	0.0	0.7	0.5	1.1
4 CLER	41 General and keyboard clerks	7.0	5.0	4.8	9.7	5.0	5.8	6.1
	42 Customer service clerks	0.0	0.7	1.3	0.2	0.0	0.0	0.5
	43 Numerical and material recording clerks	3.4	2.2	2.7	0.7	1.3	1.7	2.2
	42 Other clerical support workers	0.0	0.4	0.3	0.0	0.8	0.4	0.3
5 SERV	51 Personal service workers	6.1	6.2	6.7	7.1	8.5	6.7	6.7
	52 Sales workers	11.2	19.8	13.4	15.1	16.6	18.4	15.5
	53 Personal care workers	0.0	0.8	0.2	0.4	0.6	1.0	0.5
	54 Protective services workers	0.7	1.2	2.0	1.9	0.8	3.5	1.7
7 CRAF	71 Building and related trade workers (excluding electricians)	7.8	6.7	8.7	10.7	14.7	8.9	9.1
	72 Metal, machinery and related trades workers	8.1	7.3	8.3	3.5	6.3	6.3	6.9
	73 Handicraft and printing workers	0.6	0.3	0.3	0.2	1.8	0.0	0.5
	74 Electrical and electronic trades workers	1.9	1.8	1.2	3.7	0.5	3.3	2.0
	75 Food processing, wood working, garment and other craft and related trades workers	5.5	4.6	5.1	7.5	8.3	4.5	5.6
8 OPER	81 Stationary plant and machine operators	0.0	0.0	0.0	0.0	0.0	0.7	0.1
	82 Assemblers	0.0	0.0	0.0	0.2	0.0	0.4	0.1
	83 Drivers and mobile plant operators	9.5	4.2	6.6	6.3	5.9	5.4	6.4
9 ELEM	91 Cleaners and helpers	3.3	3.1	3.4	2.1	1.6	3.5	3.0
	92 Labourers in agriculture / forestry / fishery	0.4	0.6	0.0	0.7	0.0	0.3	0.3
	93 Labourers in mining, construction, manufacturing and transport	12.5	10.5	12.4	4.9	9.5	10.1	10.4
	94 Food preparation assistants	0.7	0.9	1.0	0.2	1.3	0.6	0.8
	96 Refuse workers and other elementary workers	0.7	0.6	0.4	0.0	0.0	1.5	0.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Administrative regions (provinces) comprising the supra-regions: Central (Mazowieckie, Łódzkie), Southern (Małopolskie, Śląskie), Eastern (Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie), Northwestern (Lubuskie, Wielkopolskie, Zachodniopomorskie), South--Western (Dolnośląskie, Opolskie), Northern (Kujawsko-Pomorskie, Pomorskie, Warmińsko-Mazurskie).

Source: BKL – Population Study 2013.

Balance of supply and demand for employees

The percentage structures of the supply of and demand for work are directly compared in Table I.7 (ISCO-1 broken down by administrative region) and Table I.8 (ISCO-2 broken down by region). Each cell of these tables contains the difference between the share of the given occupational category among the unemployed and its share in the overall volume of vacant positions for which the employers seek candidates. Positive values mean that the relative supply of candidates in a given profession exceeds relative demand, negative values - the opposite.[11]

As a summary of data on differences between the percentage shares of supply of and demand for work, on a nationwide scale as well as for the individual provinces and regions, the index of dissimilarity (ID) has been calculated by using the following formula[12]:

$$ID = \frac{1}{2}\sum_{i=1}^{k}\left|\frac{b_i}{b} - \frac{w_i}{w}\right|$$

where k is the number of occupational categories covered by the research,
b_i – number of unemployed seeking work in the profession i,
b – total number of unemployed,
w_i – number of vacancies offered in profession i,
w – total number of vacancies.

The ID value may be interpreted as the lowest percentage of jobseekers who would need to "retrain" in order for complete structural matching to appear in the market.

Table I.7. Balance in the labour market: difference between the shares of individual occupations (ISCO-1) in the supply and demand structure

Administrative region	2 PROF	3 ASSO	4 CLER	5 SERV	7 CRAF	8 OPER	9 ELEM	ID*
Dolnośląskie	-3.0	-3.2	-2.1	12.8	-8.1	-3.9	7.5	0.20
Kujawsko-Pomorskie	-6.9	9.4	-0.2	0.9	-10.3	-8.6	15.7	0.26
Lubelskie	-1.3	4.0	3.4	0.4	-3.7	-14.4	11.7	0.19
Lubuskie	1.5	-7.6	7.6	9.0	-9.2	-10.9	9.6	0.28
Łódzkie	-2.8	1.8	0.6	-1.9	-11.1	-3.6	17.1	0.20
Małopolskie	-5.3	3.4	4.0	0.0	-6.4	-11.9	16.2	0.23
Mazowieckie	-11.1	-0.1	1.5	-6.5	5.5	-3.2	14.0	0.21
Opolskie	6.8	-8.1	6.2	-6.1	-12.6	1.3	12.6	0.27
Podkarpackie	-7.3	-3.2	4.0	8.7	-9.0	-9.6	16.4	0.29
Podlaskie	-7.2	3.8	7.1	0.3	-18.1	-0.8	15.0	0.26
Pomorskie	-6.8	-6.7	6.5	3.4	-5.2	-3.3	12.1	0.22
Śląskie	-11.2	-3.4	3.6	7.8	-9.5	-2.2	14.8	0.26
Świętokrzyskie	-6.7	-2.1	4.6	22.3	-27.9	1.0	8.9	0.37
Warmińsko-Mazurskie	-6.1	-3.2	-1.6	10.4	-9.2	-9.0	18.7	0.29
Wielkopolskie	-4.5	12.2	4.6	9.6	-18.5	-1.1	-2.3	0.26
Zachodniopomorskie	-7.3	5.8	1.7	4.0	-5.0	-9.7	10.4	0.22
Country total	-5.5	0.6	2.8	4.3	-9.4	-5.4	12.6	0.20

** ID – Index of Dissimilarity.*

Source: BKL – Population Study 2013, Employer Study 2013.

[11] During the interpretation of results, one needs to keep in mind that this is a comparison of percentage structures only, and not the absolute numbers of the unemployed and vacancies. Leaving aside the issue of competencies match, the problem of unemployment is tied to the fact that the total number of unemployed job seekers is estimated to be more than 4 times larger than the number of vacancies to be filled.

[12] Index assumes values from 0 to 1. Zero corresponds to perfect matching of both percentage structures, whereas 1 corresponds to extreme situation in which the unemployed are seeking jobs only in such professions for which the employers do not exhibit any demand.

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As in the previous years, the largest relative surplus of unemployed is observed in the category of unskilled workers. From this perspective, the lack of specific qualifications is the main reason for difficulties in finding employment. Excessive supply is present also in the service, trade, and office professions, which are two categories where mostly women declare their willingness to work.

On the other hand, the relatively largest shortage of workers applies primarily to skilled workers, operators / assemblers and specialists.

Table I.8. Balance in the labour market: differences between the shares of individual occupations (ISCO-2) in the supply and demand structure

ISCO-1	ISCO-2	Central	Southern	Eastern	North-Western	South-Western	Northern	Country total
	ID*	0.33	0.31	0.36	0.34	0.35	0.29	0.25
2 PROF	21 Science and engineering professionals	0.3	-0.1	1.0	-0.8	0.2	-1.1	-0.1
	22 Health professionals	-1.9	0.2	-3.4	-2.2	1.2	-1.1	-1.2
	23 Teaching professionals	2.0	-2.4	1.6	1.5	2.1	1.6	1.1
	24 Business and administration professionals	-2.2	-5.0	-4.9	-2.5	-4.0	-3.4	-3.6
	25 Information and communications technology professionals	-5.6	-2.8	-0.6	-0.1	-3.7	-2.1	-2.3
	26 Legal, social and cultural professionals	0.2	1.2	0.7	-0.1	3.8	-0.4	0.7
3 ASSO	31 Science and engineering associate professionals	-1.5	3.2	2.6	2.1	-1.5	2.0	1.3
	32 Health associate professionals	0.0	3.4	-0.7	-0.5	-0.1	0.7	0.6
	33 Business and administration associate professionals	-2.4	-3.8	-3.7	4.6	0.6	-1.8	-1.5
	34 Legal, social, cultural and related associate professionals	2.3	-1.8	1.0	1.3	-3.9	0.1	0.0
	35 Information and communication technicians	3.0	-1.1	1.0	0.0	0.7	0.1	0.7
4 CLER	41 General and keyboard clerks	4.2	3.7	3.4	8.7	4.9	4.1	4.7
	42 Customer service clerks	-1.7	-0.2	-0.2	-3.0	-2.9	-1.0	-1.4
	43 Numerical and material recording clerks	0.4	0.8	1.0	-0.6	-2.0	-1.0	0.0
	42 Other clerical support workers	-0.8	-0.1	0.3	-0.5	0.0	0.4	-0.1
5 SERV	51 Personal service workers	0.7	-0.7	0.1	2.4	2.4	-1.8	0.4
	52 Sales workers	-6.4	5.6	5.3	5.0	6.9	5.9	3.5
	53 Personal care workers	0.0	0.1	-0.1	-0.2	0.2	0.6	0.1
	54 Protective services workers	0.7	0.6	1.9	1.8	0.4	3.3	1.5
7 CRAF	71 Building and related trade workers (excluding electricians)	-1.4	-3.1	-11.8	-12.5	-5.2	-4.4	-7.1
	72 Metal, machinery and related trades workers	2.5	-3.1	-0.4	-4.0	-0.9	0.6	-0.6
	73 Handicraft and printing workers	0.4	0.2	0.1	-0.2	0.9	-0.6	0.1
	74 Electrical and electronic trades workers	-4.4	-1.7	-2.1	1.2	-7.0	1.9	-1.8
	75 Food processing, wood working, garment and other craft and related trades workers	3.1	1.3	2.3	3.4	4.0	-3.8	1.4
8 OPER	81 Stationary plant and machine operators	-3.4	-1.1	-2.3	-2.0	-1.3	-0.6	-1.8
	82 Assemblers	0.0	-1.3	-1.4	-0.7	-0.1	0.2	-0.6
	83 Drivers and mobile plant operators	0.5	-2.4	-3.6	-1.7	-0.2	-4.5	-2.0
9 ELEM	91 Cleaners and helpers	2.3	2.0	2.9	1.8	-1.8	2.6	1.9
	92 Labourers in agriculture / forestry / fishery	-0.8	0.6	0.0	-0.7	0.0	0.3	-0.2
	93 Labourers in mining, construction, manufacturing and transport	9.8	6.6	11.1	-0.4	7.1	3.8	6.6
	94 Food preparation assistants	0.3	0.9	0.1	-0.7	-0.7	-1.8	-0.3
	96 Refuse workers and other elementary workers	0.0	0.3	-0.9	-0.5	-0.2	1.5	0.1

** ID – index of Dissimilarity.*

Source: BKL – Population Study 2013, Employer Study 2013.

Analysis conducted on ISCO level 2 (Table I.8) reveals that the problem with the mismatched structure of supply and demand is the most pronounced in categories of auxiliary industrial labourers (cat. 93), secretaries (cat. 41) and sales workers (cat. 52), where an excessive supply is present in all these categories. On the other hand, the largest shortages are found in the category of construction workers (cat. 71), business and administration professionals (cat. 24) and information and communications technology professionals (cat. 25).

Structure of requirements and competence self-assessment

The analysis of structural mismatch (in percentage values) in the labour market should be supplemented by data based on absolute values.[13] Table I.9 presents estimates of the number of job seekers ready to start work in a given ISCO-1 occupational category per one vacancy advertised by the employers under the same category.

This analysis confirms that, in the subsequent years of the study, the occupations where the employers encountered the largest difficulties with finding people to work (the smallest number of candidates per vacancy) were the categories of specialists, skilled workers, and operators. It comes as no surprise that the category with the largest number of job seekers, translating into very slim chances for employment, was the category of unskilled workers (elementary), not requiring qualifications.

Table I.9. Estimated number of job-seekers in a given occupation per one vacancy (2013)

		2 PROF	3 ASSO	4 CLER	5 SERV	7 CRAF	8 OPER	9 ELEM	Total
2010	Country total	1.0	3.1	4.1	4.3	2.4	2.0	15.1	3.1
2011	Country total	1.8	2.3	9.0	4.8	1.9	2.0	9.9	3.3
2012	Country total	1.9	3.6	8.2	6.0	2.3	2.2	12.0	3.8
2013	Country total	2.8	4.8	6.8	5.6	3.2	2.5	12.1	4.5
administrative region (2013)	Wielkopolskie	1.9	9.0	5.4	4.6	1.6	2.3	2.0	2.7
	Zachodniopomorskie	1.2	4.6	3.5	3.5	2.3	0.7	5.1	2.8
	Pomorskie	1.6	1.5	9.0	3.8	2.6	2.1	7.0	3.2
	Opolskie	7.2	2.0	8.9	2.6	2.6	4.7	27.6	3.6
	Dolnośląskie	2.8	2.4	2.8	7.2	3.0	2.4	6.6	3.8
	Lubuskie	4.7	2.1	8.4	6.0	2.7	1.8	13.5	3.8
	Łódzkie	3.2	5.3	4.5	3.8	2.7	3.0	27.4	4.1
	Kujawsko-Pomorskie	2.0	16.6	4.4	4.8	3.1	2.0	18.6	4.6
	Małopolskie	3.7	6.7	10.5	4.8	3.4	1.6	38.0	4.7
	Śląskie	1.7	3.9	9.4	7.1	3.6	3.2	15.5	5.2
	Lubelskie	4.9	9.4	9.3	5.5	4.7	2.1	18.9	5.3
	Podkarpackie	3.3	4.4	9.8	9.6	4.2	1.5	38.9	5.5
	Warmińsko-Mazurskie	2.4	4.4	4.6	10.0	3.6	2.2	12.7	5.8
	Podlaskie	3.5	9.2	22.9	6.2	2.6	5.7	16.3	6.1
	Mazowieckie	3.1	6.7	7.7	4.5	9.0	5.1	16.1	6.6
	Świętokrzyskie	4.4	5.6	15.8	26.4	3.2	8.8	16.8	7.1

↓ administrative regions arranged by average number of job-seekers per one vacancy

Source: BKL – Population Study 2010- 2013, Employer Study 2010–2013.

4. Structure of requirements and competence self-assessment

Both the employers and working-age respondents, including the unemployed, were asked questions regarding the general competence set. Employers were asked about the level of competences expected from candidates for specific positions, and the job seekers were asked to perform a self-assessment of their competences. Because both groups defined the individual competencies in an identical manner, and almost identical formats for response scales were used.[14] Therefore, it is possible to compare

[13] This type of analysis is burdened with higher risk of error, due to the difficulty of generalizing the absolute values from the sample to the whole population.

[14] In both cases 5-point scales were applied. Competence levels from 2 to 5 were described, as "elementary", "medium", "high" and "very high", respectively. However, descriptions of the first, lowest level were different – in the study of employers this was the option, which stated that the given competence is "unnecessary", while in the population study this option was labeled "low".

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competence profiles for specific positions with the competence profiles of job seekers applying for a given type of work. This comparison can be done in several ways, each of which underlines another aspect of the "mismatch." The section below presents three types of comparisons, which take into account the following:

- The raw (non-centred) results – This is the simplest comparison, based on the average levels of competence requirements defined by employers and the average self-assessment levels of job seekers. The differences show whether the respondents verbally define their level of competencies as equal to, or higher or lower than the level required by employers.
- Results mean-centred within occupational categories – In consequence of this centring, each competence is evaluated in comparison to all the remaining competencies in the given occupation. In the group of employers, positive results mean that the given competence is more necessary than the other ones in the given occupation, negative results – the contrary, the competence is less necessary than the others are. Similarly, in the group of job seekers, positive results mean that persons seeking work in a given profession have a higher self-assessment of the given competence than of others, and a negative value – the contrary. The zero value corresponds to the average level of competence requirements and self-assessments in the given occupation. Applying this kind of centring, we discount the fact that, in certain occupations, people have a general tendency for higher self-assessment (or the employers pose stricter requirements) than in other ones, and we focus on the relative importance of the individual competencies for particular occupations.
- The differences between results mean-centred in this manner show to what extent, in the individual occupational categories, the *relative* weight given to specific competencies by the employers differs from the *relative* self-assessment of the candidates.
- The double-centred results (both within occupational categories and competencies) – The centring takes into account both the importance of a given competence in a given occupation, as compared to other competencies, and also its importance in a given occupation as compared to other occupations.[15] The zero value denotes an average level of self-assessment/ requirements for all competences and occupations analysed together.

The differences between results mean-centred in this manner show to what extent the weight given by the employers to the given competency for the given occupation (compared to all other competences and to all other occupations) differs from the self-assessment of the job seekers regarding this competence (also compared to all other competences and to all other occupations).

The logic of this three-level analysis is presented below based on technical competences (TEC) in the category of skilled workers (7 – Craftsmen / skilled workers). Taking the appropriate data contained in Tables I.12–I.14, we can prepare the following comparison.

Table I.10. Balance of technical competences (TEC) for craftsmen and skilled workers (7 CRAF)

Results:		Raw		Mean-centred relative to occupations		Mean-centred relative to occupations and competences	
		TEC	All competences	TEC	All competences	TEC	All competences
Job-seekers	7 CRAF	3.18	2.90	**0.28**	0.00	**0.70**	0.00
	Total occupations	2.71	3.13	-0.42	0.00	0.00	0.00
Employers	7 CRAF	**2.64**	2.53	**0.11**	0.00	**0.84**	0.00
	Total occupations	2.01	2.74	-0.73	0.00	0.00	0.00
Difference	7 CRAF	**0.54**	0.38	**0.16**	0.00	**-0.14**	0.00
	Total occupations	0.70	0.39	0.30	0.00	0.00	0.00

Source: BKL – Population Study 2010- 2013, Employer Study 2010–2013.

[15] Formally, if x_{kz} denotes the average level of competence k required in the occupation z, and $\overline{x}_z$, $\overline{x}_k$, $\overline{x}$ denote respectively: average level of all competence requirements for occupation z, average level of competence k requirements across all occupations (i.e. in the whole economy), and the overall average level of all requirements across all professions, the mean centering is done according to the following formula: $c_{kz} = x_{kz} - \overline{x}_z - \overline{x}_k - \overline{x}$.

Based on the raw results, we see that the unemployed skilled workers assess their technical competences on the average at 3.18, while the employers recruiting skilled workers require technical competences on the level of 2.64. Thus, the difference is positive (+0.54). From the first perspective, it appears that the workers have a subjective surplus of technical competences.

The unemployed skilled workers self-assess all their competences on the average at 2.90, which means that their self-assessment of technical competences is 0.28 percentage point higher than this average level. The 0.28 is the result mean-centred with respect to occupations (here: with respect to the occupational category 7 CRAF). Similarly, the employers – taking into account all competences – pose requirements for skilled workers on the average level of 2.53, which means that their technical requirement are 0.11 percentage point higher than this average level. This manner of centring results reduced the difference between the self-assessment of job seekers and requirements of employers from 0.54 for raw data to 0.16 (the "surplus" does not appear so large anymore). This is because the overall self-assessment level of skilled workers is higher than the overall level of employers seeking to recruit them. This in turn results from the fact that the unemployed workers declare a certain level of competences that, from the employers' perspective, are completely useless at positions of this type (artistic, office, managerial and computer competences). Compared to the other competence groups, the technical competences are more important from the employers' perspective than that of the workers, and this difference in perspective is reflected in the results mean-centred within the category 7 CRAF.

In the last step, we additionally take into account the fact that, among all employers, the technical requirements are as much as 0.73 points (2.01 – 2.74) below the overall level for competence requirements (thus enterprises seeking skilled workers present rather "strict" technical requirements), and that, among all job seekers, the self-assessment of technical competences does not differ so strongly from the overall self-assessment of competences; it is lower by 0.42 points (2.71 – 3.13). In consequence, it turns out that the difference between double-centred results (for both occupations and professions) is negative (-0.14), so the doubly relativized requirements of employers are slightly higher than the doubly relativized self-assessment of job seekers.

In summary, according to the formula presented in footnote 15, the difference between the double-centred results for technical competences in the group of skilled workers can be presented in the following manner, broken down into the individual components:

Table I.11. Double centring of technical competences in the occupational category of skilled workers

	c_{kz} =	(1) $+ x_{kz}$	(2) $- \overline{x}_z$	(3) $- \overline{x}_k$	(4) $+ \overline{x}$
Self-assessment of job-seekers	**0.70** =	+3.18	–2.90	–2.71	+3.13
Requirements of employers	**0.84** =	+2.64	–2.53	–2.01	+2.74
Difference S - R	**-0.14** =	+0.54	–0.38	–0.70	+0.39

(1) – average result for technical competences in the occupations of skilled workers
(2) – average result for all competences in the occupations of skilled workers
(3) – average result for technical competences for all occupations
(4) – average result for all competences among all occupations

Source: BKL – Population Study 2010- 2013, Employer Study 2010–2013.

As a matter of fact, in terms of technical competences, the self-assessment of skilled workers is 0.54 higher than the requirements of employers seeking to fill such vacancies (x_{kz}), and the overall self-assessment of the job-seekers is 0.39 higher than the overall competence requirements of employers ($\overline{x}$), but this "surplus" is more than levelled out by two facts. First of all, the level of technical requirements among all employers is as much as 0.70 lower than the self-assessment of technical competences among all job seekers ($\overline{x}_k$). In this light, the technical requirements of employers recruiting skilled workers seem to be very radical compared against requirements of other employers, while the skilled workers do not dominate other professions so much in this regard. Secondly, the general competence requirements of employers seeking skilled workers are 0.39 lower than the overall self-assessment of the unemployed

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seeking such work ($\bar{x}_z$). This in turn means that substantial absolute domination of technical self-assessment of unemployed skilled workers over the requirements of employers advertising the respective vacancies shrinks significantly when those self-assessments and technical requirements are analysed against the backdrop of other competences.

In the further part of this section, all three approaches to competences (raw results, centred with relation to occupations and double-centred, with relation to occupations and competences) are presented in the same fashion: first the requirements of employers, next self-assessment of job seekers, finally the differences between self-assessments and requirements. Competences in the table are organised according to the overall average level of employers' requirements (calculated on raw data). When analysing these results, it is necessary to keep in mind that they are not based on objective measurement of actual competencies and actual competence requirements, but on declarations of the employers and job seekers, reflecting their subjective assessments.

Competence self-assessments and requirements: comparison of raw data

Table I.12a. Competence requirements of employers (raw data)

	PER	SLF	POL	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	4.11	4.03	3.96	3.52	2.22	3.69	3.68	2.64	1.56	2.16	2.41	2.19	3.01
3 ASSO	4.13	4.08	3.91	3.45	2.49	3.56	3.56	3.08	1.72	2.09	2.67	1.82	3.05
4 CLER	4.02	3.84	3.80	3.20	2.22	3.04	3.54	2.80	1.54	1.99	3.09	1.47	2.88
5 SERV	4.08	3.56	3.66	3.42	2.93	2.80	2.52	2.56	1.41	2.10	1.90	2.13	2.76
7 CRAF	3.25	3.32	2.99	3.25	3.43	2.43	1.73	2.32	2.64	1.98	1.24	1.74	2.53
8 OPER	3.45	3.31	3.05	3.72	3.42	2.36	1.68	2.23	2.77	1.69	1.26	1.20	2.51
9 ELEM	3.27	3.26	2.94	3.51	3.67	2.32	1.31	1.94	1.96	1.70	1.21	1.42	2.38
Total	3.75	3.62	3.47	3.43	2.93	2.90	2.55	2.52	2.01	2.00	1.88	1.80	2.74

Table I.12b. Competence self-assessment of job seekers (raw data)

	PER	SLF	POL	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	4.24	3.92	4.24	4.04	3.79	3.91	4.15	3.53	2.64	3.49	3.70	3.18	3.74
3 ASSO	4.07	3.77	3.86	3.91	3.76	3.49	3.82	3.47	2.85	3.28	3.37	2.86	3.54
4 CLER	4.03	3.67	4.02	3.98	3.72	3.57	3.89	3.41	2.46	3.39	3.76	2.75	3.55
5 SERV	3.87	3.32	3.48	3.74	3.55	3.07	3.07	3.03	2.21	2.76	2.78	2.55	3.12
7 CRAF	3.62	3.08	3.05	3.76	3.63	2.74	2.40	2.71	3.18	2.40	2.07	2.20	2.90
8 OPER	3.74	3.31	3.34	3.97	3.77	2.98	2.77	2.85	3.43	2.68	2.25	2.10	3.10
9 ELEM	3.52	2.95	2.94	3.67	3.50	2.55	2.19	2.46	2.66	2.22	1.96	2.04	2.72
Total	3.81	3.33	3.43	3.81	3.63	3.05	2.98	2.96	2.71	2.75	2.67	2.45	3.13

Table I.12c. Balance of competences as difference between self-assessment and requirement (raw data)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	0.13	-0.11	0.28	0.52	1.57	0.22	0.47	0.89	1.08	1.33	1.29	0.99	0.72
3 ASSO	-0.06	-0.31	-0.05	0.46	1.27	-0.07	0.26	0.39	1.13	1.19	0.70	1.04	0.50
4 CLER	0.01	-0.17	0.22	0.78	1.50	0.53	0.35	0.61	0.92	1.40	0.67	1.28	0.68
5 SERV	-0.21	-0.24	-0.18	0.32	0.62	0.27	0.55	0.47	0.80	0.66	0.88	0.42	0.36
7 CRAF	0.37	-0.24	0.06	0.51	0.20	0.31	0.67	0.39	0.54	0.42	0.83	0.46	0.38
8 OPER	0.29	0.00	0.29	0.25	0.35	0.62	1.09	0.62	0.66	0.99	0.99	0.90	0.59
9 ELEM	0.25	-0.31	0.00	0.16	-0.17	0.23	0.88	0.52	0.70	0.52	0.75	0.62	0.35
Total	0.06	-0.29	-0.04	0.39	0.70	0.16	0.43	0.44	0.70	0.75	0.79	0.65	0.39

ART – artistic, OFF – office, AVL – availability, PHY – physical, PER – interpersonal (contacts with other people), POL – language sophistication (in Polish), MNG – managerial, COG – cognitive, COM – computer, MAT – mathematical, SLF – self-organisational, TEC – technical.

Source: BKL – Population Study 2010–2013, Employer Study 2010–2013.

As illustrated above, the general competence requirements and self-assessment of job seekers have a similar structure. The job seekers usually assess their competences above the level of requirement posed by employers. The only clear exceptions are the self-organisational competencies, where the self-assessment does not reach the level of requirements. The dominance of self-assessment over requirements is particularly high in the case of those competences which are less in demand among all employers (physical, technical, managerial, office, and artistic). It is also worth noting that competencies characterized by the most uniform (and rather low) demand among employers, across various occupations, are the managerial competences.

Competence self-assessments and requirements: comparison of data mean centred within occupational categories

Table I.13a. Competence requirements of employers (data mean centred with respect to occupational categories)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	1.10	1.02	0.95	0.51	-0.79	0.68	0.67	-0.37	-1.45	-0.85	-0.60	-0.82	0.00
3 ASSO	1.08	1.03	0.86	0.40	-0.56	0.51	0.51	0.03	-1.33	-0.96	-0.38	-1.23	0.00
4 CLER	1.14	0.96	0.92	0.32	-0.66	0.16	0.66	-0.08	-1.34	-0.89	0.21	-1.41	0.00
5 SERV	1.32	0.80	0.90	0.66	0.17	0.04	-0.24	-0.20	-1.35	-0.66	-0.86	-0.63	0.00
7 CRAF	0.72	0.79	0.46	0.72	0.90	-0.10	-0.80	-0.21	0.11	-0.55	-1.29	-0.79	0.00
8 OPER	0.94	0.80	0.54	1.21	0.91	-0.15	-0.83	-0.28	0.26	-0.82	-1.25	-1.31	0.00
9 ELEM	0.89	0.88	0.56	1.13	1.29	-0.06	-1.07	-0.44	-0.42	-0.68	-1.17	-0.96	0.00
Total	1.01	0.88	0.73	0.69	0.19	0.16	-0.19	-0.22	-0.73	-0.74	-0.86	-0.94	0.00

Table I.13b. Competence self-assessment of job seekers (data mean centred with respect to occupational categories)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	0.50	0.18	0.50	0.30	0.05	0.17	0.41	-0.21	-1.10	-0.25	-0.04	-0.56	0.00
3 ASSO	0.53	0.23	0.32	0.37	0.22	-0.05	0.28	-0.07	-0.69	-0.26	-0.17	-0.68	0.00
4 CLER	0.48	0.12	0.47	0.43	0.17	0.02	0.34	-0.14	-1.09	-0.16	0.21	-0.80	0.00
5 SERV	0.75	0.20	0.36	0.62	0.43	-0.05	-0.05	-0.09	-0.91	-0.36	-0.34	-0.57	0.00
7 CRAF	0.72	0.18	0.15	0.86	0.73	-0.16	-0.50	-0.19	0.28	-0.50	-0.83	-0.70	0.00
8 OPER	0.64	0.21	0.24	0.87	0.67	-0.12	-0.33	-0.25	0.33	-0.42	-0.85	-1.00	0.00
9 ELEM	0.80	0.23	0.22	0.95	0.78	-0.17	-0.53	-0.26	-0.06	-0.50	-0.76	-0.68	0.00
Total	0.68	0.20	0.30	0.68	0.50	-0.08	-0.15	-0.17	-0.42	-0.38	-0.46	-0.68	0.00

Table I.13c. Balance of competences as the difference between self-assessment and requirements (data mean centred with respect to occupational categories)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	-0.59	-0.83	-0.44	-0.20	0.85	-0.50	-0.25	0.17	0.36	0.61	0.57	0.27	0.00
3 ASSO	-0.56	-0.81	-0.55	-0.04	0.77	-0.57	-0.24	-0.11	0.63	0.69	0.20	0.54	0.00
4 CLER	-0.67	-0.85	-0.46	0.11	0.83	-0.15	-0.33	-0.06	0.25	0.73	-0.01	0.61	0.00
5 SERV	-0.57	-0.60	-0.54	-0.04	0.26	-0.09	0.19	0.11	0.44	0.30	0.52	0.06	0.00
7 CRAF	-0.01	-0.62	-0.32	0.13	-0.18	-0.07	0.29	0.01	0.16	0.04	0.45	0.08	0.00
8 OPER	-0.30	-0.59	-0.30	-0.34	-0.24	0.03	0.50	0.03	0.07	0.40	0.40	0.31	0.00
9 ELEM	-0.10	-0.66	-0.35	-0.19	-0.52	-0.12	0.53	0.17	0.35	0.17	0.40	0.27	0.00
Total	-0.34	-0.69	-0.43	-0.01	0.30	-0.24	0.04	0.05	0.30	0.36	0.40	0.25	0.00

ART – artistic, OFF – office, AVL – availability, PHY – physical, PER – interpersonal (contacts with other people), LANG – languages, MNG – managerial, COG – cognitive, COM – computer, MAT – mathematical, SLF – self-organisational, TEC – technical.

Source: BKL – Population Study 2010–2013, Employer Study 2010–2013.

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After centring the results within the individual occupations, we can see that competences differ more in terms of employers' demand than the self-assessment of job seekers. This is particularly conspicuous in physical fitness (PHY): White-collar workers (2 PROF, 3 ASSO, 4 CLER) are expected to demonstrate a certain level of physical fitness, but other requirements are much more important, while in the case of blue-collar workers performing physical labour (7 CRAF, 8 OPER, 9 ELEM), their physical fitness becomes the key requirement. Looking at the self-assessment of physical fitness among the job seekers, there is a similar dependency (compared to other competences, white-collar workers self-assess their physical fitness relatively lower than blue-collar ones), but it is not so radical. The balance shows that in terms of interpersonal (PER), self-organisational (SLF) and mother-tongue language competences (POL), the job seekers across all professions have relative shortages with respect to requirements of employers, while in terms of technical (TEC), managerial (MNG), office (OFF) and artistic (ART) they display a relative surplus. In the case of computer (COM) competencies and the already mentioned physical fitness, there is a clear polarisation; the white-collar occupations display a relative shortage of computer skills and surplus of physical fitness, while the blue-collar occupations – the contrary.

Competence self-assessments and requirements: comparison of double-centred data

Table I.14a. Competence requirements of employers (data mean centred with respect to occupational categories and competences)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	0.08	0.13	0.22	-0.18	-0.99	0.52	0.85	-0.16	-0.73	-0.11	0.26	0.11	0.00
3 ASSO	0.07	0.15	0.14	-0.29	-0.75	0.36	0.70	0.25	-0.60	-0.22	0.48	-0.29	0.00
4 CLER	0.13	0.08	0.19	-0.37	-0.85	0.00	0.85	0.14	-0.61	-0.15	1.07	-0.47	0.00
5 SERV	0.31	-0.08	0.18	-0.02	-0.02	-0.11	-0.05	0.02	-0.62	0.08	0.00	0.31	0.00
7 CRAF	-0.29	-0.09	-0.26	0.03	0.71	-0.25	-0.61	0.01	0.84	0.19	-0.43	0.15	0.00
8 OPER	-0.07	-0.08	-0.19	0.52	0.71	-0.31	-0.65	-0.07	0.99	-0.08	-0.39	-0.38	0.00
9 ELEM	-0.12	0.00	-0.16	0.45	1.10	-0.21	-0.88	-0.22	0.31	0.06	-0.31	-0.02	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table I.14b. Competence self-assessment of job seekers (data mean centred with respect to occupational categories and competences)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	-0.17	-0.01	0.21	-0.38	-0.44	0.25	0.56	-0.04	-0.67	0.14	0.43	0.13	0.00
3 ASSO	-0.15	0.03	0.02	-0.31	-0.28	0.02	0.43	0.10	-0.27	0.12	0.29	0.00	0.00
4 CLER	-0.20	-0.08	0.17	-0.26	-0.33	0.09	0.48	0.03	-0.67	0.22	0.67	-0.12	0.00
5 SERV	0.07	0.01	0.07	-0.06	-0.07	0.03	0.10	0.08	-0.49	0.02	0.13	0.11	0.00
7 CRAF	0.04	-0.02	-0.15	0.18	0.23	-0.09	-0.36	-0.02	0.70	-0.12	-0.37	-0.02	0.00
8 OPER	-0.04	0.02	-0.05	0.19	0.17	-0.04	-0.18	-0.08	0.75	-0.04	-0.38	-0.32	0.00
9 ELEM	0.12	0.03	-0.08	0.27	0.28	-0.09	-0.38	-0.09	0.36	-0.12	-0.30	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table I.14c. Balance of competences as the difference between self-assessment and requirements (data mean centred with respect to occupational categories and competences)

	PER	SLF	LANG	AVL	PHY	COG	COM	MAT	TEC	MNG	OFF	ART	Total
2 PROF	-0.25	-0.15	-0.01	-0.19	0.54	-0.27	-0.29	0.12	0.05	0.25	0.17	0.01	0.00
3 ASSO	-0.22	-0.12	-0.11	-0.03	0.47	-0.33	-0.27	-0.15	0.33	0.34	-0.19	0.29	0.00
4 CLER	-0.33	-0.16	-0.02	0.11	0.52	0.09	-0.36	-0.11	-0.06	0.37	-0.40	0.35	0.00
5 SERV	-0.24	0.08	-0.11	-0.04	-0.05	0.14	0.15	0.06	0.13	-0.06	0.12	-0.20	0.00
7 CRAF	0.33	0.07	0.12	0.14	-0.48	0.17	0.26	-0.03	-0.14	-0.31	0.06	-0.17	0.00
8 OPER	0.04	0.10	0.14	-0.33	-0.54	0.27	0.46	-0.01	-0.23	0.05	0.01	0.06	0.00
9 ELEM	0.24	0.03	0.09	-0.18	-0.82	0.12	0.50	0.13	0.05	-0.18	0.01	0.02	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ART – artistic, OFF – office, AVL – availability, PHY – physical, PER – interpersonal, LANG – languages, MNG – managerial, COG – cognitive, COM – computer, MAT – mathematical, SLF – self-organisational, TEC – technical.

Source: BKL – Population Study 2010–2013, Employer Study 2010–2013.

The double-centred data show a clear polarisation of white-collar and blue-collar occupations in terms of physical fitness and computer competencies. In the white-collar occupations, physical fitness is less necessary than other competencies. It is also relatively less necessary than in other occupations; hence, there is a clear surplus of physical fitness in these occupations. The issue with computer skills is the reverse; they are relatively important, compared to other competencies, for white-collar occupations, as well as more necessary than in different types of occupations, hence their shortage. According to the same rule, but in reverse, there is a shortage of physical fitness and surplus of computer skills in the case of blue-collar occupations.

It is possible to observe, in the case of white-collar occupations (including trade and services), a special deficiency of interpersonal competences and also (not including trade and services) a deficiency of self-organisational competences. On the other hand, the white-collar occupations display a relative surplus of managerial competences.

The balance of cognitive competences is negative only in the categories of professionals (2 PROF) and associate professionals (3 ASSO), and of office competences – only among associate professionals and clerical employees.

5. Competence shortages

The starting point for analysis of competence shortages and gaps are the opinion of employers on recruitment difficulties. In all the rounds of the BKL study – starting from the autumn of 2010 – three fourths of employers wishing to fill vacancies confirmed that they encountered difficulties with finding appropriate candidates (75% of employees in 2010 and 2011, and 76% in 2012). In the spring of 2013, despite the fact that the employers recruited less frequently and in general the number of sought candidates was smaller, more employers admitted having difficulties with finding good candidates, and this statement was made by 78% of employers seeking additional workers. It should be added that usually the smaller employers (with a smaller number of employees) experience, every year, more pronounced recruitment problems.

When analysing the occupations where the problems with finding appropriate candidates were the hardest, it is easy to notice that the same categories were tied to the largest number of vacancies (table I.15). Every year, the most problems with recruitment (based on the opinions of employers seeking candidates and simultaneously complaining about the related difficulties) apply to the occupational categories of the following:

- skilled workers: 33-35% of employers named this category, only in the autumn of 2010 25% of employers spoke of such problems. The hardest to find were candidates for the following professions: welders, masons, roofers, vehicle mechanics, or carpenters.
- sales and service workers: 20-24% of employers declared experiencing difficulties with finding such candidates, while in the autumn of 2010, such problems were indicated by 16% of employers. Aside from problems with finding appropriate persons to work in sales, the employers indicated also problems with recruiting cooks, waiters, or hairdressers.
- specialists, technicians and associated professionals: The scale of problems are tied to finding appropriate specialists varied cross the years, but it can be stated that from 15% to 25% of employers encountered problems. In addition, 13 to 17% experienced problems with recruitment of technicians and associate professionals. The largest problems applied to recruitment of doctors, computer programmers, accountants, and sales representatives.
- Operators and assemblers: In this case, 12 to 18% of employers spoke of recruitment problems, which were tied primarily to the search for truck drivers and operators of heavy machinery.

With other occupations, problems were rarely encountered. This could be due to two factors: Recruitment for managerial positions is usually linked to high level of requirements that, in this case, can be met. In addition, in the case of managerial positions, the employers use the services of recruitment companies

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more often, meaning that part of the problems tied to search for such employees is transferred to them. The search for candidates for clerical jobs or unskilled (elementary) workers is easier, because there is a significant supply of persons ready to work in such positions.

This is confirmed by the research conducted by the Manpower Group regarding recruitment difficulties (2013b). The employers named the following ten professions as the hardest to fill the vacancies: skilled physical workers, engineers, technicians, sales representatives, drivers, members of management boards including top managers, chefs and cooks, IT department employees, unskilled (elementary) physical workers, and designers.

Table I.15. Occupations, in which employers from various sectors advertising vacancies encountered problems with finding the appropriate candidates (in percentage)

		Manufacturing and mining	Construction and transport	Trade, hospitality and food services	Specialist services	Education	Human health and social work activities	Total
2013	1 MANA	2	1	2	4	1	4	2
	2 PROF	10	2	8	40	76	55	16
	3 ASSO	9	7	13	23	5	40	13
	4 CLER	2	1	7	7	5	7	5
	5 SERV	5	6	42	22	17	1	20
	7 CRAF	64	55	23	9	1	1	34
	8 OPER	18	30	12	3	0	0	15
	9 ELEM	7	12	10	3	1	4	8
	N	443	800	952	535	59	102	2891
2012	1 MANA	1	2	3	3	7	1	3
	2 PROF	12	5	10	34	66	78	20
	3 ASSO	10	6	16	28	6	12	15
	4 CLER	0	1	4	5	12	12	4
	5 SERV	8	2	44	24	26	17	21
	7 CRAF	66	63	20	13	0	1	35
	8 OPER	13	26	12	4	1	0	13
	9 ELEM	3	5	8	6	1	15	6
	N	375	895	865	724	46	219	3124
2011	1 MANA	1	6	1	6	1	0	4
	2 PROF	9	2	4	33	72	71	15
	3 ASSO	11	6	20	24	4	42	17
	4 CLER	2	2	10	9	2	3	6
	5 SERV	8	5	44	34	10	0	24
	7 CRAF	65	57	24	9	21	0	33
	8 OPER	12	28	10	1	19	0	13
	9 ELEM	7	8	3	1	2	0	4
	N	237	545	663	455	20	93	2013
2010	1 MANA	2	5	2	3	1	0	3
	2 PROF	7	7	15	43	87	77	25
	3 ASSO	12	4	22	18	1	23	15
	4 CLER	3	0	11	13	0	0	7
	5 SERV	5	3	30	24	1	0	16
	7 CRAF	56	47	15	6	6	6	25
	8 OPER	20	49	8	6	4	0	18
	9 ELEM	8	1	7	0	4	0	4
	N	255	427	529	430	37	154	1834

Source: BKL Employer Study 2010–2013.

Competence shortages

It is clear that difficulties tied to recruitment of candidates for specific occupations depended on the sector in which the employers operated. The observable pattern repeats itself in practice every year, which means it can be deemed a more general regularity. Employers from the industrial sectors – manufacturing and mining, construction, and transport – complain primarily about problems with finding appropriate skilled workers, operators, and assemblers / fitters.

Employers representing the services, trade, and Horeca sector experienced the most problems with seeking candidates to work as sales or service personnel.

Employers from the specialist services and personal (education, human health and social work activities) services found the most difficulties with the recruitment of appropriate specialists.

The stability of the observed pattern across the years should be stressed particularly. Neither the different period of the study, which occurred between the first round carried out in 2010 (autumn) and the other rounds (spring), nor the change in market situation did a significant reduction of recruitment needs of employers in the spring of 2013 influence the level of difficulties encountered in the course of search for employees. In general, it can be stated that the largest problems with recruitment in Poland apply to finding good candidates for skilled workers and specialists.

The primary reason for these problems, according to employers, was that the candidates do not meet their expectations. Every year, this reason was cited by about 80% of employers seeking to fill vacancies and encountering the related difficulties. Only in the case of employers representing the public sector – education, healthcare, and social work – a more frequent problem was the smaller number of candidates responding to advertised vacancies. This is probably caused by the deterioration of financial conditions offered by that sector.

Candidates reporting for work, who failed to meet the expectations of employers, lacked mostly the specific competencies, experience, and, more importantly, the motivation to work (table I.16). Those problems were experienced by representatives of all sectors, regardless of the occupation for which they sought employees. A certain regularity, although not very pronounced, was the fact that employers representing the construction and transport sector (advertising vacancies mostly for skilled workers, operators and assemblers / fitters) indicated shortages in the experience of candidates more frequently than were others. This is tied to the type of occupation, where the important factor, aside from competencies, is the aspect of their practical application, which was measured y experience. In the case of public services sectors (education, healthcare, and social work) the employers more frequently cited the lack of appropriate qualifications: certificates, permits, or licenses, which are formally required in this sector (e.g. teacher's qualifications or doctors' licenses).

Balance of employer needs and labour market potential during recession

Table I.16. Deficiencies of job seekers reported by employers seeking employees and encountering difficulties with finding appropriate candidates (in percentage)

	Candidate deficiencies	appropriate competencies	required permits and licenses	experience	motivation	other	N
2013	Manufacturing and mining	38	9	26	25	2	407
	Construction and transport	30	10	31	25	5	735
	Trade, hospitality, food services	35	6	26	28	6	869
	Specialist services	39	8	21	28	5	522
	Education	41	11	22	9	17	46
	Human health and social work activities	23	29	27	11	11	75
	Total	35	9	26	26	5	2654
2012	Manufacturing and mining	39	8	25	24	4	341
	Construction and transport	30	10	30	26	4	812
	Trade, hospitality, food services	42	5	22	29	2	762
	Specialist services	40	4	24	26	6	697
	Education	30	33	19	15	4	27
	Human health and social work activities	4	53	17	21	6	157
	Total	35	10	25	26	4	2796
2011	Manufacturing and mining	44	9	25	15	8	199
	Construction and transport	24	6	33	32	5	445
	Trade, hospitality, food services	38	3	19	35	4	533
	Specialist services	45	12	16	16	12	348
	Education	31	38	25	0	6	16
	Human health and social work activities	24	37	25	4	10	68
	Total	36	8	23	26	7	1609
2010	Manufacturing and mining	38	3	26	25	8	220
	Construction and transport	29	11	37	18	5	386
	Trade, hospitality, food services	42	9	20	26	4	408
	Specialist services	54	2	21	17	6	399
	Education	65	10	13	13	0	31
	Human health and social work activities	55	2	8	0	35	116
	Total	43	6	24	19	7	1560

Source: BKL Employer Study 2010–2013.

Competence shortages

The deficiencies of candidates, reported by employers, are not the consequence of a lack of information provided in the course of recruitment. In general, since 2010 – the beginning of the BKL Study – a certain interrelation is observed: The more complex the occupational duties, the higher and the more precisely defined are the requirements stated in the vacancy advertisement published by the employer. A similar rule was observed during interviews with employers (Kocór, Strzebońska, 2013). Let us consider how realistic were the expectations towards candidates sought through job advertisements in the spring of 2013, specified by employers representing given sectors (see Tables I.17 and I.18). Already at the first glance, the job offers can be grouped on the basis of the volume of their content into the following: exhaustive, that is, advertisements in which the employers specify numerous expectations towards the candidates (these offers are directed at white-collar workers, from managers to sales and service personnel), and non-exhaustive, that is, advertisements which sporadically define specific features of the candidate (directed at blue-collar workers - skilled and unskilled (elementary) workers, operators of machinery and equipment).

Analysis of the manner in which the employers state their expectations regarding the experience of candidates leads to two conclusions: Firstly, regardless of the business sector of the employer, the lower is the rank of given occupation in the ISCO hierarchy, the lower is the requirement regarding average length of work experience of the candidate. Secondly, job advertisements directed at the lowest occupational groups do not even contain information on the required length of work experience. It is also worth remembering that employment certificate itself is not sufficient in the selection process. Positive references – a document in which the previous employer recommends the person to future employers - is particularly valued in the process of applying for white-collar positions. In the case of these occupational groups, the positive references increase "access" to 40% of offers, on the average, of the whole pool of the relevant employment offers.

Requirements regarding the education level of candidates for specific positions, included in the 2013 job advertisements, also confirm the trend identified since 2010 that the more complex are the duties associated with the given position, the higher is the level of education expected from the candidate. This regularity applies across the sectors. In general, the employers expected higher education from candidates in managerial and professional occupations. The employers expected associate professionals, clerical and sales personnel (including service personnel) to have upper secondary education. From skilled workers and operators, they expected basic vocational education. In the case of unskilled (elementary) workers, the employers usually expected vocational education, with basic vocational education accepted in the sectors of specialist services and in trade, hospitality, and food services.

Analysis of competence requirements confirms that expectations of employers are rational. In the case of this category of requirements, the employers – again, irrespective of their sector of operations – formulated numerous expectations (especially regarding self-organisation, interpersonal skills, job-specific, computer and cognitive competences) towards candidates for white-collar jobs; while their expectations towards candidates seeking physical labour were limited to job-specific, technical and self-organisation competencies, tied to the preparation and maintenance of the workstation. The fact that employers properly match their competence requirements to the profile of offered job is confirmed also by their very slight interest in physical and technical competencies displayed by candidates for white-collar jobs, while the same competences are treated as indispensable in the case of unskilled (elementary) workers. In addition, language skills are expected from white-collar workers, primarily English and German, while this criterion is practically absent from the recruitment of physical workers (the exception being offers addressed to skilled workers from the specialist service sector).

Table I.17. The most frequent* requirements of employers posed for candidates for white-collar positions, broken down according to the employer's business sector

		Manufacturing and mining	Construction and transport	Trade, hospitality and food service	Specialist services	Education	Human health and social work activities
1 MANA	**EXPERIEN****	references, length of experience (av. 2.9 y)	length of experience (av. 2.9 y.), references	references, length of experience (av. 2.4 y)	references, length of experience (av. 2.3 y)	no data	no data
	EDUCAT	higher vocational	higher vocational	secondary, master's degree	master's degree		
	LANGUAGES	English (1/2 of offers), German (1/4 of offers)	English (1/3 of offers), German (1/5 of offers)	English (1/4 of offers)	English (1/5 of offers)		
	COMPET.	PRO, SLF, MNG, AVL, PER	COM, SLF, PRO, MNG, PER	SLF, MNG, COM, PRO, PER	SLF, MNG, PER, PRO, COM		
	N	N = 111	N = 61	N = 185	N = 102		
2 PROF	**EXPERIEN****	length of experience (av. 2.5 y.), references	length of experience (av. 2.8 y.), references	length of experience (av. 1.9 y.), references	references, length of experience (av. 1.8 y)	length of experience (av. 1.3 y.), references	length of experience (av. 2.1 y.)
	EDUCAT	higher – master's degree and vocational	higher – master's degree and vocational	higher – master's degree and vocational	master's degree, secondary	higher – master's degree and vocational	higher – master's degree and vocational
	LANGUAGES	English (1/2 of offers), German (1/10 of offers)	English (1/2 of offers)	English (2/5 of offers), German (1/10 of offers)	English (1/2 of offers)	English (1/10 of offers)	-
	COMPETENCE	SLF, COM, PER, MNG, PRO	COM, PRO, SLF, PER, AVL	SLF, PER, PRO, MNG, AVL	COM, SLF, PER, PRO, MNG	PER, SLF	SELF, PER
	N	N = 302	N = 76	N = 330	N = 1104	N = 204	N=92
3ASSO	**EXPERIEN****	length of experience (av. 1.6 y), references	length of experience (av. 2.0 y), references	length of experience (av. 1.6 y), references	length of experience (av. 1.6 y), references	length of experience (unspecified), references	length of experience (unspecified), references
	EDUCAT	secondary	secondary	secondary	secondary	secondary, master's degree	higher vocational, secondary
	LANGUAGES	English (1/4 of offers)	English (1/3 of offers), German (1/4 of offers)	English (1/10 of offers)	English (1/5 of offers)		
	COMPETENCE	SLF, PER, PRO, COM, AVL	PRO, SLF, PER, COM, MNG	PER, SLF, PRO, MNG, CUL	PER, SLF, COM, PRO, MNG	SLF, AVL, PER, COG	PER, SLF
	N	N = 287	N = 148	N = 513	N = 608	N = 30	N = 41
4 CLER	**EXPERIEN.****	length of experience (unspecified), references	length of experience (unspecified), references	length of experience (unspecified), references	length of experience (av. 1.5 y.), references	no data	no data
	EDUCAT.	secondary	secondary	secondary	secondary master's degree		
	LANGUAGES	English (2/5 of offers), German (1/5 of offers)	English (1/3 of offers), German (1/10 of offers)	English (1/5 of offers), German (1/10 of offers)	English (1/3 of offers), German (1/10 of offers)		
	COMPETENCE	COM, SLF, PER	SLF, PER, COM	PER, SLF, COM, CUL	SLF, PER, COM, PRO, COG		
	N	N = 80	N = 40	N = 255	N = 140		

→

5 SERV	**EXPERIEN.****	length of experience (unspecified), references	length of experience (unspecified), references	length of experience (unspecified), references	length of experience (av. 1.4 y.), references	length of experience (unspecified), references	no data
	EDUCAT.	secondary	secondary	secondary	secondary	secondary	
	LANGUAGES	English (1/5 of offers), German (1/10 of offers)	English (1/5 of offers), German (1/10 of offers)	not applicable	English (1/10 of offers)	not applicable	
	COMPETENCE	SLF, PER, COM, AVL, PRO	PER, SELF, PRO, COM, MNG	SLF, PER, AVL	PER, SLF, COM, PRO, MNG	SLF, COM, AVL, MNG	
	N	N = 160	N = 60	N = 1077	N = 770	N = 20	

* *„Most frequent requirements" mean expectations of employers included in at least 70% of job advertisements directed at specific occupational groups in the given sector. The exception are requirements regarding foreign language skills (values in parentheses), which are expected much less frequently in comparison with other requirement categories.*

** *Values in parentheses denote the average length of experience in the given position and sector, expected by the employer.*

Source: BKL – Job Offers Study 2013.

Table I.18. The most frequent* requirements of employers posed for candidates for blue-collar positions, broken down according to the employer's business sector

		Manufacturing and mining	Construction and transport	Trade, hospitality and food service	Specialist services	Education	Human health and social work activities
7 CRAF	**EXPERIEN.****	length of experience (unspecified), references	length of experience (unspecified), references	length of experience (unspecified), references	length of experience (unspecified), references	no data	no data
	EDUCAT.	basic vocational	basic vocational	basic vocational	basic vocational		
	LANGUAGES	not applicable	not applicable	not applicable	English (1/10 ogł.), German (1/10 ogł.)		
	COMPETENCE	PRO, TEC (1/5 of offers)	PRO, SLF (1/10 of offers)	PRO, TEC (1/10 of offers)	PRO, SLF, COM (1/5 of offers)		
	N	N = 477	N = 264	N = 208	N = 64		
8 OPER	**EXPERIEN.****	length of experience (unspecified)	length of experience (unspecified)	length of experience (unspecified)	length of experience (unspecified)	no data	no data
	EDUCAT.	basic vocational	basic vocational	basic vocational	basic vocational		
	LANGUAGES	not applicable	not applicable	not applicable	not applicable		
	COMPETENCE	TEC, SLF, (1/10 of offers)	AVL (1/20 of offers)	PRO, PER (1/20 of offers)	SLF, TEC (1/20 of offers)		
	N	N = 146	N = 213	N = 109	N = 20		
9 ELEM	**EXPERIEN.****	length of experience (unspecified)	length of experience (unspecified)	length of experience (unspecified)	length of experience (unspecified)	no data	no data
	EDUCAT.	basic vocational	basic vocational	basic vocational, primary	basic vocational, primary		
	LANGUAGES	not applicable	not applicable	not applicable	not applicable		
	COMPETENCE	SLF (1/10 of offers)	PRO, SLF (1/5 of offers)	SLF (1/10 of offers)	SLF, PRO (1/10 of offers)		
	N	N = 73	N = 43	N = 244	N = 47		

* *„Most frequent requirements" mean expectations of employers included in at least 70% of job advertisements directed at specific occupational groups in the given sector. The exception are requirements regarding foreign language skills and competences (values in parentheses), which are expected much less frequently from the blue-collar workers, in comparison with other requirement categories.*

** *The information in parentheses means that the job advertisement did not specify the length of experience in the given position and sector, required by the employer.*

Source: BKL – Job Offers Study 2013.

6. Summary

In light of the Study of Human Capital, the year 2013 was the time of still high unemployment and dwindling number of enterprises and institutions seeking potential employees. In general, the employers were seeking less employees in practically every occupation. The only exception was the slight increase of demand for office employees. The demand for specialists, technicians, and associated professional jobs dropped the most, similarly as demand for skilled workers, operators and assemblers / fitters.

Despite these changes, the same factors as in the previous years, determining active recruitment policy, remained in force. The largest influence on the readiness to hire new employees is the business' development phase (the stronger the company develops, the more willing it is to recruit), employment volume (the larger the enterprise, the bigger are its hiring needs) and dissatisfaction with competences of current employees. The largest percentage of enterprises seeking employees was seen in the construction and transport sector, similarly as in the previous years.

If we look at the labour market from the supply perspective, the three most numerous categories on a countrywide scale include trade and service workers, skilled and unskilled workers. This last category displayed the relatively largest over-supply of job seekers. From this perspective, the lack of specific qualifications is the main reason for difficulties in finding employment. On the other hand, the relatively largest shortage of workers applies to skilled workers, operators / assemblers/fitters and specialists.

The majority of employers (more than 75%) experienced recruitment difficulties, and their proportion was in 2013 even slightly higher than during the previous years. The main source of difficulties lay in the employers' opinion and in the fact that candidates fail to meet expectations. In particular, the level of their competences was unsatisfactory (in particular as regards specific, occupation-related skills); they did not have sufficient experience, or worse still, they did not display appropriate motivation to work.

7. Literature

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Chapter II

Piotr Prokopowicz, Grzegorz Żmuda

Sectoral study of competences – expectations of employers and the higher education learning outcomes on the example of Krakow

1. Introduction

The discussion about a knowledge-based economy, the transfer of technologies, and cooperation between the business community and the educational institutions becomes increasingly present in the public debate with every year. One of its more important elements is the issue of matching the formal education offer to the requirements and needs of the labour market. As the interest in these issues grows, we can frequently observe the tendency to excessive simplification and generalisation, which darken the overall image and hinder the implementation of changes on a systemic level. In this context, a special role is attributed to all reliable research work, which, focusing on the issue of the transfer of intellectual capital from the realm of formal education to the realm of employers, diagnose the mutual expectations, needs and capacities, and identify barriers to cooperation.

The *Study of Human Capital* has and still is playing a pioneering role in this regard. This project already has its conscious and unconscious continuators, and one of them is the sector-based "Study of competences and needs of the Krakow academic centre" (see Balance of competences 2012, 2013), to which this chapter is dedicated.

The text shall not attempt to provide a detailed summary of the two-year research for all the analyzed sectors in the form of a synthetic presentation, because this would be impossible due to the different results across the sectors. Instead, we shall focus on presenting the chief methodology assumptions, and the results and benefits – illustrated with examples – stemming from the adoption of the sector perspective for the analysis of supply and demand of competences. Adoption of this perspective can,

in our opinion, enrich and complement the nation-wide research conducted under the *Study of Human Capital* by providing additional information that can be used under a fact-based dialogue.[16]

2. About the project Study of Competences

The study of competences of the Krakow academic centre has had two rounds. Under the first, the Centre for Evaluation and Analysis of Public Policies of the Jagiellonian University and the Interdisciplinary Centre for Organisational Research and Development at the Psychology Institute of the Jagiellonian University conducted research in the two primary outsourcing sectors of *Business Process Outsourcing/ Shared Service Centres* and *Information Technology/Information Technology Outsourcing* (Study of Competences, 2012).

The second round focused on four more varied sectors – the power sector, life sciences, passive and energy saving construction, and selected segments of the creative sector (Study of competences, 2013). Because the research field and the sectors covered were defined very precisely, it was possible to move away from the study of a representative sample to the study of the population, or, depending on the sector, of the target sample, and both of the enterprises and higher education institutions linked to the individual sectors. The responsiveness of businesses and higher education institutions was not always satisfactory. Despite this, taking into account the limited geographical and sector-based scope, the empirical material collected offers a sound base for reliable conclusions. During the two years of the study, its participants included over 150 companies with a total of almost 20 thousand employees and almost 300 fields of study/majors, which supply over 16 thousand graduates to the labour market.

Each time, the research had the same goal, which was to obtain responses to several core questions covering five areas: I. The standpoint of business, II. The standpoint of the institutions of higher education, III. The study of competences, IV. Cooperation between the business and science communities, V. Trends in the labour market and in the education market. A summary of these issues is presented in Fig. II.1.

One of the most important, preliminarily diagnosed barriers to cooperation between the business and education sectors is the lack of a "common language" and terms used to describe human capital, as well as the frequent stereotypical perception of the partner in discussion. As the institutions of higher education improve the implementation of guidelines tied to the National Qualification Framework and professionally apply the system of learning outcomes, the communication barrier gradually becomes less significant. However, the simplified and unjust image of the "other side" is still visible.

Such stereotypical approach is seen, for instance, in the belief that HE institutions are not interested in the opinions of employers and are not able to implement their requests and proposals. It is also expressed in the conviction of the other side that the enterprises are interested only in "draining" the institutions of higher education and in the instrumental use of their resources. Another often-encountered belief states that, regardless of what the labour market looks like, the obligation of the institutions of higher education is to adapt their educational offer accordingly. All those general and widespread opinions cannot be upheld in light of the results of the sectoral study of competences.

[16] We would like to extend our thanks to all persons and institutions whose involvement made the study possible. The development of the methodology and the study itself would not have been possible without the initiative and openness of the originators and facilitators of the project representing the Krakow City Hall and the Krakow City Council: Mr. Rafał Kulczycki, Ms. Katarzyna Wysocka and professor Paweł Węgrzyn. The study would not have been carried out without the support of the Regional Labour Office in Krakow, industry associations and clusters, and representatives of the Krakow-based enterprises and universities. The team which carried out the study, led by Professor Jarosław Górniak and Professor Małgorzata Kossowska, comprised at various stages of the study: (in alphabetical order): Bartłomiej Baryła, Karolina Dukała, Katarzyna Jaśko, Marianna Król, Diana Malinowska, Piotr Prokopowicz, Joanna Pyrkosz, Maciej Taraday and Grzegorz Żmuda.

Figure II.1. Fundamental research questions in the project, *Study of competences of the Krakow academic centre*

I. STANDPOINT OF BUSINESS

Important competences: What competences are the most sought after by enterprises from the various sectors?
Competences of the future: What competences will be the most important in a 5-year perspective?
Difficulty to obtain: How easy / how difficult it is to find the individual competences in the labour market?

II. STANDPOINT OF THE HIGHER EDUCATION INSTITUTIONS

Education results: At what level are the competences important for the sector taught at the HE institutions?

III. STUDY OF COMPETENCES

Critical consequences: Which competences are simultaneously important and difficult to obtain in the labour market?
Competence shortage: Which competences are simultaneously difficult to obtain in the labour market and not taught at the HE institutions?
Competence gap: Which competences are simultaneously difficult to obtain in the labour market and are being taught at the HE institutions?
Perceived tasks of the HE institutions: The teaching of which competences should be the task of HE institutions, in the opinion of the business community and the HE institutions?

IV. COOPERATION BETWEEB BUSINESS AND SCIENCE

Key fields of study: Which fields of study provide the natural supply of employees for companies from the sector?
Barriers: Where do the representatives of business and HE institutions identify barriers to the establishment and development of cooperation?
Good practices: Is there good cooperation between science (education) and business, and if yes, under what conditions does it exist?

V. TRENDS IN THE LABOUR AND EDUCATION MARKETS

Dynamics of graduate hiring: How many people and to what positions do the enterprises plan to recruit in the coming years?
Dynamics of education: How many graduates and of what sector-related fields of study will the HE institutions deliver to the labour market in the coming years?

Source: Own work on the basis of the Study of competences (2012, 2013).

The starting point for the sector-based study of competences is the analysis of demand for competences among the enterprises. However, this does not mean that these needs should be the only determinant and guideline for shaping university curricula (see, *Study of competences* 2013). Moreover, one of the overriding purposes of this sectoral study is to debunk the myth tied to the issue of the transfer of intellectual capital from the universities to business and to describe objectively the mutual expectations and outlook on the teaching process.

The confrontation of the awareness and views with research results enables a substantive discussion on the quality of teaching, the sensibility of placing much weight on specific competences and on the mutual relations between business and education sectors in selected segments of the economy. The opportunity to refer to concrete data allows a better definition of educational tasks for the various fields and majors of study, as well as the identification of potential shortages and those areas where formal education should be ahead of the labour market. From this perspective, the tasks of the sectoral study of competences do not differ significantly from the Study of Human Capital in Poland. However, the sectoral study is based on several detailed assumptions that make it a very good complement for the nationwide research. Those assumptions are discussed in the following sub-section.

3. Two sides of the equation – premises for the study of competences

The uniqueness of the Study of competences of the Krakow academic centre is based, not only on the analysis' goals, but also rather on the exceptional approach to their execution. The project was carried out under rather specific premises regarding the understanding of the essence of the study, definitions of competences, learning outcomes, basic units of analysis, and the standpoint from which demand for competences is analysed.

3.1. What is the study of competences?

Traditionally, in accounting, the term "balance" is understood as a side-by-side comparison of assets and liabilities. In the case of the study of human capital, the two sides of the balance are the supply and demand of jobs or occupations, or the methodological approach, such as numerical presentations comparing demand for specific type of employees, and not competences.

Under the research described in this chapter, the basic units of analysis are the competences, and the best term to define the research approach would be "epidemiological." What does that mean? Asking about the demand for specific competences (demand) or the achieved learning outcomes (supply) for the specific job, we treated the graduates as "competence carriers" of sorts. This means that, although we asked both the entrepreneurs and representatives of HE institutions on the levels of competences tied to a specific job or area of education, we were not interested in the number of architects that the market would need in 2019. From the standpoint of research goals, it was more significant to know how important in 2019 would be the competences tied to knowledge of construction physics or those tied to designing and use of CAD software.

In order to better understand the premises made during the creation of competence sets, it is worth focusing on the sparse but significant differences between the Study of Human Capital in Poland (the BKL Study) and the Study of competences of the Krakow academic centre. The balance, within the meaning of the BKL Study (2011), comprises the analysis of supply and demand of specific employees and a juxtaposition of competences needed by entrepreneurs with those recognized by the respondents. This perspective, while being valuable, does not include the item that is interesting for the Krakow City Hall, which is, the juxtaposition of competences generated for the market by the institutions of higher education with those that are "purchased" in the market by the employers. The study of competences of the Krakow centreis based on the analysisof the supply of competences provided by the Krakow universities and on the demand for competences among the local business entities. This allowed a clear definition and diagnosis of challenges associated with the transfer of competences between these two domains in the individual sectors.

The largest difference between the BKL Study and the Krakow Study lies in the understanding of competence shortages. Under the BKL Study, demand for specific competences was tested on a "vacancy" basis - the respondents were given a standardised, exhaustive list of competences and asked to indicate those required at a given job. However, the shortages of specific competences were analysed differently; the entrepreneurs were asked an open question ("What were the most important competences that the candidates did not possess?"), and the responses were categorized in line with the list of 11 core competences. This methodology perspective led to a situation in which the competences tied to occupational groups were indicated as in particularly short supply. This result was repeated in the subsequent rounds of the BKL Study. The conclusion drawn on this basis is right, since the employers complain the most about the lack of rare, occupation-related competences. However, we cannot be sure that this effect does not result from the increased psychological availability of competences tied directly to a position. This doubt could be clarified by either providing the employers with a list of standardized lists of competences for the purpose of assessing competence shortages or by including occupational competences into the catalogue of competences presented for the purpose of analyzing demand. This however would be very difficult, due to the scale and nature of research. This level of detail was

successfully achieved in the Krakow study, which was territorially limited and adapted to the specific sectors. The remaining premises of this study are presented below.

3.2. Essence of competences

The relevant literature contains numerous, competitive definitions of competences (see Shippmann et al., 2000). This term, which is used in personnel psychology, law, clinical psychology, and vocational consulting, assumes many different meanings that depend on the context in which it is used. Competences can be defined as the knowledge, skills, and motivation related to work habits and skills used to achieve work goals (Green, 1999) or the knowledge, skills and other characteristics tied to a high level of performing work in a given position (Mirable, 1997). The challenges tied to forming a clear definition of the competence context are very well enumerated in the research conducted by the task force operating for the *Society for Industrial and Organizational Psychology* (Shippmann et al., 2000). It turned out that even homogenous groups of experts are not able to precisely define competence.

Unfortunately, the lack of clearly defined competences is also a problem among Polish companies, which is confirmed by the materials we analysed under the Study of competences of the Krakow academic centre. The documents provided to us by representatives of the various sectors at the first stage of the analysis included competence profiles and competence glossaries, containing skills, features or abilities (e.g. intellectual independence, passion for business, perseverance, positive thinking). On one hand, they lacked any referral to observable behaviours, and on the other, due to the differences in terminology, they made no comparison among companies impossible.

We responded to these challenges with a definition of competence drawn from the American tradition, based on behavioural psychology. For the purpose of the project, competence was defined as "a set of behaviours belonging to a common category, enabling effective realisation of the purposes in an organization and the tasks at the given position, defined by various psychological factors" (*Study of Competences*, 2012, p. 11). In this understanding, competences are not ontogenic features – knowledge, skills, attitudes, or abilities – but constitute sets of behaviours tied to these features, expected at the given position. The characteristics that are manifested by competences are indicated below:

- Knowledge – information acquired during the learning process (e.g. the basics of economics),
- Skills – acquired, learnt actions within a given area (e.g. operation of MS Office software, foreign language skills, but also social skills – very important from the standpoint of the workplace),
- Abilities – inborn predispositions within a given area (e.g. analytic abilities),
- Other – the qualities that cannot be attributed to the aforementioned categories (e.g. PRINCE certificate)17. (S*tudy of Competences*, 2012, p. 11).

The understanding of competences, presented above, slightly different than adopted under the Study of Human Capital ("knowledge, skills and attitudes associated with the performance of specific actions, independent of the mode in which they were acquired, and whether they have been corroborated with a validation procedure"; BKL Study 2011, p. 27) allows, in our opinion, to more clearly capture the fact that competences apply directly to the occupational role and also to the organizational context in which they are manifested. More importantly, competences understood in this manner are easier to translate into the language used by institutions of higher education, which is the language of learning outcomes.

3.3. Learning outcomes

As one of the fundamental goals of analyses performed under the *Study of competences of the Krakow academic centre* was to build a glossary to facilitate understanding between the business circles and the universities regarding the teaching of competences, it was necessary to refer to the language universally

[17] The definition of the individual characteristics constituting psychological substrates of competences, adopted for the purpose of the study, is based on the traditional division in the KSAOs – *knowledge, skills, abilities, other attributes* that is traditionally accepted in the psychology of labour and organisations (Landy and Conte, 2007). For this approach, the typical understanding of "abilities" as inborn predispositions does not fully reflect the meaning of this word in Polish. However, it enables more clear allocation of individual features of graduates to the given groups of competences.

used by the Polish institutions of higher education, which is the language of the National Qualification Framework (KRK). This report is not the place to discuss the KRK[18] system itself. However, it is necessary to quote the definitions adopted for the project, which enabled the development of competence glossaries that were compatible in both ways (universities – business).

The National Qualification Framework is a specific type of a description of qualifications obtained by graduates of particular fields of studies, formulated in the language of learning outcomes, which is the language of requirements that a student should meet after completing a certain level of education (see Kraśniewski, 2011; Chmielecka, 2010). The essence of learning outcomes, according to Kraśniewski (2010, p. 12), boils down to the statement "… what the student should know, understand and be able to do after completing a certain period (process) of education." A period of education may be a single academic course or the whole curriculum in the given field of study. More importantly, according to the KRK, the learning outcomes are not "taught" but "realized," also independently, by the students themselves. This slight semantic difference has very serious practical implications. It means that the "the curriculum is as important as the teaching methods used to achieve particular learning outcomes" (*Study of competences*, 2012, p. 12). According to the guidelines formulated by the Bologna process experts, the learning outcomes in Poland are broken down into three categories: knowledge, skills, and social competences. These terms are closely tied to the classification of characteristics being the background for competences, adopted in the *Study of competences.* It is worth noting that the individual areas of learning outcomes are not always separable categories (see Kraśniewski, 2011), because the skills almost always I contain a knowledge component, and so on. The KRK system, which has been implemented for almost a decade now, is a huge opportunity for universities that gained larger flexibility in the forming of their curricula, and it is tied to a huge effort linked to the formulation of the desirable learning outcomes and their reliable verification. In this context, the study of the expectations of employers are an invaluable source of information, especially as, pursuant to the Regulation of the Minister of Science and Higher Education of 5 October 2011 on the conditions for offering studies in particular fields and on the level of studies, the learning outcomes should be defined, among others, on the basis of an analysis of labour market needs (see Kraśniewski, 2011).[19]

The Study of Human Capital, in terms of competence supply, does not analyze the learning outcomes achieved by institutions of formal education. Instead, it focuses on an in-depth research of the formal and informal education sectors (quantitative indicators) and on the self-assessment of competences. Of course, the fact that individual entities (schools or training companies) are not covered by the analysis is understandable, given the nation-wide character of the BKL Study and the resulting limitations. The purpose of the BKL Study was to analyse the level of competences supply and demand, without determining the source of competences.

A good supplement for the image of competence supply, described by the BKL Study, are the results obtained in the course of the *Study of competences and needs of the Krakow academic centre* presented here. This study focused on learning outcomes achieved through the fields of study and majors named by entrepreneurs as significant sources of competence supply. Researching the persons responsible for the areas of study and for the assessment of achieved results, this study provides another perspective for analysing the transfer of competences from the education sector to the business sector.

3.4. Important, unobtainable, sector-specific

Another element, which differentiates the project presented in this chapter from other similar research, is the combination of two close premises: (1) Competences considered by the employers as important from a business standpoint are not always difficult to obtain in the market; (2) the structure of competences which are important and difficult to obtain depends largely on the nature of the sector

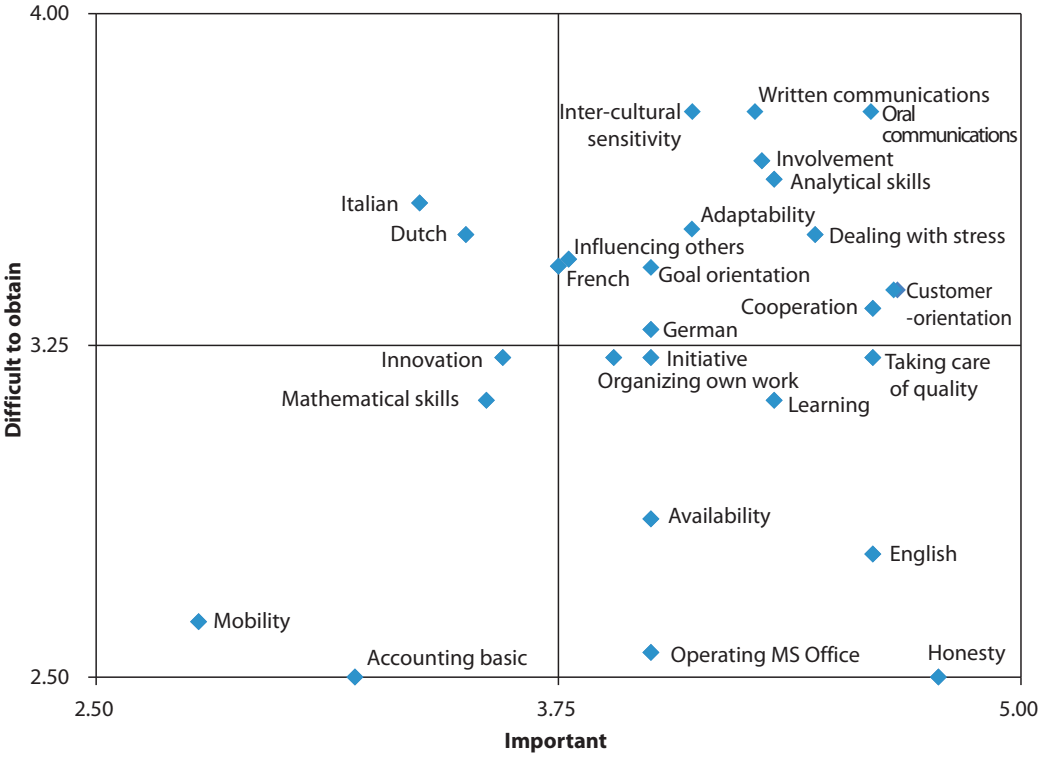
[18] Detailed description and analysis of the National Qualification Framework and the related terms can be found in the publication by A. Kraśniewski (2011), *Jak przygotować programy kształcenia zgodnie z wymaganiami Krajowych Ram Kwalifikacji dla Szkolnictwa Wyższego*. MNiSW, Warsaw; and in the publication edited by E. Chmielecka (2010), *Autonomia programowa uczelni. Ramy kwalifikacji dla szkolnictwa wyższego*. MNiSW, Warsaw.

[19] More information on the opportunities to use the study of employers' expectations to build learning outcomes, tools for their assessment and validatin, as well as the various didactic methods and techniques supporting their achievement, can be found in the *Study of Competences (2012).*

Important, unobtainable, sector-specific

in which the analysis is conducted. According to the first premise, the main analysis of the research, which is the study of competences named in the title, is the specification of competences recognised by the employers as easy or difficult to obtain and of the learning outcomes (defined according to the same behaviours) which were named by the universities as realised in the course of studies. From this perspective, the Study clearly presents the areas in which the education system functions in an optimum manner, from the business standpoint, as well as areas where intervention should be focused. The differentiation between competences which are important and difficult to obtain, while maintaining the manner in which they are studied, enables the analysis of critical competences which are both important and difficult to obtain, as well as other groups which are formed through the overlapping of these two dimensions (the difference between importance of a competence and the difficulty tied to obtaining it is illustrated in the matrix in Chart II.1; sample results are included in sub-section II.5).

Chart II.1. Competence matrix "Importance / Accessibility" in the BPO/SSC sectors



Values on the horizontal axis mean the average importance ratings on a 1 to 5 scale; values on the vertical scale reflect the average assessment of difficulty to obtain the given competence on a 1 to 5 scale. For improved clarity, the chart employs a reduced scale (from 2.5 to 5 and from 2.5 to 4, respectively).

Source: Study of competences (2012).

The clearly sector-oriented nature of the study – the basis for premise no. 2 – was determined by the nature of the need voiced by the Krakow City Hall and had its very significant practical and methodological consequences. First of all, due to the limited pool of companies and universities comprising each of the sectors, population research was possible. Secondly, thanks to the involvement of local industry associations and clusters into the study, for whom one of the benefits tied to the study was better optimization of their personnel processes, the performance of the study and the promotion of its results were significantly facilitated. Thirdly, cooperation with enterprises operating in the particular industries allowed us to create detailed, sector-specific glossaries of competences that are the basis for the common language of discussion on the transfer of intellectual capital between business and education. In the course of the project, the following were defined and described, depending on the industry:

- from 16 to 22 competences in the field – specialist knowledge,
- from 13 to 37 competences in the field – specialist skills,
- from 13 to 14 competences in the field – business knowledge and skills,
- 16 competences in the field – soft skills,
- from 17 to 21 expectations regarding foreign language skills and other requirements.

The above catalogue, particularly regarding specialist knowledge and skills, enabled an exhaustive diagnosis of the full range of competences for which the individual sectors report demand.

3.5. Conclusions and challenges

The premises presented in this sub-section, especially those referring to individual sectors, were tied to certain limitations. From the perspective of the Krakow City Hall, the interest in the flow of competences within the Krakow circles is natural, but the mobility of personnel means that such limitation excessively narrows down the analysis area. This has been particularly pronounced in the case of sectors tied to heavy industry, where some of the large employers operate (and recruit) for their offices outside Krakow. This limitation – albeit understandable in the context of this study – can be overcome only under nationwide research.

Another challenge tied to the analyses in question was the fact that both the demand for competences and the level of their realisation at institutions of higher education were based on subjective opinions of employers and university representatives. We attempted to triangulate results of the study by juxtaposing opinions of HR departments, representatives, and managers and asking questions on the learning outcomes to persons who are the closest to the operating reality of fields and majors of study. However, this does not change the fact that an ideal situation, regarding the fulfilment of study goals, would occur only if actual competence tests were conducted both for the graduates (supply) and for employers (demand). This was impossible under the present scope, however, such an option should be considered in the case of subsequent studies or if the project was extended on a nationwide scale, especially in the context of promoting innovative, accurate and cost-effective tools for diagnosing competences, namely, the competence situation tests (Prokopowicz, Żmuda and Król, 2014).

Another challenge that arose in the course of defining two sides of the equation (i.e. the supply and demand of competences) was the difference in the degree of advancement of personnel management in the individual sectors and companies that were already noticeable at the initial diagnosis stage. This problem, tied to the awareness of employers, must be taken into consideration in the case of any diagnostic studies, because low understanding of human resources issues can lead to distorted responses. A good practice, which we tried to use in our study, was to define competences in an easily understandable language, verified in the course of a pilot study through *think-a-loud protocol*.

The final, important challenge is tied to the basic premise adopted in the study regarding the sequence of structuring the balance. Since we commenced the study each time with the employers, we allowed them to "impose" the demand structure. This approach is justified by the guidelines of the Ministry of Higher Education, which specifies that the curricula should be constructed based on the entrepreneurs' needs and with their participation (so far, no such guidelines were drawn for the entrepreneurs). However, from the research standpoint, it would be equally interesting to start from the learning outcomes achieved by universities and to verify to what extent they are seen as necessary from the business perspective. The development of a competence glossary based on learning outcomes for the important fields and majors of study could mean that the result of the study would be better matched to current needs of universities; however, at the same time, it would be more distant from the demands of employees.

4. Methodology

As mentioned in the introduction, the research used the materials analysed under the *Study of competences of the Krakow academic centre* and was divided into two rounds. The methodologies employed in both rounds were similar; however, due to certain limitations diagnosed after the first round (i.e. too detailed analysis, low responsiveness of institutions of education), certain changes have been introduced. This chapter presents the methodology used for the diagnosis of competences in the following sectors: the power sector, life sciences, passive and energy-efficient construction, and selected segments of the creative sector. Persons interested in information on the methodology used to analyse the BPO and ITO sectors are encouraged to reach for the source report (*Study of Competences 2012*).

In comparison to the study of the BPO/SSC and ITO/IT sectors, quite significant changes to methodology were introduced in the second round of the Study of competences (2013). Moreover, the reasons behind these changes are an interesting subject for analysis; therefore, we have decided to present them briefly.

The first important factor applies to challenges tied to the definition of a sector. In the case of the PBO/SSC and IT/ITO sectors, the situation was rather clear; but as regards the sectors analysed during the second round of the study, there have been significant discrepancies in the criteria for their definition. To cope with this challenge, expert interviews were added to the preparatory phase with the intention to precisely determine the study scope.

For similar reasons – and again, contrary to the study of BPO and ITO sectors – it was impossible to analyse the whole population of entrepreneurs in the case of all the sectors. Some of the sectors, primarily the creative industry, consisted mainly of small and medium-sized enterprises, and their numbers forced us, to a certain extent, to conduct the study on a sample. For the second round of the study, we invited the whole population of companies with more than 9 employees from selected categories of the Polish Classification of Business Activity (PKD). The only exception was the passive and energy-efficient construction and certain other segments where the PKD database is not applicable, because it is impossible to determine the actual business profile of the companies. Micro-enterprises were added to the pool of studied enterprises through purposive sampling, based on opinions by industry experts and their activity in the relevant sectors (participation in fairs and other industry events, high recognition). The disadvantage of this approach is the inability to extrapolate conclusions to the whole industry population (for instance, as regards employment indices); however, this selection of research sample, given the project requirements, enabled a better estimation of market tendencies and the expected dynamics of demand for competences.

The most important change with respect to the first round was the fact that analysis of demand for competences was conducted on a higher level of generality (apart from specific jobs). This was due to the desire for achieving a higher return rate of questionnaires and to the significant differences in the development levels of strategic human resource management (SHRM) in enterprises, which had been diagnosed in the preparatory phase. Changes in the approach were transposed to all tools used to diagnose supply provided by the Krakow universities.

In summary, the *Study of competences of the Krakow academic centre* consisted of the following steps:

4.1. Preliminary stage

The preliminary stage of the study comprised the following actions:

- **In-depth interviews with experts (sector leaders) and consultations with the City Hall and Regional Labour Office in Krakow.** Their purpose was to draw up the final definition of industries, and deeper understanding of their operating context. The additional purpose of the interviews was to identify the key subjects – both in the business circles and among the universities.
- **Analysis of existing data (industry reports, job advertisements).** The main purpose of this action was to understand and to classify the main challenges faced by each of the sectors and to draw up a preliminary list of positions and competences sought after in the given sector.

4.2. Demand analysis

The research covering the analysis of demand for specific competences included the following actions:

- **In-depth interviews with company representatives.** The in-depth interviews conducted with selected companies gave the researchers knowledge of the opinions and experiences of business' representatives tied to various areas of the personnel function: recruitment, selection, and development of employees. In addition, the interviews served to verify the clarity and value of the preliminary list of competences, which resulted in the list being supplemented and included in the tool "Demand questionnaire."

- **Development and testing of the "Demand questionnaire."** The catalogue of data collected through analysis of existing data and in-depth interviews served to create an on-line questionnaire, which was tested with the use of the *think-a-loud protocol* method for its clarity and usefulness.
- **Development of research sample of companies.** At this stage, the research sample was defined for each of the sectors. The purposive sample was created based on the PKD database, *desk research* analysis, and recommendations from experts and companies.
- **On-line study of companies from the sector, using the "Demand questionnaire."** During this stage, the following information was collected:
  - quantitative data on the current and predicted needs of business regarding the most important competences of the graduates of Krakow's universities,
  - evaluation of the difficulty to obtain the individual competences in the Krakow market,
  - opinion on the tasks of HE institutions regarding the teaching of the individual competences,
  - employment plans (current and in 5 years' time),
  - indication of competences which are necessary for the graduates to be promoted within the company,
  - definition of the best fields of study and majors, whose profile matches the company's needs.

4.3. Supply analysis

Under this stage of the project, the following actions were undertaken:

- **Development and testing of the "Supply questionnaire."** Based on information collected through analysis of existing data and the catalogue of competences from the "Demand questionnaire," an on-line questionnaire was developed. It was tested with the use of the *think-a-loud protocol* method for its clarity and usefulness.
- **Development of research sample of fields of study and majors offered at the institutions of higher educations.** The research sample for the analysis of competence supply was selected based on the *desk research* analysis and recommendations from experts and companies indicating institutions of higher education, fields of study, and majors teaching for the purposes of the sector.
- **Structured interview (together with completion of the Supply questionnaire).** The purpose of this stage was to acquire quantitative data on the learning outcomes realized at the given moment by the fields of study and majors. In addition, at this stage, the representatives of universities presented the current and future numbers of graduates. The final purpose was to learn about the general context of the functioning of the given field of study, in particular, problems encountered in the course of cooperation with business circles and expectations regarding businesses and the Krakow City Hall.
- **On-line questionnaire for representatives of fields of study and majors with the use of the "Supply questionnaire."** During this stage, the following information was collected:
  - quantitative data on the currently realised learning outcomes,
  - information on the current and projected for the future number of graduates of specific fields of study and majors,
  - opinion on the tasks of HE institutions regarding the teaching of the individual competences.

5. Key results and conclusions

This sub-section presents a brief summary of the key results of the *Study of competences*, including commentary.

5.1. Important competences and competences of the future

One of the most important questions to which answers were sought under the *Study of competences* (2012, 2013) was the one referring to the importance of the individual competences, both at the time of the study and over a five-year perspective. The results illustrate opinions of representatives of Krakow-based companies (owners, operating managers, and HR managers) on these issues. Table II.1 below presents the 10 most important competences now (2012 for BPO/SSC and IT/ITO, 2013 for the other sectors) and over the next five years (2018 and 2019, respectively).[20] In the beginning, one reservation should be raised, which slightly limits the opportunity for drawing far-reaching conclusions. In the majority of cases, representatives of companies very cautiously spoke of the sector's future in a five years' perspective, stressing that forecasting for such a period is difficult for many reasons. In many cases, this was due to the uncertain situation of enterprises, their dependency on project-related orders, relatively large changes in sales volumes, and the resulting preference for flexible forms of employment, or finally the still imprecise consequences of legal changes that shape the sectors' condition and development trends.

As shown in Table II.1, the lists of most important competences vary quite significantly across sectors. The only competence named among the 10 most important competences in all analyzed sectors is *honesty*. Other competences, listed as particularly important in more than half of the analyzed sectors included *care for quality*, *learning* and *English language skills*. All these competences naturally have a transferable nature and are useful in various contexts.

On the general level, it can be said that soft (social) skills dominate the competences cited by employers as the most important. The sectors of passive and energy-efficient construction and partly the energy sector are an exception, because the specific knowledge and specialist skills are more important. The fact that this effect is absent from the life science sector should be attributed to its local nature. It is quite probable that the results would be different in other regions of Poland. It is surprising that the competences named as the most important in the IT/ITO sector do not include selected programming languages or other specialist skills. This result is determined in part by a different methodology employed during the first round of the *Study of competences* (2012), in part by the specific nature of work of IT specialists, and the nature of the IT/ITO sector in Krakow, where the employers do not practically perceive any competence shortages among candidates in that respect, even students of the first years quite often possess all the sufficient skills; the ability to program in one language significantly facilitates the learning of other ones, thus reducing the relative importance of the specific language.

[20] Between the first and the second round of the *Study of competences*, changes were made to the methodology, which is described in detail in the report *Study of competences* (2013). These changes do not have a significant influence on the ability to compare the relative importance of competences and trends across the individual sectors.

Table II.1. The 10 most important, at present, competences in the six analyzed sectors

The most important competences at present					
BPO/SSC	**IT/ITO**	**Life science**	**Power sector**	**Passive and energy-efficient construction**	**Creative**
Honesty	English	Using office software packages	Using 3D design software	Honesty	Cooperation
Customer orientation	Honesty	Taking care of quality	Using office software packages	Knowledge of energy-efficient technologies	Involvement
Oral communication	Initiative	Honesty	Driver's license	Effective energy management	Honesty
Taking care of quality	Taking care of quality	Analytical skills	Dealing with stress	General technical and engineering knowledge	English
Cooperation	Involvement	Clinical research	English	Knowledge of construction materials	Learning
English	Innovation	Involvement	Honesty	Using office software packages	Analytical skills
Dealing with stress	Goal orientation	Learning	Investment management	Taking care of quality	Customer orientation
Learning	Cooperation	Focus on development	Oral communication	Ventilation and AC installations (HVAC)	Taking care of quality
Analytical skills	Learning	Adaptability	Learning	Project documentation	Focus on development
Written communication	Adaptability	Validation	General technical and engineering knowledge	Energy optimisation	Innovation

Colours mark those competences that are repeated in more than half of the studied sectors. The same competences are marked with identical shades to facilitate the identification of differences across sectors.

Source: the author's own work based on the Study of competences (2012, 2013).

As regards to the competences of the future – those which will be the most important in five years' time from the study – we see even stronger differentiation of results among the sectors (see Table II.2). Only four competences have been named among the 10 most important competences of the future in more than two sectors: *innovation, initiative, learning,* and *honesty.* There is a tendency for a relative growth of the importance of specific specialist competences (knowledge and skills), which could be caused by the enterprises embracing specific directions for strategic development and by their reaction to challenges posed by the environment. The second aspect is well illustrated by the result in the power sector, which in Krakow (but probably in other locations too) is characterized by significant uncertainty. Representatives of this sector perceive their development chance in public investments, which is reflected in greater weight attributed to such competences as knowledge on the forms and methods of investment financing and knowledge on the current procurement law (see Chart II.2).

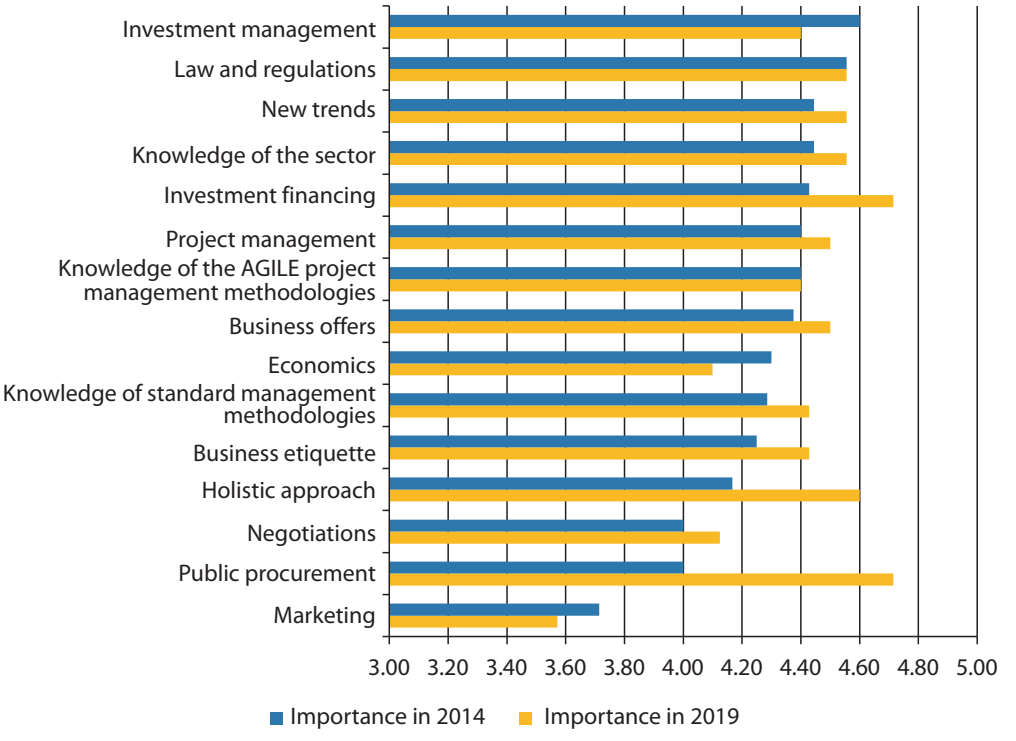
Table II.2. The 10 most important, at present, competences over a 5-year perspective, in the six analyzed sectors

The most important competences over a 5-year perspective					
BPO/SSC	**IT/ITO**	**Life science**	**Power sector**	**Passive and energy-efficient construction**	**Creative**
Innovation	Initiative	Taking care of quality	Using 3D design software	Knowledge of energy-efficient technologies	Game production environments
Influencing others	Innovation	Honesty	Learning	Designing of energy-efficient buildings	Knowledge of the AGILE methodology
Basics of economics	Written communication	Clinical research	Investment financing	Effective energy management	Human – computer interaction
Dealing with stress	Oral communication	Analytical skills	Public procurement	Designing of passive buildings	Learning
Initiative	Goal orientation	Cooperation	Effective energy management	Project documentation	Analytical skills
Goal orientation	Organising own work	Using office software packages	English	Honesty	New trends
Adaptability	Cooperation	Involvement	Using office software packages	Ventilation and AC installations (HVAC)	Game designing
Analytical skills	Involvement	Adaptability	Innovation	Using simulation software	Taking care of quality
Mathematical skills	Inter-cultural sensitivity	English	Holistic approach	Knowledge of construction materials	Test-driven development
Customer orientation	Learning	Customer orientation	Honesty	Energy optimisation	Initiative

Colours mark those competences that are repeated in more than half of the studied sectors. The same competences are marked with identical shades to facilitate identification of differences across sectors.

Source: the author's own work based on the Study of competences (2012, 2013).

Chart II.2. Expected importance of all competences from the area "Business knowledge and skills" as seen by employers from the power sector for the years 2014 and 2019



Source: Study of competences (2013).

5.2. Critical competences – importance vs. difficulty to obtain in the labour market

As previously mentioned, the assessment of the importance of competences and of the difficulty to obtain them in the labour market are two separate phenomena. Of course, it can be assumed that they are interrelated, but what is difficult to obtain becomes, in a sense, more important. However, analysis of these two values allows identifying critical competences (both important and difficult to obtain) and competences that determine the strength of the given labour market (important for the companies and easy to obtain).

Similarly as in the case of the assessment of importance itself, here too significant diversity across the sectors can be seen (see Table II.3). It is quite strong and enabled the identification of such competences that are critical for one sector and can easily become the competitive advantage of another. For instance, *honesty,* which in the case of BPO/SSC, IT/ITO or the passive and energy-efficient construction sectors is seen as both important and easy to obtain, is rated as very difficult to obtain in the creative sector. It is worth noting that, despite the fact that *honesty* was defined in behavioural categories as "Adhering to the common moral standards," some of the employers can treat it as synonym of loyalty, which could explain this exceptional result in the creative sector. A similar phenomenon is observed in the case of *taking care of quality*. In the IT/ITO sector, this is a strength of the labour market, while the situation is quite contrary in life science and the power sector. *Analytical skills* are a strength of graduates hired in the power sector and weakly represented in BPO/SSC.

Table II.3. Presentation of critical competences (important and difficult to obtain) and strengths of the labour market (competences important companies and easy to obtain) for the 20 crucial competences across the six analysed sectors

	BPO/SSC	IT/ITO	Life science	Power sector	Passive and energy saving construction	Creative
Critical competences	• Oral communication • Written communication • Inter-cultural sensitivity • Involvement • Analytical skills	• Initiative • Innovation • Software testing ability • Involvement • Inter-cultural sensitivity • Data algorithms and structures	• GMP rules. • Validation • Taking care of quality • Initiative • Technical English	• Effective energy management • Oral communication • Investment management • Knowledge of the sector • Taking care of quality	• Control of HVAC equipment • Designing energy-efficient buildings • Initiative • Effective energy management • Energy optimisation	• Honesty • Goal orientation • Innovation • Cooperation
Strengths of the labour market the market	• Honesty • English • Using office software packages • Time availability	• English • Taking care of quality • Learning, • and 6 other competences	• Using office software packages • English • Learning • Analytical skills	• Using office software packages • Driver's license • English • Analytical skills	• Using office software packages • Honesty • Learning	• Involvement • English • Focus on development

Source: the author's own study based on the Study of competences (2012, 2013).

5.3. Competences taught at institutions of higher education

In order to estimate the supply of competences that are important for the individual sectors covered by the Study, the lists of competences were translated into the language of obtained learning outcomes, and representatives of fields of study and majors indicated by the employers (supplemented by fields of study selected on the basis of curricula analysis) were asked to perform a self-assessment of their achievement under the various education modules. A presentation of detailed data on each of the sectors would take more space than allowed under this publication. Therefore, Table II.4 presents results for four sectors analysed under the second round of the study of competences. The percentage values indicate what part of the fields of study/majors linked to a given sector fulfil the learning outcomes from each of the four competence groups.[21]

In the case of the life science sector, the universities state that they manage to achieve, on at least medium level, over half of learning outcomes tied to specialist knowledge (56%), a little lower results tied to specialist skills and soft skills (46%), and to the least results tied to business knowledge and skills (26%). Results for the power sector are different. Here the most achieved learning outcomes are tied to soft skills (74%), and the next group comprises business knowledge and skills (57%). In the sector of passive and energy-efficient construction, the most frequently achieved results are tied to specialist knowledge and soft skills (on the average 56% in both groups). Significant differences are also seen among the two singled out segments of the creative sector (see Table II.4).

Given the fact that companies in each of the sectors recruit employees to different positions, requiring varied sets of competences, it is difficult to expect that the individual fields of study would be able to achieve all learning outcomes. In many cases, it would not only be impossible, but inadvisable. The higher the internal differentiation of the sector, the less comprehensive learning outcomes would be achieved by the universities. Naturally, the fields of study also differ significantly in terms of obtained learning

[21] Representatives of universities were asked in the course of the study to indicate the degree (on a scale of 1 to 5) to which the given field of study or major is able to achieve the learning outcomes tied to competences important from the standpoint of employers. This data allowed to analyse the percentage of higher education institutions relevant for the sectors, which provide, to a given extent, the significant competences.

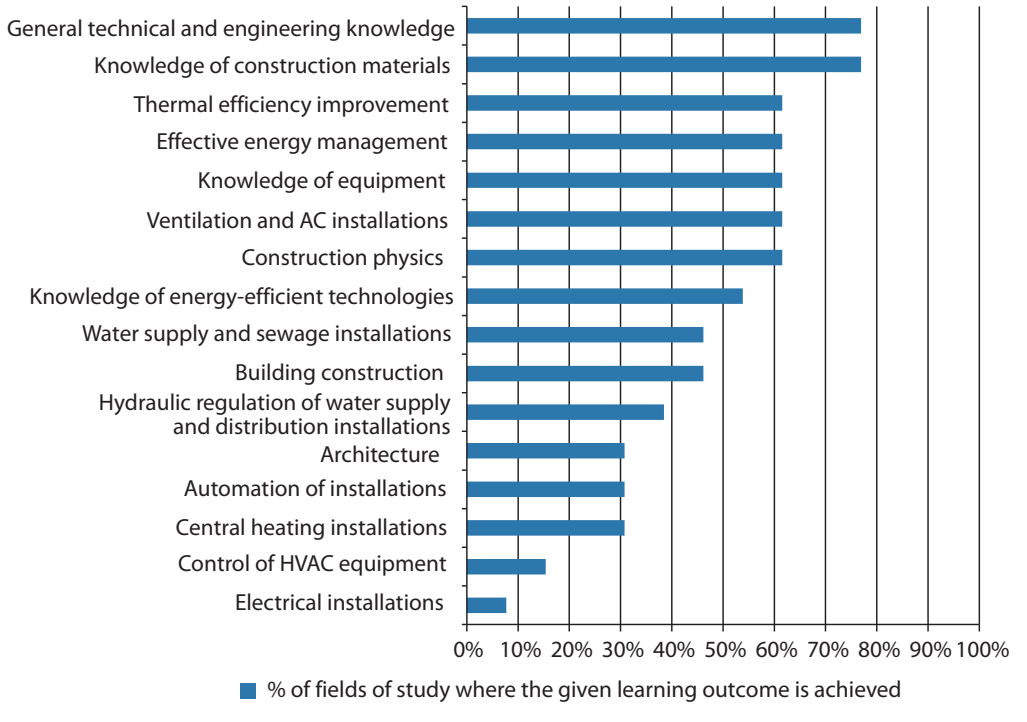
outcomes. For the passive and energy-efficient construction sector, the best-matched field of study turned out to be post-graduate studies carried out in cooperation with one of industry associations, which declared the achievement of 94% of results tied to knowledge and 100% of results tied to specialist skills. In the power sector, the best-matched field of study achieved 86% and 69%, respectively, of learning outcomes in these categories. Examples of detailed results regarding specialist knowledge in the passive and energy-efficient construction sector are presented in Chart II.3.

Table II.4. Percentages of learning outcomes achieved on at least medium level in each of the four competence groups

	Life science	Power sector	Passive and energy-efficient construction	Creative: Creation	Creative: Culture
Specialist knowledge	56%	50%	56%	46%	36%
Specialist skills	46%	43%	43%	39%	26%
Business knowledge and skills	26%	57%	44%	48%	56%
Soft skills	45%	74%	56%	68%	86%

Source: own work on the basis of the Study of competences (2013).

Chart II.3. Percentage of fields of study and majors where learning outcomes from the "Specialist knowledge" area for the sector of passive and energy-efficient construction are achieved on at least a medium level (standpoint of universities)



Source: Study of competences (2013).

5.4. Shortage of competences and competence gaps – difficulty to obtain vs. obtained learning outcomes

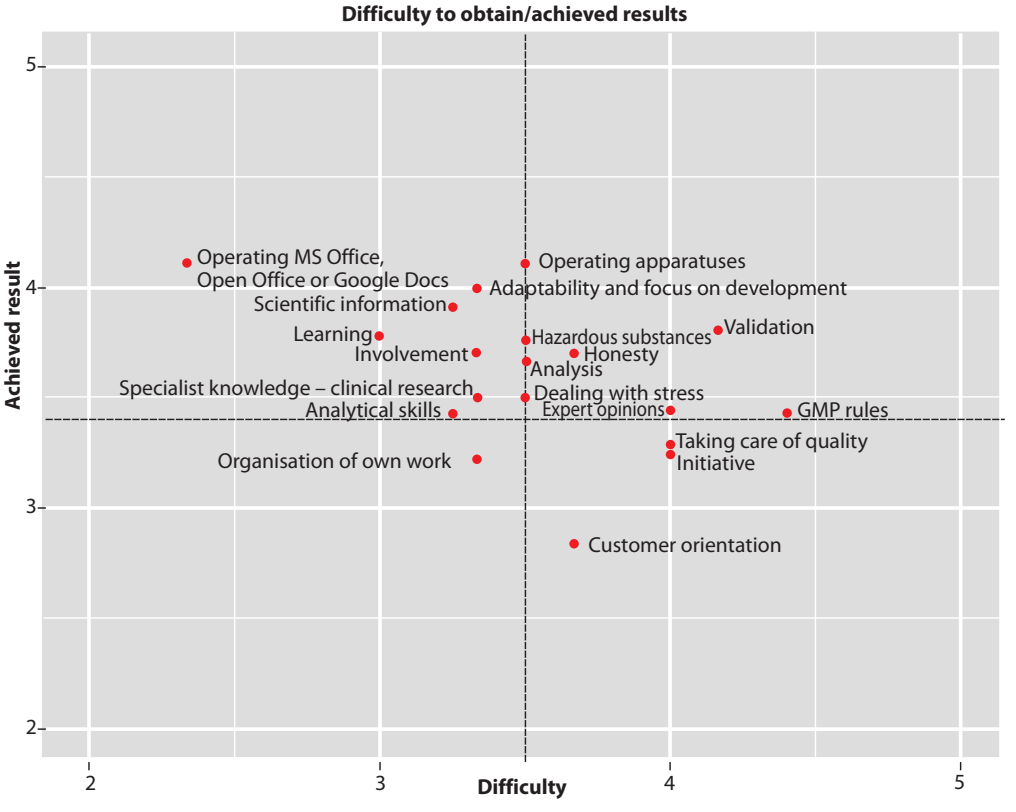
Demand analysis indicates competences key in from the perspective of the sectors and the relative difficulty to obtain them in the labour market, in the opinion of employers. Supply analysis indicates, in turn, the assessment of the degree to which the learning outcomes required by business are achieved, according to the assessment of higher education institutions. The main element of the study is the juxtaposition of these two outlooks. In an ideal situation, competences difficult to obtain in the labour market would be simultaneously not taught by universities, while competences taught at the

Shortage of competences and competence gaps – difficulty to obtain vs. obtained learning outcomes

universities would be easy to obtain for the employers. There are of course many factors (mentioned in the sub-section on challenges and limitations) which cause the probability of such "ideal" results to be very low. One of such factors is the possible distortions in the assessment of both the difficulty to obtain the competences and the achieved learning outcomes. Another one is the fact that the graduates of Krakow universities do not seek jobs exclusively in Krakow-based companies, and the companies do not hire only Krakow students. The difficulty of finding candidates possessing the specific qualifications is not determined solely by the quality of education, but also by the number of graduates, the quality of the recruitment and selection process, and the renown of the employer. The achieved learning outcomes apply to the medium level of "an average student," which means that the graduates can be both better and worse than suggested by the expected learning outcomes. At least several similar factors could be named, and we mention them only to remind the reader that the research result should be just a starting point for discussion on the desirable form of curricula on the nature of cooperation between business and science or on the need to make specific changes. Detailed solutions should be developed in the course of intense work carried out by the directly interested entities.

Chart II.4 presents a sample of difficulties tied to obtaining the most important competences, juxtaposed against the assessment of learning outcomes obtained in the life science sector. Aside from the contents of competences placed in the individual fields of the matrix, it is worth noting the significant imbalance. The upper part of the matrix is significantly over-represented. This includes the upper right quarter, which proves a discrepancy between the assessments of business and universities (competences both difficult to obtain and taught in the universities) and the upper left quarter, which proves consistency of opinions (competences easy to obtain and taught). The upper right quarter, which house as much as 45% of the core competences for the sector, can be called the competence gap. It is dangerous, because it is possible that its background is structural. The lower right quarter (15% of competences in the life science sector) are the shortage competences, which are not taught at universities and difficult to obtain for the companies.

Chart II.4. Matrix illustrating the dependency between the difficulties associated with obtaining specific competences (employers' perspective) and the obtained learning outcomes (universities' perspective) for the twenty core competences in the life science sector



Values on the horizontal axis mean the average rating of difficulty associated with obtaining the given competence measured on a 1 to 5 scale; values on the vertical axis reflect the average assessment of degree to which the given learning outcome is achieved, on a scale of 1 to 5. For improved clarity, the chart employs a reduced scale (from 2.5 to 5 and from 2.5 to 4, respectively).

Source: Study of competences (2013).

Sectoral study of competences – expectations of employers and the higher education learning outcomes on the example of Krakow

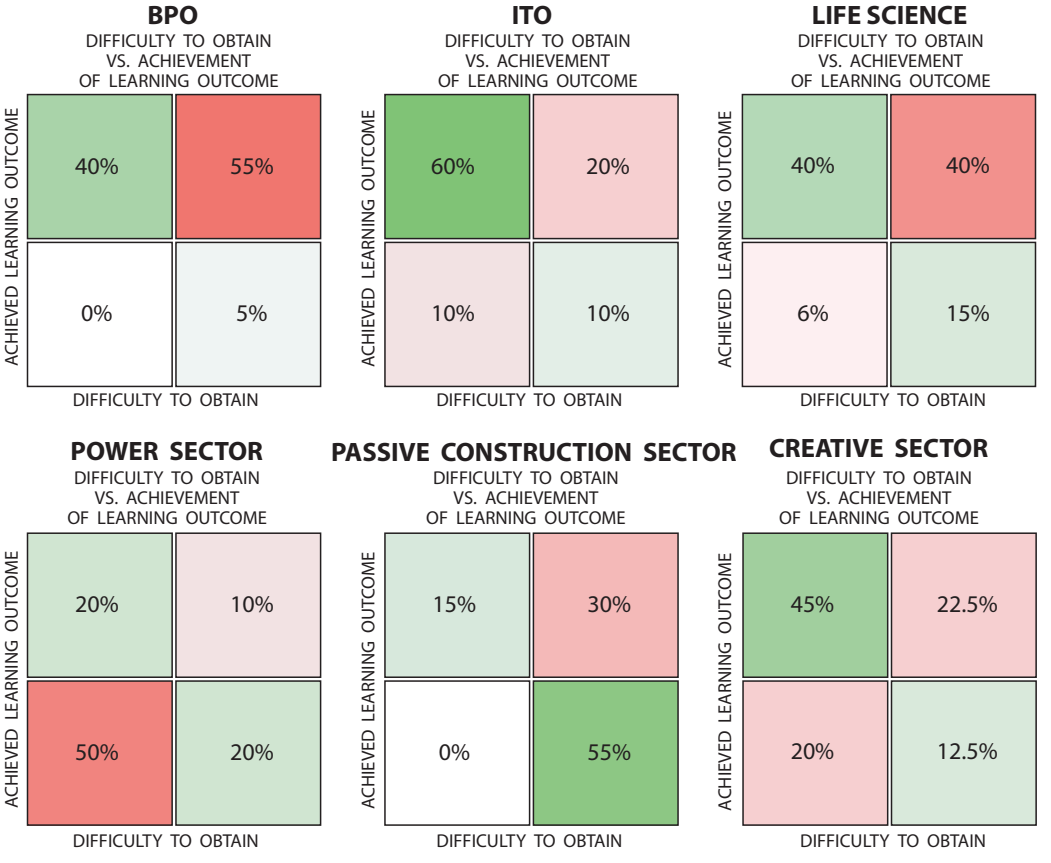
The juxtaposition of percentages of the crucial competences per individual sectors is presented in Figure II.2. The largest harmony between business and education is seen in the IT/ITO sector, which is as much as 60% of the core competences seen as taught at the institutions of higher education and easily accessible, and 10% as not taught and difficult to obtain. A similar relation, but with a different vector, is present in the passive and energy-efficient construction. 55% of the core competences is seen as difficult to obtain and not taught, and 15% as taught and easy to obtain. This means that passive construction displays the largest shortage of selected competences, which is compensated in part by the highly rated post-graduate studies.

The largest competences gap is found in the BPO/SSC sector, which is as much as 55% of competences rated as hard to obtain, on the one hand, and taught at institutions of higher education, on the other. The interviews and meetings held after the completion of the formal study shed some additional light, helping to explain this result. Due to its importance, we shall dedicate some more attention to it. The competence gap in the case of BPO/SSC applies primarily to soft competences, such as communication (oral and written), cooperation with a group, inter-cultural sensitivity, adaptability, goal orientation or influencing others. These are mostly competences which, in order to be taught by universities, require the application of adequate teaching tools and methods, and the creation of opportunities in the academic environment (science clubs, study travels, internships, opportunity to engage in various projects etc.). It is difficult to teach these competences just through the curricula. Looking at the number of study travels, various grants, meetings and other initiatives, one could state that the universities can rightfully be convinced their students are not short of opportunities. The problem, however, lies in the fact that this system leads largely to the reproduction of inequality, and not to the evening out of opportunities. It turns out that the opportunities for development of competences and building the social and cultural capital offered by universities are not used by those who would actually need it. People who display no initiative and are not able to work in a group would not venture to establish a section of science club or go for a student exchange, etc. In this manner, they create a category that the representatives of companies bluntly call "unemployable." It seems that this group, and not the beneficiaries of the educational "Saint Matthew's Effect,"[22] should be the recipient of actions undertaken by universities to raise the competences of their graduates.

The result in the power sector also requires a separate commentary. As much as 50% of competences were defined as not taught, but easy to obtain in the labour market. This result is the aftermath of two factors. First of all, the education level of Krakow universities (also in terms of numbers of graduates) exceeds the demand of the local labour market. Secondly, the companies covered by the study include several large businesses that have been cooperating with the universities for many years with respect to science and didactics. As a result, these employers declare that they encounter absolutely no difficulties in finding any competences in the labour market. Moreover, if the need arose to introduce specific modifications into the set of taught competences, this would be possible thanks to cooperation with universities.

[22] According to the concept made popular by R.K. Merton (1968), the general rule in social systems is the fact that resources (prestige, money, power, number of publications) are amassed in the hands of those who already have these resources, similarly as in the fragment from the Gospel according to Saint Matthew: "For whoever has will be given more, and they will have an abundance. Whoever does not have, even what they have will be taken from them". (Matthew, 25:29, New Standard Version).

Figure II.2. A comparison of dependencies between the difficulties associated with obtaining specific competences (employers' perspective) and the obtained learning outcomes (universities' perspective) for the twenty core competences in six analysed sectors



Percentage values mean the share of the core competences that were allocated to categories on scales denoting difficulty tied to obtaining a given competence (horizontal axis) and the degree to which the given competence is taught by the institutions of higher education[23].

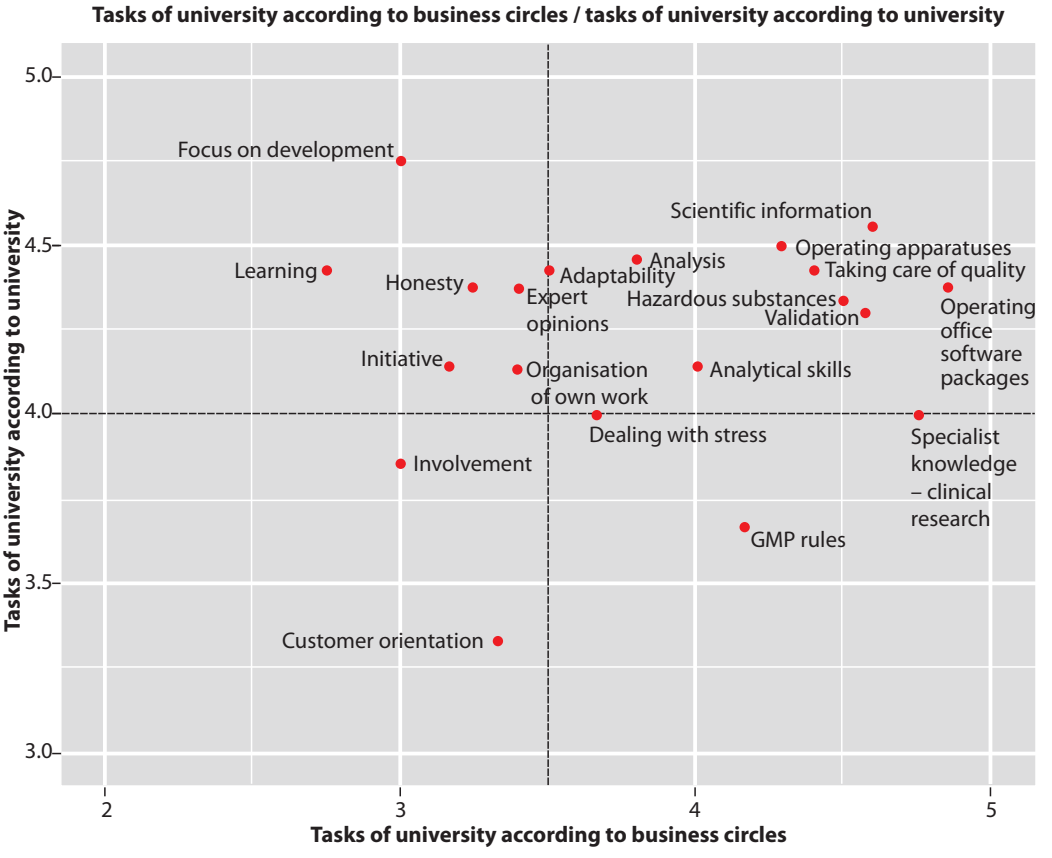
Source: the author's own work based on the Study of competences (2012, 2013).

5.5. What is, and what is not the duty of institutions of higher education

One of the analysed aspects, which sheds additional light on the study of competences, are the beliefs of representatives of enterprises and universities regarding the responsibility of the latter for teaching of each of the competences. The question on whether the teaching of the given competence should be the task of the university was asked to employers and universities during the second round of the *Study of competences* (2013). The sample matrix – for the life science sector – is presented in Chart II.5. It clearly shows that, in most cases, both sides agree on what is and what is not the task of the university. The exception is the GMP (*Good Manufacturing Practice*) rules, which business expects universities to teach, and the universities do not feel obligated to teach GMP. Moreover, there are several competences (mainly soft skills) that the universities believe are their task to teach, while the business is not so convinced.

[23] The comparisons of different categories across sectors are relative, since the take-over points for the difficulty to obtain and achieving learning outcomes have different values in various sectors. Due to the overall shift of the assessment of competences towards higher values, the competences that fall at the intersection of the axes are always allocated to the top or right quarters. Results for the creative sector are the average for its two segments – culture and creation.

Chart II.5. Matrix illustrating the dependency between the perception of teaching of specific competences as task of the university by representatives of business and universities for the twenty core competences in the life science sector

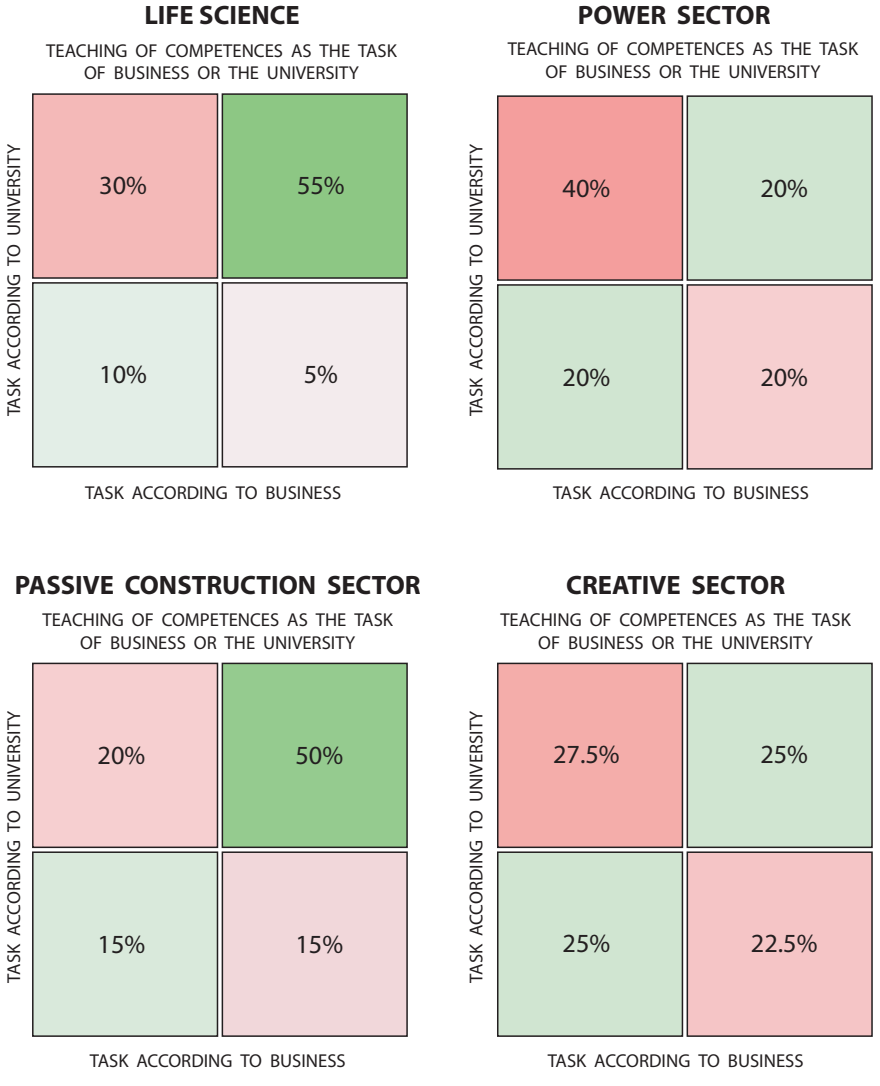


Values on the horizontal axis mean the average rating of the degree to which the teaching of the given competence should be the task of universities, in the opinion of business (on a scale of 1 to 5); values on the vertical axis mean the average rating of the degree to which the teaching of the given competence should be the task of universities, in the opinion of the universities themselves (on a scale of 1 to 5). For improved clarity, the chart employs a reduced scale (from 2.5 to 5 and from 2.5 to 4, respectively).

Source: Study of competences (2013).

Of all the analysed sectors, the highest conformity regarding the tasks of institutions of higher education is found in the sectors of life science and passive and energy-efficient construction (see Figure II.3). The situation is slightly less optimistic in the power and creative sectors, where only 20% and 25%, respectively, of the core competences is seen jointly as tasks of the university, and 20% and 25%, respectively, is clearly seen as no obligation of the university. In the case of the remaining 60% and 50% of core competences for the sectors, discrepancies are present. Interestingly enough, in most such cases, the universities assume responsibility for teaching specific competences, while the opinion of business differs. This phenomenon is exceptionally interesting, and the detailed analysis of data (see *Study of competences*, 2013) suggests that it is largely due to the approach to soft skills. In numerous cases, the employers, despite expecting the candidates to possess certain soft skills, do not share the opinion that the higher education institutions are responsible for teaching them (in the interviews opinions surface on important role played in that respect by primary schools or by families). The universities rightly take this obligation to a much larger extent. In the case of passive and energy-efficient construction, this phenomenon is illustrated in Chart II.6.

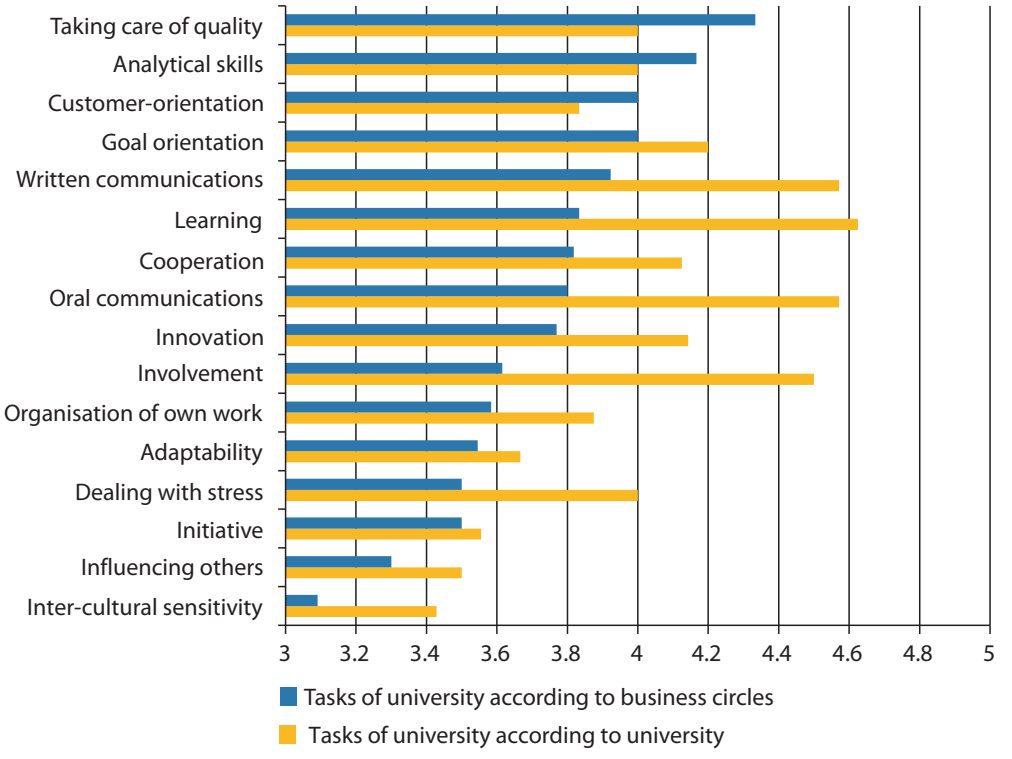
Figure II.3. Comparison of dependency between the perception of teaching of specific competences as task of the university by representatives of business and universities for the twenty core competences in four analysed sectors[24]



Source: the author's own work on the basis of the Study of competences (2013).

[24] The comparisons of different categories across sectors are relative, since the take-over points for the evaluation of the universities' tasks according to the business and according to the universities have different values in various sectors. Due to the overall shift of the assessment of tasks of the universities towards higher values, the competences that fall at the intersection of the axes are always allocated to the top or right quarters. Results for the creative sector are the average for its two segments – culture and creation.

Chart II.6. Comparison of the perceived role of institutions of higher education in the teaching of all *soft skills* in the sector of passive and energy-efficient construction



Values on the axis denote average rating for the degree to which the teaching of the given competence should be the task of the universities, according to businesses and according to universities (on a scale of 1 to 5).

Source: Study of competences (2013).

6. Summary – demand for the transfer of the sectoral study of competences to the nation-wide level

The *Study of competences of the Krakow academic centre* presented in this chapter is an innovative solution regarding the analysis of the flow of competence from the higher education domain into the business domain. Despite numerous challenges and limitations, this research promises a response to the urgent questions regarding the mutual match and communication between employers and educational institutions.

The Krakow study is, in many respects, complementary to the BKL Study and may profit from the experiences of the *Study of Human Capital* (the BKL Study), indicating possible development areas for research programs targeted at analyzing competence flows between business and education. The section below presents five possible areas for improving the project based on the opportunities and challenges identified earlier:

- **Analysis of the balance of supply and demand on the nation-wide level.** The challenge, indicated earlier, tied to the fact that research project was limited to a single geographical area, could be overcome if the project was transferred to nation-wide level.
- **Detailed research of sectors which are strategic for the country.** Sectors that are strategic for Poland could be subjected to particularly in-depth analysis. This would enable both a better understanding of their specific nature and also increased the innovativeness of the country, through more effective transfer of knowledge from science to the economy.
- **Study of the supply of learning outcomes at each stage of formal education.** The *Study of competences of the Krakow academic centre* analysed only the flow between universities and businesses, but there is no obstacle that would limit the transfer of this methodology, after certain modifications, to other stages of formal education.

- **Verification of competences based on innovative tools.** In order to profit fully from the potential of nation-wide research verifying sector-specific competences, it would be very useful to actually verify the knowledge, skills, and abilities in the individual behavioural areas. The ideal diagnostics tool could be the decision games, situational judgment tests, and knowledge tests in the form of a game, which recently are gaining popularity as assessment tools.
- **Integration with the BKL.** The above-described actions could enable a closer integration of the methodology perspectives of the *Study of Human Capital* and the Study presented in this chapter. This would allow diagnosis of the flow of human capital both on the micro and macro scale.

The implementation of the above recommendations could enable a more adequate diagnosis of the matching of competence supply and demand in Poland, and it would also be a very significant step towards an effective system for responding to challenges in the area of human capital in Poland which are matched to sectoral and regional specifics.

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Chapter III

Anna Szczucka, Konrad Turek, Barbara Worek

Trailing behind Europe – the conditions and strategies for development of competences of adult Poles

1. Introduction

The opening words of the OECD skills strategy - *Better Skills, Better Jobs, Better Lives* (OECD 2012) state that skills have become the global currency of the 21st century. Without proper competences, people remain on the margins of society, the development of technology does not translate into economic growth, and countries are unable to compete with each other in the increasingly knowledge-based global economy. However, as stated further, this currency depreciates rapidly when requirements of the labour market change and when individuals do not utilise their skills. One way to uphold their value could be activity in the market, under conditions stimulating skills development, and educational activity that allows one to obtain new, necessary competences or to improve those already possessed.

The current labour market situation is characterised, on one hand, by significant dynamics of changes and, on the other hand, by instability and uncertainty. Career paths also change. Many people change employers in the course of their professional life, and even changes of profession become a standard challenge for employees. Under such conditions, people rather not abandon learning when they complete formal education and gain the profession that they would perform for the rest of their lives. To successfully operate in the labour market and maintain employment and to develop one's career, lifelong learning is required, together with constant improvement of existing skills and the acquisition of new ones. The role of formal education in the formation of key competences, including the appropriate attitudes and motivations – including the one to continue learning – cannot be over-estimated. However, formal education is no longer sufficient to meet the challenges of the labour market and the changing society. It can easily be stated that every school leaver or graduate must, in one way or another, develop his or her skills, gain new competences, or obtain the required professional certification. Some will do it through participation in various courses and trainings, some will opt for continuation of formal education, and some will gain knowledge or skills through self-education and vocational practice. All these forms for the development of knowledge and gaining experience have their place within the open

system of lifelong learning, which stresses the variety of learning forms, places where one can study, persons with whom or from whom one can learn and the learning age. However, it is important for the socio-economic environment to offer an appropriate development impulse, to provide stimulation, and not to support educational stagnation.

The variety of educational forms and the instruments that can be used in this process is so large that it would be difficult to enumerate and catalogue them, and it would be even more difficult to develop appropriate methods allowing one to capture their wealth in research. Therefore, research dedicated to adult learning usually covers the traditional forms of non-formal education, such as courses, training, workshops, conferences, seminars, post-graduate studies, and attempts to capture the wealth of self-education (i.e. non-formal learning). As the key role of employers in the process of human capital development is recognised, the research usually covers also the policy of investment into personnel at enterprises.

Such research perspective has been adopted under the *Study of Human Capital,* because it was decided that the assessment of matching employee competences to requirements and needs of employers to be supplemented with an analysis of the skills development process of adults who have completed their formal education phase. Under the subsequent, fourth round of the BKL Study, adult learning has been one of the central research issues. Much attention has been devoted to it under the population study and employer study, and the resulting picture of the situation was supplemented with information gathered through the study of training firms and institutions. Detailed results of these studies are presented in the modular report covering the phenomenon of adult learning in Poland and the characteristics of the training market. This study focuses on the patterns for educational activity of adult, working Poles and on the employers' strategy for investing into human resources, using the data collected in the course of combined rounds of the study.

This chapter analyses these issues in an attempt to provide an in-depth diagnosis of factors influencing the fact and level of involvement of adult, employed Poles in the development of their skills. Analyses conducted from the perspective of an individual, engaged or not engaged in the learning process, are supplemented with a look at recruitment and human resource development strategies applied by enterprises. We believe that the work environment, the challenges tied to professional development, and the opportunities offered by employers are the main determinants for investing in the development of employees' skills. Without belittling the cultural factors, or the desire to develop one's own passions and interests, the requirements of the labour market and the pressure on the need to update one's knowledge and to keep up with the changes should be deemed key factors in stimulating the development of skills. On the other hand, the high competences of employees are one of the most valuable assets of an enterprise and can determine its competitive advantage.

The competences possessed by individuals need favourable conditions to develop: appropriate organisation of work, opportunities for professional development, and incentive in the form of bonuses. If neither the domestic economy nor the society offer opportunities for individual development, people often choose a strategy involving a search for more favourable conditions, which includes migration abroad. We do realise the negative influence of this phenomenon on Poland's development. However, we wish to point out that the process of adult learning needs to be analysed from a broader perspective, abandoning the discourse that primarily stresses the low level of educational activity among Poles, without looking for the deeper, social, and economic reasons behind this process. Therefore, the analyses of the education of adult Poles and strategies regarding investment into human resources at the enterprises are preceded by a comparison of adult learning in Poland and in other EU countries, indicating not only differences in the level of educational activity, but also other dimensions of these differences which may turn out to be important in understanding the present situation of Poland.

2. Educational activity of adult Poles: where are we in comparison to Europe?

The level of participation of adult citizens of European countries in the formal and non-formal learning activity is still far from satisfactory and, as shown by Eurostat data collected under the *Labour Force Survey* (*LFS*), it has indeed fallen over the past six years (Table III.1). With the average level of learning activity for persons aged 25-64 at 9.1% in 2010, Europeans failed to achieve the reference ratio for 2010, which was set at 12.5% for all EU Member States.[25] It seems rather improbable that by 2020 the planned goal would be achieved: an average of 15% of adult EU citizens developing their competences in a formal or non-formal manner. Average values are not sufficient to assess the situation in the area of adult learning in Europe, because the level of learning and training activity varies strongly across the individual countries. Denmark, the leader in this area, is separated by 30.1 percentage points from Romania, which takes the last place. The level of learning activity of the Danes is more than twenty times higher than that of Romanians.

Table III.1. Adult learning in countries of the European Union in the years 2003-2012 (population aged 25-64, formal and non-formal education, last 4 weeks, data in percentage)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
EU 28	8.4	9.1	9.5	9.4	9.3	9.3	9.2	9.1	8.8	9.0
Denmark	24.2	25.6	27.4	29.2	29.0	29.9	31.2	32.5	32.3	31.6
Sweden	:	:	17.4	18.4	18.6	22.2	22.2	24.4	24.9	26.7
Finland	22.4	22.8	22.5	23.1	23.4	23.1	22.1	23.0	23.8	24.5
the Netherlands	16.4	16.4	15.9	15.6	16.6	17.0	17.0	16.6	16.7	16.5
Great Britain	27.2	29.0	27.6	26.7	20.0	19.9	20.1	19.4	15.8	15.8
Austria	8.6	11.6	12.9	13.1	12.8	13.2	13.8	13.7	13.4	14.1
Luxembourg	6.5	9.8	8.5	8.2	7.0	8.5	13.4	13.4	13.6	13.9
Slovenia	13.3	16.2	15.3	15.0	14.8	13.9	14.6	16.2	15.9	13.8
Estonia	6.7	6.4	5.9	6.5	7.0	9.8	10.5	10.9	12.0	12.9
Czech Republic	5.1	5.8	5.6	5.6	5.7	7.8	6.8	7.5	11.4	10.8
Spain	4.7	4.7	10.5	10.4	10.4	10.4	10.4	10.8	10.8	10.7
Portugal	3.2	4.3	4.1	4.2	4.4	5.3	6.5	5.8	11.6	10.6
Germany	6.0	7.4	7.7	7.5	7.8	7.9	7.8	7.7	7.8	7.9
Cyprus	7.9	9.3	5.9	7.1	8.4	8.5	7.8	7.7	7.5	7.4
Ireland	5.9	6.1	7.4	7.3	7.6	7.0	6.3	6.8	6.8	7.1
Malta	4.2	4.3	5.3	5.5	6.0	6.2	6.1	6.2	6.5	7.0
Latvia	7.8	8.4	7.9	6.9	7.1	6.8	5.3	5.0	5.1	6.9
Belgium	7.0	8.6	8.3	7.5	7.2	6.8	6.8	7.2	7.1	6.6
Italy	4.5	6.3	5.8	6.1	6.2	6.3	6.0	6.2	5.7	6.6
France	6.8	6.0	5.9	6.4	6.1	6.0	5.7	5.0	5.5	5.7
Lithuania	3.8	5.9	6.0	4.9	5.3	4.9	4.5	3.9	5.7	5.2
Poland	4.4	5.0	4.9	4.7	5.1	4.7	4.7	5.2	4.4	4.5
Slovakia	3.7	4.3	4.6	4.1	3.9	3.3	2.8	2.8	3.9	3.1
Greece	2.6	1.8	1.9	1.9	2.1	2.9	3.3	3.0	2.4	2.9
Hungary	4.5	4.0	3.9	3.8	3.6	3.1	2.7	2.8	2.7	2.8
Croatia	1.8	1.9	2.1	2.9	2.4	2.2	2.3	2.2	2.3	2.4
Bulgaria	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.2	1.3	1.5
Romania	1.1	1.5	1.6	1.3	1.3	1.5	1.5	1.3	1.6	1.4

Source: EUROSTAT. Labour Force Survey (LFS).

[25] This ratio refers to the participation of people aged 25-64 in formal and non-formal education during the last four weeks preceding the survey.

Educational activity of adult Poles: where are we in comparison to Europe?

The highest ratios of adult learning has been seen for many years in the Scandinavian countries, where over 25% of adult residents learned in a formal or non-formal manner during the four weeks preceding the survey. Relatively good results (between 10 and 17%) are achieved by the following countries: the Netherlands, Great Britain, Austria, Luxembourg, Slovenia, Estonia, Czech Republic, Spain, and Portugal. The next in line group comprises Germany, Cyprus, Malta, Ireland, Latvia, Belgium, Italy, France, Lithuania, Poland, and Slovakia. The lowest results were recorded in Greece, Hungary, Croatia, Bulgaria, and Romania.

Poland, with the adult learning ratio at 4.5% in 2012, lies definitely closer the bottom of the list, not reaching the average for all twenty-eight Member States of the EU (9%). The data obtained from the Study of Economic Activity of the Population (the BAEL study) also shows that the learning activity of adult Poles dropped in the years 2011 and 2012, reaching the level recorded in 2003, which is before Poland's accession to the European Union.[26]

It is also worth referring to the Adult Education Survey (BAED/AES),[27] which looks at the level of participation of the population in education and training over the whole year (last 12 months preceding the study), and the analyses detailing both the time devoted to learning and reasons for absence of learning activity. As shown in Table III.2, the results of this study mostly confirm the tendency seen in the BAEL study; however, the positions of some countries in the ranking of learning activity differ slightly.[28] Among the numerous differences worth noting, it is particularly significant that the BAEL study positions France, Slovakia, and Hungary at higher positions and Ireland and Great Britain at lower positions. According to results of this study, Poland falls into the group of countries where less than one-fourth of adults learned in the formal or non-formal system over the past 12 months, while the average for all 28 Member States amounts to 40.3%. In comparison, in Sweden, 72% of adults were engaged in some form of education, in Germany and France, 50%, in Slovakia, 42%, in Hungary, 41%, and in the Czech Republic, 37%. In this study, a level lower than in Poland of learning activity was recorded only in Greece at 12% and in Romania at 8%. The results of this study show, however, that between the years 2007–2011 the learning activity level of adult Poles grew by 2.4 percentage points, which – as already mentioned – is contrary to the BAEL study and suggests that the learning activity of Poles is rising rather than falling. It is worth noting that the percentage of adult Poles participating in formal education (5.4%) is close to the EU average (6.2%). Participation in non-formal education, which is the development of competences through participation in courses, trainings, workshops and other similar activities, is much worse in Poland. In 2011, only 21% of adult Poles participated in such forms of learning, while the average for 28 EU Member States stood at 36.8%. Thus, it appears that the weakness of Poland is not the low level of general learning activity of Poles, but mostly the low participation in courses and training – shorter and more flexible forms of competence development.

Table III.2 presents information on the average number of hours dedicated to learning activity by the residents of the various countries. On the average, the most time for education per year is devoted by residents of Ireland – 208 hours, Greece – 177 hours, Spain – 167, Portugal – 164, Great Britain – 157, Sweden – 148, and Poland – 148. The shortest time in learning is spent by the Dutch, which is, on the average, 23 hours per year.[29] Attempts were made to explain the differences in time dedicated to learning

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[26] It should be added, however, that other data does not confirm this decline. According to data collected in the Adult Education Survey, presented in the publication *Kształcenie Dorosłych 2011* (GUS 2013), between the years 2007 and 2012, the learning activity of adult Poles rose by 2.4 percentage points: from 21.8% to 24.2%. The growth tendency and its stabilisation in the years 2012–2013 is also confirmed by data collected under the BKL Study. However, due to alteration of the question, data from the years 2010 and 2013 – the first and fourth rounds of the BKL Study – cannot be compared directly. According to data of the BKL Study, 22% of adult Poles were developing their competences in a formal or non-formal manner, both in 2012 and 2013. . It should also be noted that the learning activity rate of adult Poles, calculated based on the question included in the BAEL questionnaire of the GUS could understate the actual level of this activity. The question referring to participation in non-formal education does not include training, while listing other examples of learning forms. The idea behind the question was probably not to focus the respondent's attention on the examples but rather on the general contents, but part of the respondents could have focused on the listed forms of learning and omitted participation in training in their responses, because this category was not listed.

[27] The Adult Education Survey (Polish acronym BAED, English - AES) is an international survey dedicated to the learning activity of adult residents of the European Union. In Poland, its 2010 results were presented by the GUS in the publication *Kształcenie dorosłych 2011* (GUS 2013).

[28] The reasons for differences can be tied to differing research methodologies, primarily the manner for formulating questions, as it was in the case of data regarding Poland, collected under the BAEL and BAED studies. Analysis of the manner in which these questions were formulated suggests that the rate based on the BAED question can have higher sensitivity than the rate build on the basis of the BAEL question. Differences in the phrasing of questions in various countries can also significantly hamper the ability to compare values of rates across countries. The influence of the phrasing of the question on the value of the learning activity rate is well illustrated in the BKL Study, which we discuss in further sections of this chapter. The issue of comparability of data being the basis for learning activity rates requires a more in-depth discussion, which cannot be done here.

[29] Data on the time of learning and training for the Netherlands differ so strongly from other countries that it is difficult to explain them through differences in educational or training strategies; therefore, they should be approached with caution.

Trailing behind Europe – the conditions and strategies for development of competences of adult Poles

by looking for the relation between the level of adult participation in education and the time devoted to training and development (Ministry of Economy and Labour, 2005). It was indicated that, in countries with a high adult learning ratio, the average number of hours dedicated to learning is lower, which suggest either a shorter duration of the individual educational activities, or a smaller number of such activities, in which the individuals participate. Whereas, in countries with low level of adult educational activity, the average annual number of hours dedicated to learning is relatively high, which suggests that trainings are intense and attended by relatively small groups. The growing differences in the level of competence development should be counteracted by public intervention, under which support would be directed to persons whose access to training is hindered for various reasons. The current experience shows that this compensating effect was not achieved. This suggests disproportions in access to public funds, which may lead to regressive results of the current policy for the area of lifelong learning.

Table III.2. Adult learning ratios in countries of the European Union in 2011, taking into account formal and non-formal education over the last 12 months[30]

	Formal and non-formal education	Formal education	Non-formal and non-formal education	25–34 years old	55-64 years old	Low level of education (0-2 ISC ED)	High level of education (5-6 ISC ED)	Employed	Unemployed	Inactive	Managers and specialists	Elementary workers	Number of hours per year
EU 28	40.3	6.2	36.8	48.5	26.6	21.8	61.3	48.6	26.9	19.6	64.1	28.3	113
Sweden	71.8	13.5	67.0	78.7	57.5	44.2	84.9	77.5	52.8	47.5	88.1	52.3	148
Luxembourg	70.1	9.9	68.0	81.4	49.4	55.3	81.7	79.2	47.8	39.0	86.4	:	69
the Netherlands	59.3	12.3	54.8	72.4	38.2	33.0	78.2	69.7	41.4	31.1	78.9	34.2	23
Denmark	58.5	12.6	52.7	68.4	45.5	38.0	75.2	63.4	49.4	40.8	79.1	55.5	139
Finland	55.7	12.0	51.3	65.8	35.5	34.5	71.7	63.0	31.9	37.7	74.5	37.3	132
France	50.5	3.5	49.1	61.1	32.8	28.0	72.5	57.5	38.8	22.7	71.7	39.3	83
Germany	50.2	3.8	48.5	57.4	38.6	27.0	68.4	56.7	28.4	31.6	72.9	29.8	122
Estonia	49.9	6.6	48.0	64.5	32.6	22.9	67.0	58.3	34.8	20.9	74.3	29.2	95
Austria	48.2	5.9	45.5	55.4	35.7	24.8	72.4	54.2	42.5	30.0	69.2	21.6	120
Portugal	44.4	10.4	39.6	59.9	21.9	32.3	74.2	53.6	37.4	15.6	69.9	34.2	164
Cyprus	42.3	3.7	40.9	50.2	27.8	16.9	63.0	50.6	23.1	14.8	70.5	18.2	74
Slovakia	41.6	5.8	38.3	49.4	21.9	:	63.5	50.3	17.8	11.6	62.4	26.0	75
Hungary	41.1	6.5	37.6	51.8	21.7	24.7	58.1	56.9	20.5	12.8	64.0	47.2	61
Belgium	37.7	7.4	33.1	49.5	19.9	15.2	62.9	46.2	26.6	11.6	62.7	18.4	95
Spain	37.7	7.0	34.1	47.8	23.2	22.5	57.7	43.8	32.5	21.8	56.7	25.3	167
Czech Republic	37.1	3.7	34.9	44.2	20.4	10.5	64.2	45.0	25.5	13.3	63.4	14.5	85
Slovenia	36.2	2.3	34.7	43.3	22.8	13.2	62.8	43.7	27.2	19.1	62.5	16.0	86
Malta	35.9	4.4	34.2	43.7	20.1	22.6	72.6	46.9	30.9	13.9	64.0	19.9	92
Great Britain	35.8	14.8	24.3	42.6	26.5	17.9	45.8	41.4	27.9	20.2	48.1	30.6	157
Italy	35.6	2.9	34.3	43.0	22.3	19.2	65.9	46.5	22.5	16.1	63.6	25.6	78
Latvia	32.3	4.3	30.0	38.0	19.7	10.6	54.3	40.3	19.8	10.7	59.4	17.6	140
Lithuania	28.5	4.0	25.9	37.3	16.2	7.2	54.5	37.9	11.1	8.0	58.6	10.5	84
Bulgaria	26.0	2.4	24.4	31.0	15.1	12.3	40.1	38.4	5.3	4.7	43.9	33.3	92
Ireland	24.4	6.7	18.7	29.2	16.4	10.8	37.7	:	:		:	:	208
Poland	24.2	5.4	21.0	36.0	9.6	5.8	51.7	32.6	13.6	6.4	54.6	13.6	148
Greece	11.7	2.6	9.6	20.3	3.1	3.2	25.5	14.5	10.0	6.5	25.3	:	177
Romania	8.0	1.4	6.9	13.1	2.0	1.4	21.8	10.5	6.9	2.0	22.1	3.8	117

Source: EUROSTAT. Adult Education Survey: AES).

[30] The table does not include Croatia, as data for this country is unavailable.

Educational activity of adult Poles: where are we in comparison to Europe?

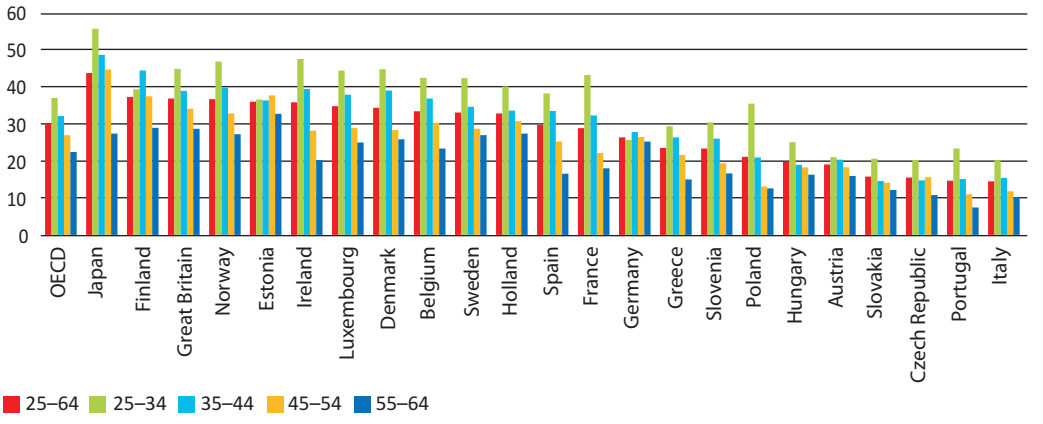
Table III.2 also presents information on the values of learning activity of adults in groups defined based on age, level of education, professional situation, and position. As shown above, the patterns of educational activity of adults are the same in all countries of the European Union: Younger people learn definitely more frequently than older ones, with a difference of an average of 22 percentage points for all EU countries. Better educated people participate in further education and training than do people with a lower educational level, with a difference of almost 40 percentage points between persons with the lowest education level (0-2 ISCED) and those with higher education (5,6 ISCED). Employed more frequently participate in further education than do the unemployed, with a difference of 34 percentage points; and, those in higher positions participate in further education more than those in lower positions at work, with a difference of 36 percentage points. In the case of Poland, these differences are as follows:

- between the youngest and the oldest age category - 26 percentage points, which is 4 percentage points more than the average for all EU Member States;
- between the lowest and the highest level of education - 45 percentage points, which is 6 percentage points more than the average for all of EU;
- for the employed and the unemployed – 19 percentage points, which is under 3 percentage points less than the average for EU Member States. This suggests that, although the overall level of educational activity of adults is low, relatively good results are achieved when the unemployed are covered by educational programs; and,
- for managers and specialists compared to non-skilled workers, the difference amounts to 41 percentage points, which is 5 percentage points more than the average for all of EU Member States.

In each of the surveyed countries, younger persons display higher learning activity than older ones. In all countries where the general ratios of adult learning are higher, the percentage of older learning persons also grows. Such is the case in Sweden, where 58% of persons aged 55-64 learn – in Luxembourg (49%) and in Denmark (46%). Almost 40% of persons aged 55-64 continue education in Germany, the Netherlands, Austria, and Finland; and from 20% to 30% in Estonia, France, Great Britain, Cyprus, Spain, Italy, Czech Republic, Hungary, Slovenia, Slovakia, Malta, and Portugal. Poland is among the three surveyed countries where the percentage of learning for older persons is under 10%: in Poland it is 9.6%, in Greece – 3.1%, and in Romania, – 2%. It should also be noted that the countries with the highest percentage of learning activity of the oldest persons are also countries where the numbers of older persons with higher education are significantly larger than in Poland: 27% in Sweden, 26% in Denmark, 25% in Germany, 27% in the Netherlands, 29% in Finland. In Poland, the proportion of persons aged 55-65 with university degrees amounted only to 13% in 2009 (see Chart III.1). Similar rates are found in Austria, Czech Republic, and Slovakia, where the learning activity of older persons is much higher than in Poland. This clearly shows that differences in the learning activity levels cannot be explained only with the differences in education levels. Also, despite the fact that the proportion of Poles aged 25-34 with university degree amounts to 35% and is similar to results seen in Estonia (37%), Finland (39%), the Netherlands (40%), and higher than in Germany (26%), Austria (21%), Slovakia (21%), or the Czech Republic (20%), the numbers of persons in this age category, developing their competences in formal and non-formal manner, are much lower in Poland that in any of these countries (see table III.2).

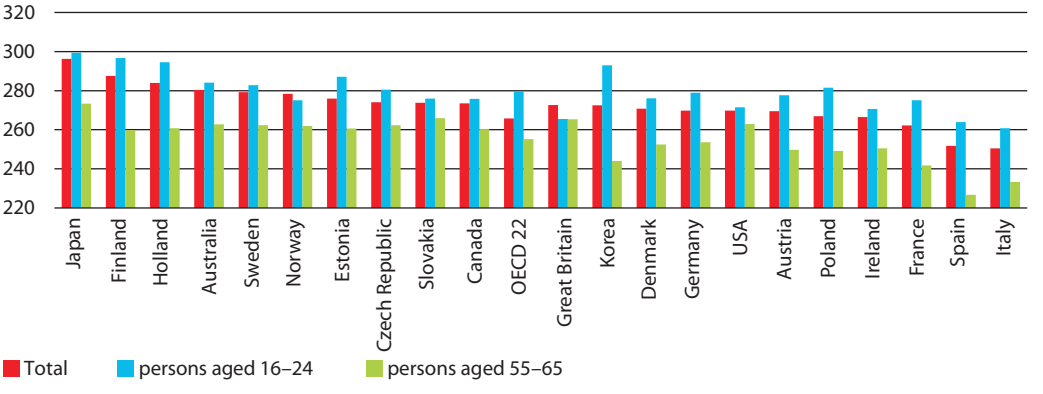
The lower level of education and low learning activity of persons in older age categories could be influencing their low competence levels. As shown by the results of the Programme for the International Assessment of Adult Competences (PIAAC) (OECD 2013), in all countries, younger persons achieve better results than older ones both in the understanding of texts and in mathematical reasoning (Charts III.2 and III.3). The size of these differences is, however, not the same for all countries, which suggests that they are subject to the influence of various factors, including primarily the level and quality of formal education, but also the opportunity to increase one's learning activity after completion of school education. Therefore, it comes as no surprise that the best results in competence tests were achieved by persons representing the oldest age groups in such countries as Japan, Sweden, Denmark, Slovakia, Norway, Great Britain, Czech Republic, the Netherlands, and Finland. In most of these countries, the percentage of older persons with university education is higher than in Poland (Japan, Sweden, Denmark, Norway, Great Britain, the Netherlands and Finland); and in each of them, there are more older persons developing their competences in formal and non-formal manners.

Chart III.1. Population with higher education in EU countries in 2009 – proportion of persons with university education in the given age groups



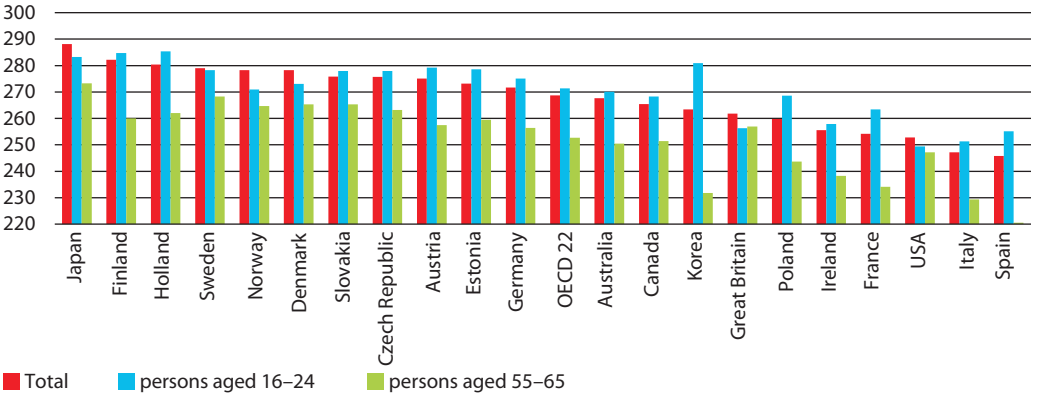
Source: OECD 2011, p. 40.

Chart III.2. Average results of PIAAC regarding understanding of texts - for persons aged 16-65 in 21 countries, and for persons from the youngest and the oldest age category



Source: OECD 2013.

Chart III.3. Average results of PIAAC regarding mathematical reasoning - for persons aged 16-65 in 21 countries, and for persons from the youngest and the oldest age category



Source: OECD 2013.

2.1. Factors determining the differences in levels of learning activity of adult EU residents

When looking for factors affecting the levels in learning activity of adults across the different countries, it is worth noting such issues as differences in education levels, ratios of economic activity and employment, the level of development, and the innovativeness of economy. A thesis could be proposed here - and it shall be repeated further on – that the level of development and innovativeness of the economy plus the demand for high competences are the factor which influences the most the educational activity of the population, or in broader terms, the these factors influence the inclination towards investment in competence development. As indicated by the BKL Study, and confirmed with other research covering the same subject (such as World Bank 2007, CEDEFOP 2011, CEDEFOP 2012, Aedo et al. 2013), the employers are the main driver behind learning activity. Training and courses are financed primarily with their funds, most training takes place during working hours, and the majority of training and courses attended by adults is associated with their employment,[31] and the chief motivation for learning and development is also of a professional nature. On the other hand, as indicated by numerous research (e.g. Hanushek and Kimko 2000, Hansson, Johanson, Leinter 2004, OECD 2010, CEDEFOP 2014), a reverse correlation is also true: High competences significantly and powerfully affect the development of both the whole economy and of individual enterprises.

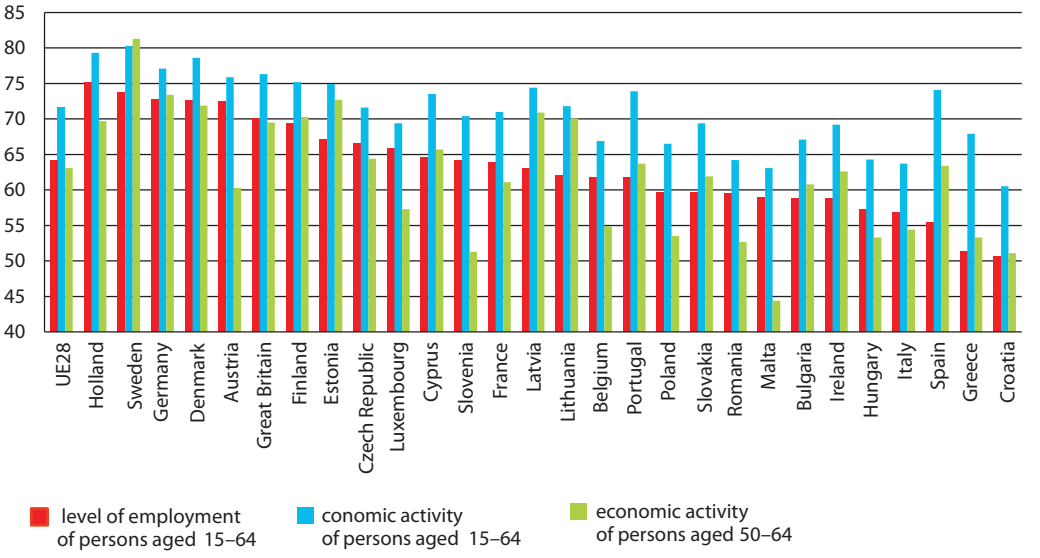
As illustrated in Table III.2, the professional situation of a respondent (being employed, unemployed, or inactive) strongly differentiates the level of participation in formal and non-formal education. Comparing the position of Poland to other countries of the EU in terms of adult learning activity levels, one needs to keep in mind the differences in the levels of employment and economic activity of residents of the various countries, because they can strongly determine the disparities in learning activity levels. As shown by the PIAAC study, employment level significantly influences the differences in competence levels among residents of the individual countries. Countries with a higher share of employed aged 16-65 obtain higher results in the understanding of texts and mathematical reasoning (Palczyńska, Rynko 2013: 50). The level of employment can also influence learning activity, as competences and learning activity are strongly related, which is confirmed also by the PIAAC study. Persons who achieve better results in the understanding of texts and mathematical reasoning are also more active in terms of learning: *The difference between results achieved by persons active and inactive in terms of learning exceeds 25 points in the case of understanding of texts and mathematical reasoning. In Poland, of the persons who achieved skill level at 4 or 5, about 55% participated in at least one form of organised learning over the last year. In the group of persons rated at 1 or below, this proportion amounts only to 16%* (Rynko, Śpiewanowski 2013: 99).[32]

The employment rate for persons aged 15-64 in Poland was 59.7% in 2012. This value is lower than the average for 28 EU countries (64.1%), and it is much lower than in Scandinavian countries (Sweden, Finland) and in Western Europe (the Netherlands, Germany, Great Britain). It is the same as in Slovakia and Romania, and it is similar to Malta, Bulgaria, Ireland, and Hungary, and higher than in the southern countries of Italy, Spain, and Greece (Chart III.4). Keeping in mind that learning activity drops with age, it is worth paying attention to the economic activity rate in the oldest age groups (50-64 years). Here the situation in Poland compared to other EU countries is even worse than in the case of employment rate. The level of economic activity in the group aged 50+ amounts to 53.5%, placing Poland at the bottom of the ranking of EU countries. This rate is lower only in such countries as Hungary, Greece, Romania, Slovenia, Croatia, and Malta. It is therefore clear that neither the present level of employment nor the overall level of economic activity, nor the economic activity level among the oldest citizens would support the increase of learning activity of adult Poles.

[31] According to Eurostat data, on the average 84% of courses and training delivered in EU countries and attended by EU residents were work-related. In Poland, this proportion amounts to 85%.

[32] For clarity, it needs to be added that levels 4 and 5 under the PIAAC competence study are the highest, and level 1 is the lowest. For detailed discussion of the PIAAC methodology and the methods for result analysis, see OECD 2013 and Burski et al., 2013).

Chart III.4. Employment rate and economic activity of the population



Source: EUROSTAT. Labour Force Survey (LFS).

The description of data is not sufficient to draw conclusions regarding correlations among the variables, however, certain regularities appear: a high level of adult learning activity is seen in countries where the population is better educated, more economically active and remains in the labour market longer. It could therefore be assumed that the level of a country's economic development has a similar effect on the learning activity. The PIAAC research does not confirm the relation between the average results achieved by the given country in the PIAAC tests and the economic development level measured in GDP per capita. They indicate that only 5% of differences between the average results among the countries regarding the understanding of texts can be explained by their GDP level, and in the case of the mathematical reasoning test – barely 1%. The influence of this factor cannot be overlooked in the analyses of adult learning activity, which more strongly depends on a country's overall economic condition, since it is mostly enterprises who finance the development of competences of adults. With the exception of EU structural funds, public funding plays an insignificant role in the financing of non-formal education (OECD 2011, UNESCO 2013). Data regarding the per capita GDP level in Poland and in other developed countries suggest that it is a barrier to increase of learning activity of adults in Poland rather than a chance for an increase. For example: according to OECD data, GDP per capita in Poland amounts to 67% of the average value of GDP per capita in 27 countries of the EU, 52% of Austria, 53% of the Netherlands, Sweden and Denmark, and 54% of Germany (see OECD Statistics).

2.2. Training activity of enterprises in EU countries

It is worth supplementing the look at the learning activity of Poles compared to residents of other countries with data on vocational training conducted by enterprises. Information on the percentage of enterprises who conduct vocational training (overall and broken down according to enterprise size), the cost of training, the percentage of employees covered by training, the annual number of training hours per employee, and the training budget of enterprises is presented in Table III.3. According to data collected under an international research of vocational training in enterprises (*CVT – Continuing Vocational Training)* in the year 2010, only 22% of Polish enterprises offered training or courses or invested into the development of professional competences of their employees. This represented a decline of training activity of enterprises by 13 percentage points, compared to 2005 (at that time, 35% of enterprises declared they engage in training activities).[33] Similar drops in training activity were seen only in Romania (decline by 16 percentage points: from 40% in 2005 to 24% in 2010) and in Great

[33] According to data collected in the BKL Study, the value of this rate was much higher: in 2010, a total of 54% of enterprises engaged in activities supporting the development of their human resources (Szczucka, Turek, Worek 2012: 54). This study also covered micro-enterprises with less than 10 employees. If these were excluded, the percentage of companies investing in personnel development would have been even higher. In 2011, after the question was rephrased in order to capture all training activities of enterprises, the value of this rate, calculated on the basis of the BKL Study, rose to 71%. Similarly as in the adult learning rate, it is worth looking more closely at the phrasing of the question that is the basis to calculate the training activity of enterprises.

Britain (by 10 percentage points – from 90% of enterprises engaged in training in 2005 to 80% in 2010). This means that Polish enterprises during that time found themselves among those who significantly cut down their investment in human resources.

Training activity of enterprises in EU countries

Table III.3. Vocational training in enterprises in 2010

	All enterprises with 10+ employees	10–49	50–249	250+	Cost of vocational training as % of total labour costs	Costs of training per 1 employee (PPS)	Percentage of employed participating in training (only enterprises providing training)	Number of training hours per 1 employee	Percentage of enterprises with training budget
EU 28	66	63	81	93	1.6	1 356	48	10	38
Denmark	91	89	98	100	1.8	1 726	41		45
Austria	87	85	96	99	1.5	1 916	37	10	46
Sweden	87	85	96	99	1.7	1 465	53	11	55
Great Britain	80	78	93	98	1.1	872	37	8	50
the Netherlands	79	75	89	97	2.2	2 150	44	14	37
Belgium	78	74	94	99	2.4	2 094	57	18	43
France	76	72	95	98	2.5	2 057	50	13	65
Spain	75	72	90	97	1.6	1 066	56	10	49
Finland	74	70	91	90	1.4	1 154	48	9	38
Germany	73	69	82	96	1.5	1 499	47	9	31
Czech Republic	72	68	90	97	1.2	394	72	9	36
Cyprus	72	68	88	100	2	1 840	52	10	34
Luxembourg	71	66	86	100	1.9	1 514	60	19	41
Slovakia	69	65	84	90	1.9	846	58	12	29
Estonia	68	64	83	97	1.1	647	40	8	27
Slovenia	68	64	84	95	1.5	1 188	62	16	31
Portugal	65	61	86	97	1.9	1 196	55	17	45
Croatia	57	53	73	86	0.7	1 084	31	6	24
Italy	56	53	77	91	1.1	1 227	51	8	31
Malta	54	49	73	90	2.3	1 319	57	14	14
Lithuania	52	48	67	89	1.1	621	31	6	15
Hungary	49	43	74	95	1.8	1 747	27	6	16
Latvia	40	37	54	82	0.8	398	49	4	11
Bulgaria	31	27	49	80	1.1	425	49	5	12
Greece	28	24	46	83	0.7	1 299	33	3	17
Romania	24	20	36	64	1.6	999	41	7	10
Poland	22	16	41	75	1.1	656	55	7	13

Source: Eurostat. Vocational training in enterprises (Continuing Vocational Training: CVT).

If the data collected through the CVT research is a good basis to compare training activity of enterprises across countries, this means the involvement of Polish enterprises in the development of their resources is three times lower than the average level of this involvement for 28 countries of the EU, and four times lower than in Denmark, Austria and Sweden. In terms of training involvement, we have fallen behind even Greece and Romania, where adult learning activity is lower than in Poland. Given the fact that the employers provide the strongest stimulus for vocational development, the level of training involvement displayed by Polish companies does not support the increase of professional competences of Poles and significantly hinders this process.

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The size of the enterprise is a factor that influences the engagement or non-engagement in training activities in each of the EU countries. However, the scale of difference between the percentage of large and small companies that train their employees varies from 11 percentage points in Denmark to 59 in Poland and Greece. According to data collected under the 2010 CVT survey in Poland, only 16% of small enterprises engaged in actions meant to increase the professional competences of their employees, while this number reached 78% in Great Britain, 69% in Germany, 68% in the Czech Republic, and 65% in Slovakia.[34] Thus, although the overall involvement of Polish enterprises into human resource development is low, under this data, the activity of small companies should be seen as insignificant. The CVT survey does not cover micro-enterprises, which are even less active in terms of human resource development, and constitute 94.8% of all Polish enterprises, with 37.2% of all employees (PARP 2012).[35] If these enterprises were included, the overall level of employers' involvement in human resource development in Poland would be even lower; consequently, the actual chances for professional development of employed Poles would also be lower.

The low level of involvement of Polish companies in the development of their personnel is also confirmed by the analysis of the costs of the financing of employees' in-service training. As shown in Table III.3, the share of these costs in the total labour costs is at 1.1% for Poland. This means our country falls into the group of such countries as Bulgaria, Latvia, Italy, Estonia, and Great Britain, where the financial involvement of employers in the vocational development of their employees is lower than the EU average (1.6%). The share of training costs in the overall labour costs is the highest – above 2% – in such countries as France, Belgium, Malta, and the Netherlands.

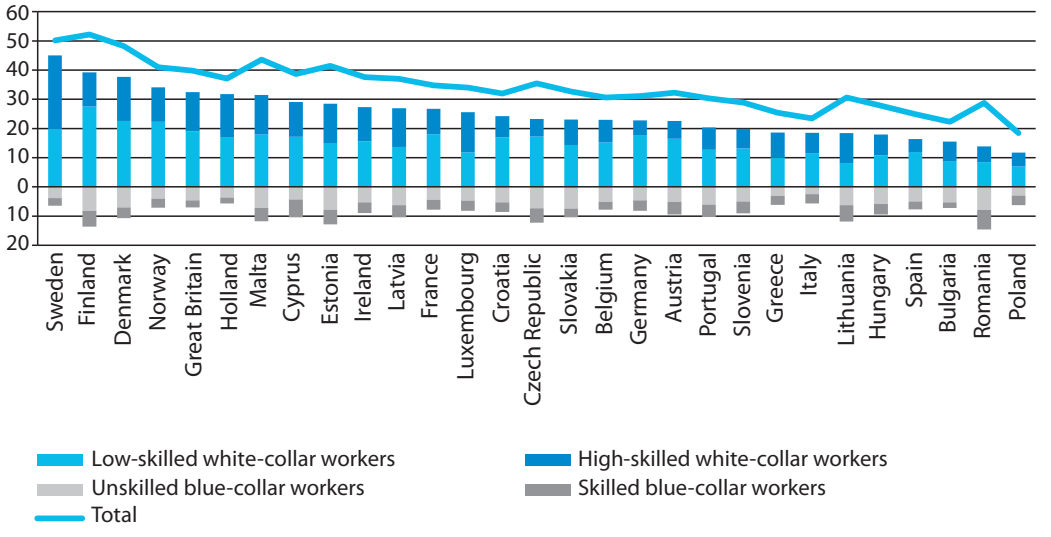
The cost of vocational training and courses per one employee are also relatively low: measured in units of purchasing power standard (PPS), they amount to 656 units. The average for the EU stands at 1356. The Netherlands spends the most for training per employee – 2150 PPS, Belgium – 2094, and France – 2057. Polish entrepreneurs rarely use a training budget to finance training. According to the CVT in 2010, only 13% of enterprises reported having a training budget, while the average for the EU is 38% of all enterprises. In France, the percentage of companies with a dedicated training budget is the highest among all EU countries, with 56% enterprises report having it. Training budgets are also found in half and more than half of Swedish and British companies. Without a detailed analysis of the attractiveness of this instrument for employers operating in different countries (e.g. tax reliefs, possibility of obtaining public subsidies), its presence can be considered as an indication of a strategic approach to training policy. In this context, the fact that training budgets are found only in slightly more than one in ten Polish enterprises with 10 and more employees is not a good portent for the development of strategic human resource management in Polish enterprises.

The level of training activity of enterprises and the resulting level of adult learning activity is strongly influenced by organisational culture of an enterprise and its innovativeness in terms of the introduction of new technologies, the development of new solutions, the launch of new products, and changes regarding the management style or the utilisation of human capital (OECD 2010, CEDEFOP 2012). Results of international comparative analyses covering these issues again are not favourable for Poland and provide a further explanation for the low involvement of Poles in the development of their competences. The pressure tied to strong competition, and the introduction of new technologies, force the reorganisation of work in order to adapt the labour process to new solutions, reduce labour costs, or increase productivity (OECD 2013). Regardless of reasons for these changes, they can lead to a shift in demand for competences and to the need to adapt to new conditions, which can be an impulse for development of employee competences (OECD 2013, Green 2012, Caroli and van Reneen 2001). The percentage of employees who declare that their workplace underwent reorganisation or introduced new technological solutions is presented in Chart III.6. In terms of changes in labour organisation, Poland takes the lowest positions among all European countries.

[34] According to the BKL Study (Szczucka, Turek, Worek 2012), in 2010, the percentage of small enterprises - from 10 to 49 employees – investing in the development of their human resources was 71%. It rose to 84% for medium-sized enterprises, and to 86% for large enterprises.

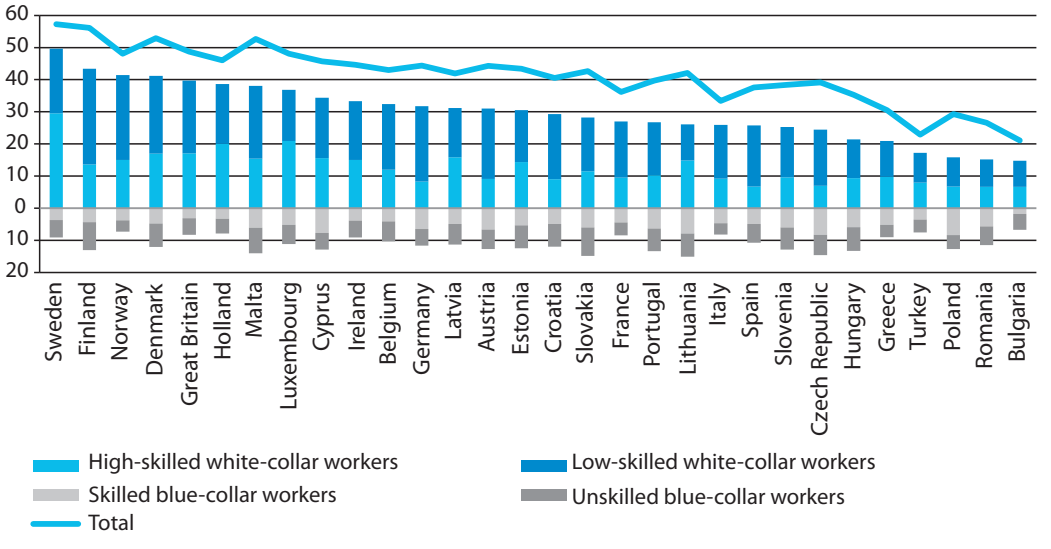
[35] The BKL Study shows that, depending on the study round and the phrasing of the question, the difference between micro and small enterprises regarding investment in personnel development ranges from 10 to 20 percentage points.

Chart III.5. Organisational changes and new technologies in enterprises: share of employees who state that changes in labour organisation occurred over the past three years at their workplace



Source: Study of labour conditions in Europe, 2010 [according to:] OECD Skills Outlook 2013, p. 51.

Chart III.6. Organisational changes and new technologies in enterprises: share of employees who state that, over the past three years, their workplace introduced new solutions or new technologies



Source: Study of labour conditions in Europe, 2010 [according to:] OECD Skills Outlook 2013, p. 51.

Poland's low potential in terms of conditions for human resource development is also confirmed by analyses conducted by CEDEFOP (2012). In the course of the comparison of labour organisation in enterprises, of the range of instruments supporting the development of human resources and the innovation index, European countries were grouped into five segments:

a) The segment of high development potential includes countries that received high ratings in each of the three dimensions named above.
b) The segment of stable development potential includes countries with high ratings, and with only average ratings regarding the instruments supporting the development of human resources and innovation.
c) The segment "moderate potential 1" includes countries that offer good development conditions and moderate innovation level.
d) The segment "moderate potential 2" includes countries with poor conditions for development and moderate innovation level.
e) The segment of low development potential includes countries with low ratings in each of the assessed dimensions.

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The results of segmentation are presented in Table III.4. Poland (together with Bulgaria, Latvia, Lithuania, Hungary, Romania, and Slovakia) falls into the segment of low potential for development of human resources. This means that neither the manner of labour organisation, nor the range of human resource development instruments employed, nor the range of innovation offer good conditions for the development of employee competences.

Table III.4. Potential for human resources development: segmentation of European countries

High human resources development potential	Stable human resources development potential	Moderate potential 1 high development opportunities, moderate innovation	Moderate potential 2 low development opportunities, moderate innovation	Low human resources development potential
• Denmark • Germany • Sweden	• Belgium • Luxembourg • the Netherlands • Austria • Finland	• Estonia • Malta • Norway	• Czech Republic • Ireland • Greece • Spain • France • Italy • Cyprus • Portugal • Slovenia • Great Britain	• Bulgaria • Latvia • Lithuania • Hungary • Poland • Romania • Slovakia

Source: CEDEFOP 2012. Learning and Innovation in Enterprises, p. 45.

In the course of the presentation of the learning activity of adult Poles and the level of training activity of Polish enterprises compared to other European entities, we limited the analysis to overall ratios that allow one to perceive the basic dimensions of differences and to have a look at factors that can contribute to these differences. We did not analyse the phenomenon of adult learning in detail or look for patterns of learning activity and factors behind these patterns. Those issues shall be covered in the following section of this chapter.

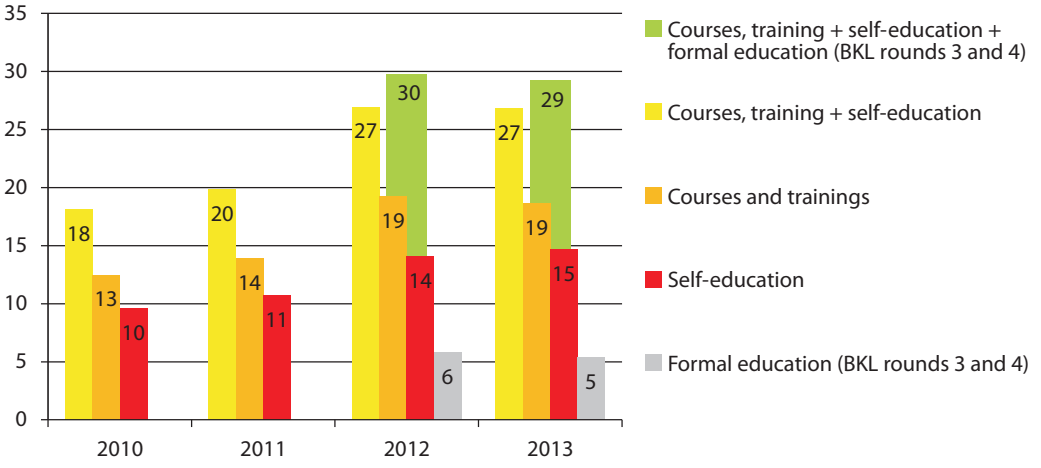
3. Patterns of learning activity of adult Poles

3.1. Educational activity of adult Poles – description of the forms for competence development

The Eurostat data, discussed earlier, show that the rates of participation of adult Poles in various forms of education have been on a very low level for many years. This low learning activity of adult Poles is confirmed by the BKL Study. During the 12 months preceding the fourth round of the BKL Study (that is, through almost the whole year 2012), 29% of employed Poles aged 25-59/64 (around 6 million persons) developed their competences in some form, including formal and non-formal education, and self-education (Chart III.7).

This category encompasses 19% of persons (3.9 million) who participated in any kind of courses and training (including the obligatory health and safety, and fire safety courses), workshops, lectures, seminars, conferences, internships, vocational internships, or post-graduate studies. This form of learning activity will be called participation in courses or training, or *non-formal education*. The study carried out in 2012 gave identical rates, while the results for the years 2010–2011 were slightly lower. This was due primarily to changes in the questionnaire that will be addressed further on.

Chart III.7. Development of competences among persons aged 25-59/64 over the past 12 months (in %)



Source: BKL – Population Study 2010–2013.

Educational activity of adult Poles – description of the forms for competence development

According to 2013 data, 15% of persons (3 million) were engaged in self-education, that is, they learned something new or gained experience using the assistance of family members, friends and co-workers, books, professional magazines, computer software, and the Internet, programs broadcast on TV and radio, museums, exhibitions, galleries, and science centres.

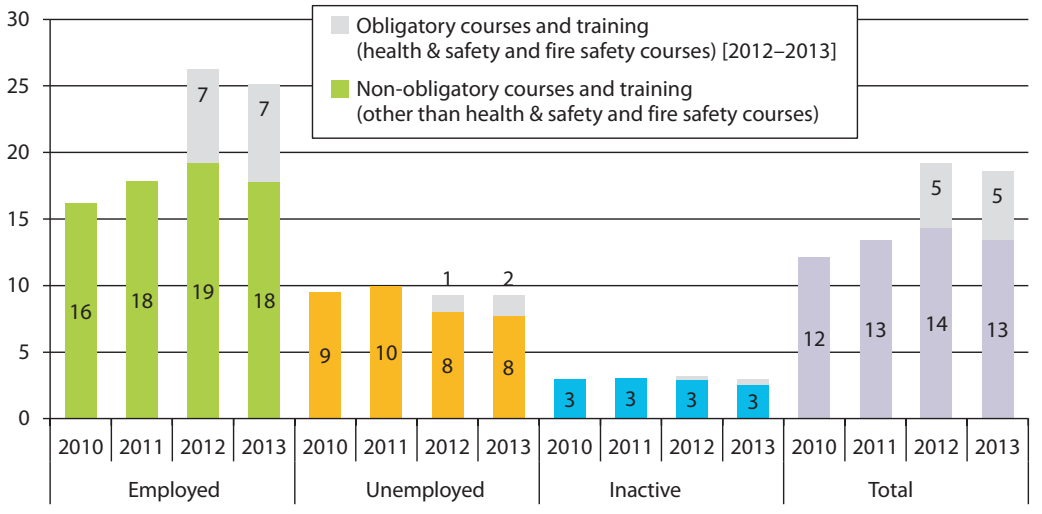
Over the past year, 5% of the respondents aged 25–59/64 (1.1 million persons) engaged in formal education. However, due to a change in the questionnaire, the comparison of this value with the previous years is not possible.

The majority of adult Poles (71%) did not develop their competences in any manner, not even through self-education. Interestingly, as much as 35% of Poles aged 25—59/64 declare that they have never participated in any courses, trainings, workshops, internships or other forms of learning. This ratio is on a similar level in the older age groups (for instance, in the group 50-59/64 it is about 31%).

Observing the 4-year trend, we see clear differences between results from the 2010-2011 round and the 2012-2013 round. The increase in rates in the second group is due not to a growth of learning activity, but to small changes in the contents and form of questions (detailed description is provided in the Annex).[36] This is a very interesting example of how strongly changes in questionnaires – even small ones – can influence the achieved results. Due to changes introduced in BKL Study in 2012, the questionnaire became slightly "easier" for the respondent, which led to an increase of the proportion of persons declaring participation in various forms of competence development. Most importantly, the changes allowed one to better capture the group of persons who participated only in the obligatory health and safety, and fire safety training. Isolation of this group is very important for the analysis of learning activity of the working population, because it is rather difficult to treat the obligatory health, safety, and fire safety courses as an actual development of competences and skills in the context of one's professional situation and improvement of opportunities in the labour market. Analyses presented in the further part of this chapter shall omit the group of persons who participated only in the obligatory health and safety, and fire safety training.

[36] Filtering questions were replaced with multiple-choice questions.

Chart III.8. Participation of persons aged 25–59/64 in non-obligatory and obligatory non-formal education over the past 12 months with relation to their professional situation (in %)



For the 2010–2011 round, participation in obligatory courses is underestimated, and it is not presented in the Figure.

Source: BKL – Population Study 2010–2013.

As shown in Chart III.8, in 2013, one-fourth of persons active in non-formal learning participated only in the obligatory forms of education. Exclusion of this group results in the share of 13% (about 3.5 million) persons who developed their competences in non-obligatory courses and training. Most of these persons were working, and their number increased slightly from 16% in 2010 to 18% in 2013.

3.2. Learning activity models among the employed

The subsequent analyses focus on the group of employed Poles aged 25-59/64. Table III.5 presents the rates of learning activity that are the most interesting for us. They include the non-obligatory non-formal education, self-education, and a combination of these activities, which is the participation both in non-obligatory non-formal education and in self-education.

Table III.5. Percentage of persons aged 25-59/64, participating in non-obligatory courses and training (A), self-education (B) and simultaneously in both types of activity (A&B) during the 12 months preceding the research, broken down per study year and occupation (ISCO-1) (shown in %)

		A. Non-obligatory non-formal education	**B.** Self-education	**A&B.** Non-obligatory non-formal education and self-education
2010		16	12	6
2011		18	13	7
2012		19	17	7
2013		18	18	7
MANA		32	27	14
PROF		39	33	21
ASSO		25	20	9
CLER		19	15	7
SERV		12	11	4
AGRI		8	8	2
CRAF		10	9	2
OPER		13	7	2
ELEM		6	6	1
Total	%	18	15	7
	N	39263	39263	39263

Data per occupation based on total sample 2010-2013.

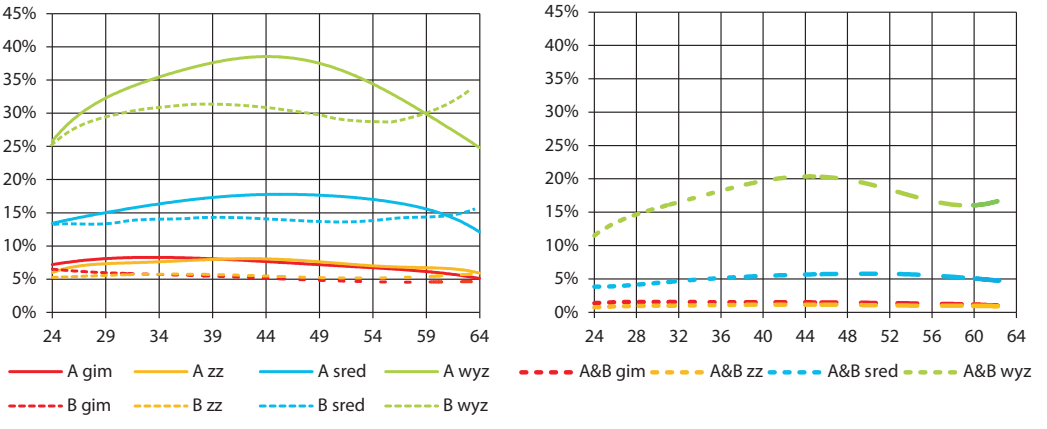
Source: BKL – Population Study 2010–2013.

Learning activity models among the employed

In an attempt to answer the question regarding factors influencing various forms of learning activity of employed persons, we have used the statistical models of logistic, negative binomial and polynomial regression. All the models are presented in detail in the Annex in Table A.III.1. The results will be presented in a more approachable form based on probability models for the participation in the given type of activity (mainly based on logistic regression models). After averaging, they can be interpreted similarly as the percentage rates of participation for the given category. As the analyses show, the key factors that differentiate participation levels in formal and non-formal training included the level of education, occupation, form of employment, and size of enterprise. The age (or career stage), place of residence, and gender were also quite important. The further section of this chapter shall analyse more closely those dimensions of differences.

Chart III.9 presents participation in non-formal training and self-education broken down per age and education level. The learning and self-education activity of persons with lower secondary education or less, or with basic vocational education, was on a low level, under 10%. Among persons with upper secondary education, learning activity rates reached several percent. The highest levels were attained by persons with higher education. It is worth adding that the result of women was higher by a few percentage point than that of men, and the differences reached a maximum of 5 percentage points (in other education level groups, the values were similar both for men and women, see: Annex, Chart A.III.1). In the group of persons with higher education, there is a clear increase in participation in non-formal education during the middle period of a career, and the maximum of almost 40% is achieved in the age group 40–49. The self-education activity remains rather stable throughout all age groups, reaching around 30%.

Chart III.9. Participation in courses and training (A), self-education (B) and simultaneously in both types of activity (A&B), broken down per age and education level, among the employed (shown in %)



Education levels: wyz – higher, sred – upper secondary, zz – basic vocational, gim - lower secondary or lower.

Averaged predicted probability for individuals based on logistic regression model Logit_1, Logit_2 and Logit_3 (see: Annex, Table A.III.1).

Source: BKL – Population Study 2010–2013.

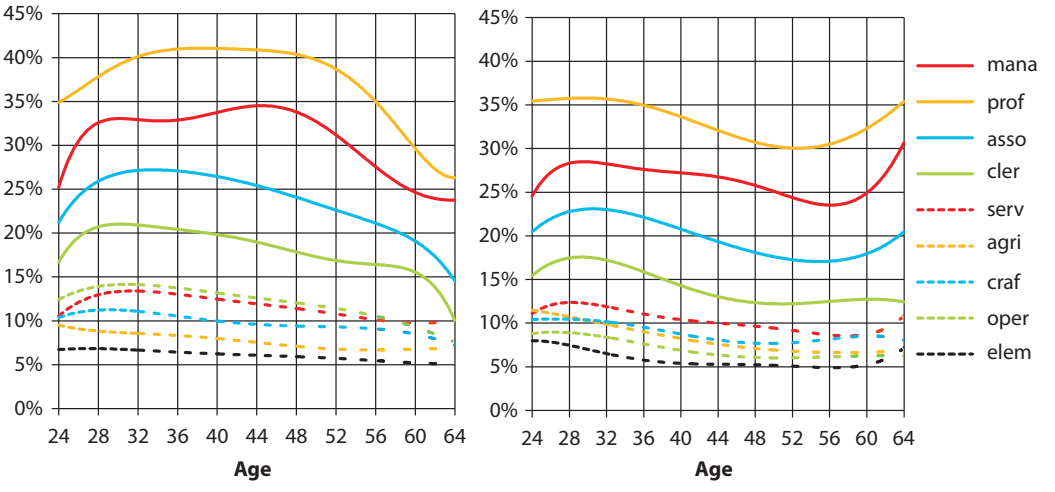
Participation in both courses and training and self-education (category A&B in Chart III.10b) was on a much lower level; however, the participant profile in terms of education level was very similar to results for formal training only. In the case of holders of university diplomas, the highest probability of participation in learning was seen in the group of 40 years old (circa 20%).

As already shown in Table III.5, the highest probability of participation in non-formal education applies to persons employed as professionals (Chart III.10). It exceeded 40% in the age group 30-50. The probability dropped after the 50th birthday, to reach a little over 30% in the pre-retirement group.[37] This group includes teachers, doctors and other healthcare employees, IT specialists, lawyers, and specialists

[37] Under the control of other variables (and after excluding from the model the sex/occupation interaction), the chances for participation in non-formal education, in comparison to the reference category (unskilled workers) were higher by 326% for those working as professionals, by 238% for managers, by 190% for associate professionals, and by 108% higher for office (clerical) staff.

in management and economy. Slightly lower values are observed among managerial professions, then technical and associate professionals, and among clerical professions.

Chart III.10. Participation in courses and training (figure on the left) and self-education (figure on the right), broken down per age and education level, among the employed (shown in %)



Averaged predicted probability for individuals based on logistic regression model Logit_1 (figure on the left) and Logit_2 (figure on the right) (see: Annex, Table A.III.1).

Source: BKL – Population Study 2010–2013.

Professions whose representatives profited from learning at courses and trainings least frequently include primarily skilled and unskilled (elementary) workers, operators, and assemblers, farmers, and employees of the service sector. The probability of participation in non-formal education in the case of these groups ranged from 5% to 15%.

The average participation of the various occupational groups in self-education was very similar to the case of non-formal education (Chart III.10) and in both activity forms simultaneously (Table III.5). In the latter case, the difference between specialist and managerial occupations and the remaining professions is much larger. Under other variables, the specialists had 6 times, and managers 4.5 times higher chances for active participation in both forms of learning than the reference category (elementary/unskilled workers).[38]

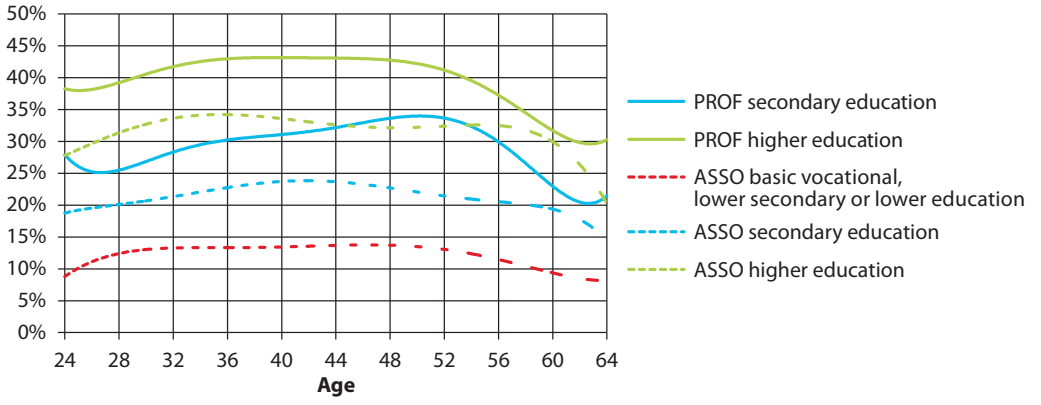
It is necessary to keep in mind the other variables, which provide additional differentiation for learning activity. Chart III.11 shows the predicted probability for participation in non-formal education for professionals, technicians and associate professionals, additionally broken down according to education level.[39] In both occupational groups, the difference between persons with higher and secondary education was clear and ranged from about 10–15 percentage points in the younger age groups to about 6-11 percentage points in the older groups.

The gender of the employee was also important. However, its significance depended on the occupation (see Chart III.12). In occupations with high learning activity rates, among the managers, professionals, technicians and associate professionals, as well as in the clerical professions, women participated in training more frequently. In the case of professionals, the difference reached as much as 8 percentage points. In the case of service, agricultural, skilled (crafts) , and operator occupations, slightly higher rates were seen among men. In the case of self-education, the importance of gender was much smaller. Men engaged in self-education a little more frequently, however, on the general level, the difference amounted only to 3 percentage points.

[38] In the case of associate professionals, the ratio was at 3.2, for clerical occupations 2.4, and for service occupations 1.9 (see: model Logit_3, Annex, Table A.III.1).

[39] For professionals, the very rarely seen lower secondary or lower education level was omitted.

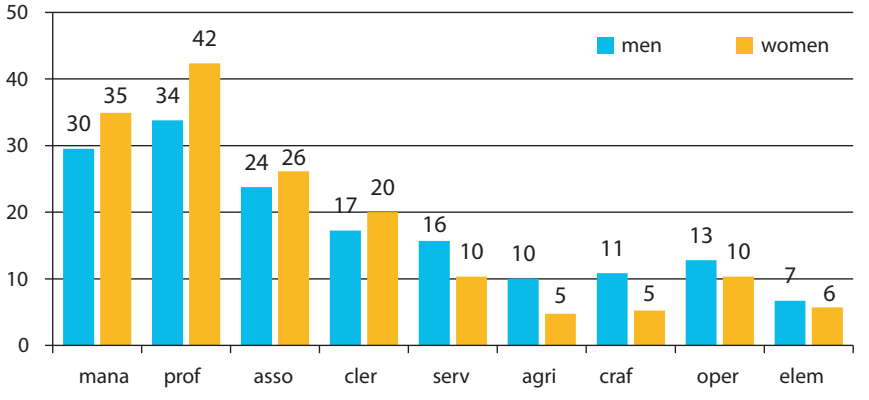
Chart III.11. Participation in courses and training, broken down per age, occupation (ISCO-1: specialists, technicians and associated professionals) and education levels, among the employed



Education levels: wyz – higher, sred – upper secondary, niz – basic vocational, lower secondary or lower.
Averaged predicted probability for individuals based on logistic regression model Logit_1 (see: Annex, table A.III.1).

Source: BKL – Population Study 2010–2013.

Chart III.12. Participation in courses and training broken down per occupation (ISCO-1) and gender among the employed aged 25-59/64



Averaged predicted probability for individuals based on logistic regression model Logit_1 (see: Annex, Table A.III.1).

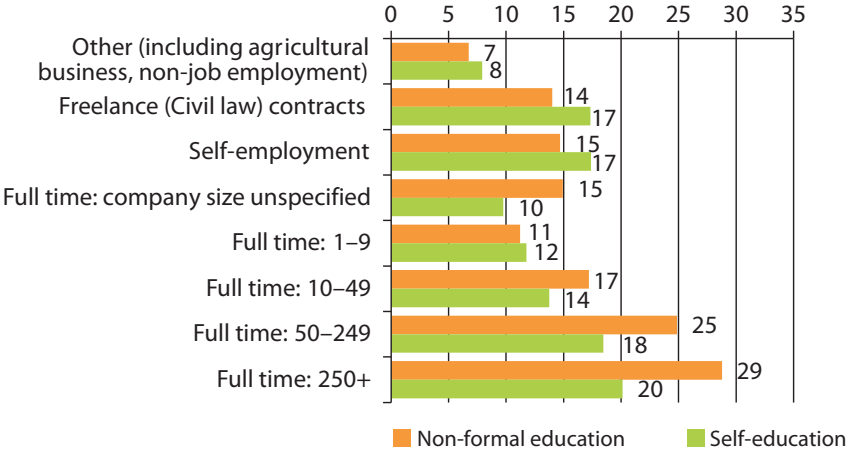
Source: BKL – Population Study 2010–2013.

It is worth remembering that the discussion of occupations takes place on the level of the nine major occupational categories according to ISCO, which are characterised by strong internal differentiation. However, it is not possible to include more detailed information on occupations into the models, because there are too many of them. Therefore all interpretations based on the most general level of ISCO classifications are a certain simplification and can omit the specifics of some smaller occupational groups. One of the issues worth mentioning is the fact that non-formal education is almost completely absent among certain occupations. This applies primarily to "unskilled" (elementary) occupations, which do not require special qualifications and the continuous development of one's competences through courses and training. In this case, participation in courses and training does not depend on the traits of the employee, but is determined by the specific nature of the occupation. This assumption can be approximated with the models of *Zero-inflated Negative Binominal* (see: Annex: Table A.III.1 – the ZINB_1 model and Annex: Chart A.III.2). As the data suggests, one of the reasons for differences in the overall learning activity rates could be the fact that women are a little more frequently found in the "always zero" group – that is, they work in professions in which there is practically no non-formal education. This applies primarily to women in the craft (skilled) (however, in the case of elementary (unskilled) workers the probability for men is equally high), operator, agriculture, and service occupations.[40]

[40] See: Annex, Fig. A.III.2. On the basis of the *Zero-inflated Negative Binomial* model (Annex, Table A.III.1, ZINB_1 model), it presents the probability for a "0" result and for the so-called "always 0" result, that is, being part of the group where the non-formal education is absent. It is based on the count model, representing the number of forms of non-formal education in which the respondent participated (count values from 0 to 6).
For example, females in the group of service occupations have a 28% probability of being in the "always 0" group, while in the case of unskilled worker occupations this probability is at 52% for males and 60% for females. Specific values should be treated with

The form of employment is also relevant for the learning activity. The strongest learning activity characterises persons working full time in large enterprises (Chart III.14). Those employed in companies with under 50 employees, self-employed, or working under freelance (civil law) contracts have shown similar results.[41] The case was similar for self-education; however, here the form of employment was less important. Only the self-employed, those working under freelance (civil law) contracts, and employed full time in companies with over 250 workers engaged in self-education significantly more frequently.[42]

Chart III.13. Participation in courses and training and self-education broken down per form of employment, among the employed aged 25-59/64 (in %)



Averaged predicted probability for individuals based on logistic regression model Logit_1 and Logit_2 (see: Annex, table A.III.1).

Source: BKL – Population Study 2010–2013.

The last of the key dimensions determining participation in learning activity was the place of residence, both in terms of size of the place of residence (and work), and the region. The chances for learning activity among residents of medium-sized and large cities were much higher than among residents of rural areas. For example, under the control of other variables for residents of cities with 50 to 199 thousand inhabitants, their predicted participation in non-formal education was 41% higher than for residents of rural areas (see: Annex, Table A.III.1).

The regional differences of results were also significant (Chart III.14). The correlation between non-formal education and self-education on the administrative region level was high (P = 0.88). Over the past four years, the Podlaskie and Małopolskie administrative regions clearly gain an advantage compared to the rest. In the area of non-formal education, slightly higher than average results were achieved by the Lubeskie, Śląskie, Warmińsko-Mazurskie and Łódzkie administrative regions.[43] The lowest values were seen in the Opolskie administrative region, and in the case of self-education, also in Mazowieckie. The largest group of 8 administrative regions located in the centre of the chart had very similar results.

Chart III.14 is based on data gathered from the sample; therefore, it can omit the internal differences of administrative regions, such as different situations in the local labour market or differences in the core business profiles of local enterprises. However, as the results of regression models show, when other variables are controlled, the differences between regions remain significant (see: models, Annex, Table A.III.1). They can be visualised through the calculation of the model-predicted probability for participation in non-formal education by persons with the same traits, depending on the administrative region in which they live (Chart III.16). The values were calculated for a person with higher education, aged 40, employed full time in a company that employs from 50 to 249 workers, living in a town from 50

caution, as they are susceptible to model specification. However, the presence itself of the observable differences is stable and can be interpreted.

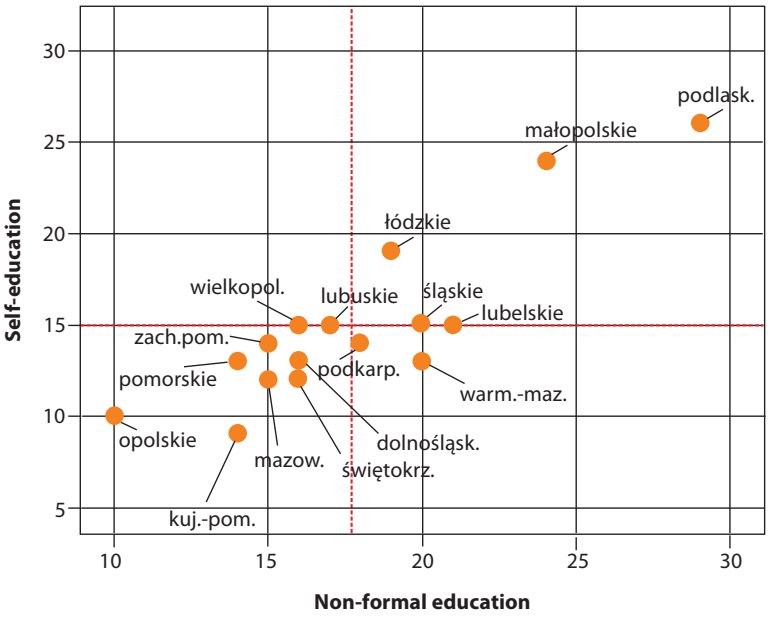
[41] Under control of other variables, on the basis of the Logit_1 model (Annex, Table A.III.1), the largest chances applied to persons working full time in companies with 250+ employees (210% higher than the reference category), working full time in companies with 50-249 employees (140%), and self-employed (90%).

[42] Under control of other variables, on the basis of the Logit_2 model (Annex, Table A.III.1), the largest chances applied to self-employed (87% higher than the reference category), next those working under contracts (48%), and persons working full time in companies with 250+ employees (38%).

[43] Differences analysed with regression model are statistically significant higher than in the case of, e.g. the Podkarpackie province.

to 199 thousand inhabitants (and the effect of gender was averaged). These features support rather high participation rates. Using the example of specialists and skilled workers, we see that, despite identical characteristics of employees, the differences between certain regions are still very pronounced.

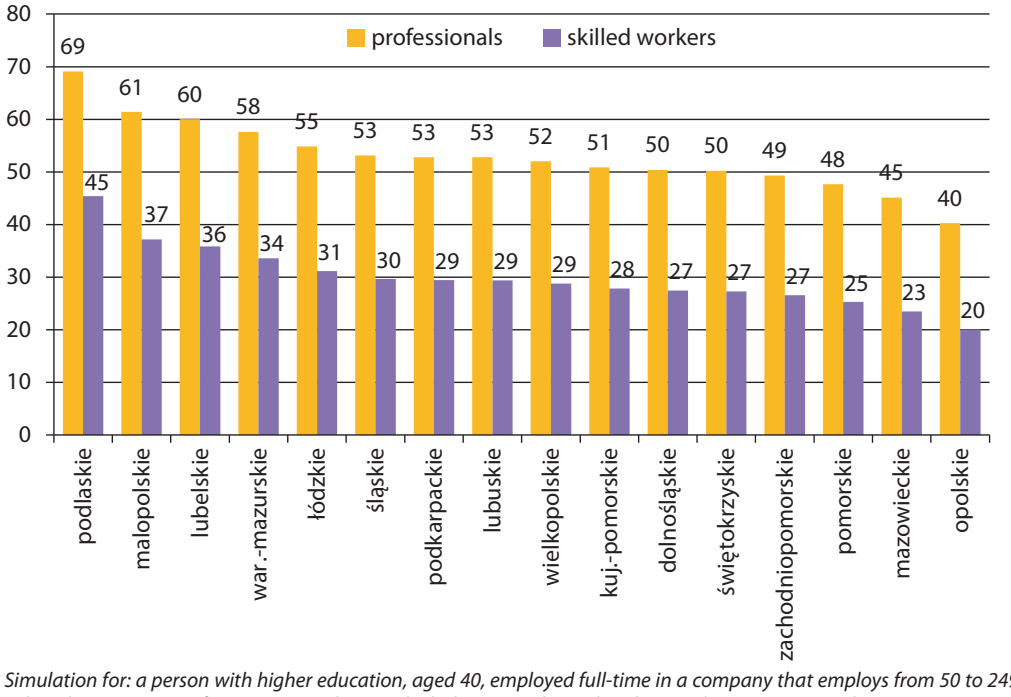
Chart III.14. Participation in non-formal education and self-education during the past 12 months broken down per administrative regions (in %), among the employed aged 25-59/64



Red dotted lines mean the average values for Poland in the years 2010–2013.

Source: BKL – Population Study 2010–2013.

Chart III.15. Predicted probability for participation in non-formal education for professionals, technicians and skilled workers with identical features,* depending on administrative region of residence



** Simulation for: a person with higher education, aged 40, employed full-time in a company that employs from 50 to 249 workers, living in a town from 50 to 199 thousand inhabitants; values related to gender were averaged.*

On the basis of logistic regression model, similar to Logit_1 model (Annex, Table A.III.1), with the only difference being the omission of interaction between gender and occupation.

Source: BKL – Population Study 2010–2013.

In the case of most mid-range administrative regions, the values are very similar, but the dominant position of the Podlaskie administrative region and the weakest of Opolskie do not change, and the difference between them is very significant. For example, in the Podlaskie administrative region, the predicted participation probability amounts to 69% for a professional and 45% for skilled worker, while in the Opolskie administrative region it drops to 40% and 20%, respectively.

3.3. Learning activity strategies of the employed

Based on information on learning activity over the past 12 months (formal, non-formal, and self-education) and on the plans for the coming 12 months, we can define strategies of educational activity and passivity (the analyses are presented for the 2012-2013 round of BKL Study). Specifically, there are four categories as follows:

1. Educationally active – have participated in any form of education and wanted to continue learning;
2. Educationally passive – did not participate in any form of education and did not plan to learn;
3. Do not continue educational activity – have participated in any form of education but did not plan to continue learning;
4. Were not active, but planned to be educationally active – did not participate in any form of education but planned to learn.

Table III.6. Percentage of educationally active and passive persons among the employed aged 25-59/64 (in %)

		2011	2012	2011–2012
Active		14	14	14
Passive		56	57	56
Do not continue learning		23	23	23
Wish to learn in the future		7	7	7
Total	%	100	100	100
	N	9902	10157	20060

Source: BKL – Population Study 2012–2013.

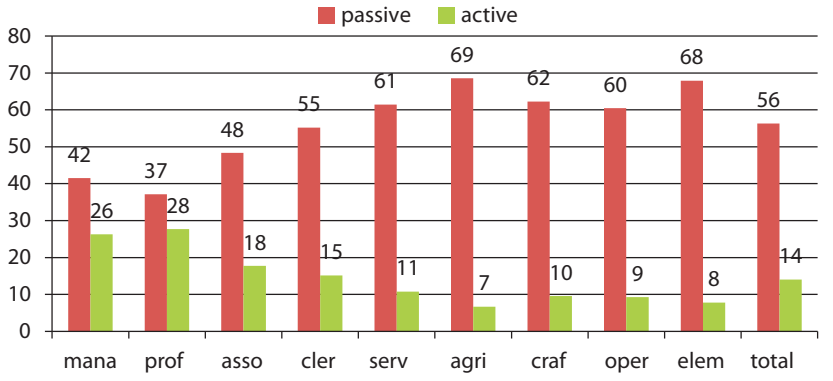
Using the model of polynomial logistic regression (see: Annex, Table A.III.2), we can define factors that influence membership in the individual categories. We shall be particularly interested in persons educationally active (14%) and passive (56%). As in the case of models presented earlier, the key factors included occupation, the level of education, the form of employment and age. The correlations were very similar. Definitely the highest rates of activity and the lowest rates of passivity were seen among specialist and managerial occupations (Chart III.16). Meanwhile, in the service, agricultural, "unskilled," (elementary) and operator occupations, less than one in ten persons were still active in terms of education.

The probability of constant activity decreased with age. It was the highest among persons aged around 30 (at 20%), and systematically dropped to fall under 10% in the 50+ age group (Chart III.17). In the case of persons permanently passive in terms of education, the values rose with age from under 50% to about 65% after passing the 50th birthday.[44] The level of education was very important – as one can guess, the higher the education level, the larger the probability of an active approach.

The largest share of persons continually active in terms of education was seen among full-time employees of large enterprises, and among persons working under freelance (civil law) contracts (Chart III.18).

[44] In the case of category not presented in the figure – "does not continue learning activity" – the values rose only slightly with age (from 22% to circa 26%), and for the category "did not engage in learning activity, but plans to" they dropped evenly (from 10% to circa 2%). Figure presenting all the categories: Annex, Figure A.III.3.

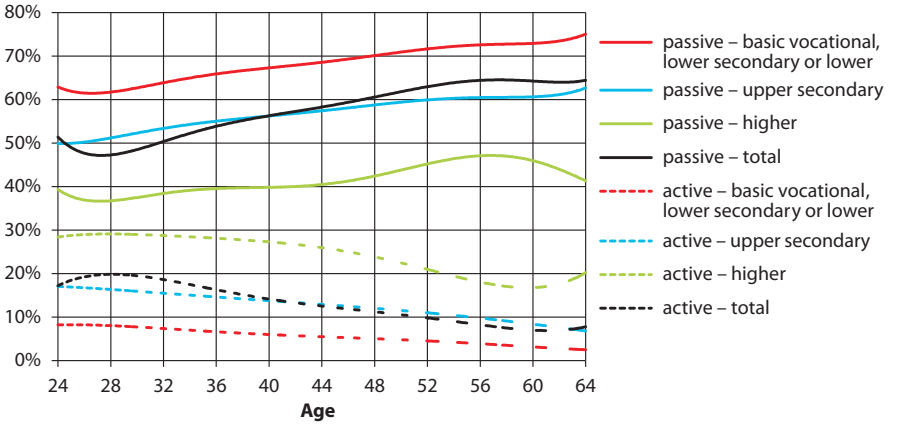
Chart III.16. Educationally active and passive broken down per occupation among the employed aged 25–59/64 (in %)



Averaged predicted probability for category affiliation for individuals based on polynomial logistic regression model MLogit_1 (see: Annex, Table A.III.1).

Source: BKL – Population Study 2012–2013.

Chart III.17. Educationally active and passive broken down per education level and age, among the employed aged 25–59/64 (in %)



Education levels: wyz – higher, sred – upper secondary, niz – basic vocational, lower secondary, or lower.

Averaged predicted probability for category affiliation for individuals based on polynomial logistic regression model MLogit_1 (see: Annex, table A.III.1).

Source: BKL – Population Study 2012– 2013.

Chart III.18. Educationally active and passive broken down per form of employment among the employed aged 25–59/64 (in %)

Averaged predicted probability for category affiliation for individuals based on polynomial logistic regression model MLogit_1 (see: Annex, Table A.III.1).

Source: BKL – Population Study 2012–2013.

Gender was less important than in the case of non-formal education; however, it is worth noting that the probability that women would be active was 3 percentage points higher than for men, and also 3 percentage points lower with regard to educational passivity.

4. Motivation for and financing of learning activity

Among the declared motivation for participation in courses and training, the dominant element was the need to develop skills required in current work (77% of employed aged 25-59/64, who participated in non-obligatory courses and training) (Table III.7). It was usually named in those occupations whose representatives participated in education most frequently, that is, specialists, managers, technical and associate professional. In those professions where non-formal education was less frequent, the requirements of employers played a significant role (32%). Further reasons included following one's own interests (29%) and the will to obtain a certificate or a diploma (22%).

Table III.7. Main reasons for participation in non-formal education among the employed aged 25–59/64, who participated in non-obligatory courses and training (other than health & safety and fire safety training) during the past 12 months (in %)

		Occupation									Education levels				Total
		MANA	PROF	ASSO	CLER	SERV	AGRI	CRAF	OPER	ELEM	lower secondary and lower	basic vocational	secondary	higher	
Development of skills required in current job		80	85	81	71	72	71	66	71	53	65	66	76	81	77
Employer's requirement		34	27	35	35	30	13	35	44	45	33	37	36	28	32
Following one's own interests		29	40	26	23	30	20	15	15	14	16	17	23	36	29
Certificate / diploma		29	23	18	21	23	27	21	22	10	14	21	19	25	22
Reducing the risk of employment loss		16	13	10	10	11	20	11	8	15	13	11	9	14	12
Opportunity for free participation		11	10	13	16	11	6	15	9	20	17	11	14	10	12
Desire to find new work		6	5	7	6	8	6	6	9	11	6	7	6	7	7
Meeting new people / pleasure		1	4	4	1	5	2	1	3	3	3	1	3	4	3
Desire to start own business		1	1	2	1	2	5	3	1	2	2	1	1	2	2
Referral from the Labour Office		0	0	1	1	0	0	2	0	5	10	1	0	0	1
Total	%	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	N	198	1195	596	322	422	128	367	281	92	110	468	1245	1816	3638

** Multiple choice question, the categories do not add up to 100%.*
** The respondents could select a maximum of three answers.*

Source: BKL – Population Study 2012–2013.

The majority of employed (74% of the group aged 25—59/64) who did not participate in courses or training felt no need to develop their competences for occupational purposes. Other reasons were named less frequently, e.g. 14% cited lack of time, and 5% lack of motivation. Lack of encouragement from the employer was named only by 4% of respondents.

Excessive cost was also not a problem for the respondents (only 4% of responses). This is largely because most training is financed with external funding (Table III.8). The employers financed 72% of courses that the respondents attended recently, and 9% was financed by external institutions. Participants" own financing applied only to 14% of respondents, usually representing agricultural, service, and professional occupations.

Table III.8. Source of financing of the most recent course, training or other form for development of competences, in which the respondent participated, broken down by occupation, among the employed aged 25—59/64 (in %)

		MANA	PROF	ASSO	CLER	SERV	AGRI	CRAF	OPER	ELEM	Total
Employer		75	64	74	82	69	30	82	81	86	72
Own funds		12	17	15	8	19	28	8	13	5	14
Other institution		6	13	8	4	7	36	6	4	4	9
Labour Office		1	1	1	1	2	3	2	1	4	1
Family, friends		1	0	0	1	0	1	0	0	1	0
Mixed sources of funds		5	5	2	4	2	2	2	1	1	3
Total	%	100	100	100	100	100	100	100	100	100	100
	N	251	1350	748	418	609	162	740	492	225	4996

Source: BKL – Population Study 2012–2013.

Table III.9. Sum of personal expenses made for participation in courses and training over the past 12 months, broken down per occupation, among the employed aged 25–59/64 (in %)

		MANA	PROF	ASSO	CLER	SERV	AGRI	CRAF	OPER	ELEM	Total
No own cost		73	64	79	84	74	54	87	78	95	75
Under PLN 100		3	4	2	2	3	20	2	2	0	3
PLN 101-500		7	9	7	7	8	13	5	7	1	7
PLN 501-1000		5	6	4	1	7	5	3	6	3	5
PLN 1001-3000		8	12	6	4	6	8	2	4	1	6
Over PLN 3000		5	6	2	2	3	0	1	2	1	3
Total	%	100	100	100	100	100	100	100	100	100	100
	N	177	957	558	314	447	128	510	355	161	3607

Source: BKL – Population Study 2012–2013.

Similar conclusions can be drawn from the analysis taking into account the sum of expenses made for participation in courses and training during the 12 months preceding the study (Table III.9). On the average, professionals spent the most on non-formal education, and 24% of them spent over PLN 500 over the year for that purpose. However, three fourths of the employed who engaged in non-formal education did not spend money for that purpose.

The above analyses confirm facts already known on the learning activity of adult Poles.[45] Among the employed, those developing their competences usually came from among well-educated persons, working in specialist professions, in managerial, technical, or associate professional jobs, in large enterprises and living in large cities. Somewhat higher ratios were noted in the central period of their career and dropped during the pre-retirement period (despite that, it cannot be said that age is a factor that strongly influences learning activity of the employed). Regional differentiation was also clearly visible and several administrative regions stood out from among the rest.

In light of the conducted analyses, it seems that the main determinants of adult learning activity are the demands and nature of the job, combined with the opportunities that it offered. Under this perspective, the primary drivers of learning activity are the employers, who usually finance the training and decide who participates in it. The further section of this chapter shall analyse investment into human resources from the employers' perspective.

[45] Identical conclusions can be drawn from analysis based on the count model – the number of learning activity forms in which the respondents participated, which can be interpreted as educational intensity (the ZINB and NBRM models, see Annex, Table A.III.1).

5. Training of employees – employers' perspective

As previously discussed, when looking for reasons for the low participation of Poles in non-formal and informal training, one needs first to look at the issue from the employers' perspective, because the work environment and conditions in the labour market are the primary drivers motivating adults to engage in learning activity. Data collected over the four rounds of the study allow us to draw a hypothesis on one of the reasons for this situation. Based on the interpretation of results, it is possible to state that Polish employers prefer the sieve model to the human capital model as regards their HR policy.[46] This is proven by the following:

a) recruitment strategies used by employers - focused on attracting candidates possessing already the required competences, which can reduce the risk of subsequent, costly investment; and,
b) the patterns of investment into human resources, encountered in Poland - preference is given to ad-hoc and short term investment over strategic and long-term solutions.

These issues are illustrated below.

5.1. Recruitment strategies

Almost three-fourths of employers seeking candidates for positions other than managerial require them to be fully prepared or allow the possibility of small-scale training. This approach, based on selecting from the market candidates who best match the criteria set by the hiring organisation (as regards qualifications and experience), can be called the sieve strategy. The percentage of employers applying this strategy remained unchanged across all the rounds of the BKL Study carried out over the years 2010-2013[47] (Figure III.1).

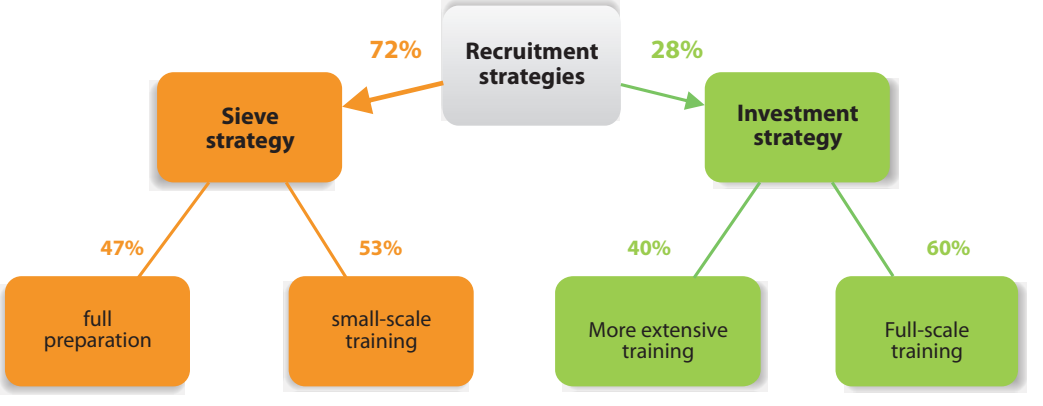


Figure III.1. Strategies for recruitment of candidates for employees (in %)

Source: BKL Employer Study 2010-2013.

The remaining group of employers, constituting only a little over one-fourth of all employers, preferred a different approach and assumed that the new hires would undergo more extensive training (40% of employers in this group) or even full-scale training (60% of employers in this group). Thus, when hiring a new employee, they plan to cover the costs of investing in his/her development and adapting his/her competences to the job. As indicated by the results of the BKL Study, those two contradictory approaches to recruitment policy do not translate in practice into extremely different practices of employers, because the difference is based rather on where the emphasis is placed.

[46] Literature contains many detailed discussions of this issue, e.g. Monika Kostera *Zarządzanie personelem*, Polskie Wydawnictwo Ekonomiczne. Warsaw 1999.

[47] Analysis on combined data from the I-IV study rounds.

To begin with, it is worth looking at the traits of employers associated with each of these approaches (Table III.10).

Table III.10. Percentage of employers applying the sieve strategy and those applying the investment strategy, broken down per main field of operation, size of entity (N = 64002) and development phase assessment of the enterprise (N = 52575)

		Recruitment strategies*	
		sieve	investment
Main field of operation	Manufacturing and mining	69	31
	Construction and transport	76	24
	Trade, hospitality and food service	69	32
	Specialist services	69	31
	Education	91	9
	Human health and social work activities	84	17
Employment volume	1–9	72	29
	10–49	78	22
	50–249	82	18
	250+	75	25
Development phase	Stagnant	76	24
	Poorly developing	69	31
	Developing	65	35
	Strongly developing	59	41

** Colours denote values separately within each of the strategies*

Source: BKL Employer Study 2010–2013.

Looking at the recruitment strategies of entrepreneurs – or their statements on the relative importance of the various elements of candidate evaluation (such as education level, work experience, gender, languages spoken) – we see that the weight of education is slightly lower for those employers who follow the investment strategy than for those favouring searching for the best employee available in the market. Usually those differences amount to a few percent.

More importantly, employers seeking employees fully prepared to work or requiring just small-scale training expect not only the relevant qualifications, but also experience. For most occupations, the approach to experience is the quintessential difference between the sieve and investment strategies. Those willing to hire a candidate not fully prepared are more frequently inclined to waive their high expectations regarding experience than those defining a preferred level of education. Differences between the percentages of employees applying different recruitment strategies are much smaller in the category of the level of education than in the category of experience. For example, in the information and communication sector, employers favouring the sieve strategy in 81% of cases required the candidate to possess work experience, while those applying investment strategy only in 50%. Their preferences were less divergent with respect to education level – it was named as an important criterion by 69% and 56% of employers, respectively.

This situation is attributable to two primary reasons:

1) The high weight of education level is tied to the fact that investment in formal education is usually costly and has a long return period. Therefore, there are no differences between employers applying different recruitment tactics in terms of the level of investment in the formal education of their employees, such as subsidising their learning at universities, vocational colleges, or other institutions **(Table III.11)**.

Table III.11. Recruitment strategies vs. investment into staff competences

	any kind of investment in personnel	strategic investment	subsidies for formal education	organisation of courses, trainings, conferences, workshops
sieve strategy	**67**	**29**	**13**	**47**
investment strategy	76	37	13	57

Source: BKL Employer Study 2010–2013.

2) Some of the competence shortages can be reduced by organizing appropriate development activities for employees. This more frequent investment activity is visible in the group of employers who, at the time of recruitment, take into account the need to train the employee more (Table III.11). However, these differences are not very significant – 9 percentage points in the case of overall investment activity or 10 percentage points in the case of such activities as courses, trainings and conferences. The difference in the case of strategic investment is also 8 percentage points (these investments shall be described further on) which means that the fact of hiring employees requiring further training in the case of Polish employers is not automatically linked with advanced HR policy tools and does not necessarily mean a consistent strategy.

On the other hand, the small differences in activity rates for such forms as courses, conferences, or formal education do not necessarily mean the lack of actual competence development of new hires. The specific nature of certain occupations requires the employees to acquire certain competences at the workplace, specific for the given company and position. It is not possible to find an employee with these competences in the labour market. For this reason, the significance of such forms of employee education as on-the-job training (through practice) and learning competences from more experienced employees (through **mentoring**) is quite large for many employers (**Table III.12**).[48]

Table III.12. Significance of various forms for gaining knowledge and skills by the employees

	Unimportant	Small	Moderate	Large	Total	
Learning on the job (through practice)	2	5	27	66	100	1030
Learning from new employees	21	22	32	25	100	1019
Learning from older employees (mentoring)	1	3	26	70	100	1034
Courses and training	5	9	36	50	100	1035

Source: ASPA PL 2009.

During the 12 months preceding the study, as many as 76% employers who were advertising vacancies encountered difficulties in finding candidates for the offered positions. Interestingly, those employers who assumed the new employees would require training experienced the recruitment problems on a similar scale. In both cases, the key reason for difficulties (over 80% of responses) was the fact that the candidates failed to meet expectations. The employers were dissatisfied mostly with their competences and skills (both in the case of those applying the sieve strategy - 38%, and in the case of the investment strategy - 36%). Slight differences can be seen in the approach to experience of candidates. In the first group, 29% of employers stated the candidate was disqualified by lack of experience; in the second group, their number was smaller - 21%. The slightly different emphasis in recruitment, mentioned in the beginning of the chapter, is also reflected in the larger importance attached by the investment-oriented employers to the candidates' motivation to work. They named this issue more often as disqualifying

[48] The international research project "Activating Senior Potential in Ageing Europe (ASPA)" was carried out in the years 2008-2011 in 8 countries: the Netherlands, Great Britain, France, Germany, Sweden, Denmark, Italy, and Poland. In Poland, it was executed by the Institute of Sociology of the Jagiellonian University (Dr Jolanta Perek-Białas and Konrad Turek). The main goal of the project was to identify conditions that support the activity of the elderly. As part of the project, a nationwide, representative survey was conducted, on a sample of 1037 companies and institutions representing the private and the public sectors, during the period June-July 2009 (TNS OBOB), using the CATI method.

the candidate. 31% of employers stated that the lack of motivation accounted for non-fulfilment of recruitment criteria, vs. 22% in the second group of employers.

5.2. Education of human resources – strategies

The second dimension of employers' activity that should be considered in the analysis of HR policies is their involvement in the process of the competence development of their personnel. Analysis of this issue and an attempt at building a typology of this activity seems interesting in the context of the attempt to establish whether the Polish employers favour the sieve model (training and development do not play an important role) because it focuses on the most effective (including cost effectiveness) management of human resources in their existing shape, or perhaps they favour the human capital model based on the long-term development process which also involves building employee loyalty.

The analyses presented below focused primarily on the following:

- the overall level of employers' activity in terms of investment in human resources, and in particular on their continued participation in this process. (Data collected under this study limit the analyses only to the recent year and declarations on activity in the following year (this is not a panel study), however, it allows to present proposals for type of this activity and to examine the related characteristics); and,
- strategies for the choice of tools/forms for developing personnel competences and characteristic of employers applying the various approaches.

Data analysed below comes from two combined runs of the BKL Study, from 2012 and 2013 (unless otherwise stated). This enabled us to increase the sample used as the basis to draw conclusions on correlations, and simultaneously to make it more immune to insignificant deviations tied to the execution or context of the given study round.[49] Similarly as with the analyses regarding learning activity of adults, during the search for factors determining educational activity of employers, statistical models of logistic regression were used. They are presented in the Annex. The following analyses focus primarily on entrepreneurs who accounted for about 90% of all studied entities. Institutions, due to their specific features, including lack of possibility for evaluating development degree, the non-profit nature, etc. have been excluded from part of the analyses, especially the logistic regression model.

Involvement of employers in personnel development

In the 2013 Study, the percentage of employers who declared having engaged in any form of competence development of their employees in the year preceding the study amounted to 69%. This result is very similar to the one measured during the previous round of the study – 71%. Thus, it can be estimated that approximately 1 200 thousand employers incurred costs tied to development of employees.

The factors that influence investment in the development of human resources (see Annex, Table A.III.3a Logit_1) include primarily the size of the enterprises, its development phase[50] and sector of operations. Other factors also play a certain role, albeit a smaller one – the ability to evaluate employees, the recruitment strategies discussed above, and the fact of having a training budget.

[49] Exclusion of the 2011 study cycle from the analysis is due to the modification of participation rate made between the study rounds, to make it more inclusive. This means that the researchers abandoned the direct question on undertaking any kind of activities meant to develop the qualifications and skills of employees, which was followed by detailed questions on the type of activity. It was replaced with a set of questions regarding the use of specific forms. This modification led to a clear increase in the percentage of employers who declared involvement in such activities (from 54% to 71%). This could mean that the employers actually engaged in such activities, e.g. in the form of subscription for trade magazines, or periodic evaluation of employee competences, despite the fact that – consciously or not – they did not classify them as development of employee qualifications and skills, which led to lower rates for their participation in this process in 2010.

[50] Assessment of enterprises development phase (excluding institutions) was made on the basis of three indicators referring to the last 12 months of operations: 1) introduction of new products, services or production methods, 2) positive employment balance, 3) demonstrating (in the opinion of enterprise representatives) an increase of profits. The group of strongly developing enterprises included those that simultaneously fulfilled all three conditions. Stagnant companies did not meet any of them. The intermediate degrees of development or poor development were based on the fulfillment of two or one of these conditions.

The size of enterprises leads to the most significant differences: The chance[51] that a large enterprise would invest in any way into its employees is almost 5 times higher than in the case of a micro enterprise, and in medium-sized enterprises, it is 4 times higher, and in small ones – 1.5 times higher. Chances that an enterprise would invest in its human resources are also 4 times higher if it is a strongly developing one (compared to stagnant companies).

The scale of differences between enterprises with extreme differences in those dimensions (size and development phase) can be compared more comfortably in Table III.13, which presents the average probability for educational activity of employers representing different groups. It is easy to notice that the activity rate is the lowest in the case of stagnant micro-companies; only one in two of such entities engage in any form of education. The main problem lies in the fact that those entities – the smallest ones, the non-developing ones – constitute the largest group of Polish enterprises (approx. 41% of all respondents), thus "building" the activity rates regarding education. As the size of enterprise grows, the probability of education provided by the employer increases visibly, but there is also a clear difference between smaller and larger enterprises. Even if we take into account the development phase, which determines the largest increase of probability regarding small and micro-enterprises, the probability still remains on a level equal to stagnant large companies. In the case of large enterprises, especially the developing ones, the rates optimistically hover among the maximum values. Despite that, it is worth remembering that in terms of their numbers, this is a marginal group of domestic enterprises.

Table III.13. Averaged predicted probability for investment into human resources development depending on enterprise size and development phase, based on Logit1 regression model (see Annex, Table A.III.3a)

	Company development phase				
	Stagnant	Poorly developing	Developing	Strongly developing	Total
1–9	55%	70%	78%	85%	66%
10–49	61%	74%	81%	88%	71%
50–249	82%	89%	93%	95%	87%
250+	90%	94%	96%	98%	94%

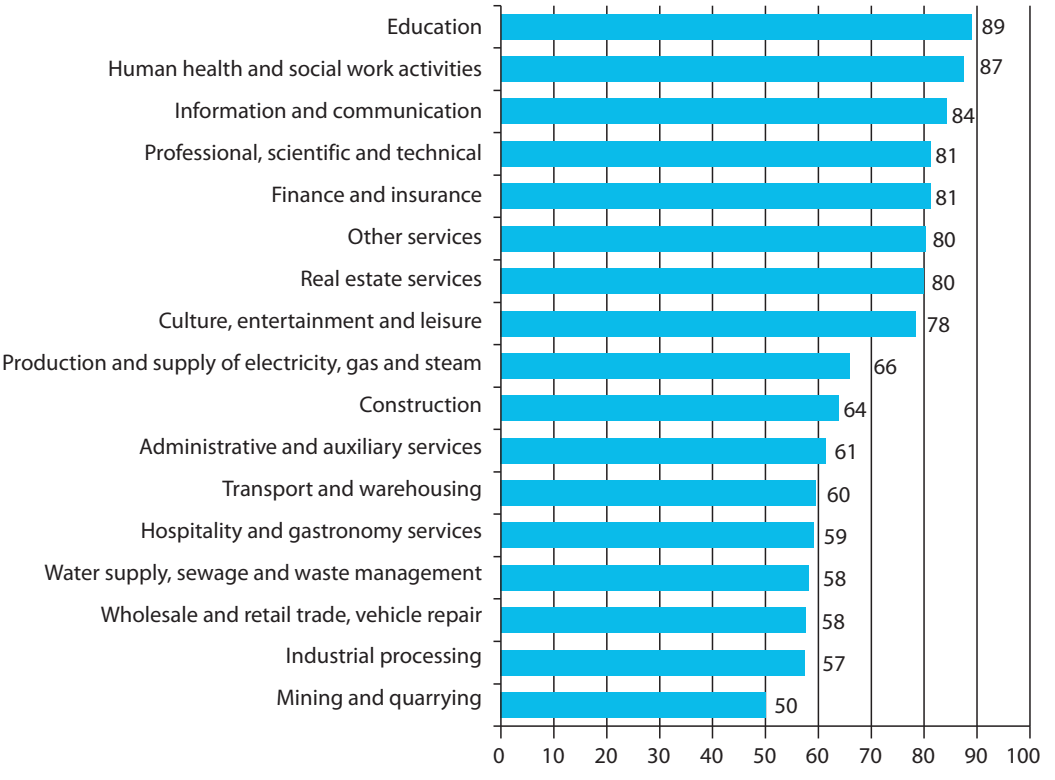
Source: BKL Employer Study 2010-2013.

Another of the key factors influencing involvement of employers in the development of their employees is the sector in which a given company operates.

Chart III.19 presents the rate broken down per 21 sectors. A clear division into two groups is visible. A higher probability of investment, in the range of 78-89%, is seen among companies operating in education, healthcare, and specialised services sectors. These active sectors belong to the "new economy." Below, the figure shows a drop by 12 percentage points. This visibly less active group includes traditional sectors, tied to industry, construction, hotels, and auxiliary services, trade, and mining, which closes the group of the least active sectors.

[51] Chance under logistic regression is understood as the rate of the probability of the given event to the probability of an opposite event.

Chart III.19. Averaged predicted probability for investment into human resources development depending on sector of operation, based on Logit1 regression model (see Annex, Table A.III.3a)



Source: BKL Employer Study 2010–2013.

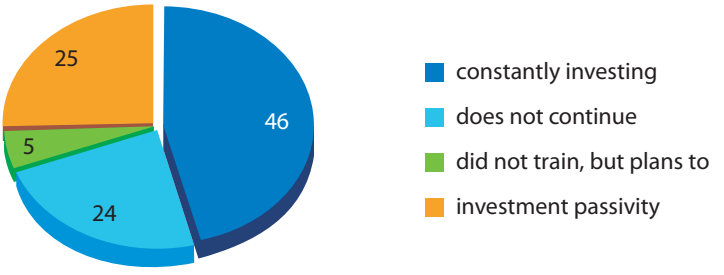
Continuity of involvement

Aside from the fact of investment into human resources itself, it is also very important whether this involvement is continuous or incidental. Data collected under the BKL Study does not enable a comparison of that process over several years. However, using the information on educational activity over the past 12 months and on the plans for the coming 12 months, we can define four types of employers' involvement (for the 2012-2013 round of BKL Study):

1. **constant activity** – invested into personnel development during the past year and plan further actions in this area;
2. **investment passivity** – did not engage in any form of employee training during the past year, do not plan such actions in the coming year;
3. **do not continue** – have provided training during the previous year, but do not plan to continue these actions in the coming year; and,
4. **plan** – did not provide training during the previous year, but plan to invest into staff competences in the coming year.

The first two types represent contradictory approaches and the two subsequent ones can be referred to as incidental or ad-hoc, i.e. training is undertaken depending on the different circumstances "moderating" this activity, such as the need to engage in other investment (almost half of employers inactive during the past year indicated this reason), excessive cost (reported by 53% of employers), or the key factor, which is the achievement, in the employer's opinion, of a balance between enterprise needs and employee skills (80% of employers declared that their staff possess the required skills).

Chart III.20. Types of employers' involvement into investment in human resources

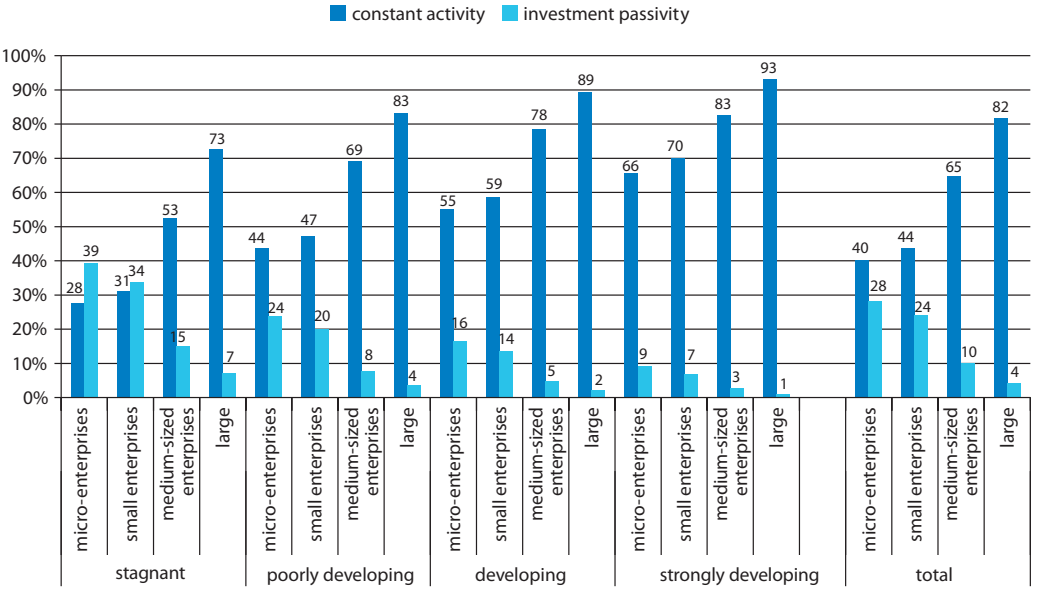


Source: BKL - Employer Study 2012–2013.

The "constantly investing" represents almost half of all employers (Chart III.20). The group not engaged in training (passive ones) comprises one in four among all employers, and those who invest into personnel development activities on an ad-hoc basis constitute 30%.

Using the logistic regression model (Annex, Table A.III.3b, Logit 5 and 6), we can determine factors that influence the affiliation with the two most interesting categories: employers who are active and passive in terms of staff training. The intermediate categories are omitted.

Chart III.21. Averaged predicted probability for employers being constantly active or passive, broken down per groups of enterprises, based on Logit_5 regression model (see Annex, Table A.III.3b)



Source: BKL Employer Study 2012-2013

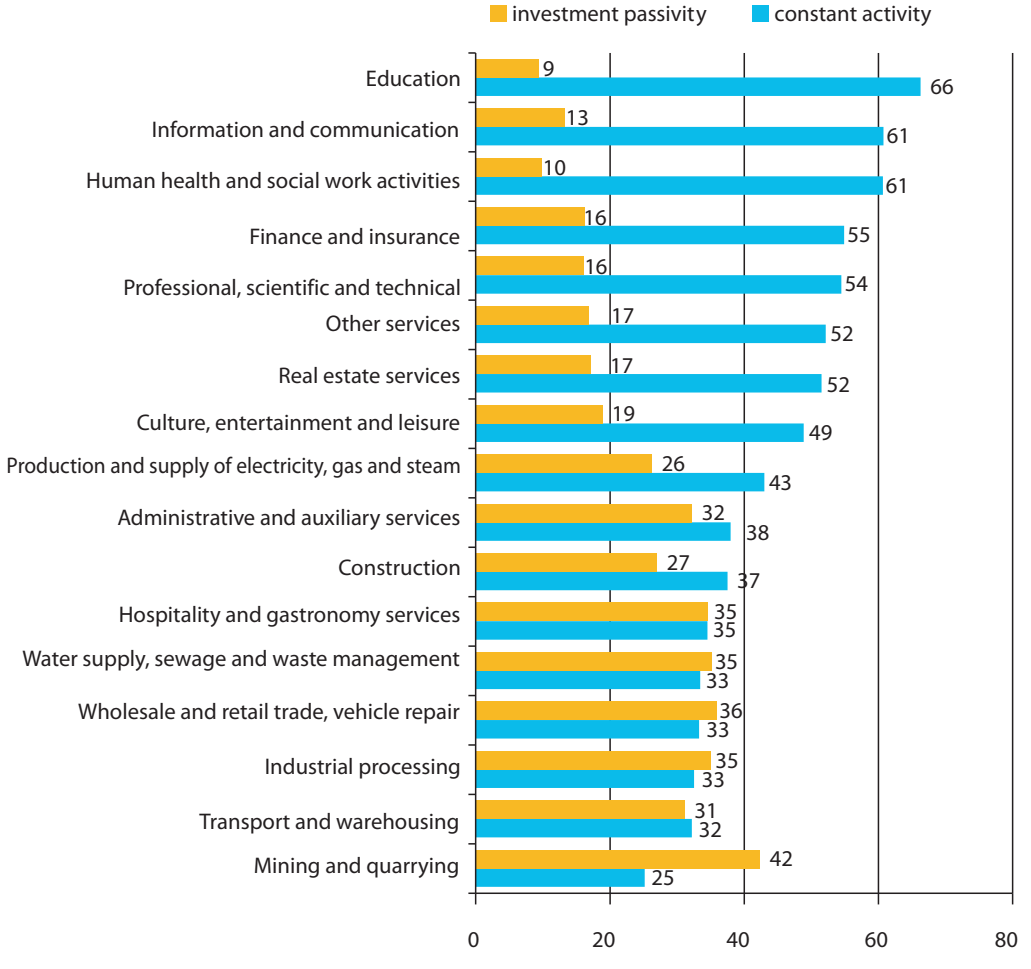
Enterprise size is once again an important predictor for being part of both groups: the active and the passive ones in terms of investment into human resources. For a large enterprise, the chances that it engages in constant development activity are 4.5 times higher than for micro enterprises. On the other hand, a micro-enterprise has a 5 times larger chance of being among the passive entities than a large one.

In terms of development strength, we can observe (Chart III.21) that, for the largest group of domestic enterprises, which are stagnant micro-enterprises, the probability of being constantly passive is higher (39%) than the probability of being among the companies actively investing into the development of their human resources. The more strongly a company develops, the higher their chances for continuous educational activity, as both processes stimulate each other, because enterprise development means the need to improve competences of employees (new markets, production processes, innovative products etc.). In turn, the competitive advantage in the form of highly skilled employees enables and strengthens the company's development. This tendency is visible for each enterprise size. However, the difference

is particularly pronounced with respect to smaller companies. Between a strongly developing micro-company and a stagnant micro-company, there is a gap of as much as 38 percentage points (probability for constant activity). While in the case of large enterprises, it reaches 20 percentage points.

In several sectors (hospitality and gastronomy services, water supply, sewage and waste management, trade, and primarily in the case of mining), the value of passivity rate in terms of personnel development is higher than the value of constant activity rate (Chart III.22). The highest probability for constant activity is obviously seen among companies operating in the sectors of education, information and communication and healthcare, i.e. those with the highest overall chance for educational activity. The remaining sectors, with probability for constant activity at slightly above 50% and relatively low educational passivity rate, primarily represent specialized service sectors.

Chart III.22. Averaged predicted probability for employers being constantly active or passive, broken down per groups of enterprises, based on Logit 5 and 6 logistic regression models (see Annex, Table A.III.3b)



Source: BKL - Employer Study 2012–2013.

In the course of discussion of factors influencing the employers' involvement into education and training, it is worth to mention one more factor, namely, the training budget. Although, according to the BKL Study, not more than an average of 6% of employers[52] had a training budget in the years 2011-2012, those who did have it invested into their human resources much more frequently. It is worth noting that, while among companies that did not have a training budget, the probability of investment passivity stood at 30%, the risk dropped to 4% among those enterprises that did possess this tool. This is also linked with the 77% probability of constant activity, versus 38% among other companies. Of course, it is

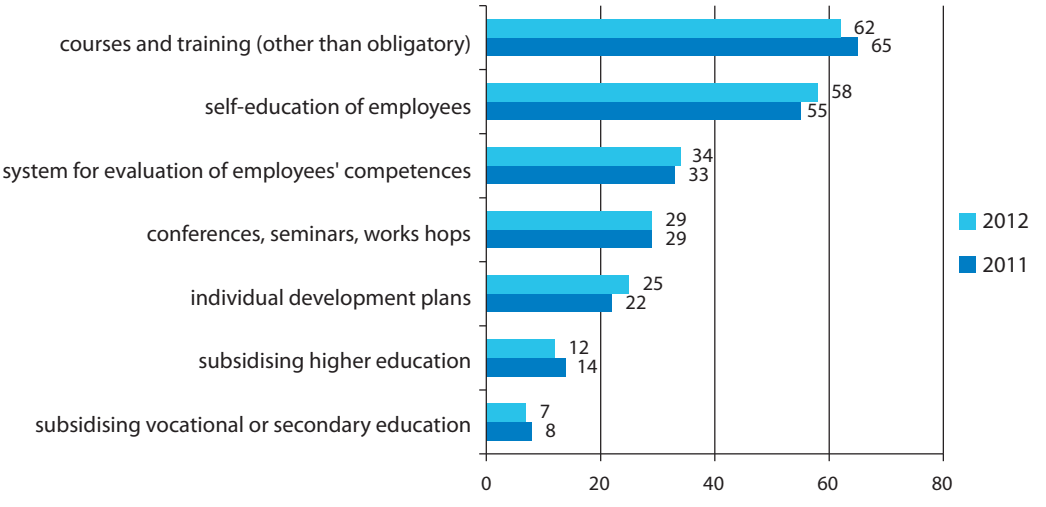
[52] According to the CVT study, quoted earlier, about 13% of Polish enterprises have training budgets. It is however necessary to remember that this study did not cover micro-enterprises, that is, companies with less than 10 employees, who very rarely have separate training budgets.

rather difficult to consider the training budget as the reason for this activity. It should rather be seen as an indicator of the long-term outlook of the entrepreneur who set it up.

Strategies regarding selection of education forms

The issues analysed above applied to the very fact of employers engaging in activities meant to develop competences of their personnel. The use of at least one tool during the year preceding the study was an indicator of activity. When analysing the employers' approach to personnel training and defining the patterns for their activity, it is worth having a look at the forms of activities that they choose. Preferences in this area are stable – two-thirds of employers investing into development opted for courses or trainings. More than half supported the self-education of their employees, for example, by purchasing magazine subscriptions or books. One in third declared having in place an employee evaluation system. Less than 30% of employers used conferences, workshops, or seminars. One in four spoke of setting up individual development plans for employees, and the least popular solution were subsidies for learning at all types of schools.

Chart III.23. Percentage of employers engaged in development, who declare the use of various forms for investment into the development of employee qualifications and skills



Source: BKL - Employer Study 2012–2013.

Based on the forms of education that were included in the questionnaire, a typology of education strategies can be proposed, which includes the following:

1. **strategic and long-term approach** – involves the use of at least one of the two more specific forms:
   a. **strategic** – the use of at least one of the forms which require intentional, long-term, and systematic action: system for competence evaluation and individual development plans;
   b. **long-term (formal education)** – subsidising the education of employees at institutions of higher education, secondary or vocational schools;
2. **short-term investment** – application in the company's educational practice at least one of the short training forms: training, courses, workshops, conferences, or seminars;
3. **self-education of employees** – supporting the learning of employees through purchase or subsidising the purchase of subscription of professional magazines, books, etc.

Using again the logistic regression model (Annex, Table A.III.3a, Logit 2-4),[53] we can determine whether there are certain factors which influence more strongly the affiliation of an enterprise to one of these types. As in the case of models presented earlier, the key factors include the size of the enterprise, the phase of development and the field of operation. The strongest differentiation is visible among companies using the short forms of education - large companies have a 450% bigger chance of falling

[53] The analysis covers only enterprises.

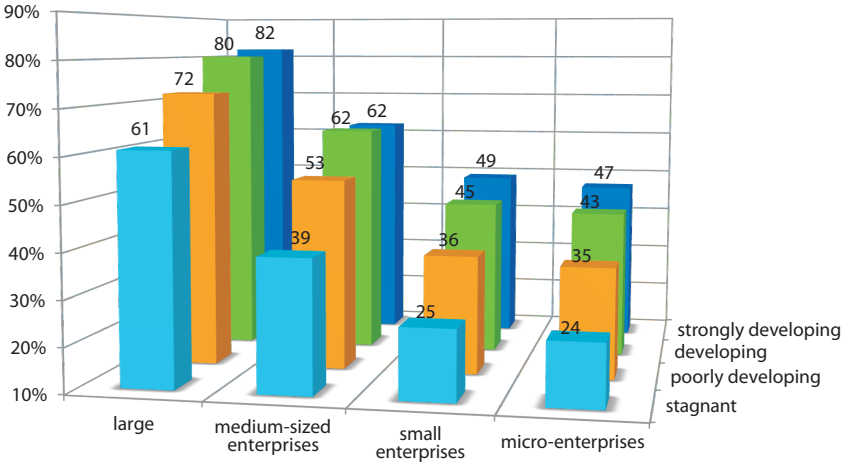
into this category than micro-enterprises. In the case of the latter, this is not because they are more active in the support for self-education or in strategic and long-term approach – here the values are even lower – but rather from the fact that among micro-enterprises, any form of investment into employee competences is much rarer. Stronger development of enterprises (Table III.14 and Chart III.24) visibly increases the probability of using all combinations of educational forms. This tendency is seen across all enterprise sizes. In the case of micro-enterprises, the differences between poorly developing or stagnant companies and the strongly developing ones are the strongest in the short-term training forms, and the difference in the probability value amounts to 19 percentage points. The situation is similar in the case of small companies. Thus, the development of a micro- or small enterprise increases its chances for providing employee education in the form of courses, training, workshops, or conferences. The rate of strategic and long-term education rises less strongly (by 15 and 16 percentage points, respectively) for the micro- and small enterprises. A move from the stagnant to developing category increases by 11 percentage points the probability of supporting self-education, regardless of company size. In the case of large enterprises, this change mostly increases the probability of using strategic or long-term forms of investment into human resources (by 14 percentage points).

Table III.14. Averaged predicted probability for the various groups of enterprises as regards short-term forms (Logit_2), support for self-education (Logit_4) and strategic investments (Logit_4) (see Annex, Table A.III.3b)

Company development phase	Employment volume	short-term	support for self-education	strategic and long-term
lack of development or poor development	1–9	40%	33%	29%
	10–49	49%	36%	30%
	50–249	72%	49%	45%
	250+	83%	53%	67%
development and strong development	1–9	59%	44%	44%
	10–49	68%	47%	46%
	50–249	85%	60%	62%
	250+	92%	64%	81%

Source: BKL Employer Study 2010–2013, N = 26794.

Chart III.24. Average probability for engaging in strategic or long-term forms of investment in human resources, depending on the size of entity and development phase



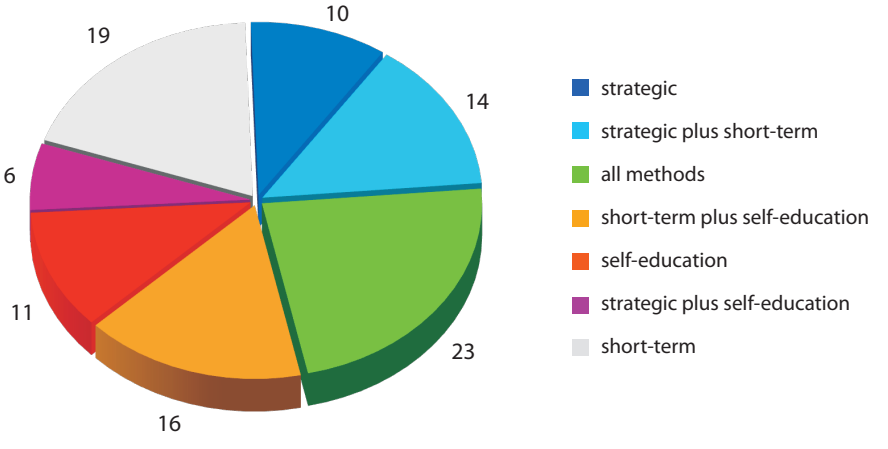
Source: BKL - Employer Study 2012–2013.

Heightened probability of strategic development forms is seen also among companies that set up training budgets, and their probability of investing in such forms amounts to 70%, while for the remaining enterprises, it is at 30%. Of course it increases with the entity size. It is certainly a very important factor among those that strengthen the level of engagement in the long-term and systematic investments into human resources. However, with a similar reservation as formulated above, first of all, it is used by a very small group of enterprises, and, secondly, it is rather the result of a strategic approach to personnel development than its direct reason.

Trailing behind Europe – the conditions and strategies for development of competences of adult Poles

The use of advanced tools of competence development, i.e. competence evaluation systems or individual development plans, may be an indicator of the weight of personnel development for the overall HR policy of the enterprise.[54] Their application is tied to a broader range of tools used to support competence development than the range used by other enterprises also engaged in training. Among the companies that used at least one of these tools, more than half (56%) used at least three different forms of training, while in the remaining group of entrepreneurs training their personnel, almost all (97%) limited themselves to a maximum of two options. These results have a simple justification: The strategic human resource development tools are rarely used on their own, and they rather form another level of the training policy applied by the given company, complementing the forms used earlier. In a situation where personnel policy is based on the strategic approach from the very beginning, the application of various forms of development activities shall be a natural consequence of its application. Over half of all employers who organised training used at least one of the aforementioned tools (competence evaluation system or individual development plans), and 43% of all those providing training combined them with other forms of employee education. The most frequent approach involved the application of at least one form of each type (strategic and short-term training, support for self-education). The second most popular was the use of short training forms only. The subsequent places were taken by a combination of the short-term approach and support for self-education and by the combination of strategic and short forms. Thus, if the employer applied only one type of tools, the most frequent group were the short training forms. The other approaches (strategic and employee self-education) were applied two times less frequently.

Chart III.25. Forms of employee education used by employers (data combined for the 3rd and 4th round of the Study). N – 32005



Source: BKL - Employer Study 2012–2013.

[54] A broader study of the set of actions and key dimensions comprising strategic human resource management in the practice of enterprises can be found in the report of the Educational Research Institute, „Zarządzanie zasobami ludzkimi w oparciu o kompetencje. Perspektywa uczenia się przez całe życie" (*Competence-based human resource management. Prospects for lifelong learning*). This report also provides an interesting supplement for the analyses presented here, as regards the employers' perspective on the competence-based strategic approach to human resource management, especially in the parts covering strategies of employers regarding investment in specific groups of employers.

6. Summary

This chapter covered the analysis of the conditions for and models of learning activity of adult, working Poles. The situation of Poland was presented in the context of the situation seen in other Member States of the European Union. Compared to Europe, the participation of Poles in formal education is not optimistic, because its level is definitely below the EU average. We have analysed the models and strategies of the learning activity of Poles aged 25-59/64. Those who developed their competences usually included well-educated persons, working in specialist professions, in managerial, technical, or associate professional jobs, working in large enterprises, and living in large cities. Somewhat higher ratios were noted in the central period of career and dropped during the pre-retirement period.

The process of adult learning should be considered from a broader perspective, taking into account the labour market situation, the level of demand for competences, as well as the overall life and development conditions. The statement that the level of learning activity of Poles is low does not bring anything new into the description of situation in that area, and it is certainly not sufficient for the development of appropriate policy for the strategic development of human resources in the country.

After the period of educational boom, Poland finds itself in a situation where the majority of labour market participants hold university diplomas. In this situation, the importance of formal education level is reduced, especially as the quality of this education is uneven. In turn, the importance of specific competences, skills, and development potential of an employee rises. In the course of discussion of the development of lifelong learning system, it is necessary to keep in mind the changes that would occur in the society and the economy. The European and the Polish labour markets over the coming decades will be increasingly employee markets, and the employers will have to learn to better manage their human resources that will be more limited and older than previously. By the year 2020, Poland will lose around 1.2 million of persons aged 15-64. In the year 2030, their number will be smaller by 10% (2.8 million) compared to the present one, and in the year 2050, the workforce will be reduced by almost one-third (7.5 million). Many countries already experience problems with employee shortages. As the number of employees shrinks, their average age will rise. Candidates for jobs will be increasingly sought in the 50+ age group, and employees will remain in the job market for longer. This problem is already seen in the Polish public policy, as evidenced by the significant weight tied to issues of lifelong learning under the program "Solidarity of Generations. Actions to increase occupational activity of persons aged 50+." The effectiveness of public interventions will largely depend not so much upon the subsidies for training, but rather on the creation of conditions under which both the employees and the employers would feel the benefits stemming from the development of competences of human resources.

The chief determinants of learning activity are not the individual predispositions, but rather the demands and nature of the job itself, together with opportunities offered by it. The main driver of learning activity could be the employers, who usually finance the training and select its participants. For this reason, a significant part of the chapter was dedicated to the employers' perspective and to their strategies for investment in human resource development. One of the main barriers to increase of educational activity is the low demand for higher competences in Polish enterprises and institutions. The long-term career planning, taking into account individual training plans and systematic evaluation of competences, is still poorly developed.

Finally, it is worth discussing several important issues tied to the present conditions influencing the learning activity of Poles and the development of the lifelong learning system.

- The existing patterns of learning activity of Poles suggest that differences between those who already have the capital of education and competences and those who do not possess it may deepen further. This is not favourable – neither from the standpoint of optimum use of competences, nor from the standpoint of profiting from Poland's development opportunities, nor from the perspective of maintaining harmonious social development. The existing analyses show that the economy and the society develop well not when narrow groups have very high competences, but rather when the overall level of competences in the general population rises.

- The expectation that learning activity would rise automatically as the education level grows – despite being far from groundless – does not take into account the complexity of conditions determining the learning activity of adults, and especially the role played by professional development opportunities. The work environment and new professional challenges are those factors that stimulate development most frequently. Well-educated persons, working in professions where the development of one's competences is not often seen, do display, on the average, slightly higher ratios of educational activity, but they are still low in comparison with persons working in specialist professions.
- The available data suggest the ineffectiveness of existing mechanisms for the support of learning activity with public funds. There is no growth in levels of this activity, nor levelling of differences between training participation by persons with various education levels, or working in different positions. As shown by the BKL data, in the years 2010-2013, the activity of Poles in that field almost did not change at all.
- Studies on the profitability of investments into human resource development made by the employers indicate that, for the employers, the most rational strategy is to invest primarily in the development of skills of those people who already possess a high level of competence, which guarantees a higher return rate. The smaller chances for employer-provided training for persons from the group with lower competences could provide opportunity for public interventions that would be targeted at reducing the growing differences among these groups. At the same time, the results of research suggest that the present mechanisms for supporting educational activity with public funds are ineffective. Public financial assistance does not contribute to an increase in the level of educational activity, nor to the levelling of differences between training participation of persons representing various education levels or working in different positions.
- The present demand for competences, exhibited by employers, is not sufficient to improve the quality of human capital. The statement that employee competences are sufficient for the performance of duties may not be an expression of recognition for the high level of skills represented by employees, but rather an indicator of a poor development level of the company that does not perceive new development needs. The work organisation manner predominant in Polish enterprises and the lack of innovation are also factors that hamper investment in human capital. The existing recruitment strategies and level of investment into personnel development do not offer an optimistic forecast for the development of human capital and an increase in the competitiveness of the Polish economy.
- The sieve model applied by employers in their personnel strategy, which is based on the selection of employees in the course of recruitment or during employment, does not stimulate participation in education. This approach, preferred by stagnant companies, is meant to minimize the costs of investing into personnel. It is worth keeping in mind that it does not support employee loyalty and does not encourage them to remain with the company, thus increasing staff turnover. This in turn does not allow the company to build its competitive advantage based on the human capital it already possesses and to overcome the deadlock of market stagnation. A vicious circle mechanism is formed.

7. Annex

Small differences in the content and form of questions had a certain influence on the obtained results and on their comparability between the 2010-2011 and 2012-2013 study rounds. Most importantly, as the result of replacing the filtering questions with the multiple-choice questions, the percentage of persons declaring participation in various forms of competence development rose. Questions asked during the first and second round were slightly more "difficult" for the respondents, which may have caused the percentages of responses indicating development of competences to be underestimated. Most importantly, the changes allowed to better capture the group of persons who participated only in the obligatory health and safety and fire safety training. The data suggest that the changed led to an increase in the total rate of participation in courses, training, and self-education by about 10 percentage points; however, it is primarily due to an increase in responses regarding participation in the obligatory health and safety and fire safety training. They did not influence the rates of participation in non-

obligatory courses. All the changes were included in the comparative analyses of data from BKL Studies 2010-2013. Study questionnaires are available at the website *www.bkl.parp.gov.pl*.

The 2010–2011 Study rounds:

In the 2010-2011 BKL Study rounds, filtering questions were used, followed by questions on detailed forms of competence development. First of all, the respondents were asked whether, during the past 12 months:

a) they engaged in any form of additional learning, e.g. by participating in courses, training, private classes, post-graduate studies, etc. *(If the answer was "yes," the respondent was asked to respond to questions on detailed forms of competence development, as in the 2012-2013 Study round)*;
[participation in courses and training]

b) they gained knowledge and/or skills through self-education *(If the answer was "yes," the respondent was asked to respond to questions on detailed forms of competence development, as in the 2012-2013 Study round);*
[self-education].

The 2012–2013 Study rounds:

In the 2012 and 2013 Study rounds, multiple-choice questions were used for all the respondents. They were asked whether during the past 12 months:

a) they studied at any kind of secondary school or higher education institution;
[formal education]

b) they participated in *(multiple-choice question)*
any kind of courses and training (including the obligatory health and safety and fire safety courses), workshops, lectures, public lectures, seminars, conferences, internships, vocational internships, or post-graduate studies;
[participation in courses and training]
they learned anything new or gained experience using *(multiple choice question)*

c) the assistance of family members, friends, co-workers; books, professional magazines, computer software and the Internet, programs broadcast on TV and radio, museums, exhibitions, galleries, and science centres.
[self-education]

Table A.III.1(a). Logit_1 logistic regression model for non-obligatory non-formal education

		A. Non-obligatory non-formal education	
Dependent variable		Yes (1) – No (0)	
Model		LOGIT_1	
Variables (p. 1)		B	EXP(B)
Study round	2010	R	R
	2011	0.02	1.02
	2012	**0.16	**1.17
	2013	0.09	1.09
(R = male)	female	-0.30	0.74
Age	age(10)	***0.59	***1.80
	age(10)2	***-0.08	***0.93
Place of residence (R = rural)	up to 49 thousand	0.06	1.07
	50-199 thousand	***0.34	***1.41
	200+ thousand	***0.18	***1.19
Education	lower secondary and lower	***-0.48	***0.62
	basic vocational	***-0.59	***0.55
	higher	***0.47	***1.61
Form of work (R = other, incl. agriculture, no-contract job)	self-employed	***0.64	***1.90
	full time: unspecified size	**0.42	**1.52
	full time: 1-9	*0.28	*1.32
	full time: 10-49	***0.50	***1.64
	full time: 50-249	***0.87	***2.40
	full time: 250+	***1.13	***3.10
	contract	**0.46	**1.58
Occupation (R = elem)	mana	***0.97	***2.63
	Prof	***1.01	***2.74
	Asso	***0.84	***2.31
	Cler	**0.50	**1.65
	Serv	***0.59	***1.80
	Agri	**0.40	**1.50
	Craf	**0.41	**1.50
	oper	***0.52	***1.68
Variables (p. 2)		B	EXP(B)
Administrative region (R = Opolskie)	Dolnośląskie	***0.40	***1.50
	Kujawsko-pomorskie	***0.44	***1.55
	Lubelskie	***0.80	***2.23
	Lubuskie	***0.51	***1.66
	Łódzkie	***0.59	***1.81
	Małopolskie	***0.86	***2.35
	Mazowieckie	*0.20	*1.22
	Podkarpackie	***0.50	***1.65
	Podlaskie	***1.19	***3.29
	Pomorskie	**0.29	**1.34
	Śląskie	***0.52	***1.68
	Świętokrzyskie	***0.40	***1.49
	Warmińsko-Mazurskie	***0.70	***2.01
	Wielkopolskie	***0.47	***1.61
	Zachodniopomorskie	***0.36	***1.44
Gender x occupation (interaction)	female*mana	*0.52	*1.68
	female*prof	***0.74	***2.09
	female*asso	*0.43	*1.54
	female*cler	0.41	1.50
	female*serv	-0.03	0.97
	female*agri	**-0.65	**0.52
	female*craf	*-0.54	*0.58
	female*oper	-0.08	0.92
Constant		***-4.60	***0.01

Model summary	N	38036
	Cragg-Uhler(Nagelkerke) R2	0.186
	McKelvey & Zavoina's R2:	0.225
	McFadden's Adj R2:	0.124
	BIC	32772
	AIC	32336

*Relevance : ***p<0.001; **p<0.01; *p<0.05;*

R— reference category

Table A.III.1(b). Model of Zero-inflated Negative Binominal ZINB_1 regression for the non-obligatory non-formal education

		A. Non-obligatory non-formal education	
Dependent variable		Number of forms (0-6)	
Model		ZINB_1	
Variables (p. 1)		B (Count)	B (Inflated = Pr. "Always 0")
Study round	2010	---	---
	2011	---	---
	2012	R	---
	2013	-0.01	---
(R = male)	female	**0.21	0.36
Age	age(10)	**0.49	---
	age (10)2	**-0.06	---
Place of residence (R = rural)	up to 49 thousand	-0.04	---
	50-199 thousand	***0.26	---
	200+ thousand	***0.20	---
Education	lower secondary and lower	**-0.34	---
	basic vocational	***-0.47	---
	higher	***0.46	---
Form of work (R = other, incl. agriculture, no-contract job)	self employed	***0.60	---
	full time: unspecified size	**0.47	---
	full time: 1-9	0.28	---
	full-time: 10-49	**0.55	---
	full-time: 50-249	***0.87	---
	full-time: 250+	***1.10	---
	contract	*0.53	---
Occupation (R = elem)	mana	0.35	*-25.24
	prof	0.52	*-2.69
	asso	0.23	***-19.29
	cler	0.21	-1.54
	serv	-0.04	*-13.30
	agri	-0.47	***-15.51
	craf	-0.08	***-15.44
	oper	-0.09	***-17.46

Variables (p. 2)		B (Count)	B (Inflated = Pr. "Always 0")
Administrative region (R = Opolskie)	Dolnośląskie	0.12	---
	Kujawsko-pomorskie	0.15	---
	Lubelskie	***0.43	---
	Lubuskie	**0.30	---
	Łódzkie	**0.37	---
	Małopolskie	***0.47	---
	Mazowieckie	0.08	---
	Podkarpackie	*0.23	---
	Podlaskie	***0.92	---
	Pomorskie	-0.13	---
	Śląskie	*0.24	---
	Świętokrzyskie	0.09	---
	Warmińsko-Mazurskie	***0.39	---
	Wielkopolskie	0.18	---
	Zachodniopomorskie	0.17	---
Gender x occupation (interaction)	female*mana	---	4.75
	female*prof	---	***-14.83
	female*asso	---	14.06
	female*cler	---	-0.43
	female*serv	---	*11.92
	female*agri	---	***15.01
	female*craf	---	***15.40
	female*oper	---	***16.22
Constant		23.85	0.06

Model summary	N	19125
	Cragg-Uhler(Nagelkerke) R2	0.175
	McKelvey & Zavoina's R2:	---
	McFadden's Adj R2:	0.101
	BIC	22205
	AIC	21734

*Relevance : ***p<0.001; **p<0.01; *p<0.05;*

R – reference category

Table A.III.1(c). Logit_2 logistic regression model and the Negative Binominal NBRM_1 regression model for self-education

Dependent variable		B. Self—education		
		Yes (1) - No (0)		Number of forms (0-6)
Model		LOGIT_2		NBRM_1
Variables		B	EXP(B)	B
Study round	2010	R	R	---
	2011	0.03	1.03	---
	2012	***0.36	***1.44	R
	2013	***0.45	***1.56	0.08
(R = male)	female	*-0.10	*0.91	0.00
Age	age (10)	***-0.08	***0.92	***-0.14
	age(10)2	---	---	---
Place of residence (R = rural)	up to 49 thousand	***0.19	***1.21	*0.14
	50–199 thousand	***0.61	***1.83	***0.47
	200+ thousand	***0.62	***1.86	***0.59
Education	lower secondary and lower	***-0.75	***0.47	***-0.65
	basic vocational	***-0.77	***0.46	***-0.84
	higher	***0.49	***1.63	***0.43
Form of work (R= other, incl. agriculture, no-contract job)	self-employed	***0.63	***1.87	**0.47
	full-time: unspecified size	**-0.37	**0.69	-0.20
	full-time: 1–9	0.09	1.10	0.00
	full-time: 10–49	-0.01	0.99	0.08
	full-time: 50–249	0.22	1.24	0.23
	full-time: 250+	**0.32	**1.38	*0.34
	contract	*0.39	*1.48	*0.47
Occupation (R=elem)	mana	***0.91	***2.48	***0.67
	prof	***1.16	***3.20	***0.95
	asso	***0.73	***2.07	***0.62
	cler	***0.41	***1.51	0.27
	serv	*0.22	*1.24	0.25
	agri	0.08	1.09	*0.36
	craf	**0.30	**1.35	*0.34
	oper	0.04	1.04	-0.07
Administrative region (R = Opolskie)	Dolnośląskie	0.11	1.11	-0.12
	Kujawsko-pomorskie	-0.21	0.81	-0.13
	Lubelskie	**0.35	**1.42	-0.05
	Lubuskie	***0.45	***1.57	**0.30
	Łódzkie	***0.59	***1.81	***0.39
	Małopolskie	***0.87	***2.40	***0.48
	Mazowieckie	-0.08	0.93	-0.21
	Podkarpackie	**0.34	**1.41	0.18
	Podlaskie	***0.95	***2.57	***0.67
	Pomorskie	0.16	1.17	-0.22
	Śląskie	*0.22	*1.25	0.15
	Świętokrzyskie	0.08	1.08	-0.16
	Warmińsko-Mazurskie	0.20	1.22	0.15
	Wielkopolskie	***0.44	***1.56	*0.24
	Zachodniopomorskie	**0.28	**1.32	0.11
Constant		***-2.91	***0.05	*-168.54

N	38018	19125
Cragg-Uhler(Nagelkerke) R2	0.192	0.136
McKelvey & Zavoina's R2:	0.243	---
McFadden's Adj R2:	0.133	0.075
BIC	29208	24444
AIC	28849	24121

*Relevance: ***p<0.001; **p<0.01; *p<0.05;*
R - reference category

Table A.III.1(d). Logit_3 logistic regression model and the Zero-inflated Negative Binominal ZINB_2 regression model for the simultaneous presence of non-obligatory non-formal education and self-education

		A&B. Non-obligatory non-formal education and self-education			
Dependent variable		Yes (1) - No (0)		Number of forms (0-10)	
Model		LOGIT_3		ZINB_2	
Variables		B	EXP(B)	B (Count)	B (Inflated = Pr. "Always 0")
Study rounds	2010	R	R	---	---
	2011	0.07	1.07	---	---
	2012	***0.26	***1.29	R	---
	2013	***0.28	***1.33	0.04	---
(R = male)	female	0.10	1.10	***0.20	***0.85
Age	age (10)	*0.46	*1.58	***-0.08	---
	age (10)2	*-0.06	*0.94	---	---
Place of residence (R = rural)	up to 49 thousand	**0.24	**1.28	0.06	---
	50-199 thousand	***0.73	***2.07	***0.36	---
	200+ thousand	***0.41	***1.51	***0.39	---
Education	lower secondary and lower	**-0.74	**0.48	-0.24	**0.76
	basic vocational	***-1.17	***0.31	***-0.48	**0.58
	higher	***0.67	***1.96	***0.39	-0.38
Form of work (R= other, incl. agriculture, no-contract job)	self-employed	***0.98	***2.67	***0.50	---
	full-time: unspecified size	0.11	1.12	0.08	---
	full-time: 1–9	0.29	1.33	0.11	---
	full-time: 10–49	**0.60	**1.81	*0.27	---
	full-time: 50–249	***0.86	***2.36	***0.49	---
	full-time: 250+	***1.05	***2.85	***0.66	---
	contract	**0.77	**2.15	**0.53	---
Occupation (R = elem)	mana	***1.50	***4.46	0.07	-3.46
	prof	***1.79	***5.99	0.30	***-2.95
	asso	***1.17	***3.23	0.05	***-2.26
	cler	***0.87	***2.40	-0.16	***-1.66
	serv	**0.64	**1.91	-0.09	**-0.98
	agri	0.25	1.28	-0.01	-0.44
	craf	**0.62	**1.87	-0.03	*-0.81
	oper	0.37	1.45	*-0.48	**-2.02
Administrative region (R = Opolskie)	Dolnośląskie	0.04	1.05	0.00	---
	Kujawsko-pomorskie	-0.04	0.96	0.00	---
	Lubelskie	***0.61	***1.84	*0.17	---
	Lubuskie	*0.34	*1.41	**0.30	---
	Łódzkie	***0.67	***1.95	***0.36	---
	Małopolskie	***0.92	***2.50	***0.45	---
	Mazowieckie	0.09	1.10	-0.08	---
	Podkarpackie	***0.52	***1.68	*0.20	---
	Podlaskie	***1.10	***2.99	***0.73	---
	Pomorskie	*0.33	*1.39	-0.17	---
	Śląskie	0.11	1.11	*0.18	---
	Świętokrzyskie	0.17	1.18	-0.03	---
	Warmińsko-Mazurskie	0.13	1.14	**0.26	---
	Wielkopolskie	***0.52	***1.68	**0.23	---
	Zachodniopomorskie	0.20	1.22	0.14	---
Constant		***-6.23	***0.00	-76.37	-0.22

N	38036	19125
Cragg-Uhler(Nagelkerke) R2	0.218	0.191
McKelvey & Zavoina's R2:	0.357	---
McFadden's Adj R2:	0.179	0.088
BIC	16438	35195
AIC	16071	34771

*Relevance : ***p<0.001; **p<0.01; *p<0.05;*
R — reference category

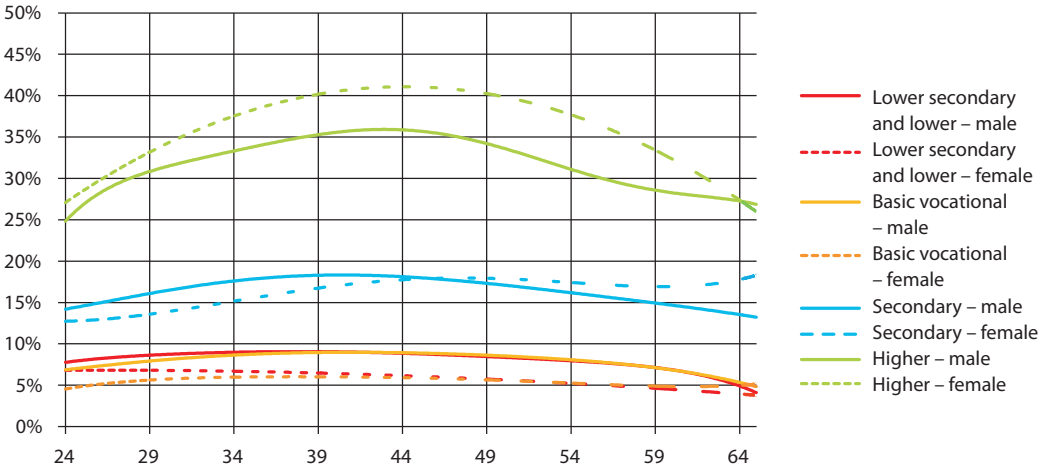
Table A.III.2. Model of polynomial logistic regression

Dependent variable		Category (R= passive)		
Model		MLOGIT_1		
Category		does not continue	wants in the future	active
Variables		B	B	B
Study round	2012	R	R	R
	2013	-0.01	-0.02	0.03
(R = male)	female	*-0.11	0.08	0.01
Age	age(10)	**-0.50	0.51	-0.23
	age(10)2	*0.05	**-0.11	-0.02
Place of residence (R = rural)	up to 49 thousand	0.02	0.14	0.05
	50-199 thousand	**0.22	-0.03	***0.33
	200+ thousand	***0.31	-0.21	***0.28
Education	lower secondary and lower	*-0.23	**-0.46	***-0.77
	basic vocational	**-0.19	-0.16	***-0.81
	higher	0.12	0.14	***0.48
Form of work (R = other, incl. agriculture, no-contract job)	self-employed	**0.42	*-0.37	***0.79
	full-time: unspecified size	***0.52	***-0.61	0.13
	full-time: 1–9	**0.40	*-0.42	*0.42
	full-time: 10–49	***0.50	**-0.49	*0.45
	full-time: 50–249	***0.86	*-0.36	***0.94
	full-time: 250+	***0.94	-0.20	***1.31
	contract	*0.45	0.43	***1.03
Occupation (R = elem)	mana	***0.81	-0.25	***0.83
	prof	***1.03	*-0.35	***0.90
	asso	***0.79	-0.25	**0.47
	cler	**0.37	-0.24	0.11
	serv	***0.36	-0.20	0.03
	agri	0.15	0.04	*-0.36
	craf	***0.38	-0.16	0.23
	oper	***0.41	-0.13	0.11
Administrative region (R = Opolskie)	Dolnośląskie	***0.55	***1.10	***0.56
	Kujawsko-pomorskie	0.05	*0.48	0.20
	Lubelskie	**0.34	***1.39	***1.07
	Lubuskie	**0.29	***1.42	***0.78
	Łódzkie	***0.45	***1.30	***1.03
	Małopolskie	***0.70	***1.13	***1.28
	Mazowieckie	-0.19	**0.65	0.21
	Podkarpackie	0.14	***0.85	***0.57
	Podlaskie	***1.02	***2.03	***2.19
	Pomorskie	-0.22	*0.51	0.25
	Śląskie	***0.54	***0.81	***0.59
	Świętokrzyskie	**0.28	**0.57	0.24
	Warmińsko-Mazurskie	0.21	***0.92	***0.87
	Wielkopolskie	***0.40	**0.62	**0.51
	Zachodniopomorskie	*0.26	***0.97	***0.59
Constant		26.19	46.08	-58.77

N	19125
Cragg-Uhler(Nagelkerke) R2	0.183
McFadden's Adj R2:	0.073
BIC	41782
AIC	40815

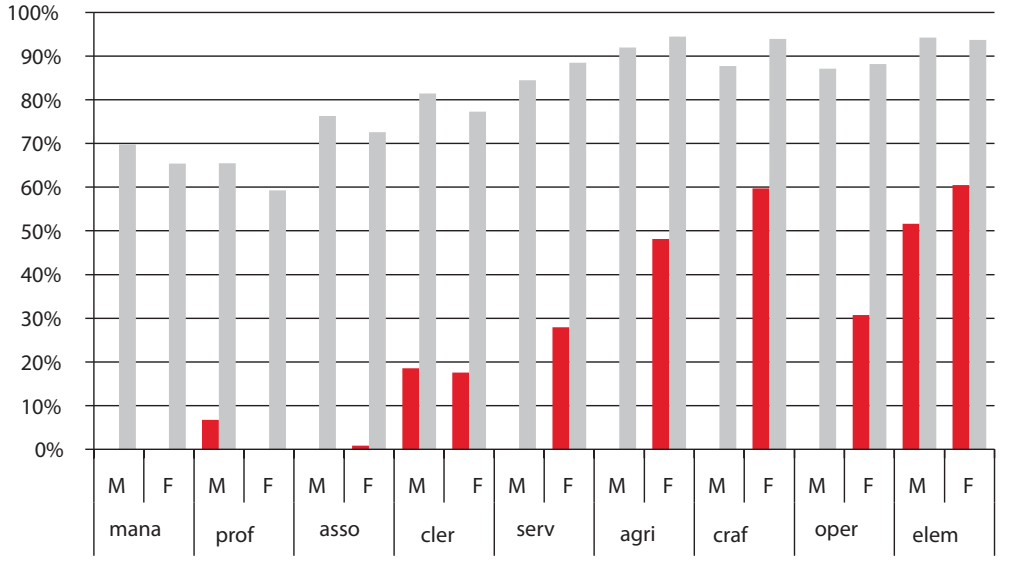
*Relevance: ***p<0.001; **p<0.01; *p<0.05; R – reference category*

Chart A.III.1. Participation in courses and training, broken down per age, education, and gender



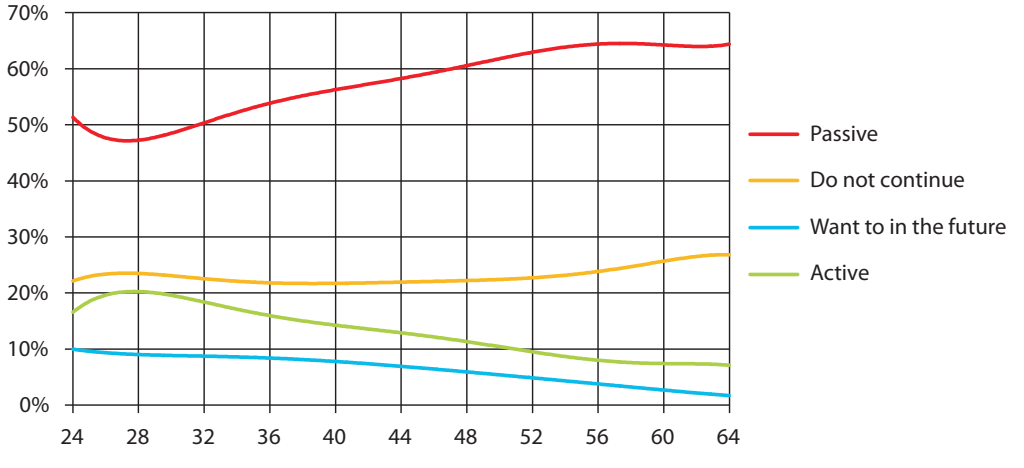
Averaged predicted probability for individuals on the basis of logistic regression model Logit_1 (see: Annex, table A.III.1).

Chart A.III. 2. Probability of "0" result and probability of the so-called "always 0" result (that is, being part of the group where the non-formal education is absent)



Averaged predicted probability for individuals based on the Zero-inflated Negative Binomial model (Annex, Table A.III.1, ZINB_1 model).

Chart A.III.3. Educationally active and passive due to age (in %)



Averaged predicted probability for category affiliation for individuals based on polynomial logistic regression model MLogit_1 (see: Annex, Table A.III.1).

Table A.III.3a. Model of polynomial logistic regression

		any investment into personnel development		short-term		Self-education		strategic	
Dependent variable		Yes (1) – No (0)		Yes (1) – No (0)		Yes (1) – No (0)		Yes (1) – No (0)	
Model		LOGIT_1		LOGIT_2		LOGIT_3		LOGIT_4	
Variables		B	EXP(B)	B	EXP(B)	B	EXP(B)	B	EXP(B)
Study round	2012	R	R	R	R	R	R	R	R
	2013	-0.037	0.964	-0.118	0.889	0.121	1.129	0.098	1.103
Enterprise size	1–9	R	R	R	R	R	R	R	R
	10–49	0.426	1.532	0.534	1.706	0.312	1.366	0.113	1.12
	50–249	1.374	3.953	1.485	4.414	0.707	2.027	0.551	1.734
	250+	1.699	5.469	1.7	5.477	0.578	1.782	1.043	2.839
Evaluation of employee competences	sufficient	R	R	R	R	R	R	R	R
	require training	0.737	2.089	0.8	2.225	0.548	1.73	0.399	1.49
Sector	Manufacturing and mining	R	R	R	R	R	R	R	R
	Construction and transport	0.287	1.332	0.401	1.493	-0.132	0.876	0.085	1.089
	Trade, hospitality, food services, support services	0.144	1.155	0.203	1.226	0.053	1.054	0.067	1.07
	Specialist services	1.179	3.252	0.973	2.646	1.139	3.123	0.318	1.375
	Education	1.816	6.145	1.391	4.018	1.457	4.293	1.264	3.539
	Human health and social work activities	1.605	4.977	1.116	3.052	1.071	2.918	0.781	2.183
Recruitment strategy	Sieve	R	R	R	R	R	R	R	R
	investment	0.401	1.493	0.42	1.522	0.106	1.112	0.349	1.417
Development phase	stagnant	R	R	R	R	R	R	R	R
	poorly developing	0.534	1.705	0.63	1.877	0.209	1.233	0.442	1.556
	developing	0.853	2.347	0.85	2.339	0.46	1.584	0.754	2.126
	strongly developing	1.297	3.66	1.112	3.041	0.329	1.39	0.813	2.255
Training budget	No	R	R	R	R	R	R	R	R
	Yes	1.327	3.77	1.254	3.504	0.814	2.257	1.398	4.046
Administrative region	Dolnośląskie	R	R	R	R	R	R	R	R
	Kujawsko-pomorskie	0.026	1.026	-0.015	0.985	-0.003	0.997	0.014	1.014
	Lubelskie	0.028	1.028	0.151	1.163	-0.062	0.94	-0.244	0.783
	Lubuskie	0.026	1.026	0.058	1.06	-0.003	0.997	-0.06	0.941
	Łódzkie	-0.052	0.949	-0.122	0.885	-0.034	0.966	-0.106	0.899
	Małopolskie	0.07	1.073	0.058	1.06	0.099	1.104	-0.084	0.92
	Mazowieckie	0.204	1.227	-0.026	0.974	-0.038	0.963	0.314	1.368
	Opolskie	0.025	1.026	0.138	1.147	0.045	1.046	-0.079	0.924
	Podkarpackie	0.084	1.088	0.138	1.148	-0.138	0.871	-0.145	0.865
	Podlaskie	-0.024	0.977	0.061	1.063	0.027	1.028	-0.326	0.722
	Pomorskie	0.195	1.215	0.179	1.196	0.019	1.019	0.133	1.142
	Śląskie	0.075	1.078	0.041	1.042	-0.019	0.981	0.103	1.108
	Świętokrzyskie	-0.085	0.919	-0.052	0.949	-0.107	0.899	-0.041	0.96
	Warmińsko-Mazurskie	0.039	1.04	0.131	1.139	-0.105	0.9	-0.047	0.954
	Wielkopolskie	0.04	1.041	0.077	1.08	-0.092	0.912	0.082	1.086
	Zachodniopomorskie	0.118	1.125	0.084	1.087	0.04	1.041	0.124	1.132
	Constant	-0.697	0.498	-1.69	0.185	-1.529	0.217	-1.737	0.176

-2 likelihood logarithm	3295039.398a	3545814.556a	3476221.731a	3414518.805a
Cox's and Snell's R-squared	0.139	0.146	0.104	0.086
Nagelkerke's R-squared	0.192	0.196	0.142	0.119

*Relevance : ***p<0.001; **p<0.01; *p<0.05; R – reference category*

Table A.III.3b. Model of polynomial logistic regression

		constantly active		passive	
Dependent variable		Yes (1) - No (0)		Yes (1) - No (0)	
Model		LOGIT_5		LOGIT_6	
Variables		B	EXP(B)	B	EXP(B)
Study round	2012	R	R	0,023	1,023
	2013	0.112	1,118	R	R
Enterprise size	01.September	R	R	1.673	5.33
	October 49	0.294	1.342	1.306	3.69
	50–249	1.043	2.838	0.375	1.455
	250+	1.497	4.467	R	R
Evaluation of employee competences	sufficient	R	R	0.925	2.523
	require training	0.997	2.71	R	R
Sector	Manufacturing and mining	R	R	1.529	4.615
	Construction and transport	0.237	1.268	1.142	3.133
	Trade, hospitality, food services, support services	0.193	1.213	1.434	4.197
	Specialist services	0.918	2.504	0.497	1.643
	Education	1.47	4.349	-0.137	0.872
	Human health and social work activities	1.167	3.213	R	R
Recruitment strategy	sieve	R	R	0.422	1.525
	investment	0.448	1.565	R	R
Development phase	stagnant	R	R	1.616	5.032
	poorly developing	0.605	1.832	0.991	2.694
	developing	1.003	2.725	0.625	1.868
	strongly developing	1.378	3.967	R	R
Training budget	no	R	R	1.9	6.686
	yes	1.467	4.335	R	R
Administrative region	Dolnośląskie	R	R	-0.045	0.956
	Kujawsko-pomorskie	0.083	1.087	-0.261	0.771
	Lubelskie	0.199	1.221	-0.135	0.873
	Lubuskie	0.01	1.01	-0.05	0.951
	Łódzkie	0.1	1.105	-0.113	0.893
	Małopolskie	0.178	1.195	-0.286	0.751
	Mazowieckie	0.367	1.443	-0.103	0.902
	Opolskie	0.22	1.246	-0.23	0.794
	Podkarpackie	0.176	1.193	-0.016	0.984
	Podlaskie	0.195	1.215	-0.305	0.737
	Pomorskie	0.188	1.207	-0.08	0.923
	Śląskie	0.188	1.207	-0.108	0.897
	Świętokrzyskie	0.156	1.169	-0.149	0.862
	Warmińsko-Mazurskie	-0.003	0.997	-0.19	0.827
	Wielkopolskie	0.106	1.112	-0.133	0.876
	Zachodniopomorskie	0.159	1.172	R	R
	Constant	-2.237	0.107	-7.495	0.001
-2 likelihood logarithm		3370918.815a		2989886.059a	
Cox's and Snell's R-squared		0.174		0.145	
Nagelkerke's R-squared		0.235		0.208	

*Relevance : ***p<0.001; **p<0.01; *p<0.05;*

R – reference category

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Chapter IV

Magdalena Jelonek, Patrycja Antosz

Students of fields strategic for the polish economy – educational choices, professional strategies and the outlook for the future

1. Introduction

According to the OECD strategy *Better Skills, Better Jobs, Better Lives* (OECD 2012), effective investment in competencies and skills is to be the response to challenges such as youth unemployment or income inequality. Such investment should bring benefits in the future, not only for those directly interested. It should also, which seems equally important from economic standpoint, contribute to the success of enterprises and even whole economies (Hansson, Johanson, Leinter 2004, OECD 2010, and CEDEFOP 2014). Unfortunately, not all educational investments – especially those that do not require the commitment of one's own funds – are appropriate. The OECD diagnosis of changes in the Polish economy (transfer from the model of cost competitiveness to model of imitative innovation – OECD 2010) can be used to formulate a thesis that the selected field of higher education is frequently an example of wrong educational investment. This problem has been recognised as significant by representatives of the Ministry of Science and Higher Education who, in order to match educational processes with the needs of labour market, decided to implement a number of actions whose purpose was to attract potential students to those fields of study which are considered strategic for the Polish economy. An example of such actions is the initiative tied to the commissioning of selected study specialties in institutions of higher education.

This chapter is dedicated to the public intervention in the form of commissioned fields of study. The commissioning covers certain technical, mathematical, and natural sciences specialties, identified by the National Centre for Research and Development (NCBiR) as strategic fields of study, which are subsequently co-financed by the Ministry of Science and Higher Education. This co-financing, according to provisions of the project, is meant to ensure sufficient supply of properly qualified specialists in sciences and is provided under the Sub-measure 4.1.2 "Increasing the number of graduates from faculties

of key importance for knowledge-based economy" of the Human Capital Operational Programme. The programme commenced in 2008 with a pilot run, and the first round of the actual intervention was carried out in the academic year 2009/2010.

In the academic year 2012/2013, students of the first-cycle studies[55] of commissioned fields of the 2010/2011 programme round, who were in their third year of studies, were included in the population of students selected for participation in the Study of Human Capital. The researchers were aware of the gravity of the problem to which this intervention relates, which is a discrepancy between the structure of higher education and the needs of the labour market is easy to perceive. Thus, it was decided that, under the second round of student survey, the research sample would be chosen in a manner allowing the analysis of the commissioned specialties not only the analysis of the commissioned specialties as a whole, but also each of them separately. Results of the Human Capital Study in Poland, published in 2013 (see Jelonek, Szklarczyk 2013), suggested diverse employment chances of graduates of the various fields of study selected for the strategic group. Under the current round of the Study, a decision was made to examine this diversity in more detail – not on the level of graduates, but rather students finalising their higher education.

The structure of the chapter is arranged in line with research questions. The first question refers directly to the purpose of the intervention, which was to increase the number of graduates of fields of study of crucial importance for knowledge-based economy. Data of the Central Statistical Office (GUS) was used to characterise the growth in the number of students of particular fields, co-financed by the Ministry. In most cases, commissioning of a given field of study at a specific HE institution was not tied to the introduction of a field of study which has previously been absent from that university's offer. It resulted rather in increasing enrolment for the specialty (e.g. computer science), which has been an element of that university's permanent portfolio.[56] Certainly, the offer tied to commissioned specialties (compensatory programmes, better facilities, scholarships) is attractive for students, and as such, it should improve the supply of specialists defined by the experts as "key for the knowledge-based economy" when enrolment is improved. Analysing this issue, we have used data provided by the Central Statistical Office (GUS), comparing the information on number of students of other specialties with the number of students who enrolled after the specialty obtained co-financing.

The second question posed in this chapter applies to the overall satisfaction with educational decisions made by the students of the commissioned specialties. Assuming that teaching at the commissioned specialty is definitely more expensive than at a regular one, and that the difference in costs should be allocated to improving quality of teaching, we could predict that the level of satisfaction among students of specialties co-financed by the Ministry would be higher than the level of satisfaction among students of similar specialties that were not subsidised.

We applied the same rule for the third question, which covered differences in the evaluation of own opportunities and in occupational strategies of students of the same fields (e.g. computer science) but in various types of specialties (Ministry-subsidised and financed in the standard manner).

Response to the two above questions was formulated based on data collected during the second round of student survey, conducted under the Study of Human Capital in Poland. For this purpose, a list of commissioned fields of study was obtained from the Ministry of Science and Higher Education together with basic information on the given field (number of persons receiving scholarships, amount of co-financing etc.).[57] For the commissioned field of studies, exhaustive[58] research was carried out regardless of the number of students in their last year of studies (for first cycle studies) or in the last two years (for second cycle studies). Thus, in the course of our study carried out in 2013 (academic year 2012/2013), we managed to collect information the following:

[55] Most of the specialties commissioned by the Ministry of Science and Higher Education were studies for a BA/BS or engineer degree (first cycle studies). The sample covers also selects 4th year students (in the case of 3.5 year studies) and in the 1st and 2nd year of second-cycle studies.

[56] We do not have a negative view on this situation; majors that have been offered by HE institutions for several years usually have a solid position, time-tried curriculum, and good set of lecturers.

[57] The sample covered all commissioned specialties launched in the academic year 2009/2010 and – where the given specialty was commissioned for the first time in 2010 – those launched in the academic year 2010/2011.

[58] The research was a population study regarding the specialties, and not students of particular specialties.

1. on students of first-cycle studies, who commenced learning at the commissioned specialty in the academic year 2010/2011 (2nd round of the programme after the pilot run) (with respect to students in the 3rd year of first-cycle studies); and,
2. on students of first-cycle studies, who commenced learning at the commissioned specialty in the academic year 2009/2010 (1st round of the programme after the pilot run), usually engineering studies of 3.5 years[59] (for students in the 4th year of first-cycle studies) .

To support the validity of our theses, we have designed a comparative sample for each of the commissioned fields of study.[60] This sample was built on a rule similar to quota matching (see: Holmes, 2014), taking into account the specific field of study and type of higher education institution where the given field of study is offered (universities, technical universities, other HE institutions). The purpose of this procedure was to improve estimates through the control of key confounding variables. Since we wanted to make detailed comparisons among the fields of study being part of the strategic specialties group, they were matched on a theoretical basis. Detailed information regarding theoretical matching is provided in the annex.

At the same time, the idea to match cases on the individual students' level was abandoned; instead statistical control of key variables was introduced. The control applied to such factors as the following:

- gender of the respondent;
- whether the respondent studied simultaneously for a second major;
- whether the respondent studied under the 1st or 2nd cycle; or,
- whether the specialty was offered in Krakow / Warsaw, other major academic centre or other academic centre, not included among the major ones.

This decision was due to the large costs associated with matching the respondents one-to-one using the similarity function, which were tied to the loss of a significant part of cases (including respondents from commissioned fields of study) during the matching procedure.[61]

2. How did the launch of the intervention influence the number of students in the strategic faculties?

The first question that this chapter attempts to answer regards the degree of achievement of the project's goal, defined as "Increasing the number of graduates from faculties of key importance for knowledge-based economy." Analysis conducted under the first part of the study covered data on the number of students of the individual specialties of 1st degree studies (Bachelor or Engineer) when these fields of studies were not commissioned and after the given field received subsidies from the Ministry of Science and Higher Education. Therefore, the researchers selected all the fields of study offered at the given HE institutions, launched in the academic year 2009/2010, and compared changes in the numbers of students between the years 2009 and 2012.

The comparison was made from two perspectives:

1. By presenting changes in enrolment (number of first-year students when the given field of study became commissioned and in the subsequent years) in the strategic specialties which received subsidies and those without financial support, the comparisons illustrate well

[59] As most of the commissioned specialties that were covered under the BKL Students' Study are first-cycle studies (the sample covered mostly students of the 2009 and 2010 enrollment), we have decided to limit our analyses to this type of educational offer.

[60] The comparison of the commissioned and regular specialties could significantly influence our theses, leading to hasty conclusions on differences between these two groups. The correlation between (e.g.) evaluation of occupational opportunities of students and the fact of subsidising the given specialty would be disturbed by many additional features (the so-called confounding variables) which differentiate both groups (e.g. the domination of humanities and social sciences among those fields which did not receive additional financial support).

[61] Each correlation presented further in the text was verified for statistical significance and strength of the relationship. However, in order not to obscure the overall message, the information about p values are provided only in selected situations (e.g. if without stating them the readers could formulate too hasty conclusions on the basis of general view of the tables).

changes in the preferences of would-be students when the given specialty is subsidised by the Ministry and when it does not receive support; and

2. By comparing the number of students in their second[62] year of studies at the time when the curriculum was not offered at the given HE institution and when it was implemented (the number of second-year students is a better illustration of the potential growth in the number of graduates of the strategic fields than the number of first-year ones. In other words, it adjusts the number of students for the frequent "pre-selection" made after the first year).

It should be pointed out that, in most cases, the commissioned fields of study were tied not to the launch of new teaching offer, but rather to increasing enrolment for the given specialty. For example, comparing the number of second-year[63] of the first-cycle students before the intervention and after its launch, we usually see a clear increase in the number of students after the subsidies were introduced. One could ask whether this growth would appear if the specialties did not receive additional financial support, and also whether it would not be spread more evenly across the HE institutions (including those that did not receive the subsidies). In other words, would this effect be achieved if the intervention has not occurred at all? This issue shall be examined in the further sections of this chapter. Most of the commissioned fields of study were among the "growth" faculties, i.e. those enjoying rising popularity among the students, even before their inclusion in the program. (Please notice that a significant portion of the specialties covered by the intervention is computer sciences and civil engineering, which are one of the most popular fields of study.) Therefore, one could suspect that the increase in the number of students of the commissioned fields is only partly attributable to the commissioning itself, and partly to the influence of other factors, among them the other, softer actions undertaken by the Ministry, meant to promote studies in various science fields.

Data provided by the Ministry of Science and Higher Education show that, in 2009, education was commissioned for 18214 students. If we compare the number of second-year[64] students in the various commissioned specialties with the number of students of the same specialties a year earlier (when the Ministry did not co-finance them), we obtain a positive value – circa 2600 students. It could be said that a visible growth in the number of students of the strategic fields[65] was observed; however, this growth is not commensurate with the costs associated with it. One can suspect that a large part of the students would have studied the same fields even if they did not receive the additional financial support. As further sections of this chapter show, the choices made by students are relatively homogenous within groups of specialties (students usually consider choice of specialties within the same profiles). They rarely consider choice between, for example, the humanities, and the sciences. A theory can be drawn that the commissioning of certain fields of study had a larger influence on shifts in educational choices within the groups of similar study specialties and between individual HE institutions, and to a lesser extent on shifts between various study profiles. The phenomenon seems to have the features of both the *substitution effect* (the subsidised fields of study gain students at the expense of the same fields elsewhere that were not subsidised) and of the *deadweight effect* (the change in the number of students of technical specialties which occurred after the intervention would have occurred anyway even if no actions were undertaken).

The largest increases in the number of students in the second year of commissioned fields of studies were seen in the engineering-technical group and the computer science group, which was naturally tied to fact that, in the academic year 2009/2010, these fields were the most frequently commissioned.

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[62] We decided to compare the number of students in the 2nd and not the 3rd year for formal reasons, which were tied to lack of access to data on the number of 3rd year students from a sufficient number of measurement points.

[63] We decided to present the number of 2nd year students, as the number of students of these specialties frequently drops after the first year (after the first round of exams).

[64] The 2nd year was chosen for comparison, as it illustrates the number of future graduates better than the number of 1st year students (which in turn is a better indicator of changes in the students' preferences).

[65] It should be added that such growth is difficult to achieve in a situation where the number of potential candidates for studies drops with every year.

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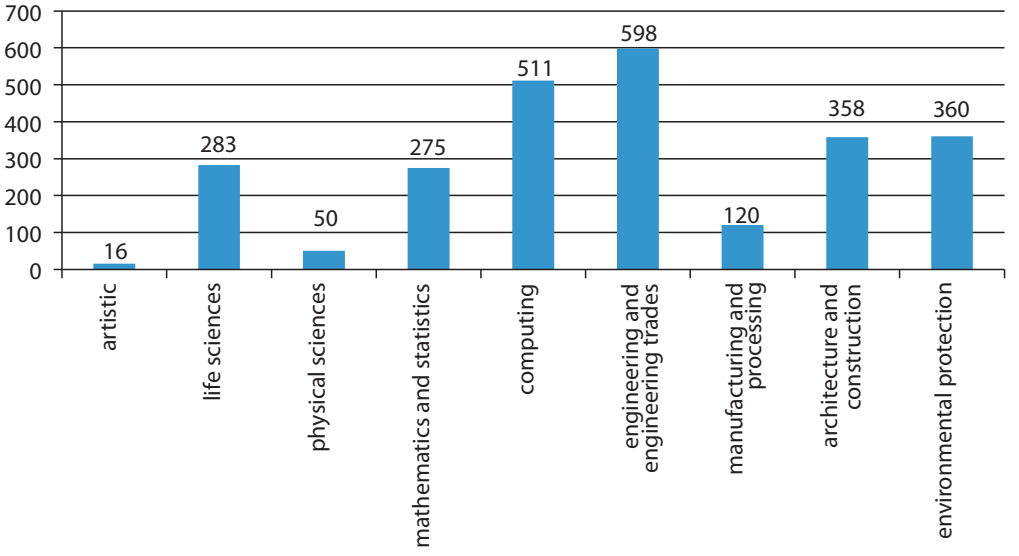
Chart IV.1. Change in the number of students in the 2nd year of first-cycle studies when the specialty is commissioned and a year before implementation of the program at the HE institution (enrolment 2009/2010)



Source: the authors, own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

The overall consequences of the commissioning of fields of study by the Ministry of Science and Higher Education are shown in Tables IV.1 and IV.2, which compare the change in the numbers of students of various years, at the various Ministry-commissioned specialties, with the change observed during the same years in the numbers of students of the strategic specialties, but not co-financed by the state.[66] Based on this simple juxtaposition, several conclusions can be drawn.

The effect of commissioning is clearly visible in the form of increased enrolment for the given specialties. Higher percentages of the numbers of students of the subsidised specialties were visible in each of the basic fields of study and ranged from 4 to 52%. Simultaneously, at the start of the first round of the programme, a slight decline in the number of students was observed among most of the strategic fields of study that were not subsidised. It would be worth asking whether this drop was not a side effect of the commissioning program, which resulted in attracting of students by those entities that offer additional benefits, such as high scholarships. If so, this would mean that the widely known effect of supporting selected beneficiaries (universities that obtained subsidies) at the expense of others (under-financed institutions) was at play here.

Basically, only five groups of study specialties have demonstrated increases in enrolment in the first year of the intervention, regardless of whether they received the co-financing or not. Those specialties belong to the following groups: mathematics and statistics, physics, environmental protection, engineering and technology and architecture and construction – a large overall demand for these specialties was observed during that period. As further sections of the chapter show, demand for some of them was stopped.

In most cases, the commissioned fields were not able to uphold the growth tendency in the subsequent years, and usually generated a small increase or even a decrease of the number of second-year students. Only the numbers of students of commissioned mathematics, engineering and technical specialties, and computing rose relatively systematically (in this case, this was probably attributable to the effect of the re-commissioning of the same specialty by the Ministry of Science and Higher Education). It should also be noted that the effect of the growth in the number of students was not the same for the various specialties and various HE institutions that participated in the project. This issue shall be discussed further on.

[66] All specialties with the same name as the subsidised specialties were selected for this group.

Table IV.1. Change (year-on-year) in the number of students in the 2nd year of studies of the commissioned fields of study

Groups of specialties	2009	2010	2011	2012	2009/2010	2010/2011	2011/2012
artistic	42	58	36	51	38%	-38%	42%
biology	712	995	882	770	40%	-11%	-13%
physics	1187	1237	1338	1297	4%	8%	-3%
mathematics and statistics	741	1016	1287	1333	37%	27%	4%
computing	2398	2909	2965	3373	21%	2%	14%
engineering and technology	2894	3492	3585	3773	21%	3%	5%
manufacturing and processing	229	349	313	292	52%	-10%	-7%
architecture and construction	1549	1907	2000	1902	23%	5%	-5%
environmental protection	1133	1493	1478	1337	32%	-1%	-10%

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S-10).

Table IV.2. Change in the number of students in the 2nd year of strategic field of study, not co-financed by the Ministry[67]

Groups of specialties	2009	2010	2011	2012	2009/2010	2010/2011	2011/2012
Artistic	391	385	490	602	-2%	27%	23%
Biology	2324	2275	1953	1753	-2%	-14%	-10%
Physics	1171	1308	1137	1069	12%	-13%	-6%
mathematics and statistics	1301	1625	1923	1800	25%	18%	-6%
computing	3870	3860	4111	4696	0%	7%	14%
engineering and technology	7918	8440	9748	10567	7%	15%	8%
manufacturing and processing	593	587	790	865	-1%	35%	9%
architecture and construction	4591	4726	4883	4935	3%	3%	1%
environmental protection	2483	2757	2645	2718	11%	-4%	3%

Source: the authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

The groups of specialties presented above are not internally homogenous, and special attention should be paid to internal variability of the engineering and technology specialties. To maintain order and to better organise conclusions, we can sort these fields of study into several groups:

1. **Strong growth fields, regardless of subsidies:** This group includes usually future-oriented specialties, with strong links to the present and future needs of the Polish and global economy, such as mechatronics, power engineering and computer science – in their case the number of students probably would have grown without the intervention in the form of commissioned specialties. This group also includes automation and robotics, mechanics, and machinery designs, as well as mathematics; however, in the case of these specialties, slight fluctuations were observed in the number of 2nd year students in the various years.
2. **Growth specialties from the regular offer and downward subsidised specialties** in 2009 (materials engineering, technical physics): Despite an overall increase of interest in these specialties, the students prefer to study them at those institutions that did not obtain co-financing.
3. **Typically downward specialties:** These included environmental protection, chemistry, environmental engineering, and in these fields, a decline in the number of students should be expected, resulting in smaller number of graduates. The intervention in the form of the commissioning of specialties usually caused an increase in the number of students in the year of the commissioning, coupled with a systematic decline in the subsequent years, and led to shifts of choices within the same groups (from regular to commissioned fields of study).

[67] The strategic fields are those whose counterparts were commissioned at other universities. For example, if during the given round of enrollment biotechnology at the Jagiellonian University is subsidised, the strategic but not subsidised fields include all biotechnology specialties offered by other HE institutions that did not receive the subsidies.

4. **Fluctuating fields of study** (showing significant changes in the numbers of students, without a clear growth or downward tendency): This group includes, among others, biotechnology.

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An interesting example, which will be discussed further on, is civil engineering that has recorded increasingly slower growth in the numbers of second-year students (and even, when it was among the commissioned specialties, there was a slight decrease in their number in 2012).

Based on a comparison of this data with analyses presented in 2013 in the main report of the BKL Study (see Jelonek, Szklarczyk 2013), we can draw a rather optimistic conclusion that educational choices are made on the basis of common sense (at least among those who decide to study sciences). The rational nature of their choices is seen in the process of selecting the commissioned fields, because enrolment rises for those specialties that ensure a relatively good market situation for their graduates. In the case of commissioned fields of study, whose graduates encounter problems with finding employment, the effect of financial encouragement is not so strong.

Table IV.3. Change in the number of students in the 2nd year of studies of the commissioned fields – detailed specialties

Specialty	2009	2010	2011	2012	2009/2010	2010/2011	2011/2012
Industrial design	42	58	36	51	38%	-38%	42%
Environmental protection	712	995	882	770	40%	-11%	-13%
Chemistry	1065	1076	1205	1152	1%	12%	-4%
Physics	122	161	133	145	32%	-17%	9%
Mathematics	741	1016	1287	1333	37%	27%	4%
Computer science	2398	2909	2965	3373	21%	2%	14%
Automation and robotics	664	769	739	805	16%	-4%	9%
Biotechnology	770	862	716	773	12%	-17%	8%
Technical physics	73	97	104	73	33%	7%	-30%
Mechanics and machinery design	998	1104	1295	1256	11%	17%	-3%
Mechatronics	276	459	536	542	66%	17%	1%
Power engineering	113	188	188	324	66%	0%	72%
Material engineering	229	362	320	292	58%	-12%	-9%
Civil engineering	1549	1907	2000	1902	23%	5%	-5%
Environmental engineering	1133	1493	1478	1337	32%	-1%	-10%

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

Table IV.4. Change in the number of students in the 2nd year of studies of the strategic fields – detailed specialties

Specialty	2009	2010	2011	2012	2009/2010	2010/2011	2011/2012
Industrial design	391	385	490	602	-2%	27%	23%
Environmental protection	2324	2275	1953	1753	-2%	-14%	-10%
Chemistry	929	1123	982	890	21%	-13%	-9%
Physics	242	185	155	179	-24%	-16%	15%
Mathematics	1301	1625	1923	1800	25%	18%	-6%
Computer science	3870	3860	4111	4696	0%	7%	14%
Automation and robotics	1571	1613	1746	1842	3%	8%	5%
Biotechnology	1840	1677	1819	1691	-9%	8%	-7%
Technical physics	362	440	537	646	22%	22%	20%
Mechanics and machinery design	2671	2761	3116	3356	3%	13%	8%
Mechatronics	803	1077	1321	1402	34%	23%	6%
Power engineering	671	885	1216	1630	32%	37%	34%
Material engineering	593	574	783	865	-3%	36%	10%
Civil engineering	4591	4726	4883	4935	3%	3%	1%
Environmental engineering	2483	2757	2645	2718	11%	-4%	3%

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

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The discussed tendencies are even more pronounced in the comparisons in the numbers of persons enrolled for the first year of studies when the given specialty was commissioned and three years afterwards. The number of enrolled persons is a better indicator of actual interest in the given field of education than the number of second-year students (in the latter case, the value of this rate depends not only on the increased interest in this area of studies, but also on the number of students who successfully completed the first year which in turns depends on a number of factors, such as the degree of difficulty, strictness of the academic personnel or the intellectual level of the enrolled student).

The strongest increase of enrolment between 2009 and 2012 was seen in the following fields of study: computer science, mathematics, mechatronics, mechanics and machinery design, automation and robotics. The fields of study that lost the largest numbers of students included civil engineering, environmental engineering, and environmental protection (see Annex, Chart IV.25). However, the losses and gains in the numbers of students of specialties that were commissioned in 2009 differ among the various types of HE institutions.

As previously indicated, one of the more important factors that increases the opportunity for achieving lasting growth in the number of students of strategic specialties that are being commissioned is the type of the institution of higher education that is participating in the programme. The situation can be easily illustrated by a comparison of the numbers of second-year students before and after the given specialty was commissioned.

As shown in Table IV.5, in the year of commissioning of the given specialty, the largest increases in the number of students were seen in the case of "other" institutions of higher education (usually smaller ones). We can therefore suspect that the fact of obtaining financial support from the Ministry of Science and Higher Education is an important factor for these smaller HE institutions, boosting the interest of students. This effect is reduced when the specialty loses the co-financing. A reverse trend is observed in the case of technical universities and universities. The percentage growth in the number of students during the first year of commissioning is significantly smaller than for other HE institutions, and these schools maintain the upward trend over the subsequent years. We can suspect that this trend is partly strengthened by subsequent commissioning, because the programme is continued more frequently in the group of universities and technical universities. However, we can state with full certainty that, in the longer perspective, the other HE institutions (not universities and not technical universities) are among those entities for which the gain tied to commissioning of students was the most short-lived.

Table IV.5. The commissioning of a specialty and the number of students in the 2nd year of the commissioned specialties in various types of HE institutions

Type of HE institution	2009	2010	2011	2012	2009 / 2010	2010 / 2011	2011 / 2012	Number of commissioned specialties	Average increase of the number of students per one commissioned specialty (2009 vs. 2012)	Average increase of the number of students per one commissioned specialty (2009 vs. 2010)
university	3349	3902	4289	4454	17%	10%	4%	47	24	12
technical university	6864	8386	8361	8526	22%	0%	2%	58	29	26
other institution	672	1168	1234	1148	74%	6%	-7%	23	21	22

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

The problem presented above is a classic example of the "Saint Matthew's effect," described by R. Merton (see: Merton, 1968), i.e. the strong HE institutions which attract students obtain a dual benefit from the participation in the programme of commissioned fields of study. The smaller and weaker institutions obtain a short-term benefit, and in the subsequent years, they slowly but systematically lose everything they gained through the Ministry's investment.

The problem is shown even better in the comparison of the number of first-year students in various HE institutions when the given specialty is commissioned and not commissioned.

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Table IV.6. The commissioning of a specialty and the number of students in the 1st year of the commissioned specialties in various types of HE institutions

Type of HE institution	2009	2010	2011	2012	2009 / 2010	2010 / 2011	2011 / 2012	Number of commissioned specialties	Average increase of the number of students per one commissioned specialty (2009 vs. 2012)	Average increase of the number of students per one commissioned specialty (2009 vs. 2010)
university	6096	6832	7344	7186	12%	7%	-2%	47	23	16
technical university	10889	10784	11230	11593	-1%	4%	3%	58	12	-2
other institution	1618	1760	1688	1649	9%	-4%	-2%	23	1	6

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

The universities gained about 1000 students in the commissioned specialties, and the technical universities gained about 700. In the case of the other institutions, the increase in the number of students of the commissioned fields of study was visible only at the time of commissioning, and the number of first-year students after a few years was similar to their number before the programme started. For these other schools, the commissioning had the effect of a one-off "injection" and turned out to be rather short-lived.[68]

Table IV.7 provides a supplement to these analyses. It presents changes in the numbers of first-year students of the fields of study commissioned in 2009, depending on the location of the subsidised HE institution. This example illustrates the Saint Matthew's effect even better, referred to above.

Table IV.7. Differences between the number of first-year students in 2009 and 2012 and the type of academic centre (specialties commissioned in 2009)

Academic centre	2012–2009 (1st year)	Number of students in 2009 (1st year)	% change in number of students
other centre	49	8038	1%
Krakow – Warsaw	712	2589	28%
other key academic centre	1064	7976	13%

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

The table presents information on the numbers of students who studied at the first year of specialties commissioned by the Ministry of Science and Higher Education in 2009. The largest number of such students was seen in smaller academic centres ("other centres") or in key academic centres[69] outside Krakow and Warsaw. If we take a look at the percentage change in the number of first-year students between 2012 and 2009, we notice that the highest increase in the number of students was seen in specialties offered in Krakow and Warsaw, which is lower by almost a half in other key centres and was almost unnoticeable in the case of other, smaller schools.

This phenomenon fits into the tendency, typical for numerous educational markets, to centralise academic centres; key centres are strengthened, and peripheral ones weaken or even deteriorate. In Poland, this tendency has been additionally strengthened by the processes tied to the demographic decline. Krakow and Warsaw are currently the strongest in terms of education, and they will certainly attract students from smaller, peripheral centres.

[68] These patterns could obviously change in the future (so far only 3 measurement points are available), therefore, further monitoring of changes in the number of students of fields subsidised by the Ministry of Science and Higher Education is proposed.

[69] Those centres are Gdańsk, Katowice, Lublin, Łódź, Poznań, and Wrocław.

Students of fields strategic for the polish economy – educational choices, professional strategies and the outlook for the future

From the purely rational standpoint, for the Ministry it makes the most economic sense to invest in the commissioning of fields of study offered by the large centres, because they offer the largest chances for upholding the increase in the numbers of specialists who are crucial for the economy, even after the extra financing ends. On the other hand, we need to be aware of threats tied to strengthening those who are already strong. In this case, it is tantamount to further weakening of the smaller centres. At this time, this process is largely irreversible and fully understandable. However, it shall lead to additional negative social and economic outcomes for the smaller cities, such as their increasing economic decline or rapidly progressing ageing of whole regions, as the demographic processes become coupled with young people who study in the larger centres and remain there permanently.

At the end of this section, let us look at the commissioned fields of study from slightly different perspective by presenting who benefits more frequently from the subsidies offered by the Ministry of Science and Higher Education – women or men. The factors that reduce women's chances in the market include unfavourable educational choices and more frequent selection of those education profiles that are linked to lower income or problems with finding employment. The researchers compared the percentages of women studying the commissioned specialties with the percentages of women in the strategic, but not subsidised, specialties. Several conclusions can be drawn based on such comparison.

Table IV.8. Percentage of women studying the commissioned specialties and the strategic but not subsidised specialties

	Percentage of women in the commissioned specialties				Percentage of women in strategic, not subsidised specialties				Difference between the percentages of women in the commissioned specialties vs. the strategic but not subsidised specialties			
Groups of specialties	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
artistic	60%	72%	67%	75%	79%	79%	77%	81%	-19%	-6%	-10%	-6%
life sciences	68%	72%	72%	69%	67%	67%	69%	70%	1%	5%	3%	-1%
physical sciences	74%	71%	74%	73%	69%	73%	74%	72%	5%	-2%	-1%	1%
mathematical and statistical	62%	60%	65%	68%	65%	69%	68%	70%	-3%	-9%	-4%	-2%
computing	8%	10%	11%	11%	10%	9%	10%	11%	-1%	0%	2%	0%
engineering and technology	25%	26%	23%	25%	23%	21%	22%	22%	2%	5%	0%	2%
manufacturing and processing	43%	37%	44%	54%	41%	44%	43%	47%	2%	-7%	1%	7%
architecture and construction	27%	34%	33%	36%	27%	29%	32%	37%	0%	5%	1%	-1%
environmental protection	51%	51%	54%	57%	49%	50%	50%	52%	2%	2%	4%	5%

Source: The authors' own work based on data of the Central Statistical Office (reporting data of the HE institutions – form S–10).

First of all, the commissioned specialties can be classified into three groups:

1. **"More feminine" specialties** (artistic, life sciences, physical sciences, mathematical and statistical);
2. **"More masculine" specialties** (computing, engineering and technology, manufacturing and processing, architecture and construction); and,
3. **Fields with relatively even proportions of women and men** (environmental protection).

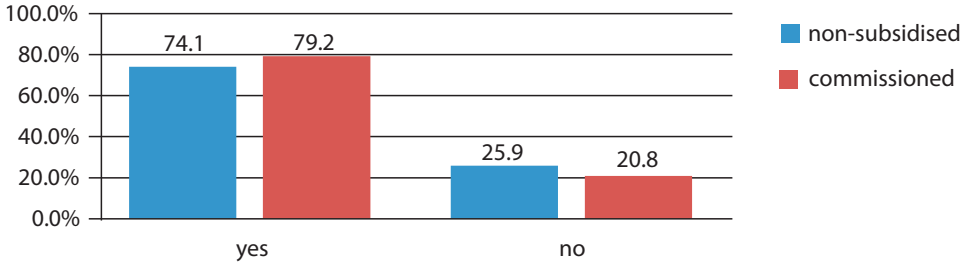
Secondly, if we compare the percentage of women studying the commissioned specialties and the similar, strategic, but not subsidised specialties, we notice an interesting trend. In the case of commissioned specialties from the groups of manufacturing and processing, environmental protection, and the engineering and technology specialties, the percentage of women studying the "more masculine" specialties is higher than in the strategic, but not subsidised specialties. The situation regarding the percentage of men studying the commissioned "more feminine" specialties is similar; it is higher in the specialties subsidised by the Ministry of Science and Higher Education. This outcome of the intervention is rather weak at present. However, it deserves further monitoring, because it could be an important, unpredicted, and positive effect, which is the equalisation of the sexes in the selection of educational profile. In the case of the commissioned specialties, it occurs a little faster.

3. How do the students of commissioned fields evaluate their educational decisions, and what are their educational plans for the future?

In the first part of this chapter, we looked at the quantitative results of intervention by comparing changes in the numbers of students of commissioned and not subsidised specialties. This part focuses not on the effects of the intervention, but on the characteristics of the programme from the perspective of the participating students. Does the fact of studying a commissioned specialty lead to higher satisfaction of the students with their educational decisions? What educational and occupational strategies do the students of commissioned fields have, and how do they perceive their occupational opportunities?

As shown in the figure below, for most of the students of strategic fields, the specialty that they study was their first choice. The relationship between the commissioning of the given specialty and its first-choice character is statistically significant; however, measurements of the relationship strength suggest that it is rather weak.

Chart IV.2. Is the specialty that you study your first-choice specialty? [N commissioned = 3037, N non-subsidised = 3333]



** Differences significant on p< 0.01 level*

Source: BKL – Students' Study 2013.

About 74–79%[70] of students of strategic fields are in their preferred (first-choice) specialties, although significant differences are present within these specialties. We have classified them into four groups:

1. **Strongly preferred specialties, regardless of commissioning** (first choice of at least 80% of students), i.e. automation and robotics, civil engineering, computing, mathematics and physics;
2. **Moderately preferred specialties, regardless of commissioning**, i.e. mechanics and machinery design, biotechnology, material engineering (for the last two commissioning has a slight positive effect);
3. **Strongly preferred specialties, but only when commissioned**, i.e. mechatronics and electronics, power engineering; and,
4. **Moderately preferred specialties, but only when commissioned** (chemistry and related areas, environmental protection, environmental engineering).

In most cases, the students are pleased with their choice of study field. The factor that differentiates the satisfaction is not the commissioning of a given specialty, but rather the fact of studying a specific area. Larger differences in the level of dissatisfaction between students of subsidised and not subsidised specialties are observed only among those studying power engineering and industrial design (to the disadvantage of those studying commissioned specialties), and chemistry and related fields (here to the disadvantage of those studying the non-subsidised specialties).

[70] The higher the percentage in the group, the bigger the chance that the students are actually interested in the given field. It appears rather interesting that, within the humanities and social sciences, the percentage of "first choices" is very similar to the one in the strategic group. For example, in the humanities, it reaches 78%, and in pedagogical group – 79%. Of course, differences on the level of individual specialties can be observed within these groups.

Table IV.9. Percentage of students declaring that the given specialty was their first choice

Specialty \ Type of financing	Percentage		N	
	N-S	C	N-S	C
Biotechnology	73%	77%	308	160
Mechanics and machinery design	73%	74%	218	258
Automation and robotics	86%	86%	105	176
Material engineering	70%	74%	119	122
Mechatronics and electronics	71%	85%	255	150
Power engineering	72%	80%	60	40
Civil engineering	84%	85%	197	314
Chemistry and related	64%	77%	275	195
Environmental protection and environmental engineering	61%	71%	355	548
Industrial design	77%	73%	99	40
Mathematics and physics	78%	79%	321	598
Computer science	81%	84%	725	732
N	74%	79%	3037	3333

N-S – non-subsidised, C – commissioned.

Source: BKL - Students' Study 2013.

Similar to the case of declarations regarding priority choice of a given specialty, in the case of satisfaction with one's choice, a clear relation with the studied field is visible. The specialties where a larger percentage of students would not choose again the same profile are those specialties that were named as second or subsequent choice more frequently, namely: environmental protection and environmental engineering, chemistry and related fields.

The level of satisfaction with educational choice among the students of strategic specialties is not an exception; on the average, students really study those areas, which they chose. Data presented in Chart IV.6 (Annex) shows that typical level of satisfaction within all groups of specialties is comparable (higher than 80%). For most of the specialties, it is difficult to notice any significant differences between the two years of the study, with the exception of the drop in satisfaction by about 4–5 percentage points in the groups of social sciences, economics, law, and services.

Table IV.10. Would you choose once again to study the same specialty today, looking back from the perspective of your current experience? (First-cycle students)

	Difficult to say		No		Yes	
	N-S	C	N-S	C	N-S	C
Biotechnology	11%	9%	14%	10%	76%	81%
Mechanics and machinery design	6%	12%	8%	7%	86%	81%
Automation and robotics	8%	7%	13%	9%	79%	84%
Material engineering	14%	5%	9%	11%	78%	84%
Mechatronics and electronics	8%	13%	14%	19%	78%	68%
Power engineering	10%	3%	3%	15%	86%	82%
Civil engineering	7%	9%	7%	12%	87%	80%
Chemistry and related	14%	9%	23%	7%	63%	84%
Environmental protection and environmental engineering	19%	15%	16%	20%	65%	66%
Industrial design	10%	8%	7%	15%	83%	77%
Mathematics and physics	12%	7%	14%	15%	74%	78%
Computer science	7%	3%	10%	6%	84%	91%
N	310	273	374	391	2323	2632

N-S – non-subsidised, C – commissioned.

Source: BKL – Students' Study 2013.

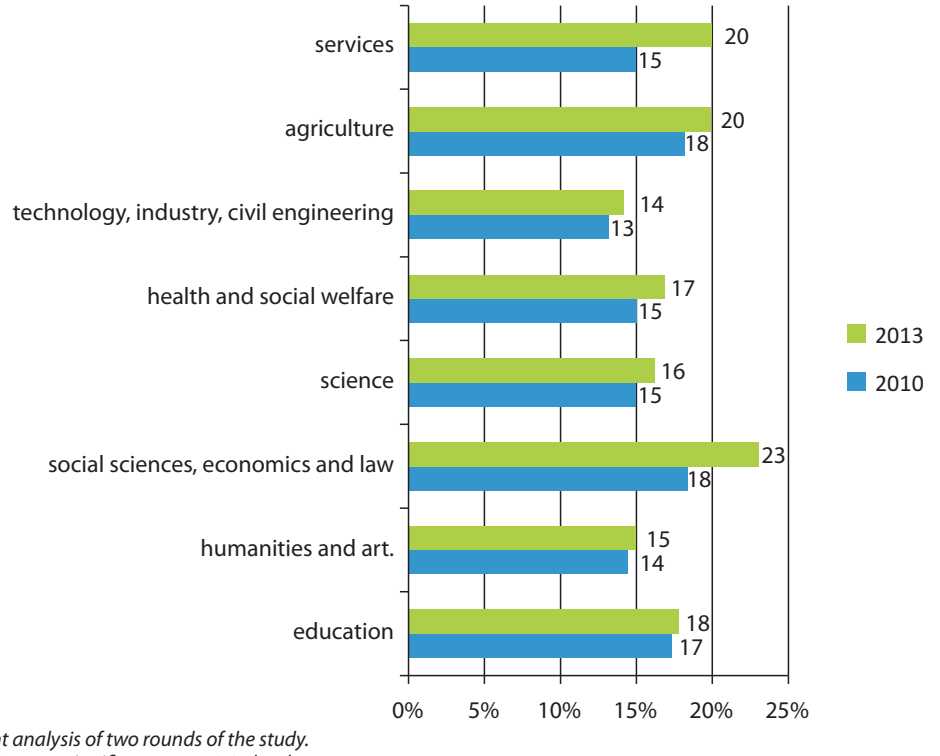
How do the students of commissioned fields evaluate their educational decisions, and what are their educational plans for the future?

From this perspective, it is worth taking a look at those, from the group dissatisfied with the choice of specialty made, who would potentially be interested in studying a specialty defined as strategic (in this case, this group includes the areas of technology, industry and sciences). Based on Chart IV.3, one can point out to several groups with a stronger focus on the choice of these areas. They include the following:

1. **Those already studying sciences and technology** (it is worth noting that students of physics, mathematical, statistical and computing specialties would exceptionally frequently choose again the specialty which does not fall within the group of strategic specialties);
2. **Those who study specialties related to environmental protection and biology** (in their case, there is a very strong focus on science and technical fields, and this group could potentially become engineers in the future);
3. The high percentage of **law students** who would choose a science specialty instead comes as a significant surprise (although it should be noted that this is a small portion among all law students – their majority, over 88%, is satisfied with the choice they made);
4. Specialties from the groups of technology, industry and science would be selected **by about 20% of the dissatisfied students of economics, administration and social sciences**, because this group of specialties serves as a sort of buffer between the strictly science and engineering fields and the humanities. Future shifts to the engineering group seem the most probable in the group of persons who potentially consider studying these areas.

In summary, the most probable scenarios show that the shifts among groups of specialties would not be mass. The most motivated to select science and engineering fields would be those studying specialties in the area of environmental protection and biology (which currently are commissioned specialties), and the largest shifts can be seen here. It is also probable that some of the candidates who could choose the group of economics, administration, and social sciences would lean more towards the sciences and engineering specialties. In this case, the rule can work both ways; economic, administrative and social science specialties are seen as the most attractive for students of sciences and engineering specialties dissatisfied with their present choices.

Chart IV.3. Percentage of students dissatisfied with their chosen field of study who declare that an alternative choice would be a specialty from the group of technology, industry, sciences (N_{2010} = 29796, N_{2013} = 28352)

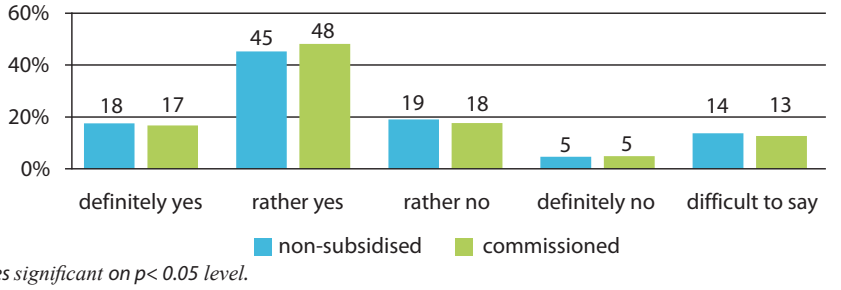


** Joint analysis of two rounds of the study.*
** Differences significant on p< 0.01 level*
Source: BKL – Students' Study 2010, 2013

3.1. What is the students' view on their competences acquired during studies?

The assessment of students' competences seems particularly important, because the strategic fields were selected based on economic demand. Therefore, in their case, the focus on the practical dimension of learning should be particularly strong. One could expect that students of the commissioned fields would value practical aspects of knowledge gained during studies higher. This, however, is not the case. Students of both commissioned and non-subsidised fields feel similarly prepared to apply knowledge acquired during the studies in practical settings. About two-thirds of the respondents claim that their studies ensured such preparation. A slightly higher percentage of positive responses come from men (67%) or from first-cycle students (67%).

Chart IV.4. Did you learn practical applications of knowledge acquired during studies? According to commissioning [N=9285]



** Differences significant on p< 0.05 level.*

Source: BKL – Students' Study 2013.

Preparation to apply knowledge in a practical manner differs among fields of study. Students of biology, computer science, industrial design, civil engineering (at universities and technical universities) as well as mechanics and machinery design (in other HE institutions), most often feel the practical aspects of knowledge were highlighted during the course of their studies. Over two-thirds of students of these specialties are of the opinion that their studies taught them how to apply the acquired knowledge in practice.

Table IV.11. Did you learn practical applications of knowledge acquired during studies? According to specialty and commissioning [N=9285]

	Non-subsidised			Commissioned		
	No	Yes	difficult to say	No	Yes	difficult to say
Material engineering (other)	35%	30%	35%	0%	95%	5%
Chemistry and related (U and TU)	23%	62%	15%	11%	85%	4%
Chemistry (other)	20%	65%	15%	23%	78%	0%
Biotechnology (U and TU)	16%	74%	11%	17%	76%	7%
Computer science (other)	17%	72%	11%	14%	75%	11%
Computer science (U and TU)	17%	71%	12%	17%	73%	11%
Mathematics (other)	48%	43%	8%	13%	73%	15%
Mechanics and machinery design (other)	23%	66%	11%	22%	68%	10%
Material engineering (U and TU)	31%	57%	12%	21%	65%	15%
Automation and robotics (U and TU)	36%	47%	17%	25%	65%	11%
Civil engineering (U and TU)	18%	70%	12%	25%	64%	11%
Mathematics and physics (U and TU)	36%	52%	13%	25%	63%	12%
Mechatronics and electronics (U and TU)	22%	61%	17%	25%	63%	12%
Mechanics and machinery design (U and TU)	22%	64%	14%	22%	59%	19%
Environmental protection (U and TU)	28%	57%	15%	23%	59%	18%
Environmental protection (other)	14%	65%	21%	35%	53%	12%
Civil engineering (other)	23%	63%	14%	36%	46%	18%
Power engineering (U and TU)	29%	46%	25%	43%	45%	13%
Industrial design	6%	79%	15%	35%	40%	25%
Mechatronics and electronics (other)	22%	75%	3%	45%	35%	20%

** U – university, TU – technical university.*

Source: BKL – Students' Study 2013.

Persons studying commissioned material engineering (at other HE institutions), chemistry and related fields (at universities and technical universities), biotechnology (at universities and technical universities), computer science (at other HE institutions), automation and robotics (at universities and technical universities), or mathematics and physics (at universities and technical universities) believe that they are better prepared for practical application of their knowledge than persons who have studied similar, non-subsidised fields. On the other hand, students of commissioned industrial design have a sense of being less prepared than were their counterparts from the non-subsidised specialty.

Persons who received scholarships during the previous academic year value their ability to apply the knowledge in practice relatively high, regardless of whether their field was subsidised or not. The same is true for persons from commissioned fields who did not receive scholarship during their studies. This aspect is rated much lower by students of non-subsidised specialties who did not receive scholarships during previous academic year. Further studies are required to explain this interesting effect.

Table IV.12. Did you learn practical applications of knowledge acquired during studies? According to commissioning and scholarship [N=9173]

		Non-subsidised		Commissioned	
		NS	S	NS	S
Practical application of knowledge during studies	N	1057	4765	818	2533
	No	27.2%	22.8%	22.9%	22.3%
	Yes	60.2%	63.4%	65.8%	64.6%
	difficult to say	12.7%	13.9%	11.4%	13.1%

NS – no scholarship, S – scholarship

** Differences significant on p< 0.05 level*

Source: BKL – Students' Study 2013.

Table IV.13. Did you learn practical applications of knowledge acquired during studies? According to commissioning and higher education institution type [N=9225]

		Large universities		Technical / agricultural universities		Other	
		N-S	C	N-S	C	N-S	C
Practical application of knowledge during studies	N	1870	955	3224	1879	747	550
	No	25%	17%	24%	26%	20%	20%
	Yes	64%	73%	61%	59%	68%	70%
	difficult to say	12%	10%	15%	15%	12%	11%

N-S – non-subsidised, C – commissioned.

** Differences significant on p< 0.05 level*

Source: BKL – Students' Study 2013.

The differences in the perception of teaching practical aspects of knowledge acquired during studies appear only in the case of students from larger universities. Students of commissioned fields at these universities have a more positive view on practical application of knowledge acquired during their studies than those from non-subsidised fields and from technical and agricultural universities. Interestingly, differences in favour of large universities are also apparent in comparison with Poland's large technical universities. Students from large universities, especially in case of commissioned fields, have a more positive view on teaching practical applications of knowledge than those from technical universities. This difference may occur because students of the largest technical universities have higher expectations regarding the practical nature of knowledge than university students.

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Students both of commissioned fields and of similar but non-subsidised fields perceive their chances of finding a good employment and finding employment consistent with one's education as high. Students of mechanics and machine construction (at universities and technical universities), automation and robotics (at universities and technical universities), materials engineering (at other HE institutions), and computer sciences (at universities and technical universities) are the most confident about their chances in the labour market. The smallest proportions of students convinced that education would help them in finding a good employment are observed among students of environmental protection and environmental engineering, industrial design or chemistry, and related fields (at other HE institutions). Moreover, a belief that a diploma enables work in a field consistent with education occurs primarily among students of computer science (at universities and technical universities), and automation and robotics (at universities and technical universities). The same belief appears least frequently among students of environmental protection and environmental engineering, chemistry and related fields (at other HE institutions), and biotechnology (at universities and technical universities).

Table IV.14. To what extent do your studies enable you to find a good job and a job consistent with your education? According to specialty [N = 9285]

	Finding a good job			Finding a job consistent with education			
	No	Yes	difficult to say	No	Yes	difficult to say	will not look for job
Mechanics and machinery design (U and TU)	8%	81%	11%	8%	74%	17%	2%
Automation and robotics (U and TU)	10%	80%	10%	8%	74%	17%	1%
Material engineering (other)	0%	80%	20%	5%	73%	23%	0%
Computer science (U and TU)	11%	79%	10%	8%	81%	10%	1%
Mechatronics and electronics (U and TU)	9%	77%	14%	5%	72%	22%	1%
Civil engineering (other)	12%	76%	12%	6%	79%	14%	1%
Mechanics and machinery design (other)	9%	75%	16%	11%	69%	20%	1%
Civil engineering (U and TU)	11%	73%	16%	9%	73%	16%	2%
Computer science (other)	12%	72%	15%	10%	72%	18%	2%
Power engineering (U and TU)	11%	72%	17%	10%	71%	18%	1%
Material engineering (U and TU)	16%	69%	15%	9%	69%	21%	1%
Mechatronics and electronics (other)	25%	67%	8%	20%	66%	11%	3%
Chemistry and related (U and TU)	17%	65%	18%	14%	62%	23%	1%
Mathematics (other)	19%	65%	16%	20%	62%	16%	2%
Mathematics and physics (U and TU)	18%	64%	17%	15%	63%	20%	3%
Biotechnology (U and TU)	21%	62%	17%	22%	53%	25%	0%
Chemistry (other)	26%	61%	13%	22%	53%	25%	0%
Industrial design	14%	60%	26%	10%	56%	33%	1%
Environmental protection (U and TU)	18%	60%	22%	16%	54%	28%	1%
Environmental protection (other)	14%	56%	30%	14%	46%	39%	1%

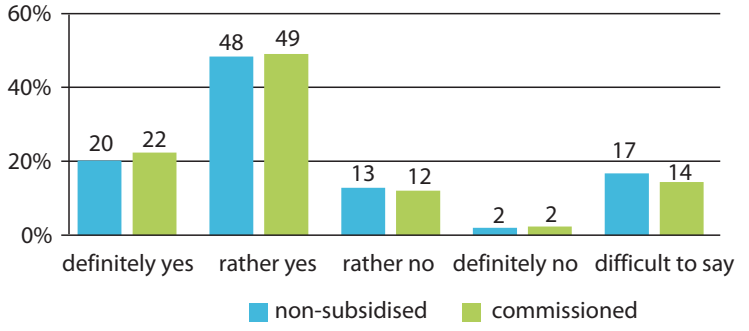
** U – university, TU – technical university.*

Source: BKL – Students' Study 2013.

Even though the extent to which students are taught practical applications of knowledge is rated similarly by both groups, students of commissioned fields state more frequently[71] that the skills acquired during studies would increase their chances for finding a good employment. That belief is shared more often by men (76%) and students of engineering fields (72%). It is worth stressing that the fact of receiving a scholarship does not influence this correlation.

[71] This correlation is statistically significant but weak.

Chart IV.5. To what extent do your studies enable you to find a good job? According to commissioning [N = 9285]



** Differences significant on p< 0.05 level*

Source: BKL – Students' Study 2013.

Table IV.15. To what extent do your studies enable you to find a good job? According to commissioning and higher education institution type [N = 9225]

		University		Technical/agricultural university		Other	
		N-S	C	N-S	C	N-S	C
Finding a good job	N	1870	955	3224	1879	747	550
	No	18%	13%	13%	15%	14%	14%
	Yes	65%	75%	71%	71%	70%	68%
	difficult to say	18%	12%	16%	14%	17%	18%

N-S – non-subsidised, C – commissioned.

** Differences significant on p< 0.05 level*

Source: BKL – Students' Study 2013.

The differences between students of commissioned and non-subsidised fields regarding their chances for finding a good employment upon graduation are seen only in the case of students from larger universities. Students of commissioned fields at these universities have a much better opinion on the influence that the knowledge and skills acquired during studies will have on their chances in the labour market.

Similarly to perception of chances for finding a good job, students of commissioned fields, men and students of engineering studies see their chances for finding employment consistent with their field of study as higher. Interestingly, those receiving scholarships at non-subsidised fields of study are less certain of finding a job in line with their education than are those studying commissioned specialties, irrespective of whether they receive scholarships (see Annex, Table A.IV.28). Similarly as in the case of evaluation of chances for finding a good employment, the differences between students of commissioned and non-subsidised fields apply only to students from larger universities.

Chart IV.6. To what extent do your studies enable you to find a job consistent with your education? According to commissioning [N = 9285]

** Differences significant on p< 0.05 level.*

Source: BKL – Students' Study 2013.

Table IV.16. To what extent do your studies enable you to find a job consistent with your education? According to commissioning and higher education institution type [N = 9225]

		University		Technical/agricultural university		Other	
		N-S	C	N-S	C	N-S	C
Chances for finding a job consistent with education	N	1870	955	3224	1879	747	550
	No	15%	9%	11%	12%	12%	12%
	Yes	62%	74%	67%	68%	66%	67%
	difficult to say	22%	15%	21%	19%	20%	20%
	will not look for job	1%	1%	1%	2%	2%	1%

N-S – non-subsidised, C – commissioned.

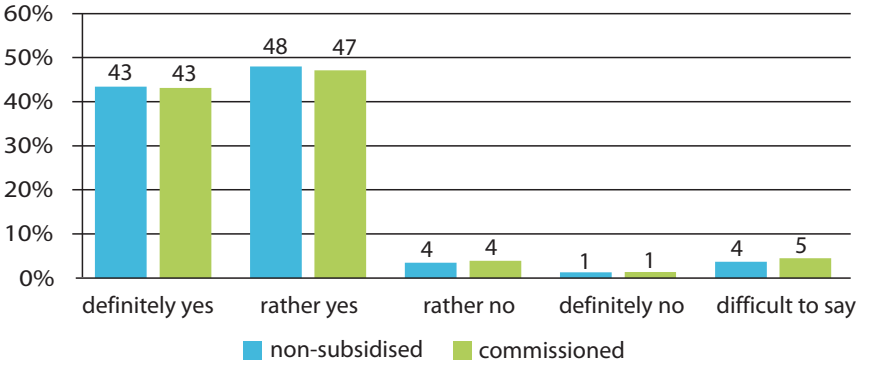
** Differences significant on p< 0.05 level.*

Source: BKL – Students' Study 2013

3.2. What are the occupational plans of students?

Students of both commissioned and non-subsidised fields usually plan to work in an occupation related to their study specialty.

Chart IV.7. Will you try in the future to find a job in your learnt profession? According to commissioning [N = 9285]



Source: BKL – Students' Study 2013.

Factors such as gender, type of studies (for BA/engineer's degree or master's degree) or the type of university do not influence this dimension of students' occupational plans. In addition, the differences in the percentages of persons who plan to have a career consistent with their education, studying the various fields as commissioned and non-subsidised, are statistically insignificant.

Table IV.17. Will you try in the future to find a job in your learnt profession? According to commissioning and specialty group [N = 9285]

	Non-subsidised			Commissioned		
Groups of specialties	No	Yes	don't know	No	Yes	don't know
computing	5%	94%	2%	4%	94%	2%
architecture and construction	5%	94%	1%	4%	93%	3%
physics	8%	90%	2%	4%	92%	5%
engineering and technology	5%	93%	3%	7%	90%	3%
environmental protection	3%	94%	3%	9%	88%	3%
manufacturing and processing	4%	90%	6%	6%	87%	7%
life sciences	5%	86%	9%	7%	87%	7%
mathematical and statistical	7%	85%	8%	3%	85%	12%

Source: BKL – Students' Study 2013.

Working in a field not related to educational profile is most frequently considered by students of commissioned mechatronics (at other HE institutions - 50%), material engineering (at other HE institutions – 20%), environmental protection and environmental engineering (at other HE institutions – 15%), industrial design (15%), and civil engineering (at universities and technical universities – 15%). As an alternative, these students plan to work as professionals in the fields of physics, mathematics, or technology. Among students of non-subsidised fields, unrelated careers are usually planned by students of mathematics (at other HE institutions – 25%), environmental protection and environmental engineering (at other HE institutions – 23%), and material engineering (at other HE institutions – 15%). These students do not have uniform, strong preferences regarding their alternative occupations.

As mentioned earlier, financing of commissioned studies could have motivated young people to choose gender-stereotypical disciplines less frequently: Women more frequently selected typically "masculine" commissioned specialties, such as manufacturing and processing or computing.

At the same time, men opted for education traditionally more popular among women (e.g. biology). As indicated in the table below, this effect may not be sustainable. The percentage of students planning careers in line with their educational profile is smaller among women studying typically "masculine" fields (compared to women studying "feminine" fields). A similar situation is seen among men studying typically "feminine" specialties (biology, physics). Of course, it should be stressed that this effect applies to all strategic fields, both commissioned and non-subsidised. This provokes a reflection on young people's motives to choose disciplines that stereotypically are not related to their gender.

Table IV.18. Will you try in the future to find a job in your learnt profession? According to field of study and gender [N = 9056]

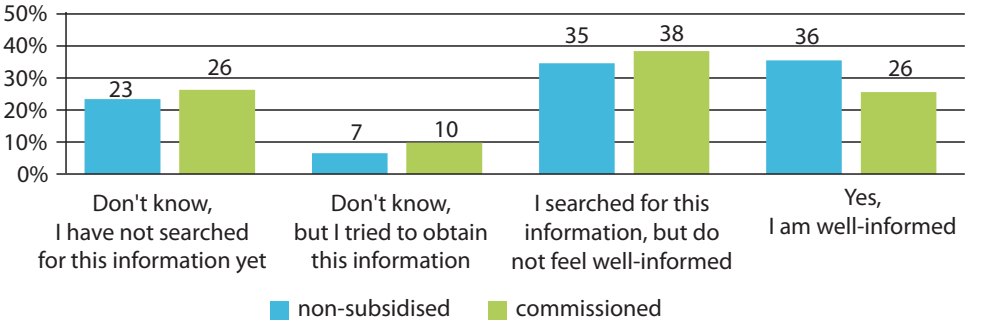
	Women			Men			difference in "yes" answer
Groups of specialties	No	Yes	don't know	No	Yes	don't know	
manufacturing and processing	7%	85%	8%	3%	91%	6%	7%
computing	7%	89%	3%	3%	95%	2%	6%
engineering and technology	5%	91%	4%	5%	93%	2%	2%
artistic	6%	88%	5%	3%	90%	7%	1%
mathematical and statistical	6%	84%	10%	4%	85%	11%	1%
architecture and construction	5%	94%	1%	4%	94%	2%	0%
physics	5%	91%	3%	6%	91%	4%	-1%
environmental protection	5%	92%	3%	7%	90%	3%	-2%
life sciences	6%	88%	7%	6%	85%	10%	-3%

Source: BKL – Students' Study 2013.

No significant differences in aspirations for alternative careers between students of commissioned and non-subsidised specialties were observed. Only students of non-subsidised biotechnology, indicating their future desired employment in the professional occupations in healthcare and associate professional occupations in physics, chemistry, or technical sciences, demonstrated slightly lower ambitions than did their colleagues studying commissioned biotechnology. The future biotechnologists, studying commissioned specialty, more frequently plan that their alternative employment would include professional-level occupations related to physics, mathematics, and technology. It is worth stressing that students of non-subsidised specialties seem to have better knowledge of their chances for finding employment not related to education profile; a larger fraction of these students feel that they have a good grasp of such information, and a smaller fraction has never attempted to obtain such information.

Students of the analysed specialties have higher salary expectations than do all the students in tertiary education. However, the salary requirements of the students of the commissioned and non-subsidised fields do not differ significantly. The lowest after-tax salary for which students of fields important from the standpoint of the national economy would agree to work is slightly under PLN 2000 on average. An after-tax salary of PLN 2800-2850 is perceived as fairly satisfactory. Moreover, a salary one would be very lucky to obtain is defined by the students as slightly over PLN 4000, after tax.

Chart IV.8. Do you know the chances of finding a job in your preferred occupation? According to commissioning [N nc = 448, N c = 297]



** Differences significant on p< 0.05 level.*

Source: BKL – Students' Study 2013

Table IV.19. Salary aspirations of students of the commissioned and non-subsidised fields (after-tax salary)

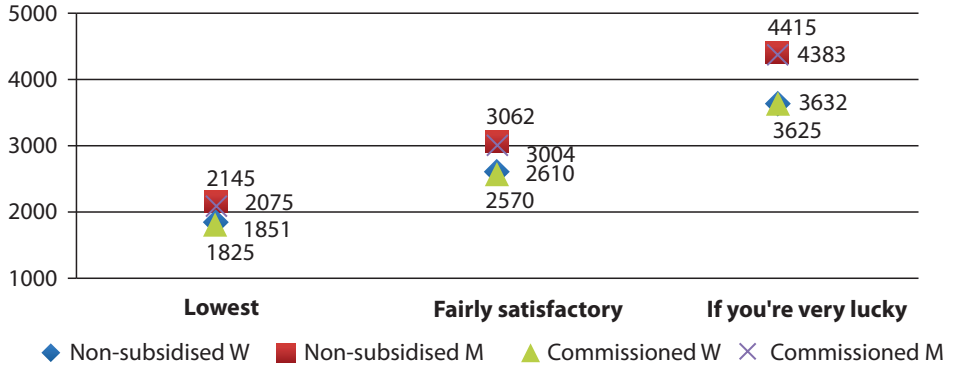
	Non-subsidised	Commissioned
Lowest salary	1999	1972
Fairly satisfactory salary	2846	2828
Salary if you're very lucky	4026	4067

5% trimmed mean.

Source: BKL – Students' Study 2013.

The salary aspirations of students differ depending on their gender and studied specialty. Regardless of whether the specialty is commissioned or not, women have lower salary expectations than men. This stratification becomes more apparent in the case of salary "for the very lucky ones." Here women seem to be even more realistically pessimistic. It is worth stressing that this correlation remains significant when the field of study is controlled. Specialties in the field of architecture and construction are exceptions to this rule, since women have higher salary aspirations than men in this field. This attitude represented by women is an important element in the discussion of the discriminatory nature of their lower salaries. Lower salary aspirations may be one of the most important factors influencing the actually lower salaries of women.

Chart IV.9. Salary expectations of students according to gender and type of studies



5% trimmed mean.

** Differences significant on p< 0.05 level.*

Source: BKL – Students' Study 2013.

The lowest salary expectations are present among students of mathematics, physics, chemistry, and environmental protection (lowest after-tax salary from PLN 1586 to PLN 1848). On the other hand, the highest aspirations occur among students of computer science, design, power engineering,

mechatronics, automation, and robotics (the lowest expected after-tax salary from PLN 2129 to PLN 2302, difference significant on p = 0.01 level).

Table IV.20. Salary expectations of students according to specialty

Specialty	Lowest salary	Fairly satisfactory salary	Salary if you're very lucky
Mathematics (other)	1586	2077	2741
Environmental protection (other)	1672	2220	2992
Chemistry (other)	1699	2312	3401
Environmental protection (U and TU)	1802	2500	3512
Mathematics and physics (U and TU)	1846	2665	3734
Chemistry (U and TU)	1848	2595	3757
Material engineering (other)	1867	2489	3197
Civil engineering (U and TU)	1967	2739	3898
Biotechnology (U and TU)	1975	2840	3907
Civil engineering (other)	2010	2903	4039
Mechatronics (other)	2016	2724	4225
Mechanics (other)	2053	2958	4516
Computer science (other)	2062	2917	4188
Mechanics (U and TU)	2073	2937	4111
Material engineering (U and TU)	2109	2973	4467
Automatics (U and TU)	2129	3119	4726
Mechatronics (U and TU)	2136	3157	4596
Power engineering (U and TU)	2150	3129	4519
Industrial design	2150	2867	4189
Computer science (U and TU)	2302	3342	4783

5% trimmed mean.

Source: BKL – Students' Study 2013.

As shown in Table IV.20, it is often the case that students of the same specialties have higher salary expectations if they study at larger universities and technical universities. Differences between persons studying at the larger universities and technical universities and persons studying at other HE institutions in terms of their average salary expectations are significant in the case of material engineering, environmental protection and environmental engineering, computer science, mechatronics, and electronics (this last field only for "fairly satisfactory" salary).

The students are prepared to make numerous sacrifices in order to find employment after graduation. About 80% of respondents would be ready to move from their current place of residence to another town. Around 70% feels motivated to learn a new profession. Finally, to avoid unemployment, about 40% of persons would undertake any job, even a low paid one. No differences were observed in this case between students of commissioned and non-subsidised fields. Women more frequently than men would be ready to retrain or to take any job, even a low-paid one. Students of second-cycle non-subsidised specialties would be ready for low-paid work more frequently than would those in first cycle studies. Persons who do not receive a scholarship would be ready to take low-paid work more frequently than those receiving financial rewards for their educational attainments. Students of engineering specialties would be ready to move more frequently than would their counterparts studying for a BA degree. In addition, students of technical or agricultural universities are more frequently willing to retrain than are students of smaller HE institutions and would be more willing to change place of residence than students of larger universities.

Students of fields strategic for the polish economy – educational choices, professional strategies and the outlook for the future

In the era of economic migration, an important issue to consider is the aspect of planned migrations of well-educated Poles. Work outside Poland is considered equally frequent by students of commissioned and non-subsidised specialties. Around 16% of the students of specialties considered strategic for the development of the Polish economy plan to move abroad. Another 50% would consider migration, if job supply in the local labour market turns out insufficient. Only about 20% are not considering migration at all. Students of commissioned specialties, who did not receive scholarship during the previous academic year, are significantly more frequently ready to move abroad if they cannot find work in Poland than their counterparts who received scholarships (regardless of whether their specialty was commissioned or not). In addition, migration plans depend on the study specialty. Students of mechatronics and electronics (at other HE institutions), material engineering (at universities and technical universities), mechanics and machine construction (at other HE institutions), and biotechnology (at universities and technical universities) are most willing to migrate. In most cases, these fields guarantee well-paid jobs outside Poland and relatively poor prospects in the country, especially in the case of biotechnology. Students of mathematics and physics, material engineering (at other HE institutions), chemistry and related fields (at other HE institutions), and industrial design are most prone to work in Poland.

Table IV.21. Readiness to work abroad, per study specialty [N = 9285]

Specialty	yes, I have such plans	maybe, if I can't find work in Poland	no, I plan to work in Poland	difficult to say
Mechatronics and electronics (other)	24%	53%	8%	15%
Material engineering (U and TU)	23%	46%	19%	13%
Mechanics and machinery design (other)	22%	54%	18%	7%
Biotechnology (U and TU)	20%	51%	17%	12%
Computer science (U and TU)	18%	43%	22%	16%
Mechanics and machinery design (U and TU)	17%	47%	23%	13%
Chemistry and related (U and TU)	17%	51%	20%	12%
Automation and robotics (U and TU)	17%	53%	17%	14%
Mechatronics and electronics (U and TU)	16%	44%	26%	14%
Industrial design	16%	44%	14%	26%
Civil engineering (other)	15%	52%	21%	11%
Computer science (other)	15%	43%	23%	19%
Civil engineering (U and TU)	14%	42%	26%	18%
Chemistry (other)	14%	43%	28%	15%
Power engineering (U and TU)	13%	47%	24%	16%
Mathematics and physics (U and TU)	13%	43%	26%	18%
Environmental protection (other)	12%	46%	21%	21%
Environmental protection (U and TU)	12%	51%	22%	16%
Mathematics (other)	4%	42%	35%	19%
Material engineering (other)	3%	43%	28%	28%

Source: BKL – Students' Study 2013.

4. Summary

Closing this chapter, let us recap the key conclusions that were formulated and discussed in more detail. The view presented here reflects on the intervention in the form of commissioned fields of study. The authors have refrained from formulating a general assessment, because this is the task of project evaluator. Instead, the authors attempted to point out certain threats and opportunities that appear in relation to this intervention. The opportunities include, for instance, the tendency for increased egalitarianism of sexes in the case of commissioned specialties. This aspect requires in-depth, multi-annual studies. If this tendency were maintained, the program of commissioned fields of study would bring a significant, unplanned benefit to the Polish society and economy.

In most cases, the commissioned fields of study were tied not to the launch of new teaching offer, but rather to increasing enrolment for the given fields, which usually had an upward profile, i.e. enjoying rising popularity among students. Thus, the observed effect (relatively small, when we consider the volume of financing) of growing number of students of the strategic fields of study does not necessarily have to be caused by the intervention itself. One can suspect that a large part of the students would have studied the same fields even if they did not receive the additional financial support. They would perhaps choose other universities or slightly different specialties from the same field. The phenomenon seems to have the features of both the substitution effect (the subsidised fields of study gain students at the expense of the same fields elsewhere that are not subsidised) and of the deadweight effect (the change in the number of students of technical specialties which occurred after the intervention would have occurred anyway, even if no actions were undertaken).

During the design of an intervention meant to increase the number of graduates of fields considered strategic for the Polish economy, one needs to keep in mind that educational choices on the higher level are usually homogenous. Students who, at the lower level of education, were directed towards social sciences or humanities usually would not choose to study sciences (even with financial encouragement). If they do make such a decision, it probably would have negative consequences, because it would mean education in a field inconsistent with the students' interests and talents. It is doubtful that the public intervention would lead to mass shifts among groups of specialties. The largest probability of selecting sciences and engineering specialties is found among students of environmental protection and other life sciences fields, students in economic, administration and social studies, where certain transfers may be expected. However, the rule can work both ways (economic, administrative, and social majors are seen as attractive for students of sciences and engineering specialties).

One could risk the statement that the number of sciences and humanities graduates is not determined by financial incentives to study specific fields, but rather by the perception of these fields and by the quality of teaching at lower levels of education (influencing of cognitive curiosity and a passion for sciences). In Poland, the humanities have been treated as more important (as evidenced by the absence of mandatory mathematics examination during the secondary school finals); therefore, one cannot be surprised that this learning profile dominated also among students.

The correlation described above suggests the conclusion that the effectiveness of intervention in the area of educational choices based on financial incentives is lower than of adjustments of mandatory education (focused mainly on modernising the teaching of sciences). The importance of these changes for the higher education system manifested itself when mandatory mathematics was reinstated in the upper secondary school finals. On the level of candidates for higher education, sufficient incentive for choosing the right field of study would be better knowledge and awareness on the market situation of graduates of the various fields (e.g. through reliable research of the graduates' fate), the needs of employers, and the students' competencies, skills and talents (through a professional consulting system).

Within the groups of specialties, the commissioning effect is moderated by the overall assessment of labour market opportunities after graduating from the given field. In the long-term perspective, enrolment rises in those specialties that ensure a relatively good labour market standing for their graduates. In the case of commissioned specialties whose graduates experience problems with finding employment, the financial incentive does not have such a strong effect on students, and if it does, it is short-lived. The conclusion based on the above correlations is an optimistic one, because it is a symptom that the micro-mechanisms regulating enrolment in particular fields are based on common sense.

An interesting correlation occurs between the size of the academic entity and the outcomes of commissioning specialties that it offers. For the smaller HE institutions, the financial support from the Ministry of Science and Higher Education is an important factor, boosting their chances to increase enrolment. This effect is usually short-lived and ends when the support offered by the Ministry is terminated. A reverse trend occurs among technical universities and universities; those academic centres usually achieve a constant increase of the number of strategic fields' students in the subsequent years. This leads to a conclusion that the stronger institutions that attract students obtain a dual benefit from their participation in the programme of commissioned fields of study. The smaller and weaker

institutions obtain a short-term benefit, and, in the subsequent years, they slowly but systematically lose everything they gained through the Ministry's investment. Thus, the concept of investing into strategic fields offered by the key academic centres appears to be fully justified.

Contrary to expectations, students of the both the commissioned and regular fields of study considered strategic are similar in many respects. Their view on professional opportunities and satisfaction with the education offered or plans for the future are tied more to the chosen specialty and the type of HE institution than to the mere fact of studying a commissioned, subsidised field. It is worth pointing out those elements that differentiate students of commissioned and non-subsidised specialties.

Despite the fact that the practical application of knowledge acquired during the studies is seen similarly by students of both the commissioned and non-subsidised fields, the first group is more convinced that the skills they gained would increase their chances for finding good employment that is consistent with the education profile. This belief is not influenced by the fact of receiving a scholarship. It leads to the conclusion that the increased confidence in the labour market does not only depend on the actual skills of the students, but rather on studying a commissioned field itself, which in the future (according to the beliefs of the students) should guarantee good employment. Fulfilment of this expectation will be a huge challenge for decision-makers in charge of educational and labour market policy.

Both groups of students usually plan to work in an occupation tied to their specialty (about 90%). Other work is considered most frequently by students of commissioned mechatronics (at other HE institutions), material engineering (at other HE institutions), environmental protection, and environmental engineering (at other HE institutions), industrial design, and civil engineering (at universities and technical universities). There are no significant differences in the occupational alternatives between students of commissioned and non-subsidised specialties. Students of non-subsidised specialties have a better understanding of the opportunities for finding employment not related to education profile.

Those studying strategic fields have higher salary expectations than all the students in tertiary education. However, the salary requirements of students of commissioned and non-subsidised specialties do not differ significantly. The lowest after-tax salary for which students of the strategic fields would agree to work is slightly under PLN 2000, on the average. Regardless of the field of study, women have lower salary expectations than men. From the perspective of the individual specialties, the highest salary expectations are displayed by students of computer science, design, power engineering, mechatronics, automation, and robotics (the lowest expected after-tax salary from PLN 2129 to PLN 2302).

The salary requirements of students are important to consider in the context of the foreign migration of educated persons. Students of commissioned fields and of parallel non-subsidised fields to the same extent plan to work outside Poland in the future (about 15% of all respondents). As the data suggests, this percentage could rise, depending on Poland's economic situation. Another 50% would consider migration, if employment supply in the local labour market turns out insufficient. The highest frequency of readiness for migration is displayed by students of mechatronics and electronics (at other HE institutions), materials engineering (at universities and technical universities), mechanics and machine construction (at other HE institutions), and biotechnology (at universities and technical universities). Although the declarations of the willingness to migrate are usually a bit over-estimated, the data presented above allows one to draw the conclusion that one of the strategic challenges for Poland would be to match the economy and the specially commissioned education in such a manner that the returns on the cost-intensive and highly qualified human resources remain primarily in Poland. Otherwise, this investment would become a costly gift for the foreign economies.

5. Annex

Table A.IV.22. The manner for combining commissioned fields of study with their non-subsidised counterparts

Group	Commissioned specialties in the group (study round 2009/2010,BK Study – 3rd year of first-cycle studies – 2013)
Environmental protection	Environmental engineering
Architecture and construction	Civil engineering
Manufacturing and processing	Material engineering
Engineering and technology	Biotechnology Technical physics Automation and robotics Mechanics and machinery design Mechatronics Power engineering
Computing	Computer science
Mathematical and statistical	Mathematics
Physical sciences	Physics Chemistry Medical physics Application of physics in biology and medicine Macro-direction and engineering of nanostructures
Life sciences	Environmental protection
Artistic	Design

Source: The authors' own work.

Table A.IV.23. Basic information on combining the commissioned specialties with their non-subsidised counterparts

Specialty	Number of students			Percentage	
	N-S	C	Total	N-S	C
Biotechnology – U and TU	609	181	790	77.1%	22.9%
Mechanics and machinery design – U and TU	360	220	580	62.1%	37.9%
Mechanics and machinery design - other	100	59	159	62.9%	37.1%
Automation and robotics – U and TU	205	178	383	53.5%	46.5%
Material engineering - U and TU	160	102	262	61.1%	38.9%
Material engineering - other	20	20	40	50.0%	50.0%
Mechatronics and electronics - U and TU	320	130	450	71.1%	28.9%
Mechatronics and electronics - other	59	20	79	74.7%	25.3%
Power engineering – U and TU	120	40	160	75.0%	25.0%
Civil engineering – other	265	240	505	52.5%	47.5%
Civil engineering – U and TU	100	75	175	57.1%	42.9%
Chemistry and related - U and TU	500	157	657	76.1%	23.9%
Chemistry – other	80	40	120	66.7%	33.3%
Environmental protection and environmental engineering – U and TU	889	494	1383	64.3%	35.7%
Environmental protection and environmental engineering – other	80	60	140	57.1%	42.9%
Design	100	40	140	71.4%	28.6%
Mathematics and physics – U and TU	644	565	1209	53.3%	46.7%
Mathematics – other	60	40	100	60.0%	40.0%
Computer science - U and TU	903	507	1410	64.0%	36.0%
Computer science – other	307	236	543	56.5%	43.5%
Total	5881	3404	9285	63.3%	36.7%

N-S – non-subsidised, C – commissioned.

Source: BKL – Students' Study 2013.

Table A.IV.24. Changes in the numbers of first-year students between the years 2009 and 2012

Groups of specialties	2009	2010	2011	2012	change in % 2009 vs. 2012
Pedagogical	23473	21019	19301	17299	-26%
Humanities	29400	27913	27491	24704	-16%
Artistic	4665	5311	5713	5593	20%
social	27976	27392	27427	24409	-13%
economics and administration	36837	36107	35502	33202	-10%
law	5936	6034	6039	6142	3%
journalism and information	3396	3347	3519	3227	-5%
life sciences	7830	7494	7099	6627	-15%
physical sciences	7624	7944	7664	7344	-4%
mathematical and statistical	4072	5260	6381	5293	30%
computer technology	12004	12429	13914	14003	17%
medical	18228	17783	18324	18853	3%
welfare	1273	1373	1739	1674	32%
engineering and technology	29311	32522	33749	34265	17%
manufacturing and processing	11040	11510	11715	11626	5%
architecture and construction	12237	12713	13062	12344	1%
agriculture, forestry and fishery	4698	4136	3954	3831	-18%
veterinarian	614	630	683	714	16%
public services	8631	8197	8562	7894	-9%
environmental protection	5595	5450	5307	4904	-12%
transport services	2920	3829	3964	4007	37%
protection and safety	3231	5455	7373	6939	115%
Total	260991	263848	268482	254894	-2%

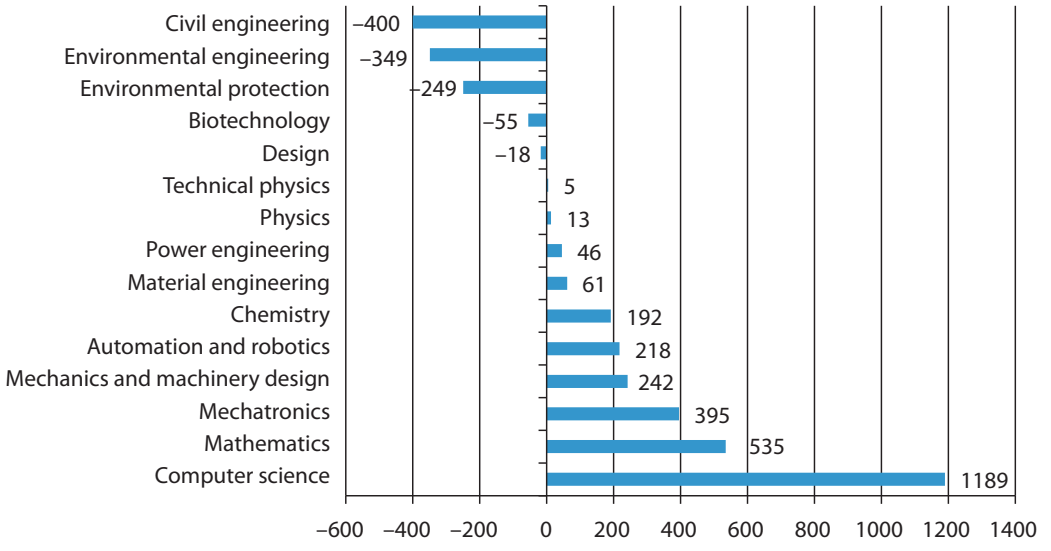
Source: The authors' own work based on the data of the Central Statistical Office.

Table A.IV.25. Percentage change in the number of students of the strategic fields – total for commissioned and non-subsidised specialties (2nd year students – enrolment 2009)

Specialty	2009	2010	2011	2012	2009/2010	2010/2011	2011/2012
Design	433	443	526	653	2%	19%	24%
Environmental protection	3036	3270	2835	2523	8%	-13%	-11%
Chemistry	1994	2199	2187	2042	10%	-1%	-7%
Physics	364	346	288	324	-5%	-17%	13%
Mathematics	2042	2641	3210	3133	29%	22%	-2%
Computer science	6268	6769	7076	8069	8%	5%	14%
Automation and robotics	2235	2382	2485	2647	7%	4%	7%
Biotechnology	2610	2539	2535	2464	-3%	0%	-3%
Technical physics	435	537	641	719	23%	19%	12%
Mechanics and machinery design	3669	3865	4411	4612	5%	14%	5%
Mechatronics	1079	1536	1857	1944	42%	21%	5%
Power engineering	784	1073	1404	1954	37%	31%	39%
Material engineering	822	936	1103	1157	14%	18%	5%
Civil engineering	6140	6633	6883	6837	8%	4%	-1%
Environmental engineering	3616	4250	4123	4055	18%	-3%	-2%

Source: The authors' own work based on the data of the Central Statistical Office.

Chart A.IV.10. Difference between the number of first-year students in 2009 and 2012 and the type of academic centre (specialties commissioned in 2009)



Source: The authors' own work based on the data of the Central Statistical Office.

Table A.IV.26. Would you choose once again to study the same specialty today, looking back from the perspective of your current experience? (First-cycle students, broken down per type of HE institution, specialty and whether it is commissioned or not)

Specialty	Non-subsidised			Commissioned		
	difficult to say	No	Yes	difficult to say	No	Yes
Biotechnology – U and TU	10.6%	13.9%	75.6%	9.4%	10.1%	80.5%
Mechanics and machinery design – U and TU	7.6%	5.9%	86.6%	11.9%	7.3%	80.8%
Mechanics and machinery design - other	5.1%	10.2%	84.7%	12.1%	5.2%	82.8%
Automation and robotics – U and TU	7.8%	12.7%	79.4%	7.3%	9.0%	83.7%
Material engineering - U and TU	16.3%	7.1%	76.5%	5.9%	12.9%	81.2%
Material engineering - other	0.0%	16.7%	83.3%	0.0%	0.0%	100.0%
Mechatronics and electronics - U and TU	9.0%	14.0%	77.0%	10.9%	18.6%	70.5%
Mechatronics and electronics - other	5.2%	15.5%	79.3%	26.3%	21.1%	52.6%
Power engineering – U and TU	10.3%	3.4%	86.2%	2.6%	15.4%	82.1%
Civil engineering - other	2.9%	7.8%	89.2%	7.7%	13.3%	79.0%
Civil engineering – U and TU	10.2%	6.1%	83.7%	11.3%	5.6%	83.1%
Chemistry and related - U and TU	13.4%	23.6%	63.0%	9.6%	7.7%	82.7%
Chemistry – other	21.1%	10.5%	68.4%	5.4%	5.4%	89.2%
Environmental protection and environmental engineering – U and TU	22.0%	14.6%	63.4%	14.2%	20.7%	65.1%
Environmental protection and environmental engineering – other	5.1%	22.0%	72.9%	18.6%	11.9%	69.5%
Design	10.2%	7.1%	82.7%	7.7%	15.4%	76.9%
Mathematics and physics – U and TU	12.4%	13.1%	74.5%	6.8%	16.1%	77.1%
Mathematics – other	7.7%	23.1%	69.2%	7.5%	0.0%	92.5%
Computer science - U and TU	5.5%	8.9%	85.6%	1.8%	5.0%	93.2%
Computer science – other	9.1%	11.1%	79.8%	6.1%	8.3%	85.5%
N	310	374	2323	273	391	2632

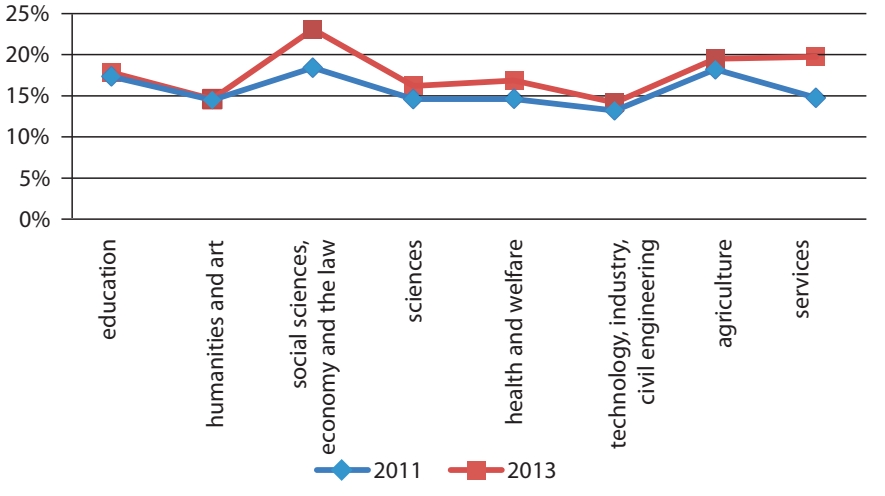
Source: The authors' own work based on the data of the Central Statistical Office.

Table A.IV.27. Change in the number of first year students of the specialties commissioned in 2009

Specialty	Type of HE institution	2012–2009 (1st year)	Number of students in 2009 (1st year)
Environmental protection	University	-141	769
Environmental protection	Technical university	-94	518
Environmental protection	other institution	-14	14
Chemistry	University	147	1314
Chemistry	Technical university	-9	157
Chemistry	other institution	54	0
Physics	University	15	328
Physics	Technical university	-2	53
Mathematics	University	349	1083
Mathematics	Technical university	145	519
Mathematics	other institution	41	0
Computer science	University	837	1541
Computer science	Technical university	336	2176
Computer science	other institution	16	826
Automation and robotics	university	12	89
Automation and robotics	technical university	195	835
Automation and robotics	other institution	11	31
Biotechnology	university	-97	602
Biotechnology	technical university	42	455
Mechanics and machinery design	technical university	208	1578
Mechanics and machinery design	other institution	34	102
Mechatronics	technical university	410	527
Mechatronics	other institution	-15	77
Civil engineering	university	-5	118
Civil engineering	technical university	-319	1756
Civil engineering	other institution	-76	337
Environmental engineering	university	-33	171
Environmental engineering	technical university	-294	1535
Environmental engineering	other institution	-22	153

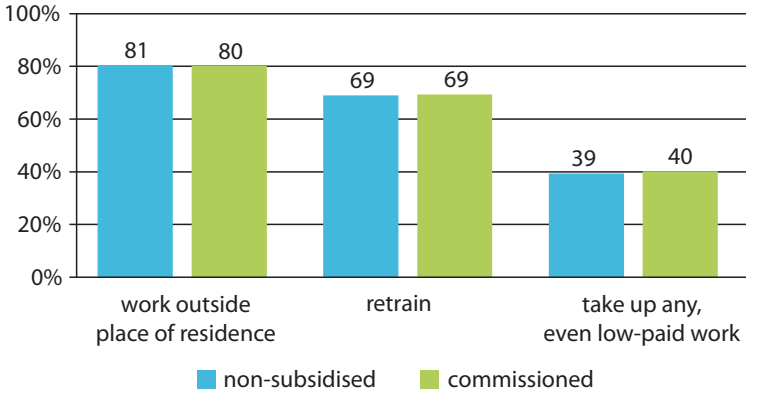
Source: The authors' own work based on the data of the Central Statistical Office.

Chart A.IV.11. Percentage of students who declare that they would not choose the same specialty again



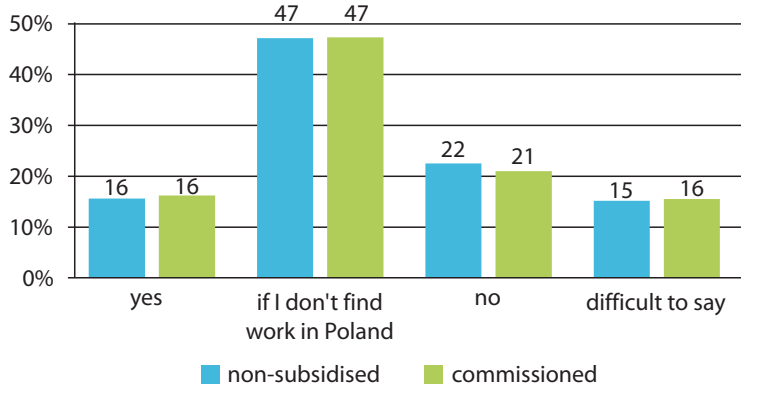
Source: BKL – Students' Study 2010, 2013.

Chart A.IV.12. Readiness for various actions in order to find work [N = 9285]



Source: BKL – Students' Study 2013.

Chart A.IV.13. Readiness to work outside Poland [N = 9285]



Source: BKL – Students' Study 2013

Table A.IV.28. Assessment of the chances for finding a job consistent with study profile, according to type of studies and scholarship

		Non-subsidised		Commissioned	
		N-S	S	N-S	S
Chances for finding a job consistent with education	N	1057	4765	818	2533
	No	13%	13%	13%	11%
	Yes	67%	65%	70%	69%
	difficult to say	19%	21%	17%	18%
	will not look for job	1%	1%	1%	1%

N = 9173.

NS – no scholarship, S – scholarship

** Differences significant on p< 0.05 level*

Source: BKL – Students' Study 2013.

6. Literature

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Chapter V

Krzysztof Kasparek, Mateusz Magierowski, Tomasz Masłyk

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

1. Introduction

This paper uses data collected during two rounds of the Study of Human Capital. It attempts to analyse the level of the self-assessment of competences considered key in the contemporary labour market by students of upper secondary schools. The analyses use a number of socio-demographic variables. They have been performed for two groups of competences, which are described as "hard" and "soft" in the relevant literature. The results of the research presented in this chapter is combined with the context of provisions of the law regarding key competences and with the results of the most important nationwide studies conducted so far, which covered the same issue.

The primary questions that the researchers attempted to answer included those on the overall level of the self-assessment of the key competences covered by the analysis and on potential changes that could have occurred during the four years separating the two rounds of the study. The authors were also interested in factors that could have differentiated the self-assessment level of analysed competences. They included both factors tied to the school itself (type of school attended by the given student, and the size class of its location) as well as the socio-demographic variables characterizing the student and his/her family (including gender and the socioeconomic status).

2. Key competences – legal regulations

School – next to the family and peer group – is one of the most important social environments where an individual forms his/her competences during childhood and adolescence. The Polish education system, functioning under both national and EU regulations, is subject to the EU recommendation on key competences for lifelong learning adopted by the European Parliament and the Council in 2006 (Official Journal L 394 of 30 December 2006). They are defined as *a combination of knowledge, skills, and attitudes*

appropriate to the context and are considered necessary for personal fulfilment and development, social inclusion, active citizenship, and employment (ibidem). The Recommendation of the European Parliament and the Council defines eight key competences for lifelong learning:

- communication in the mother tongue,
- communication in foreign languages,
- mathematical competence and basic competences in science and technology,
- digital competence,
- learning to learn,
- social and civic competences,
- sense of initiative and entrepreneurship, and
- cultural awareness and expression.

2.1. "Hard" key competences

Among these eight groups of competences, certain ones, due to their nature, are the first (mandatory) step on the road to the acquisition of advanced occupational skills required in the labour market. Those skills are closely linked to the following: fundamental knowledge of the world around us, the laws that govern it, the development of appropriate abilities for the acquisition of that knowledge and its integration, its use for the proper interpretation of observed phenomena, and clear communication of results obtained in this manner (ibidem).

Authors of this chapter defined the following competences as key, and adopted the following definitions, proposed in the document referred to above:

- **communication in the mother tongue** is "the ability to express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) and to interact linguistically in an appropriate and creative way in a full range of societal and cultural contexts."
- **communication in foreign languages**[72] **is defined as** "mediation and intercultural understanding in addition to the main skill dimensions of communication in the mother tongue, and the level of proficiency depends on several factors and the capacity for listening, speaking, reading, and writing."
- **mathematical competence and basic competences in science and technology is defined as "**the ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations, with the emphasis being placed on process, activity, and knowledge; and, the basic competences in science and technology refer to the mastery, use and application of knowledge and methodologies that explain the natural world. These involve an understanding of the changes caused by human activity and the responsibility of each individual as a citizen."
- **digital competence** is "the confident and critical use of information society technology (IST) and basic skills in information and communication technology (ICT)."
- **learning to learn**[73] is defined as "the ability to pursue and organise one's own learning, either individually or in groups, in accordance with one's own needs and the awareness of methods and opportunities."

The competences listed above, due to their instrumental nature for the building of subsequent, specialist competences, are referred to as "hard skills."

One of their most important features is the measurable nature, enabling systematic monitoring of the degree of their mastery by the individual students under research programs such as PISA (OECD 2014).

[72] Because the issue tied to the self-assessment of foreign language skills among students of upper secondary schools was discussed in the subject-specific report BKL Study of the students 2013, this paper does not cover it again.

[73] Cognitive competences, similarly as in the paper by Hsin and Xie (2012), are treated as hard competences. In this case, the competence "learning to learn" may raise doubts, because it is an attitude developed in the course of school education, similarly as the remaining cognitive skills.

2.2. Key "soft" competences

Social competences are defined in the document setting out the European Reference Framework in the spirit of definitions used in the relevant literature (achievement of goals through social interaction). The elements comprising this area include the following:

- the ability for constructive communication under different social contexts,
- tolerance,
- the ability to express and to understand various positions and standpoints,
- the ability for empathy, and
- negotiation skills and building "a climate of trust" (ibidem: 7).

The competences, which many researchers of the subject would define as "social," are included in the areas called "sense of initiative and entrepreneurship" or "organizational skills." These categories include traits that are intuitively associated with the dimension of social competences, such as managerial/leadership traits (managing, leading, and delegating tasks), as well as the ability to cooperate within a team (ibidem: 11).

2.3. Polish regulations regarding key competences of students

Polish legislation follows the framework set out by the European regulations. The key document is the core curriculum for lower secondary and upper secondary schools, whose completion enables the school leaver to obtain the secondary school certificate after passing the matriculation examination. This curriculum is enclosed as an appendix to the *Regulation of the Minister of National Education of 27 August 2012, on the Core Curriculum for Pre-school Education and General Education in the Various Types of Schools* (Journal of Laws of 2012, item 977). This document defines eight key skills, matching the key competences defined in the Recommendation of the European Parliament and which are to be the outcome of general education (ibidem: 73):

- **reading** – "the ability to understand, use and reflectively process texts, including cultural texts, leading to the achievement of one's own goals, personal development and active participation in the life of the society";
- **mathematical thinking** – "the ability to use mathematical tools in daily life and to formulate opinions based on mathematical reasoning";
- **scientific thinking** – "the ability to use scientific knowledge to identify and solve problems, and also to formulate conclusions based on empiric observations of the nature and society";
- **ability to communicate in the mother tongue and in foreign languages** (oral and written);
- **ability to effectively use modern information and communication technologies;**
- **the ability to search for, select, and critically analyse information;**
- **the ability to diagnose one's own educational needs and to learn; and,**
- **teamwork ability.**

Secondary vocational schools, technical secondary schools, or post-secondary schools provide vocational education. The expected results of this type of education are presented in the ***Regulation of the Minister of National Education of 7th February 2012 on the Core Curriculum for Vocational Training*. They are broken down into three primary groups:**

- results common for all occupations,
- results common for occupations within one education field, and
- results of education appropriate for qualifications identified for particular occupations.

In light of the European requirements for key competences, it is worth paying special attention to the educational results expected from all students of vocational education, which fit into the system set out in the EU documents. Their scope covers results referring both to the "soft" competences (interpersonal and social competences, work organisation for small teams) as well as those that can be defined as "hard" (starting and running one's own business, foreign language for occupational purposes).

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Having given a brief description of the legal framework for teaching competences to students of upper secondary schools, we can now move to the results of the most important research on that subject carried out in Poland.

3. Competences of students of upper secondary schools in Poland – review of selected studies

In order to see the overall image of the issues tied to key competences of upper secondary schools students, it is necessary to review the results of the most important research of this subject carried out in Poland. There have been several studies of this type. We have selected those with at least nationwide reach that are recognized as methodologically appropriate. All the research selected covered "hard" competences. During the analysis of available data, we did not find similar nationwide research that would cover the "soft" competences of upper secondary schools students. For each of the discussed studies, its methodology and the most important results have been described.

The specific nature of research carried out in Poland, whose goal was to measure the competences of upper secondary schools students, can be characterised in a general manner through reference to the several features that differentiate them. They include the following:

- the coverage – the competence of Polish students are assessed under international as well as nationwide Polish studies, but also under regional (covering a single region or several) or local ones;
- the nature of the study – some of the research projects factor in the time element – they register changes in competences by conducting panel studies – on the same sample (e.g. on the basis of results of two tests conducted at specific intervals), or surveys that are repeated within the same population but on different samples (e.g. through comparison of results obtained over several years by students of the final years in the given type of school);
- the nature of the sources of data used for the analyses – Some researchers under certain projects utilize available data (e.g. by analysing results of the matriculation examinations), and some others use collected data where the measurement is made with specially designed tools; and,
- the type of researched competences. In this respect, there are more research projects focusing on "hard" competences (in contradiction to "soft" competences).

The analysis of projects focused on researching the competences of upper secondary schools students in Poland should be started from the widely discussed study carried out at the initiative of the Organisation for Economic Cooperation and Development under the Programme for International Student Assessment – PISA.[74] The PISA study (OECD 2014) is conducted at a three-year interval (it was conducted in 2000, 2003, 2006, 2009, and 2012), and covers skills from three areas:

1) reading and interpretation (understanding),
2) mathematics, and
3) understanding in life sciences.

In each subsequent cycle of study, one of the areas is given priority (as the main area) and covered by more extensive research. In 2006, aside from the 15-year-old students, the PISA survey also covered the population of students of the 1st and 2nd years of upper secondary schools: general secondary schools, secondary vocational schools (technical secondary schools and specialised secondary schools), as well as basic vocational schools (with the exception of special schools for students with learning difficulties or disabilities), (Bartnik et al. 2006).

[74] 3 The purpose of this international undertaking is to analyse the skills and knowledge of 15 year olds' from several dozens of OECD member countries. Poland has been participating in it since its inception, i.e. the year 2000. Initially, the research carried out in Poland was led by a team of experts from the Institute of Philosophy and Sociology of the Polish Academy of Sciences (during the subsequent rounds, the research team worked under the auspices of the Educational Research Institute).

Students of Polish upper secondary schools[75] obtained higher than average results on the scale of reasoning in life sciences in comparison to the lower secondary students. This advantage is owed primarily to students of general secondary schools, who achieved much better results than did their peers in technical secondary schools, specialised secondary schools, and, most importantly, students of basic vocational schools, whose results were significantly lower than were those of students of lower secondary schools. The disproportion between the skill levels of students from various types of upper secondary schools was also apparent in the case of mathematics. If the result achieved by students of lower secondary schools is the point of reference, only the students of general upper secondary schools have a clear advantage over them. The students of technical upper secondary level achieved results similar to lower secondary schools' students, while the result of students of basic vocational schools was much lower. A similar pattern can be observed for skills tied to reading and interpretation. Much better results, in comparison with students of lower secondary schools, were obtained by students of general upper secondary schools, while the results of students of other types of upper secondary schools were similar to or worse than those of their colleagues from lower secondary schools.

The Programme for the International Assessment of Adult Competences (PIAAC) is another research project carried out under the auspices of the OECD. The purpose of the study carried out in the years 2011–2012 on the population aged 16 to 65 was to measure three skills: understanding of text, mathematical reasoning, and the use of information and communication technologies, as well as to determine the correlations between the surveyed skills and many social and economic variables (OECD 2013). The methodology assumptions were carried out based on standards similar to those employed under the PISA study (measurement and calibration), with some differences stemming from the purpose of the research. In Poland, the study was carried out on a sample of 9366 persons, which included 5372 persons in the age cohort 19–26 (Burski et al., 2013). The basic results of the PIAAC study are discussed in the section on hard competences.

The PISA research (similarly as the PIRLS – Progress in International Reading Literacy Study – carried out on children aged 10 years) became an inspiration for the nationwide project *School of Independent Thinking* prepared by the Educational Research Institute and carried out in late 2011 and early 2012 (IBE 2013a). The research covered pupils in the fourth year of primary schools, first year students in lower secondary schools, and the first and last year students of upper secondary schools.[76] The study aim was to diagnose the level of complex skills in Polish (reading, debating, and interpretation) and mathematics (mathematical modelling, creating strategies for solving problems, reasoning, and debating).

The research team, as in the case in the international studies, stressed the significant skills disproportions between students of various types of upper secondary schools, both in Polish and mathematics. At the fourth stage of education, the highest level of skills – both mathematic and linguistic – was recorded among students of general secondary schools. Relatively low competences are seen primarily among students of vocational schools, and many of them did more poorly on the test problems than did students of lower secondary schools (IBE 2013a).

"Longitudinal research – paths of youth educational development – upper secondary schools" (referred to also as Further Education and Work) is a research initiative of the Team for Interdisciplinary Studies on Education and the Centre of Sociological Research, both being part of the Institute of Philosophy and Sociology of the Polish Academy of Sciences. This research was part of the project "Research on the development of methodology for estimating the rate of educational value added (EVA)" carried out in the years 2009–2012 (IBE 2013b). In 2012, the project moved to the Educational Research Institute. The purpose of this nationwide research was to measure the increase in knowledge and skills of upper secondary schools students and to diagnose conditions for this increase. Three areas of knowledge were studied: reasoning in life sciences, mathematics, and reading comprehension. The study population covered first year students of general and specialised secondary schools, technical secondary schools,

[75] In 2006, from the population of 107 7000 students of upper secondary schools, 5195 students were selected randomly, of whom 4451 participated in the study (86% response rate), (Bartnik et al., 2006).

[76] The study of students from upper secondary schools covered 300 sections (grades): 120 sections from general secondary schools (response rate – 82%), 100 sections from technical and specialised secondary schools (response rate 83%) and 80 sections from vocational schools (response rate – 78%). The total number of first-grade students who participated in the study reached 3489, and last-grade students – 3004. The sample was selected based on the Educational Information System (SIO), and was stratified based on the following criteria: administrative region, type of school, size of place of residence and size of school.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

and basic vocational schools (other than under the PISA survey, the criterion of 15 years of age was not used and replaced by the criterion of education level – first grade). The researchers' aim was to determine the index of educational value added (EVA), which describes the effectiveness of teaching, in other words, the school's input into the results achieved by students at the final exams, taking into account differences between schools tied to their "input" resources (in this case: results of the lower secondary school leaving examination) and "output" (results of the matriculation examination). The evaluation indices for general and technical secondary schools were calculated based on results obtained by school leavers from three years: classes of 2010, 2011, and 2012. They were used to develop examination indices for four areas of teaching: (1) index for the humanities (Polish, history, and civic education), (2) index covering the result of Polish language examination, (3) index for mathematics and life sciences (mathematics, information, and computer science, physics, chemistry, biology, geography), and (4) a separate index for mathematics.

As in the case of the PISA or PIAAC research, here too the test results reflected the characteristic differences between skill levels of students at various types of schools. Students of general secondary schools (participated in all measurements) obtained, on the average, 563 points in the maths test, 569 points in the reading and interpretation test, and 566 points on reasoning in life sciences. The second place in this conventional ranking of school types belonged to students of technical secondary schools, with respective results at 499, 493, and 509 points. Students of specialised secondary schools obtained similar, but lower results of 482, 497, and 496 points. The last place in the ranking was taken by students of vocational schools, with results at 401, 392, and 413 points.

The results obtained by students of upper secondary schools during their matriculation examination are a valuable source material for comparative analyses.[77] In 2010, mathematics was restored as mandatory during the upper secondary school finals. In the same year, the Educational Research Institute in its *Report on the State of Education. A Society on the Road to Knowledge* (IBE 2011) presented a synthetic comparison of matriculation examination results in mathematics, obtained by students of all types of upper secondary schools: general and specialised secondary schools, technical secondary schools, and supplementary upper secondary schools – both general and technical. The matriculation exam results, in their simplest presentation (success vs. failure) confirm the conclusions regarding the varied level of competences of students representing different types of upper secondary schools. In 2010, the highest value of the matriculation success rate was recorded in general secondary schools (91%). The success rates were lower at other types of schools – only 70% of technical secondary schools and 64% of specialised secondary schools passed their school finals. In the general and technical supplementary upper secondary schools, the success rate was almost three times lower, in comparison to general secondary schools (37% and 34%, respectively).

In the following year, the Educational Research Institute published the *Report on the State of Education 2011, Continuation of Changes* (IBE 2012). It analysed the requirements for vocational school students tied to the acquisition of professional qualifications and provided data on the percentages of graduates of vocational schools (technical secondary schools, supplementary technical secondary schools and basic vocational schools) who take the exams confirming their qualifications (including the percentage of persons studying the specific occupations). The analysis also covered the pass rate for vocational examinations, broken down by school type, occupation, and administrative region. The highest percentage of students who left schools with a diploma confirming their vocational qualifications in 2010 came from basic vocational schools (85.4%). As the authors of the report indicated, this relatively high result could be attributed to the fact that, in those schools, the teachers focused on the result of the vocational exam, and to a lesser extent, on teaching competences required in a given profession. The occupational diploma was awarded also to 66.7% of students of the specialised secondary schools, 59.8% students of technical secondary schools and 40.7% graduates of the supplementary technical schools.

The subsequent *Report on the State of Education 2012, Outcomes Matter* (IBE 2013c) presented the results of matriculation examinations obtained by graduates of general secondary schools, specialised

[77] Detailed results of the finals, including all subjects covered by the exams, can be found in reports published by the Central Examination Board. In the reports for the years 2009-2013, the results are presented with commentary to problems, which discuss the most frequent issues and errors.

secondary schools, and supplementary schools, as well as by graduates of technical secondary schools and supplementary technical schools. It specified the percentages of graduates taking the examination and their success rate. The analysis also covered the differences in the results of the upper secondary school finals in Polish, mathematics, biology, and physics, with respect to such variables as gender, social status of residence, and the ownership status of the school (public and non-public schools). In 2012, the matriculation examination was passed by 93% of students of general secondary schools, which was 15% more than in the case of technical secondary schools and 25% more than in specialised secondary schools. In the supplementary general secondary schools, 37% of students passed their finals, and in supplementary technical secondary schools, only 30% passed.

Limitations of the self-description method

The research quoted above primarily indicates the large disproportions between the results achieved by students of various types of schools in terms of "hard" skills. Definitely, the best results, in comparison to their peers, are attained by students of general secondary schools. The lowest results in the competence tests are achieved by students of basic vocational schools. This tendency is reflected in most results of the BKL Study, quoted in the section dedicated to self-assessment of "hard" competences.

4. Soft and social competences

In light of the requirements for employees regarding the "hard" competences and the growing uncertainty of employment in numerous sectors, the competences referred to as "soft" play a vital role in the labour market (Bereiter, Scardamalia 2012). Contrary to the "hard competences," which are closely tied employment and the knowledge necessary to perform it, the "soft" skills make it possible "to deal with others and to manage oneself and one's emotions," in line with rules applied at the specific workplaces and organisations (Hurrel, Scholarios, Thompson 2013: 162). The literature often cites social competences, non-occupation specific, as a significant area of the soft competences. These can be defined, according to Rubin and Rose-Krasnor (1992), in the categories of the effective achievement of one's own goals under interactions with others, in a manner allowing one to preserve the positive nature of the relationship.[78] Sometimes the preservation of such relationships is a goal in itself, and the individual uses his/her social competences to attain it. In such case, we speak of interpersonal goals (different from the instrumental ones) (Martkowska 2012: 16). Irrespective of the goal's nature, the effectiveness of handling social situations should be deemed the fundamental measure of social competences (ibidem). This effectiveness consists not only of the fulfilment of one's own needs, but also of acting in line with social expectations, although the balance between these two elements "is not always possible or desirable from the adaptive standpoint" (Matczak 2007: 5–6, Rose-Krasnor 1997).

As pointed out by Nangle et al. (2009: 3), the range of skills classified as social includes cognitive, emotional or behavioural competences, as well as sets of expectations or motivations. In Polish studies, it is worth noting the proposal by Urszula Jakubowska (1996), who identified the following components of social competence, understood as a general ability: adaptive skills (the ability to adapt oneself and one's behaviour to the situational context), the ability to build emotional ties, the ability to communicate effectively, and the ability to achieve one's own goals.

Self-assessment of soft skills in a study of upper secondary schools students carried out under the Study of Human Capital

4.1. Limitations of the self-description method

Before presenting the analysis of results obtained under the BKL Study, it is necessary to point out the limitations resulting from the self-descriptive nature of obtained data. As in the case of each subjective measurement of competences, the nature of data is determined primarily by the opinion of the entity who evaluates them, and this opinion can significantly deviate from results obtained through

[78] The achievement of one's own goals under interaction with others as the core application area of social competences is cited also by Ford (1982).

measurement of the same skill with objective indicators. In the case of hard skills, the students may confront their self-assessment of selected skills with an external evaluation (e.g. the results of internal knowledge tests, results of external examinations, etc.), but in the case of soft skills, the opportunity for comparing their self-assessment with results of objective tests is much rarer. Moreover, low self-assessment regarding selected "soft" skills (e.g. interpersonal skills) may be perceived as a more serious threat to the positive self-image than in the case of hard competences (e.g. mathematical abilities). Stereotypes (such as gender-based ones) exert a significant influence on the self-assessment of these competences, because it is not fitting for representatives of certain groups to have a low self-assessment of certain competences (e.g. self-assessment of males on resilience to stress).

With these limitations in mind, the distortions in the self-assessment of "soft" skills in comparison with the objective results of their measurement will mainly involve its over-estimation.

4.2. Soft competences under the BKL Study

In the study of upper secondary schools' students under the Study of Human Capital, several questions comprising the set used for the self-assessment of students' competences can be considered as indicators of soft skills, in reference to the work by Hurrel, Scholarios and Thompson (2013: 162). The questions were selected on two levels, i.e., the respondents were asked for a self-assessment within the given competence class both on the most general level (e.g. self-organisation and initiative) and on the more detailed one (e.g. independent decision-making, entrepreneurship, and initiative).

The self-assessment of each of the competences tested under the BKL Study was rated by the students on a 1 to 5 scale, where 1 denoted a very low level of the given skill, 2 – basic level, 3 – moderate, 4 – high, and 5 – a very high level of that skill.

The soft competences measured in the Study are arranged into three main groups, which can be further broken down into detailed dimensions as follows:

1) social competences:
   a) interpersonal competences ("contacts with other people with whom tasks are performed jointly"),
      - cooperation within the group,
      - ease of establishing contacts,
      - communication skills, clear formulation of one's thoughts,
      - solving conflicts between people;
   b) managerial competences (general competence: "managerial skills and organising the work of others"):

coordination of work of others,
disciplining others.

2) self-organisation competences (general competence: "self-organisation of work and initiative (planning and timely execution of tasks, effectiveness in the attainment of goals"):
   - independent decision-making,
   - entrepreneurship and initiative,
   - creativity (innovation, coming up with new solutions),
   - resilience to stress,
   - timely completion of planned actions;
3) clerical competences (general competence: "organisation and execution of office work");
4) flexibility competences (general competence: "availability"):
   - frequent travels,
   - flexible working hours.

The concept presented above was reflected in the results of the exploratory factor analysis (EFA), performed based on empirical data. The factor loadings values presented in the table below (Promax rotation with Kaiser normalisation, kappa = 4; the values of Pearson's r correlation coefficient for the factors fell within the range from 0.419 to 0.713), which illustrate the strength and direction of the relationship between the factor and the variable allow one to distinguish four factors which can be clearly interpreted[79] and represent the interpersonal, managerial, clerical, self-organisation, and flexibility competences, respectively.

Differences in the levels of soft skills among upper secondary schools students due to socio-demographic variables

Table V.1. Structure of the components of the EFA performed on variables representing soft competences

Type	Competences	Factor			
		Competences interpersonal	Self-organisation competences	Managerial and clerical competences	Flexibility competences
SLF	self-organisation and initiative	.024	.690	.028	-.067
	independent decision-making	.022	.710	-.051	.018
	entrepreneurship and initiative	-.114	.784	.083	-.029
	Creativity	-.011	.668	.002	.016
	resilience to stress	.030	.337	.005	.166
	timely completion of planned actions	.130	.431	-.032	.019
PER	contacts with others	.930	-.027	-.057	-.037
	cooperation within a group	.921	-.098	-.025	-.019
	ease of establishing contacts	.593	.117	.042	.020
	communication, clarity of thoughts	.432	.266	.085	.013
	solving conflicts between people	.348	.094	.219	.024
OFF	organisation and execution of office work	.044	.196	.358	-.002
MNG	managerial skills and organising work of others	-.026	.072	.842	-.031
	coordination of work of others	-.027	-.048	.968	-.019
	disciplining others	.026	-.041	.734	.060
AVL	Availability	.108	.111	.051	.419
	frequent travels	.006	-.075	-.024	.824
	flexible working hours	-.088	.049	.014	.614

Source: BKL – Study of students of upper secondary schools 2013

The analyses presented in the further sections of this paper use both ratios of the general level of competence and ratios referring to their specific aspects; as well as various independent variables which may influence the differentiation in ratio values, such as: type of school, gender, socioeconomic status of the student's family and its financial standing, number of siblings, size class of the place of residence or the fact of performing paid work.

Before commencing the analysis of results obtained under the BKL Study, it is necessary to pay special attention to the limitations.

4.3. Differences in the levels of soft skills among upper secondary schools students due to socio-demographic variables

According to the hypotheses, one of the main factors determining the differences in levels of soft competences is the nature of the given education type, which is tied to the type of school.

[79] The eigenvalue of each of the components remaining in the model was larger than 1, in line with the Kaiser's eigenvalue rule.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Table V.2. Self-assessment of soft skills by groups of students of various types of schools (upper secondary, on a 1 to 5 scale)[80] The cells show average values

Type	Competences	Basic vocational school		Technical secondary school		Specialised secondary school		General secondary school		Post-secondary school	
		N	average	N	average	N	average	N	average	N	average
SLF	self-organisation and initiative	3870	3.49	11926	3.71	687	3.63	18736	3.79	704	3.82
	independent decision-making	3903	3.85	11971	3.94	688	3.94	18819	3.97	707	3.95
	entrepreneurship and initiative	3793	3.16	11816	3.44	679	3.34	18604	3.51	691	3.48
	Creativity	3856	3.44	11890	3.67	682	3.72	18732	3.79	699	3.65
	resilience to stress	3881	3.41	11950	3.41	686	3.31	18775	3.3	706	3.4
	timely completion of planned actions	3832	3.56	11820	3.73	677	3.68	18597	3.72	700	3.9
PER	contacts with others	3905	4	11973	4.12	689	4.15	18802	4.14	707	4.14
	cooperation within a group	3906	4.06	11988	4.16	688	4.19	18829	4.09	709	4.17
	ease of establishing contacts	3913	3.93	11976	3.96	688	4.06	18823	3.96	710	4.01
	communication, clarity of thoughts	3878	3.68	11942	3.84	687	3.87	18794	3.9	708	3.92
	solving of conflicts	3834	3.54	11865	3.64	681	3.81	18710	3.73	696	3.68
OFF	organisation and execution of office work	3835	2.84	11862	3.25	680	3.26	18677	3.28	698	3.42
MNG	managerial skills and organising work of others	3892	3.33	11936	3.51	687	3.5	18799	3.57	706	3.41
	coordination of work of others	3861	3.26	11914	3.47	682	3.49	18749	3.55	704	3.42
	disciplining others	3848	3.4	11853	3.47	679	3.59	18653	3.52	701	3.42
	Availability	3865	3.69	11929	4	686	3.92	18722	3.92	703	4.03
AVL	frequent travels	3831	3.78	11857	3.81	676	3.83	18618	3.75	695	3.52
	flexible working hours	3849	3.51	11864	3.58	679	3.54	18652	3.57	699	3.48

Source: BKL – Study of students of upper secondary schools 2013.

Analysis of the table allows one to draw the following conclusions:

- The group of competences rated the lowest by students of all types of school included the office competences, resilience to stress, managerial competences, entrepreneurship, and initiative; while the highest rating was given, across all schools, to interpersonal competences.
- Most frequently, the average values across the groups were seen among students of vocational schools. They were the most similar (difference of circa 0.1 point) to the values in other groups with respect to independent decision-making, resilience to stress, most of the interpersonal competences, and flexible working hours. Differences between the highest result (students of general secondary schools or of post-secondary schools) and the group of vocational schools' students become clearer (0.3–0.4 points on the scale) for some of the self-organisation competences and clerical competences.
- It is worth noting the lack of significant differences in the average self-assessment of interpersonal competences across students of different schools, which are measured both on the general level and on the level of ratios denoting detailed aspects of this type of competences.

[80] In this paper, the authors decided not to state the values of significance tests for average differences regarding the average self-assessments for the individual competences. Due to the significant numbers of responses in sub-groups, their significance level p was below the critical value, even in the case of differences of 0.01 on the scale.

- The influence of gender revealed a stronger differentiation between the self-assessment of interpersonal competences by women and men in post-secondary schools. In the case of resilience to stress (usually rated visibly higher by men), the smallest differences between self-assessment of men and women was observed in post-secondary and vocational schools. The group of vocational schools' students also displayed the smallest differentiation between the self-assessment of women and men regarding flexible working hours. Interestingly, in the schools covered by the 2010 and 2013 study rounds, the average values in groups identified due to school type almost do not differ from each other in the majority of cases. The largest changes in values (drops by circa 0.3 points) were seen among students of basic vocational schools, in terms of creativity and solving conflicts between people.

Differences in the levels of soft skills among upper secondary schools students due to socio-demographic variables

Table V.3. Differences between the average values of self-assessment of soft skills by students of various types of upper secondary schools in 2010 and 2013

Type	Competences	Basic vocational school	Technical secondary school	Specialised secondary school	General secondary school	Post-secondary school	Total
SLF	self-organisation and initiative	-0.08	0.02	-0.06	-0.04	-0.04	-0.06
	independent decision-making	0.02	-0.01	0.01	0	-0.01	0
	entrepreneurship and initiative	-0.03	0	-0.03	-0.02	-0.03	-0.05
	creativity	-0.28	0.11	-0.17	-0.06	-0.05	-0.09
	resilience to stress	-0.11	0.04	-0.07	-0.04	0.05	-0.05
	timely completion of planned actions	-0.19	0.08	-0.11	-0.04	-0.07	-0.04
PER	contacts with others	-0.11	0.02	-0.1	-0.08	-0.06	-0.09
	cooperation within a group	-0.16	0.04	-0.13	-0.09	-0.08	-0.1
	ease of establishing contacts	0.05	-0.02	0.04	0.02	0.02	0.02
	communication, clarity of thoughts	-0.03	-0.01	-0.04	-0.05	-0.08	-0.06
	solving conflicts between people	-0.3	0.13	-0.18	-0.05	-0.08	-0.06
OFF	organisation and execution of office work	-0.13	0.03	-0.1	-0.06	-0.25	-0.08
MNG	managerial skills and organising work of others	-0.17	0.08	-0.09	-0.02	-0.05	-0.04
	coordination of work of others	-0.1	0.07	-0.03	0.04	0.01	0.03
	disciplining others	-0.24	0.12	-0.13	-0.01	-0.02	-0.01
AVL	availability	-0.18	0.04	-0.15	-0.11	-0.06	-0.11
	frequent travels	-0.01	0	-0.01	0	0.07	0
	flexible working hours	-0.11	0.02	-0.09	-0.07	-0.07	-0.06

Source: BKL – Study of students of upper secondary schools 2010 and 2013.

The Argyle study (1991) provides interesting conclusions regarding the differences in social competences tied to gender. Men obtained better results on the assertiveness scale, while women fared better with the remaining components of social competences, such as empathy or cooperation. One of the potential explanations for this difference is the different course of socialisation for children of both genders; according to the results of the Huston study (1983), boys are encouraged to compete and given more independence, while girls are treated with more affection, punished less frequently and watched over more.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Table V.4. Self-assessment of soft competences in groups of men and women (average values, 1 to 5 scale)

Type	Competences	Women		Men	
		N	average	N	average
SLF	self-organisation and initiative	18990	3.79	16933	3.65
	independent decision-making	19064	3.94	17024	3.95
	entrepreneurship and initiative	18812	3.42	16771	3.47
	Creativity	18937	3.7	16922	3.72
	resilience to stress	19008	3.12	16990	3.62
	timely completion of planned actions	18799	3.76	16827	3.65
PER	contacts with others	19057	4.2	17019	4.02
	cooperation within a group	19080	4.18	17040	4.04
	ease of establishing contacts	19076	4.05	17034	3.86
	communication, clarity of thoughts	19036	3.93	16973	3.76
	solving conflicts between people	18927	3.8	16859	3.55
OFF	organisation and execution of office work	18896	3.37	16856	3.06
MNG	managerial skills and organising work of others	19036	3.5	16984	3.55
	coordination of work of others	18975	3.47	16935	3.51
	disciplining others	18881	3.48	16853	3.5
AVL	Availability	18972	3.94	16933	3.9
	frequent travels	18822	3.7	16855	3.85
	flexible working hours	18864	3.45	16879	3.69

Source: BKL – Study of students of upper secondary schools 2013.

In the group of women, the average for office competences was indeed slightly higher (0.3 point on the scale). Women rated themselves slightly higher (by about 0.2 point) in terms of competences tied to interactions with other people. Men in turn perceive themselves as more resistant to stress (difference of 0.5 point) and declared more flexibility regarding working hours (0.24 points). Especially interesting is the fact that the observed higher self-assessment of men regarding these two competences is clearly less applicable to students of vocational schools, where the students declare lower average self-assessment, despite the fact than men outnumber women.

Family is undoubtedly the most important environment influencing the development of social competences at the earliest stage and for the longest time. Moreover, it determines the influences of other social groups in which the individual functions at later stages of life (Martkowska 2012: 71). The parents function as the primary "providers" of behavioural models for specific social circumstances, where the important determinants of these behaviours are the socio-demographic traits of parents, including their socioeconomic status (SES). As in the works of Dolata (2001), the ratio of the socioeconomic status was determined by adding up points allocated to the given education levels of the father/primary caregiver and mother/primary caregiver (1 – primary or incomplete primary, 2 – basic vocational, 3 – upper secondary, 4 – tertiary). This operation led to the development of a summation index, whose range of theoretical values fell between 2 and 8. This variable has been transformed into 4 values as follows:

1) very low SES – 2–3 points,
2) low SES – 4–5 points,
3) moderate SES – 6 points, and
4) high SES – 7–8 points.[81]

[81] Analyses with the use of this variable excluded respondents who did not state the education level of one of their caregivers – other than in the case of Dolata, who imputed the modal value to such persons.

Table V.5. Self-assessment of soft competences in groups identified by the socioeconomic status (SES) of the student's family (average values, 1 to 5 scale)

Type	Competences	Very low SES		Low SES		Moderate SES		High SES	
		N	average	N	average	N	average	N	average
SLF	self-organisation and initiative	1307	3.55	13670	3.7	7751	3.78	7600	3.84
	independent decision-making	1310	3.81	13743	3.9	7786	3.99	7627	4.04
	entrepreneurship and initiative	1294	3.24	13531	3.37	7692	3.52	7547	3.63
	Creativity	1302	3.46	13659	3.6	7731	3.77	7583	3.93
	resilience to stress	1306	3.18	13700	3.29	7767	3.39	7616	3.45
	timely completion of planned actions	1291	3.61	13559	3.71	7686	3.75	7537	3.77
PER	contacts with others	1311	4.04	13742	4.13	7781	4.15	7621	4.13
	cooperation within a group	1314	4.05	13759	4.14	7791	4.14	7632	4.09
	ease of establishing contacts	1313	3.85	13748	3.96	7792	3.99	7629	4
	communication, clarity of thoughts	1309	3.71	13708	3.81	7773	3.91	7612	3.97
	solving conflicts between people	1297	3.59	13608	3.67	7737	3.7	7588	3.73
OFF	organisation and execution of office work	1293	3.14	13619	3.19	7715	3.31	7568	3.29
MNG	managerial skills and organising work of others	1311	3.29	13709	3.44	7775	3.58	7614	3.71
	coordination of work of others	1304	3.26	13666	3.42	7765	3.54	7593	3.68
	disciplining others	1299	3.36	13611	3.45	7704	3.51	7567	3.58
AVL	Availability	1305	3.84	13667	3.94	7771	3.96	7593	3.93
	frequent travels	1297	3.63	13590	3.75	7697	3.78	7552	3.83
	flexible working hours	1298	3.39	13594	3.49	7728	3.59	7573	3.7

Source: BKL – Study of students of upper secondary schools 2013.

For most competences, the average value rises with each subsequent category of respondents characterized by a higher socioeconomic status of their families. As these differences were not very pronounced, the relationship between the socioeconomic status (measured with the Somers' d coefficient) and the individual sub-classes of soft competences does not exist in practice in the majority of cases.

The occupational situation of parents is a factor that, under certain circumstances, can be closely tied to their education level; therefore, it is worth separately examining the influence of that situation[82] on the level of the student's competences.

[82] The variable used in this analysis was created by the recoding of variables "occupational situation of father/caregiver" and "occupational situation of mother/caregiver" in such a manner that responses "works" or "is a working retired / disabled person" were classified to the overall category "working", while the responses "is a non-working retired / disabled person" and "is a homemaker" formed the category "occupational inactivity." The last category was the unemployed. On the basis of these 3 categories, 6 combinations of occupational situations were defined for the students' parents. The value of the ratio was calculated only for those students who stated that both parents worked.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Table V.6. Soft competences in groups identified by the occupational situation of parents / primary caregivers (average)

Type	Competences	Both working		Working and inactive		Working and unemployed		Both unemployed		Unemployed and inactive		Both inactive	
		N	average	N	average	N	Average	N	average	N	average	N	average
SLF	self-organisation and initiative	19088	3.77	7939	3.71	1852	3.66	287	3.52	533	3.57	1527	3.64
	independent decision-making	19162	3.97	7993	3.92	1861	3.91	287	3.84	534	3.79	1534	3.9
	entrepreneurship and initiative	18927	3.51	7867	3.4	1835	3.35	287	3.18	525	3.2	1511	3.34
	creativity	19020	3.77	7957	3.66	1852	3.64	283	3.45	530	3.52	1521	3.59
	resilience to stress	19121	3.39	7968	3.31	1860	3.27	288	3.19	528	3.15	1528	3.28
	timely completion of planned actions	18938	3.74	7871	3.71	1832	3.66	286	3.58	525	3.54	1511	3.67
PER	contacts with others	19153	4.13	7993	4.12	1861	4.09	285	4.05	534	4.05	1533	4.11
	cooperation within a group	19179	4.12	8000	4.12	1863	4.13	288	4.08	534	4.08	1537	4.13
	ease of establishing contacts	19167	3.98	7999	3.94	1862	3.92	287	3.86	536	3.88	1534	3.94
	communication skills, clear formulation of one's thoughts	19125	3.89	7979	3.83	1855	3.79	286	3.7	534	3.69	1529	3.77
	solving conflicts between people	19053	3.7	7902	3.66	1839	3.62	284	3.58	530	3.5	1515	3.65
OFF	organisation and execution of office work	18996	3.26	7922	3.21	1842	3.17	281	3.07	531	3.06	1518	3.14
MNG	managerial skills and organising work of others	19133	3.59	7973	3.47	1857	3.39	287	3.3	534	3.29	1528	3.37
	coordination of work of others	19091	3.55	7958	3.45	1852	3.36	284	3.29	529	3.26	1522	3.34
	disciplining others	18998	3.52	7915	3.46	1844	3.4	286	3.38	530	3.35	1511	3.43
AVL	availability	19085	3.94	7948	3.92	1856	3.9	284	3.88	534	3.82	1525	3.89
	frequent travels	18971	3.78	7903	3.76	1841	3.72	283	3.82	528	3.7	1506	3.75
	flexible working hours	19001	3.59	7913	3.52	1844	3.51	280	3.46	525	3.42	1517	3.5

Source: BKL – Study of students of upper secondary schools 2013.

Students with both parents (caregivers) working demonstrate average values slightly higher than the remaining groups. The most similar average results were obtained by students across all the groups in the area of interpersonal competences, as in the case of analyses based on the socioeconomic status.

Not only the parents, but also siblings can often be an important partner for social interactions that support the development of soft competences. Argyle (1998) stresses, in this context, the influence of the age and number of siblings on the level of social competences. However, under the BKL Study of students of upper secondary schools carried out in 2013, the averages across five groups identified by the number of siblings did not differ appreciably. This was also in the case of social competences (interpersonal and managerial) and in the case of the other soft competences.

Differences in the levels of soft skills among upper secondary schools students due to socio-demographic variables

Table V.7. Self-assessment of soft competences in groups identified by the number of siblings (average, 1 to 5 scale)

Type	Competences	None		1		2 or 3		4 or 5		more than 5	
		N	average	N	average	N	average	N	average	N	average
SLF	self-organisation and initiative	4837	3.74	14620	3.75	13321	3.71	2352	3.66	793	3.65
	independent decision-making	4848	3.97	14679	3.96	13386	3.93	2369	3.91	806	3.88
	entrepreneurship and initiative	4790	3.51	14505	3.47	13188	3.42	2312	3.32	788	3.36
	creativity	4825	3.78	14596	3.75	13301	3.67	2347	3.61	790	3.59
	resilience to stress	4851	3.37	14642	3.35	13349	3.36	2353	3.31	803	3.36
	timely completion of planned actions	4783	3.73	14509	3.72	13201	3.7	2339	3.68	794	3.64
PER	contacts with others	4849	4.05	14671	4.13	13380	4.13	2369	4.1	807	4.14
	cooperation within a group	4854	4.03	14685	4.11	13405	4.14	2369	4.12	807	4.15
	ease of establishing contacts	4849	3.93	14676	3.97	13403	3.96	2370	3.95	812	3.99
	communication, clarity of thoughts	4838	3.87	14642	3.88	13362	3.84	2359	3.79	808	3.76
	solving conflicts between people	4813	3.68	14561	3.7	13276	3.67	2332	3.63	804	3.66
OFF	organisation and execution of office work	4796	3.27	14547	3.25	13275	3.2	2339	3.15	795	3.12
MNG	managerial skills and organising work of others	4840	3.57	14647	3.56	13369	3.49	2360	3.41	804	3.43
	coordination of work of others	4822	3.53	14618	3.53	13320	3.46	2352	3.37	798	3.41
	disciplining others	4807	3.49	14543	3.51	13250	3.47	2338	3.43	796	3.53
AVL	availability	4816	3.89	14614	3.94	13317	3.93	2355	3.88	803	3.8
	frequent travels	4787	3.73	14513	3.76	13240	3.79	2339	3.77	798	3.79
	flexible working hours	4802	3.6	14533	3.57	13261	3.55	2344	3.49	803	3.59

Source: BKL – Study of students of upper secondary schools 2013.

During the analysis of average values for the individual competence classes in groups of students who have undertaken paid work during the 12 months preceding the study, it is worth remembering that the correlation between such work and a higher average may be of a dual nature. On one hand, students with a higher level of soft competences may find it easier to get a job. On the other hand, the experience of work may be a factor that is beneficial for the development of these competences.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Table V.8. Self-assessment of soft competences by groups of students who did and did not engage in paid work during the past 12 months (average values, 1 to 5 scale)

Type	Competences	Worked		Did not work	
		N	average	N	average
SLF	self-organisation and initiative	18146	3.79	17739	3.66
	independent decision-making	18238	4.01	17811	3.88
	entrepreneurship and initiative	17945	3.51	17601	3.38
	creativity	18110	3.77	17712	3.65
	resilience to stress	18185	3.47	17775	3.23
	timely completion of planned actions	17994	3.72	17594	3.69
PER	contacts with others	18232	4.18	17806	4.05
	cooperation within a group	18251	4.18	17831	4.04
	ease of establishing contacts	18242	4.07	17830	3.85
	communication, clarity of thoughts	18178	3.92	17794	3.79
	solving conflicts between people	18060	3.72	17691	3.64
OFF	organisation and execution of office work	18038	3.22	17678	3.23
MNG	managerial skills and organising work of others	18192	3.61	17791	3.43
	coordination of work of others	18124	3.57	17751	3.41
	disciplining others	18045	3.56	17652	3.41
AVL	availability	18148	3.97	17721	3.87
	frequent travels	18033	3.87	17607	3.67
	flexible working hours	18049	3.64	17660	3.48

Source: BKL – Study of students of upper secondary schools 2013.

The analysis of the averages did not reveal any significant differences between the groups; those students who undertook paid work over the last 12 months have a slightly (by circa 0.2 point on the scale) better view on their resilience to stress, managerial competences, and frequent travels than their non-working peers.

Data presented in the table below shows that the class size of the school's location is not a significant determinant for any of the soft competence areas.

Table V.9. Self-assessment of soft competences in groups identified by the class size of the location of the student's school (average values, on a 1 to 5 scale)

Type	Competences	Country	City up to 49 K	City 50–199 K	City 200–499 K	City 500+ K
SLF	self-organisation and initiative	3.71	3.69	3.75	3.77	3.76
	independent decision-making	3.94	3.93	3.95	3.98	3.95
	entrepreneurship and initiative	3.40	3.41	3.47	3.50	3.51
	creativity	3.68	3.66	3.73	3.77	3.79
	resilience to stress	3.36	3.34	3.36	3.40	3.32
	timely completion of planned actions	3.67	3.69	3.73	3.74	3.69
PER	contacts with others	4.11	4.12	4.12	4.12	4.10
	cooperation within a group	4.11	4.12	4.12	4.11	4.08
	ease of establishing contacts	3.96	3.97	3.96	3.96	3.91
	communication, clarity of thoughts	3.79	3.84	3.86	3.90	3.86
	solving conflicts between people	3.66	3.67	3.67	3.71	3.69
OFF	organisation and execution of office work	3.12	3.21	3.24	3.26	3.27
MNG	managerial skills and organising work of others	3.45	3.49	3.52	3.58	3.61
	coordination of work of others	3.44	3.46	3.49	3.54	3.57
	disciplining others	3.47	3.48	3.48	3.52	3.49
AVL	availability	3.87	3.90	3.95	3.95	3.89
	frequent travels	3.82	3.79	3.77	3.73	3.71
	flexible working hours	3.53	3.53	3.57	3.62	3.61
N		1100	15972	9814	5658	3024

Source: BKL – Study of students of upper secondary schools 2013.

Under both rounds of the Study (2010 and 2013), the three most frequently cited categories of extra-curricular activities were private lessons, language courses, and activities undertaken as a hobby or the pursuit of one's own interests. The first two categories of extracurricular activities primarily help in the development of those skills that, in the language used by employers, can be defined as "hard." The development of one's own interests or the pursuit of a hobby seems to be the field that (depending on the nature of the hobby/interest) helps to develop certain groups of soft competences. To verify this theory empirically, the table below juxtaposes the averages for the groups of students participating in activities that allow them to pursue personal interests and hobbies, and facilitate the broadly defined "personal development."

Table V.10. Self-assessment of soft competences by groups of students who did and did not participate in extracurricular activities tied to their own hobby, pursuit of interests, or personal development (average values, 1 to 5 scale)

Type	Competences	Does not participate in activities		Participates in activities	
		N	average	N	average
SLF	self-organisation and initiative	30288	3.7	5635	3.85
	independent decision-making	30423	3.93	5665	4.05
	entrepreneurship and initiative	29992	3.43	5591	3.54
	creativity	30218	3.69	5641	3.83
	resilience to stress	30348	3.32	5650	3.55
	timely completion of planned actions	30028	3.7	5598	3.72
PER	contacts with others	30416	4.09	5660	4.24
	cooperation within a group	30453	4.09	5667	4.22
	ease of establishing contacts	30443	3.94	5667	4.08
	communication, clarity of thoughts	30353	3.84	5656	3.95
	solving conflicts between people	30166	3.66	5620	3.78
OFF	organisation and execution of office work	30141	3.23	5611	3.22
MNG	managerial skills and organising work of others	30366	3.49	5654	3.67
	coordination of work of others	30274	3.46	5636	3.63
	disciplining others	30114	3.46	5620	3.63
AVL	availability	30262	3.91	5643	3.99
	frequent travels	30068	3.75	5609	3.89
	flexible working hours	30132	3.55	5611	3.64

Source: BKL – Study of students of upper secondary schools 2013.

The differences in averages, to the advantage of students who do participate in extracurricular activities, are small or insignificant, since they reach a maximum of 0.2 point on the scale (in the case of resilience to stress and managerial competences).

5. Hard competences

Analysis of the self-assessment of hard competences among students of upper secondary schools, done based on data collected during the BKL Study of students of upper secondary schools in 2013, was performed with the use of the following equivalents of key competences identified in the recommendation of the European Parliament and of the Council:

a) **communication in the mother tongue:**
language competences, i.e., *fluency in Polish, spoken and written (correct language use, extensive vocabulary, ease of expression);*

b) **mathematical competence and basic competences in science and technology:**
mathematical competences: (1) *performing calculations* (general level), (2) *performing simple calculations* (basic level), (3) *performing advanced mathematical calculations* (advanced level);
technical competences: *handling, assembling and repairing equipment;*

digital competence:
computer competences: (1) working with a computer and using the Internet (general level), (2) *basic knowledge of office software (MS Office type)* (basic level), *knowledge of specialist software, writing software, authoring of websites* (advanced level);

c) **learning to learn:**
d) **cognitive competences: (1)** *finding information, drawing conclusions* **(general level), (2)** *quick summarising of large amount of text***, (3)** *logical thinking, factual analysis* **(detailed level), (4)** *continuous learning of new things* **(detailed level).**

In order to empirically test whether the proposed division of hard competences may be reduced to a smaller number of analysed constructs of the database, the exploratory factor analysis (EFA) technique was used. Due to the nature of data (admissible mutual correlation of constructs), the method of highest reliability (MLL) was used to isolate the individual factors, combined with diagonal Promax rotation with Kaiser normalisation (kappa = 4). The optimum solution was recognised as the model containing the following factors: mathematical competences, cognitive and language competences, and computer and technical competences.[83]

Table V.11. Model matrix of the exploratory factor analysis, with the method for identifying the highest reliability, after application of the Promax rotation.

Type	Competences	Factor		
		Cognitive and language	Mathematical	Computer and technical
COG	finding information, drawing conclusions	.741	-.005	-.013
	quick summarising of large amount of text	.649	-.054	-.061
	logical thinking, factual analysis	.592	.204	.003
	readiness to learn new things	.454	.111	.028
LNG	fluency in Polish	.546	-.152	.038
MAT	performing calculations	-.066	.993	-.031
	performing simple calculations	.087	.696	.050
	advanced mathematical calculations	-.049	.819	.036
COM	working with computers and using the Internet	.019	-.047	.739
	basic MS Office skills	.043	-.016	.789
	programming, authoring of websites	-.037	.032	.554
TEC	handling, assembling and repairing equipment	-.059	.144	.374

Source: BKL – Study of students 2013.

Further analysis of the self-assessment levels of the individual hard competences is presented based on the structure shown in Table V.12.

Since the data analysed in this paper refers to the self-assessment of individual competences, it is susceptible to numerous distortions, which can result in the assessment being inadequate for the objective measurement of the given skill level. The distortions can include the following:

a) psychological (personality) factors, such as excessive or insufficient self-criticism or the increased need for a positive self-image;
b) social factors, such as stereotypes regarding certain competence classes (e.g. technical skills) and structural conditions involving the level of skills significantly removed from the average level of the given competence in the given student's class (e.g. a student with average mathematical skills, in a class where other students are exceptionally poor at maths, may perceive his/her abilities as above average); and,
c) non-standard understanding of the competences (e.g. basic MS Office skills interpreted only as the ability to type using MS Word).

Due to the possibility of these distortions influencing the self-assessment of competences, in this chapter, the average self-assessment results for the individual skills are discussed in the context of results obtained by persons aged 16-19 under the Polish round of the PIAAC study conducted in 2012,

[83] The correlations between the factors ranged from 0.45 to 0.50.

i.e., during the time when the majority of students covered by the BKL Study were attending upper secondary schools.

5.1. Cognitive and language competences

Most of the respondents assessed their overall level of cognitive and language competences as good. The level of language competences was rated higher, on the average.

It is worth noting that the students' self-assessment of their language skills become clearly lower if they are required to perform a task involving rapid summarising of large text volumes (a difference of 0.7 points).

The average self-assessment regarding the detailed aspect of cognitive competences, in the form of logical thinking and factual analysis, was higher than the overall level of these skills. This could be because students perceive such competences as elementary. Deficiencies in that respect could be seen more negatively than in the case of the other identified competences.

Differences in the assessment of competences due to the gender of students were visible in the self-assessment of the language competences (higher average self-assessment of women). Those differences become smaller, but remain visible, for the rapid summarising of large text volumes. Men more frequently rate higher than women their abilities tied to logical thinking and factual analysis.

Table V.12. Average self-assessment of cognitive and language competences broken down by gender, socioeconomic status (SES), and size of the school's location, in comparison with the previous round of the study (2010) (1 to 5 scale)

		Cognitive				Language	N*
		seeking and analysing information, concluding	rapid summarising of text	logical thinking, factual analysis	learning new things	fluency in Polish	
gender	female	3.49	3.17	3.58	3.63	3.89	18070
	male	3.55	3.01	3.79	3.64	3.68	16172
SES	low	3.4	3.0	3.55	3.58	3.7	14251
	moderate	3.57	3.14	3.74	3.67	3.85	7393
	high	3.76	3.27	3.95	3.79	3.96	7271
size of school location	Country	3.38	3.01	3.57	3.59	3.66	1054
	City up to 49 K	3.47	3.08	3.62	3.61	3.77	15341
	City 50 – 199 K	3.53	3.08	3.7	3.66	3.79	9409
	City 200 – 499 K	3.58	3.15	3.77	3.67	3.84	5497
	City 500+ K	3.62	3.16	3.78	3.67	3.85	2941
total		3,52	3.1	3.68	3.64	3.79	34242
difference between the study rounds 2013–2010							
gender	female	0.09	0.09	0.08	0,08	–	18073
	male	0.11	0.08	0.11	0,09	–	15829
SES	low	0.1	0.07	0.09	0,07	–	15870
	moderate	0.09	0.08	0.11	0,09	–	7941
	high	0.13	0.1	0.13	0,12	–	7495
size of school location	Country	0.14	0.13	0.17	0,08	–	1325
	City up to 49 K	0.1	0.08	0.08	0,07	–	14761
	City 50–199 K	0.11	0.06	0.11	0,09	–	9206
	City 200–499 K	0.11	0.1	0.12	0,1	–	5653
	City 500+ K	0.07	0.1	0.05	0,08	–	3045
total		0.1	0.08	0.1	0.08	–	33902

** the number is the lowest of the numbers in the given line.*

Source: BKL – Study of students 2013.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Analysis of the self-assessment of cognitive and language competences according to the **socioeconomic status** (SES) allows one to observe a slight increase in the average results for the subsequent SES groups.

The size of school location is significant only with respect to students of schools located in rural areas. Students of these schools assess their language competences on the average lower than do students of schools in cities (the average difference is 0.14 point).

The strength of the correlation of the self-assessment of individual cognitive competences with the socioeconomic status and the population size of the school's location is shown in Table V.13.

Table V.13. Correlation between the average self-assessments of cognitive competences with the socioeconomic status and population size of the school's location (Kendall's tau-b correlation)

	finding information, drawing conclusions	rapid summarising of text	logical thinking, factual analysis	learning new things	fluency in Polish
SES	0.16*	0.10*	0.17*	0.09*	0.1*
School location size	0.06*	0.03*	0.06*	0.03*	0.03*

** the stated value is statistically significant on the level of p = 0.05*
Source: BKL – Study of students of upper secondary schools 2013.

One of the important features tied to the assessment of cognitive competences is also the type of school attended by the student (Table V.14).

Table V.14. Average self-assessment of cognitive and language competences broken down type of school and respondents' gender, in comparison to the previous round of the study (2010, 1 to 5 scale)

Type of school	gender	finding information, drawing conclusions	rapid summarising of text	logical thinking, factual analysis	learning new things	fluency in Polish	N*
vocational school	F	3.12	2.92	3.29	3.49	3.55	1052
	M	3.21	2.82	3.43	3.59	3.48	2595
	total	3.18	2.84	3.39	3.56	3.5	3647
Technical secondary school	F	3.36	3.04	3.42	3.55	3.76	4578
	M	3.5	2.99	3.74	3.62	3.68	6777
	total	3.45	3.01	3.61	3.6	3.7	11355
Specialised secondary school	F	3.4	3.01	3.34	3.47	3.76	459
	M	3.46	3.05	3.61	3.53	3.8	190
	total	3.41	3.02	3.42	3.49	3.77	649
General secondary school	F	3.57	3.24	3.67	3.68	3.97	10692
	M	3.73	3.11	4	3.69	3.77	6271
	total	3.63	3.2	3.79	3.68	3.9	16963
Post-secondary school	F	3.64	3.32	3.68	3.75	3.97	535
	M	3.61	3.21	3.85	3.62	3.85	117
	total	3.63	3.3	3.71	3.73	3.95	652
difference between the study rounds 2013–2010							
vocational school	F	-0.01	0.06	0.01	0.01	–	1405
	M	0.04	0.05	0.07	0.05	–	3193
	total	0.03	0.05	0.06	0.04	–	4598
Technical secondary school	F	0.09	0.09	0.05	0.07	–	4741
	M	0.13	0.11	0.1	0.07	–	5861
	total	0.12	0.1	0.09	0.08	–	10602
Specialised secondary school	F	0.12	0.06	0.03	0.1	–	591
	M	0.05	0.19	0.11	0.07	–	5861
	total	0.09	0.11	0.04	0.08	–	938
General secondary school	F	0.09	0.08	0.09	0.08	–	10692
	M	0.11	0.05	0.1	0.12	–	6271
	total	0.1	0.07	0.09	0.1	–	16963
Post–secondary school	F	0.11	0.06	0.06	0.02	–	771
	M	0.08	0.13	0.07	0.01	–	317
	total	0.1	0.1	0.05	0.03	–	1094

** the number is the lowest of the numbers in the given line.*
Source: BKL – Study of students 2013.

The highest average assessments, with respect to both competence classes (general and detailed ones), were formulated by students of general secondary schools and post-secondary schools. The lowest average assessments were formulated by students of vocational schools.

In comparison to the study of competences carried out in 2010, no systematically present and significant differences were recorded. The only exception was the slight increase of self-assessment regarding the rapid summarising of long texts among men from secondary and basic vocational schools.

The differences between genders in the average assessment of the competences of **logical thinking and factual analysis** were the most pronounced in technical secondary schools and in general secondary schools (differences of more than 0.3 point). The slight advantage of the average self-assessment of women regarding the **rapid summarising of long texts** was not observed in technical secondary schools and in specialised secondary schools.

It is worth noting that, while the overall self-assessment of **logical thinking and factual analysis** was higher among general secondary school students, female students of these schools assessed their competence in this area on a level very similar to male students of technical secondary schools (the assessment was minutely higher in the second group).

The largest differences between the genders in the self-assessment of language competences and their cognitive equivalent – summarising of texts – were seen among students of general secondary schools. Such differences were not seen among students of specialised secondary schools.

Fluency in Polish – PIAAC results

The main results of the Polish edition of the PIAAC regarding competence in the mother tongue can be summarised as follows:

- Polish students aged 16–19 achieved results above the OECD average for the given age category.
- No differences between the genders in terms of the results were recorded, neither on the general level nor on the school type level.
- A positive correlation was noted between the parents' educational level and results achieved by the students.
- Students from rural areas obtained lower average results than did students residing in urban areas.
- The highest average results were achieved by students of general secondary schools, and the lowest ones were achieved by students of vocational schools.
- The results of self-assessment under the BKL Study, compared with the main results of the PIAAC described above, are puzzling mainly in the context of the slight, but statistically significant, difference regarding the higher average assessment of language competences of women, which was observed in the BKL. An explanation for this situation could lie in the stereotypical perception of this skill as rather feminine than masculine. This may have a stronger influence on the self-perception of these skills than on the actual level at which tasks of this type are performed.

5.2. Mathematical competences

The analysed scope of mathematical competences referred to the overall level of skills, which are understood as **calculations** and the following detailed levels: **basic** (simple calculations) and **advanced** (advanced mathematical computations).

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Table V.15. Self-assessment of mathematical competences, broken down by gender, socioeconomic status (SES) and size of the location of the school, in comparison to the previous round of the study (2010) (1 to 5 scale)

		Performing calculations	Simple calculations	Advanced computations	N*
gender	female	3.13	3.79	2.47	18732
	male	3.27	3.84	2.71	16680
SES	low	3.10	3.73	2.46	14739
	moderate	3.24	3.86	2.63	7652
	high	3.45	4.06	2.86	7520
size of school location	Country	3.03	3.63	2.46	1082
	City up to 49 K	3.17	3.77	2.56	15886
	City 50–199 K	3.22	3.84	2.60	9789
	City 200–499 K	3.23	3.86	2.60	5638
	City 500+ K	3.27	3.93	2.64	3017
total		3.20	3.82	2.58	35412
difference between the study rounds 2013–2010					
gender	female	0.10	0.11	0.08	18485
	male	0.13	0.10	0.15	16244
SES	low	0.10	0.10	0.09	16245
	moderate	0.14	0.13	0.16	8155
	high	0.18	0.16	0.18	7658
size of school location	Country	0.20	0.17	0.16	1352
	City up to 49 K	0.08	0.08	0.09	15178
	City 200–499 K	0.17	0.14	0.18	9425
	City 200–499 K	0.10	0.12	0.09	5768
	City 500+ K	0.09	0.10	0.10	3100
total		0.12	0.11	0.12	34729

**the number is the lowest of the numbers in the given line.*

Source: BKL – Study of students of upper secondary schools 2010 and 2013.

Most of the respondents assessed their mathematical competences as average, although clear disproportions were observed in the assessment of the identified detailed competences. The basic mathematical competences are assessed as above average, but the detailed competence of advanced computations is usually assessed on the basic level.

The slight differences in the self-assessment of mathematical competences tied to the gender of the students are visible on both the basic and advanced levels (differences of circa 0.1 and 0.2 point, respectively).

When the **socioeconomic status** is factored into the analysis, this allows one to observe a slight increase in the average assessments with each subsequent higher status category, for each of the analysed level of mathematical competences. The population **size of the school's location** seems to be relevant only in the case of schools located in rural areas, whose students declare slightly lower self-assessments in comparison with their peers from urban schools. In comparison with results of the 2010 study, a slight increase in the self-assessment of each of the mathematical competences was observed (circa 0.1 point).

The strength of correlation of the self-assessments of individual mathematical competences with the **socioeconomic status** and the population **size of the school's location** is shown in Table V.16.

Table V.16. Correlation between the average self-assessments of mathematical competences with the socioeconomic status and the population size of the school's location (Kendall's tau-b correlation)

	Performing calculations	Simple calculations	Advanced computations
SES	0.10*	0.12*	0.11*
School location size	0.03*	0.04*	0.02*

** the stated value is statistically significant on the level of p = 0.05*

Source: BKL – Study of students 2013.

Another feature that differentiates the assessment levels of mathematical competences is the type **of school** attended by the student (Table V.17).

In the case of mathematical competences (both overall and broken down into basic and advanced), the highest average self-assessment was seen among students of general secondary schools. The lowest average self-assessment was seen among students of vocational schools and specialised secondary schools.

Table V.17. Self-assessment of mathematical competences broken down type of school and respondents' gender, compared with the previous round of the study (2010, 1 to 5 scale)

School type	gender	2013			Difference between study rounds 2013–2010			N 2013	N 2010
		Performing calculations	Simple calculations	Advanced computation	Performing calculations	Simple calculations	Advanced computation		
Vocational school	F	2.88	3.32	2.42	0.03	-0.04	0.06	1087	1442
	M	2.88	3.27	2.39	0.01	-0.04	0.01	2685	3282
	total	2.88	3.28	2.40	0.02	-0.04	0.03	3772	4724
Technical secondary	F	3.01	3.65	2.31	0.05	0.09	0.01	4751	4741
	M	3.18	3.79	2.57	0.09	0.08	0.12	7000	5861
	total	3.11	3.73	2.46	0.08	0.09	0.08	11751	10602
Specialised secondary	F	2.69	3.34	2.06	-0.12	-0.07	-0.15	482	619
	M	2.98	3.53	2.39	0.11	0.00	0.10	194	351
	total	2.77	3.40	2.15	-0.06	-0.06	-0.09	676	970
General secondary	F	3.22	3.91	2.54	0.12	0.12	0.11	11841	10892
	M	3.53	4.14	3.00	0.18	0.13	0.22	6678	6428
	total	3.33	4.00	2.71	0.14	0.12	0.15	18519	17320
Post-secondary	F	3.27	3.76	2.59	0.22	0.10	0.25	571	791
	M	3.24	3.77	2.84	0.20	0.11	0.46	123	322
	total	3.27	3.77	2.64	0.22	0.10	0.28	694	1113

** the number is the lowest of the numbers in the given line.*

Source: BKL – Study of students of upper secondary schools 2010 and 2013.

In comparison with the study of competences carried out in 2010, an increase of average self-assessment was observed in **general secondary schools** and **post-secondary schools** for all the analysed aspects of mathematical competences (the highest increase was seen for men studying at post-secondary schools). Another less optimistic trend observed by the researchers was the slight decline in average self-assessment for both the general and advanced mathematical skills reported by women in specialised secondary schools. The increase in the self-assessment of mathematical competences, observed among students of general secondary schools, may be one of the outcomes of reinstating mathematics as mandatory subject of the upper secondary school finals, which occurred in 2010. The subsequent classes taking the finals were prepared for these examinations better than their peers who paved the way by taking the exam in 2010. Similarly, the clear increase in the self-assessment of mathematical competences seen in post-secondary schools may be tied to the fact that, since 2010, these schools receive students who were prepared to take school finals in mathematics.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

No differences between the genders regarding the self-assessment of mathematical competences were observed in **vocational schools** and in **post-secondary schools** (with the exception of advanced competences). The largest differences in the average self-assessment of these competences were seen in **general secondary schools** (circa 0.3 point). This larger difference could be explained by the fact that education profiles with extended mathematical curriculum are male-dominated, while those profiles with extended curriculum in the humanities tend to be dominated by female students.

Mathematical competences – results of the PIAAC

The main results of the Polish edition of the PIAAC regarding mathematical competences are summarised below:

- The results obtained by students of Polish upper secondary schools were the same as OECD average.
- The test results did not indicate any statistically significant differences in results tied to the gender of the respondents. The only exceptions were the general secondary schools, where men obtained higher average results than did women.
- There is a positive correlation between results obtained by the students and the education levels of their parents.
- Students from rural areas obtained lower average results than did students residing in urban areas.
- The highest average results were achieved by students of general secondary schools, the lowest average results were achieved by students of vocational schools.

The results of the self-assessment of mathematical competences under the BKL Study, analysed in the context of the PIAAC, show a higher average self-assessment by men. Under the PIAAC study, this was seen only in the case of students of general secondary schools. As in the case of language competences, one of the possible explanations for this difference could be the stereotypes of the allegedly worse mathematical skills of women.

5.3. Computer and technical competences

The computer competences, analysed during the study, referred to the **general level** of these abilities (computer literacy and use of the Internet) and, as in the case of mathematical competences, to the two identified levels: **basic** (basic use of office packages of the MS Office type) and **advanced** (specialist software, programming or development of websites)**.**

Technical competences were defined in a general manner, as the handling, assembling, and repairing equipment.

As in the case of mathematical competences, disproportions are also visible in the self-assessment of computer competences. The general computer literacy and use of the Internet is usually assessed on a very high level (the majority of respondents rate it as at least good); however, when specific and related competences are isolated (such as the use of MS Office software), the average drops by about 0.35 point. When the respondents are asked about advanced computer skills, such as the use of specialist software, the development of websites or programming, the average self-assessment of competences drops from close to good to almost basic (by 1.4 point). The observed disproportions of self-assessment can be because the students may perceive the basic computer literacy as the skills tied rather to entertainment than to work.

The situation with the self-assessment of technical competences is much worse than of the computer competences. Technical competences receive the lowest average rates from among all competences assessed by the students covered by the study. Most of them rated their level of competences in this area as basic at best.

Table V.18. Self-assessment of computer and technical competences, broken down by gender, socioeconomic status (SES), and the population size of the location of the school, in comparison to the previous round of the study (2010) (1 to 5 scale)

		2013				Difference between study rounds 2013 – 2010				N 2013	N 2010
		computer			TEC	computer			TEC		
		computer literacy and use of the Internet	use of MS Office	website development	operation of technical devices	computer literacy and use of the Internet	use of MS Office	website development	operation of technical devices		
Gender	female	4.03	3.68	2.2	2.09	0.06	0.18	0.02	0.12	18879	18702
	male	4.29	3.89	2.64	3.33	0.05	0.09	0.05	0.07	16870	16498
SES	low	4.1	3.69	2.34	2.64	0.08	0.17	0.05	0.11	14897	16496
	moderate	4.21	3.89	2.48	2.74	0.06	0.15	0.05	0.10	7721	8257
	high	4.21	3.94	2.47	2.68	0.02	0.08	0	0.07	7562	7742
size of school location	Country	4.08	3.66	2.43	2.92	0.11	0.17	0.05	0.32	1107	1376
	City up to 49 K	4.14	3.76	2.44	2.69	0.07	0.16	0.06	0.10	16076	15395
	City 50–99 K	4.16	3.8	2.4	2.68	0.05	0.12	0.03	0.14	9834	9546
	City 200–499 K	4.16	3.81	2.35	2.63	0.04	0.12	-0.02	0.02	5687	5844
	City 500+ K	4.16	3.88	2.35	2.59	0.04	0.09	0.04	0.06	3045	3127
total		4.15	3.78	2.41	2.68	0.06	0.14	0.04	0.10	35749	35200

** the number is the lowest of the numbers in the given line.*

Source: BKL – Study of students of upper secondary schools 2010 and 2013.

The **gender** of students visibly differentiated between the average self-assessments of computer competences on the general level (a difference of circa 0.3 point) and on the detailed level (in the case of advanced level – difference of 0.44 point). Those differences were even more pronounced for technical competences – men rated their skills as average, while women assessed it as basic (difference of 1.24 point). It is worth noting that, despite the clearly worse self-assessment of computer and technical competences among women, the results rose slightly in comparison to 2010 (0.18 point as regards the use of MS Office package and 0.12 point for technical competences). This could be one of the observed outcomes of social programmes and campaigns, encouraging women to study technical fields (such as the programme "Girls, study at technical universities!").

The **socioeconomic status** of the student and the population **size of the school's location** in the case of computer competences were significant only with respect to students with a low status and students of schools located in rural areas. These students had a lower self-assessment of their computer skills at each of the levels. It is also worth noting that the largest decline of the average self-assessment of the general computer skills, in comparison to the medial self-assessment of the use of MS Office package, was seen among persons with low SES and those attending upper secondary schools located in rural areas (by 0.41 and 0.47 point, respectively).

In the case of technical skills, the **socioeconomic status** did not lead to differences in the self-assessment of respondents. An interesting result for this class of skills was obtained based on the population **size of the school's location**. As in the case of the previous competence classes, location accounted for clear differences only with respect to students of schools in rural areas. However, the direction of the correlation was opposite to all the other cases – students from rural schools had an average higher view of their technical competences than did their peers at urban schools. This category too has shown the largest increase of the average self-assessment of these skills, compared to results of the BKL Study of students of upper secondary schools 2010 (by 0.32 point).

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

Analysis of the self-assessment of computer and technical competences, broken down by **school type**, is presented in Table V.19.

From among all the studied types of schools, the highest self-assessment of the overall and basic computer competences was found among students of **technical secondary schools**, and in the case of advanced competences, among students of **technical secondary schools**, **specialised secondary schools,** and **vocational schools**. The most probable explanation of this phenomenon is the fact that schools of this type offer education profiles tied to computer science and electronics.

The highest self-assessment of competences tied to handling, assembling and repairing equipment was reported by students of vocational schools.

Table V.19. Self-assessment of computer competences broken down by type of school and respondents' gender, compared with the previous round of the study (2010, 1 to 5 scale)

		2013				Difference between study rounds 2013–2010				N 2013*	N 2010*
		COM			TEC	COM			TEC		
		working with computer and using the Internet	use of MS Office	authoring of websites	handling of technical devices	working with computer and using the Internet	use of MS Office	authoring of websites	handling of technical equipment		
vocational school	F	3.87	3.09	2.46	2.24	-0.07	0.05	0.05	0.13	1108	1460
	M	4.05	3.34	2.59	3.49	0	-0.02	-0.03	0.09	2749	3363
	total	4	3.27	2.55	3.13	-0.02	0.01	-0.01	0.1	3857	4823
technical secondary school	F	4.11	3.76	2.32	2.14	0.08	0.19	0.03	0.19	4780	4790
	M	4.36	4	2.72	3.51	0.07	0.12	0.09	-0.02	7076	5943
	total	4.26	3.9	2.56	2.96	0.08	0.16	0.08	0.01	11856	10733
specialised secondary school	F	4.02	3.58	2.39	2.02	-0.02	0.19	0.01	0.23	482	624
	M	4.33	3.92	2.87	3.2	-0.03	-0.03	0.09	-0.2	194	366
	total	4.11	3.68	2.53	2.36	-0.04	0.08	0	0.03	676	990
general secondary school	F	4.01	3.71	2.11	2.04	0.07	0.17	0.02	0.09	11936	11025
	M	4.31	4.01	2.58	3.08	0.03	0.06	0.04	0.1	6727	6502
	total	4.12	3.82	2.28	2.42	0.06	0.12	0.03	0.15	18663	17527
Post-secondary	F	4.02	3.74	2.23	2.38	0.07	0.21	0.17	0.12	573	803
	M	4.14	3.81	2.42	3.06	0	0.06	0.06	0.01	124	324
	total	4.04	3.76	2.27	2.5	0.04	0.16	0.11	0.06	697	1127

**the number is the lowest of the numbers in the given line.*

Source: BKL – Study of students of upper secondary schools 2013.

With respect to advanced computer skills, the highest self-assessment was declared by men studying at specialised secondary schools.

In comparison to the 2010 results, with the exception of women studying in vocational schools, an increase was observed in the average self-assessment of basic computer skills (by 0.2 point on the average).

Another interesting result is the fact that the slight increase in the self-assessment of technical competences among women, referred to above, applied to students of most upper secondary schools but was the least visible in general secondary schools.

The strongest differences between the genders, regarding the self-assessment of computer competences, were seen in the **specialised, general,** and **technical secondary schools**. This could be attributed to the observed phenomenon of a smaller female presence in the classes with educational profiles focused on mathematics and computer science, or strictly on computer science, while more females opt for

those profiles where pressure on these skills is smaller. In the case of technical competencies, the most pronounced differences were seen in **upper technical schools** and **vocational schools**. This is probably due to the female domination of those profiles of vocational education, which are not linked to the handling of technical equipment (e.g. commercial, hospitality, food services, and economic profiles).

Working with computer – PIAAC results

The main results of the Polish edition of the PIAAC regarding computer skills among upper secondary school students are shown below:

- 38% of Poles aged 16-24 achieved the 2nd or 3rd skill level (OECD average is 51%).
- 31% of young people in Poland either refused to solve tests on the computer, failed the test on basic computer skills or were under the 1st level (OECD average is 16%).
- Students whose parents had tertiary education less frequently achieved low scores on their computer competences.
- Persons from rural areas dominated the group that refused to participate in the computer version of the test and those who failed the test on basic computer skills.

The optimistic results of computer skills self-assessment, formulated by students participating in the BKL Study, show a large disproportion in comparison with the low results of the test of computer skills carried out under the PIAAC. These results support the hypothesis that students treat the computer more as an entertainment device than a tool for work.

5.4. Interdependence of the self-assessment of hard competences

The self-assessments of students regarding each of the defined areas of hard competences were correlated statistically and significantly with the self-assessments of at least one of the remaining areas. For the purpose of this report, the researchers decided to interpret only those relations between the individual competence areas whose strength allows one to properly predict the variance of the second skill in at least 10% of the cases (value of 0.3 or higher). Due to the significant skewness of distribution of most of the analysed variables, the Spearman's rank correlation was used as measure of the strength of the relationships.

The self-assessment of **cognitive** competences made by the students in numerous cases was visibly tied to the self-assessment of **mathematical**, **computer,** and **language competences**. For each of the analysed cases, this relationship was positive, i.e. the higher the student's assessment of competences in the given area, the higher was the competence assessment in the related areas.

Table V.20. Correlation* of the self-assessments of mathematical, computer, and language competences with cognitive competences (Spearman's rank correlation)

	Competences	COGNITIVE			
		finding information, drawing conclusions	logical thinking, factual analysis	quick summarising of text	continuous learning of new things
MAT	performing calculations	***	0.40**	***	***
MAT	performing simple calculations	0.30**	0.41**	***	***
MAT	performing advanced mathematical calculations		0.36**	***	***
COM	working with computers and using the Internet	***	***	***	***
COM	basic knowledge of MS Office-type package	0.31**	0.31**	***	***
COM	writing software, authoring of websites	***	***	***	***
LNG	Fluency in Polish	0.34**	***	0.37**	***

** the table presents only the correlations whose value was at least 0.3*
*** correlation significant on the level of p = 0.01*
**** statistically significant, positive correlation with value < 0.3*

.Source: BKL – Study of students of upper secondary schools 2013.

Self-assessment of "hard" and "soft" competencies of students of upper secondary schools

The strongest relation between self-assessments of the individual areas of competence applied to **cognitive** and **mathematical** categories of competences. The self-assessment of students regarding **logical thinking and factual analysis** was linked with each of the analysed **mathematical competences** – both on the general level (performing calculations) and on the level of basic and advanced skills in this area. The self-assessment of cognitive competences on the general level (finding information, drawing conclusions) has demonstrated a clear relationship with the self-assessment of basic mathematical skills. Skills tied to "quick summarising of large amount of text" and "continuous learning of new things" were also positively correlated with mathematical competences, but the correlation value did not exceed 0.3.

The self-assessment of **computer competences** has shown the strongest links between the basic competences (basic knowledge of MS Office package) with cognitive competences on the general level, as well as with logical thinking and factual analysis. In the other cases, the correlations were also statistically significant, but did not exceed the value of 0.3.

The strongest relation of the self-assessment of **fluency in Polish** was shown with the "quick summarising of large amount of text" and the overall self-assessment of cognitive competences. In the remaining cases, the strengths of analysed relationships did not exceed the value of 0.3.

Table V.21. Correlation* of the self-assessments of mathematical and technical competences with computer competences (Spearman's rank correlation)

	Competences	Computer		
		working with computers and using the Internet	basic knowledge of MS Office-type package	writing software, authoring of websites
MAT	performing calculations	0.30	0.33	***
MAT	performing simple calculations	***	***	***
COM	writing software, authoring of websites	***	***	1
TEC	handling, assembling and repairing equipment	***	***	0.39

* *the table presents only the correlations with value of at least 0.3*
** *correlation significant on the level of p = 0.01*
*** *statistically significant, positive correlation with value < 0.3*

Source: BKL – Study of students of upper secondary schools 2013.

The strongest relationship of the self-assessment of **computer** and **mathematical competences** was demonstrated with the opinion of students on their general mathematical and computer competences, and the basic skills regarding work with computers (knowledge of the MS Office package).

Competences tied to the **handling, assembling, and repairing of equipment** were clearly correlated with competences tied to advanced computer usage (authoring of websites, writing software, use of specialist software).

Table V.22. Correlation* between the self-assessments of cognitive competences (Spearman's rank correlation)

	finding information, drawing conclusions	quick summarising of text	logical thinking, factual analysis
quick summarising of text	0.41**	1	0.34**
logical thinking, factual analysis	0.52**	0.34**	1
continuous learning of new things	0.34**	***	0.40**

* *the table presents only the correlations whose value was at least 0.3*
** *correlation significant on the level of p = 0.01*
*** *statistically significant, positive correlation with value < 0.3*

Source: BKL – Study of students of upper secondary schools 2013.

For the self-assessment of cognitive competences, the strongest relationship between the self-assessments of students was seen for the assessment of general cognitive competences and the skills tied to logical thinking and factual analysis. The weakest relation was seen between the continuous learning of new things and the assessment of ability to quickly summarise large amount of text.

Table V.23. Correlation* between the self-assessments of mathematical competences (Spearman's rank correlation)

	performing calculations	performing advanced mathematical calculations
performing simple calculations	0.71*	0.61*
performing advanced mathematical calculations	0.77*	1

** correlation significant on the level of p = 0.01*

Source: BKL – Study of students of upper secondary schools 2013.

The self-assessments of students regarding their mathematical competences are strongly related. The assessment of skills defined as general mathematical competences allows one to correctly predict about 50% of the variance of the basic and advanced mathematical competences.

Table V.24. Correlation* between the self-assessment of computer competences (Spearman's rank correlation)

	working with computers and using the Internet	basic knowledge of MS Office-type package
basic knowledge of MS Office-type package	0.60*	1
writing software, authoring of websites	0.35	0.43

** correlation significant on the level of p = 0.01*

Source: BKL – Study of students of upper secondary schools 2013.

For the general computer competences, their self-assessment is more strongly related to the basic skills in that area than to the advanced ones (0.6 vs. 0.35).

5.5. Main results

In the summary of knowledge on the self-assessment of Polish students regarding their "hard" competences, it is worth stressing that competences requiring the use of specialist skills could be deemed as being in short supply (i.e. are rated the lowest by most students). These competences include the handling and repairing of equipment, writing software, authoring of websites, knowledge of specialist software, and the ability to perform advanced mathematical calculations. An interesting phenomenon, observed with respect to deficit competences, is the fact that a high self-assessment of one of them is linked to high self-assessment of the remaining categories. For each of the short-supply competences, men have an average higher self-assessment regarding their abilities in that field. However, it should be mentioned that, in a comparison with the 2010 study results, we observed an increase in the average self-assessment of females regarding mathematical skills, basic computer usage, and technical competences.

The self-assessment of Polish students is the highest in terms of the general work with computers and using the Internet, fluency in Polish, and the ability of logical thinking and factual analysis. Unfortunately, the very high self-assessment of overall computer skills, when compared with the poor results obtained by students during objective tests of these skills, turns out to be unfounded. On this basis, one can conclude that this high self-assessment is due to use of the computer more frequently for entertainment than for work. The self-assessments of students regarding their mathematical and language competences appear to be better grounded in reality, as confirmed by the results of objective tests of these competences.

6. Predictors for the high self-assessment levels of students' competences

For both sets of competences – soft and hard – logistic regression models were designed. Their dependent variable is the variable-identifying respondents with a high self-assessment level of the given type of competence. (A high level is defined as an average rating higher than or equal to 4; however, the analysis includes only those respondents who self-assessed each of the variables that measure both hard and soft competences.)

In both cases, the independent variables with a significant influence of the high self-assessment of both hard and soft competences included the gender, socioeconomic status of the family, type of the school attended by the student, and the fact of engaging in paid work during the past 12 months, which only with respect to soft skills. The strongest influence for the self-assessment of both the soft and hard competences was exerted by the type of school. This variable had a stronger influence on hard competences. Among students of general secondary schools, the chance[84] of finding a student with a high self-assessment of these competences was twice (exp(b) = 2.063)[85] higher, and among students of post-secondary schools, it was almost three times (exp(b) = 2.896) higher than among students of vocational schools.

Table V.25. Logistic regression model identifying the traits of persons with a high average level of self-assessment of hard and soft competences

Categories		Exp(B)	
		hard comp.	soft comp.
	model with a constant	.243***	.402***
Gender	(Reference: men)	***	***
	Women	0.429***	1.133
Work ?	(reference: did not work)	p > .05	***
	worked	0.871	1.576***
socioeconomic status	(reference: high SES)	***	***
	very low	.515***	.524***
	low	.545***	0.653***
	moderate	.715***	0.823***
Type of school	(reference: vocational school)	***	***
	general secondary school	2.063***	1.296
	specialised secondary school	1.570**	1.626
	post-secondary school	2.896**	1.137
	technical secondary school	1.754***	1.312
Model summary	Nagelkerke's pseudo R-squared	0.063	0.026
	Likelihood ratio test significance	***	***
	N	27300	27815

** $p = 0.01$
** $p = 0.0001$

Source: BKL – Study of students of upper secondary schools 2013.

While the socioeconomic status had a similar influence on the self-assessment of both types of competences (the lower the status category, the smaller the chance of finding a person displaying a high self-assessment of the competence in that group), the nature of the influence exerted by the gender of the respondents was fundamentally different. The chance that a student from the given group would report a high self-assessment of competences was slightly larger (1.13 time) among women. In the case of hard competences, this chance was two times smaller than for men. Research indicates that, during the past 12 months, the chance of finding a person with a high self-assessment of soft competences

[84] In this case, chance is used to apprise the average number of students with a high competence level per one student with low competence level. Chance should be clearly differentiated from probability (chance is the proportion of probability of the fact that the average for the student is high (larger than or equal to 4) to the probability that this average is moderate or low (under 4).

[85] The abbreviation "exp(B)" means the number e raised to the power equal to the regression ratio. This value indicates how the chance that the student has a high level of the given competence (average larger than or equal to 4) changes under the influence of a given factor.

increased by a factor of 1.5. In the model developed for the self-assessment of hard competences, the influence of this variable turned out to be statistically insignificant.

Content-related model validity aside, it is necessary to point out that, for the self-assessment of both types of competences, the consideration of their variables explains the minute (a few percent) part of the variance of both variables (compare with the values of Cox & Snell's R-squared and Nagelkerke's R-squared). In light of this fact, it is worth considering a hypothesis under which the self-assessment of both hard and soft competences is determined by variables that were not covered by the BKL Study, e.g. variables of a psychological nature.

7. Summary

Methodologically advanced research, whose goal is to monitor the competences of students, has been conducted in Poland for years. This research is both international (using specially developed batteries of tests) and domestic (usually based on the result of external state examinations, e.g. upper secondary school finals). With regard to the "hard" competences, one of the most extensive researches covering that area, the PIAAC, paints a picture of competences of Polish upper secondary students as optimistic in terms of language skills (results above the OECD average), moderate for mathematical skills (result on the level of OECD average), and seriously insufficient with respect of computer competences (ratios below OECD average).

Despite significant progress made in the research of competences of students, the primary discourse of that issue focuses almost exclusively on the measurement of "hard" competences, passing over the "soft" skills, which are not less important in the contemporary labour market. Filling this gap could be one of the most important challenges for education in the future.

Aside from the measurement of the actual, objective level of students' competences, an interesting aspect is the research of their competence self-assessment, as well as the identification of socioeconomic factors influencing the declared self-assessment.

Particularly interesting is the fact that the analyses performed under the PIAAC and BKL Study indicates similar roles of selected social and demographic characteristics. This occurs despite their different methodologies (tests vs. questionnaires), the focus on other aspects of competences (objective measurement of competences vs. their subjective self-assessment), and many other differences. Variables such as the socioeconomic status (measured differently under PIAAC and BKL), the type of school attended by the student, and the size of town (under the PIAAC – student's place of residence, under the BKL – school's location) demonstrate the same direction of correlation. This regularity is not confirmed in the case of differences between the genders, referring to selected competences that are stereotyped as masculine or feminine. The objective results of tests in most cases do not show any differences in that respect, while the subjective self-assessment allows one to capture the functioning of stereotypes tied to these competences.

The most interesting results of the BKL Study with respect to self-assessment of "soft" skills include the high self-assessment levels for the majority of these competences offered by most of the students. Due to difficulties with the verification of the objective level of competences of that type, it is difficult to have a position on the aptness of these self-assessments.

With respect to the "hard" competences, one of the most puzzling results is the high self-assessment of students regarding their computer competences in the general sense, although the tests of these competences, carried out in Poland under the PIAAC study, yielded results below the OECD average, including the age group of upper secondary school students.

One of the conclusions that can be formulated based on these analyses is the need for more models that would measure competences not only uniformly, either as results of objective tests or self-assessment, but in a form allowing one to capture both these aspects simultaneously. This approach could enable the development of more advanced causal models that would facilitate broader understanding of this phenomenon in the future.

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