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Career Development Of School Graduates In The Aspect Of Creation Of Innovative Economy – Polish Experiences

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CAREER DEVELOPMENT OF SCHOOL GRADUATES IN THE ASPECT OF CREATION OF INNOVATIVE ECONOMY – POLISH EXPERIENCES

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Introduction

Methods and concepts of innovation performance are widely analysed, discussed and evaluated. Economic crisis in Greece, problems in Portugal, Spain and Italy incline towards research on areas of development in Europe. The influence of educational management on the creation of innovative economy is not widely described in scientific literature, however procedures of innovation performance include the measures of educational elements. European Commission analysis the economic innovation on the basis of EIS and IUS reports¹. Scientists are also looking for new tools for measurement of innovations². All

¹European Innovation Scoreboard 2006, <http://www.proinno-europe.eu/metrics> (EIS 2006); European Innovation Scoreboard 2007, Comparative analysis of innovation performance, <http://www.proinno-europe.eu/metrics> (EIS 2007); European Innovation Scoreboard 2008, Comparative analysis of innovation performance, <http://www.proinno-europe.eu/metrics> (EIS 2008); European innovation scoreboard 2009, <http://www.proinno-europe.eu/metrics> (EIS 2009); Innovation Union Scoreboard 2010, The innovation union's performance scoreboard for research and innovation, <http://www.proinno-europe.eu/metrics> (IUS 2010).

²Laforet, S. (2011), "A framework of organisational innovation and outcomes in SMEs", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 17, No. 4, pp. 380-403; Murat Ar, I., Baki, B. (2011), "Antecedents and performance impacts of product versus process innovation. Empirical evidence from SMEs located in Turkish science and technology parks", *European Journal of Innovation Management*, Vol. 14 No. 2, pp. 172-206; Zientara, P. (2008), "Polish Regions in the Age of a Knowledge-based Economy", *International Journal of Urban and Regional Research*, Vol. 32, No. 1, pp. 60 – 85; Crescenzi, R. (2005), "Innovation and Regional Growth in the Enlarged Europe: The Role of Local Innovative Capabilities Peripherality and Education", *Growth and Change*, Vol. 36 No. 4, pp. 471–507.

processes in educational area play a great role in preparation of graduates to enter the labour market.

Career development of young people cannot be accidental, especially in difficult economical situation in Europe and should be supported by specialists and experts. Educational research mainly are focused on teaching and behavioural problems. Projecting and modelling of educational processes and activities to make education adjusted to economies needs and requirements. This is connected mainly with school nets planning, structure of vocational and general education, system of vocational advisory and evaluation of educational performance methods.

The research questions in this article³:

How do develop careers of schools graduates and how graduates' decisions influence on innovation indicators of polish economy?

How to improve performance of innovations by performance of education?

The article argue research questions on the basis of:

1. Analysis of educational indicators in European Innovation Scoreboard (EIS) and Innovation Union Scoreboard (IUS) reports from 2006 till 2010 in the aspects of education.
2. Analysis of information given in EIS and IUS reports for educational systems and for economy. Discussion of role and the influence of educational indicators in the creation of innovative economy and for competitiveness of countries.
3. Research of graduates' careers of post lower secondary schools and secondary schools in Poland. Methodology and research preparation was divided into following stages: sampling, choose of forms and measurement methods, creation of measurement tools, evaluation of tools. Research population: 649 last year pupils of lower secondary school and All types of secondary schools (basic vocational school - BVS, technical and vocational secondary school - TVSS, general secondary school – GSS and general secondary school with profile - GSSP). The research was carried out in three schools of each type between march and may 2011, the measurement tool was a survey. Basic information of population are included in Tab.1.

³ The article presents a part of research of the project “Creation the cluster initiatives in education system”. The project is carried out between 2010 and 2012 in Silesian University of Technology in Poland, in Faculty of Organization and Management, Institute of Production Engineering and is financed by Ministry of Science and Higher Education (no 0193/B/H03/2010/39).

Tab. 1. Number and percentage of surveyed pupils

Lower secondary school	GSS	GSSP	TVSS	BVS	Together
159	123	25	132	210	649
24,50%	18,95%	3,85%	20,34%	32,36%	100,00%

Source: self study.

As a data also were used the results of author's study on educational strategies and vocational education carried out from 2009 to 2010.

Performance of innovations

Methodology of performance of innovation was introduced in 2000 year by European Commission and is constantly evaluated (EIS 2006 – 2009 and IUS 2010). The advanced proposal is based on integrated indicators: Innovation Indicator Scoreboard used and developed since 2000 till 2009 and Innovation Union Scoreboard introduced in 2010 (EUS). In EUS report 2010 indicators are grouped into 3 areas and 8 dimensions (Tab. 2).

Tab. 2. Innovation Union Scoreboard 2010.

Areas of innovations	Dimensions	Indicators
ENABLERS	Human resources	New doctorate graduates
		Population completed tertiary education
		Youth with upper secondary level education
	Open, excellent and attractive research systems	International scientific co-publications
		Scientific publications among top 10% most cited
		Non-EU doctorate students
	Finance and support	Public R&D expenditure
Venture capital		
FIRM ACTIVITIES	Firm investments	1 Business R&D expenditure
		Non-R&D innovation expenditure
	Linkages & entrepreneurship	SMEs innovating in-house
		Innovative SMEs collaborating with others
		Public-private co-publications
	Intellectual Assets	PCT patent applications
		PCT patent applications in societal challenges
Community		

		Community designs
OUTPUTS	Innovators	SMEs introducing product or process innovations
		SMEs introducing marketing/organisational innovations
	Economic effects	Employment in know ledge-intensive activities
		Medium and high-tech product exports
		Know ledge-intensive services exports
		Sales of new to market and new to firm innovations
		Licence and patent revenues from abroad

Source: *Innovation Union Scoreboard 2010, The innovation union's performance scoreboard for research and innovation.* , <http://www.proinno-europe.eu/metrics>.

Complete and advanced methodology allows to measure innovations, compare particular countries and indicates those elements which are important in the creation of innovative climate.

The article discusses indicators in the educational area. In 2006 and 2007 they were (*EIS 2006 and EIS 2007*):

1. New S&E (science and engineering) graduates per 1000 population aged 20-29 (postsecondary education graduates in life sciences, physical sciences, mathematics and statistics, computing, engineering and engineering trades, manufacturing and processing and architecture and building).
2. Population with tertiary education per 100 population aged 25-64.
3. Participation in lifelong learning per 100 population aged 25-64. Life-long means participation in any type of education or training course during the four weeks prior to the survey.
4. Youth education attainment level (percentage of population aged 20-24 having completed at least upper secondary education).

EIS 2008 and EIS 2009:

1. S&E and SSH (social sciences and humanities) graduates per 1000 population aged 20-29 (first stage of tertiary education). In comparison with 2006 and 2007 the indicator includes additional information of SSH graduates.
2. S&E and SSH doctorate graduates per 1000 population aged 25-34 (second stage of tertiary education). This indicator did not appear in 2006 and 2007 years.
3. Population with tertiary education per 100 population aged 25-64.

4. Participation in life-long learning per 100 population aged 25-64.
5. Youth education attainment level.

Indicators 3, 4 and 5 are repeated from previous reports.

IUS 2010:

1. New doctorate graduates per 1000 population aged 25-34 (border definition than EIS 2009).
2. Percentage population aged 30-34 having completed tertiary education.
3. Percentage youth aged 20-24 having attained at least upper secondary education.

Tab. 3. A comparison of the indicators in the EIS 2009 and IUS 2010

EIS 2009	IUS 2010	COMMENT\
S&E and SSH graduates per 1000 population aged 20-29		EIS 2009 indicator has been used only once
S&E and SSH doctorate graduates per 1000 population aged 25- 34	New doctorate graduates per 1000 population aged 25-34	IUS 2010 has broader definition than EIS 2009
Population with tertiary education per 100 population aged 25-64	Percentage population aged 30-34 having completed tertiary education	In IUS 2010 age group is more precisely defined than in EIS 2009
Participation in life-long learning per 100 population aged 25-64		EIS 2009 indicator has been used only once
Youth education attainment level	Percentage youth aged 20-24 having attained at least upper secondary level education	IUS 2010 and EIS 2010 have different names but are identical

Source: self study on the basis of EIS 2006 – 2009 nad IUS 2010.

Methods of calculation the EIS and IUS indicators in the area of educational has not evaluated much since 2006. Laforet⁴ presents drivers of innovations and investigates that innovation capacity is determined by resource, collaborative structures and processed, skilled workforce. Especially employers with higher education level and clear growth objectives can create innovation with their knowledge and experience. Accordingly to Murat Ar, Baki⁵ there are 7 drivers of innovation describe creative capability, which is, among others, connected with employment creativity. Zientara⁶ proofs that knowledge based economy requires well-

⁴ Laforet, S. (2011), "A framework of organizational... *op. cit.*

⁵ Murat Ar, I., Baki, B. (2011), "Antecedents and performance... *op. cit.*

⁶ Zientara, P. (2008), "Polish Regions ..., *op. cit.*

educated and skill labor. Barro, R.J. and X. Sala-I-Martin⁷ highlight the role of investment of human capital and education on economical growth.

All of educational indicators are quantitative and do not include any information of quality of education. Researchers are agreed that innovation processes and economical growth requires well educated and skilled workforce and they assume that skilled workers are on output of educational system. The measurement system of innovations in Europe includes various economical aspects, allows to observe trends and gives opportunity to improvement for countries and is directed on future educational effects (e.g. number of patents or number of innovative companies). Indicators of number of graduates, population in particular level of education allow to observe trends, educational needs, desires (dreams sometimes) of pupils and their parents. Efficiency of these indicators is presented on the example of Poland.

To the advantages of EIS/IUS system belong:

- Easiness of gathering the data to calculate indicators.
- Objective entrance data for indicators based on public statistics.
- Clear structure of indicators and the measurement system, divided into three complementary areas.
- Ability to compare indicators between countries.
- Ability to observe results in particular country (improvement of innovation in comparison with other countries).
- Easy to use by governments and local authorities.
- Tool for governments and local governments that can support making decisions.
-

To the disadvantages of the EIS/IUS system belong:

- Containing only easy to gather quantitative data.
- Do not include information of quality of education.
- Do not refer to studies on quality of education.
- Do not present complex methodology of measurement of innovation.
- Provides general information about trends in education worth for making strategic decision on governmental level but will not support making decisions on local government.

⁷ Barro, R.J. and X. Sala-I-Martin (1995), *Economic growth*. McGraw-Hill, New York.

EIS/IUS indicators on the example of Poland

Efficiency of EIS/IUS indicators is presented on the example of Poland.

Since 2006 polish indicators have improved, seem to be better (Tab. 4).

Tab. 4. Comparison of EIS 2006 – 2009 and IUS 2010 of EU and Poland

	2006		2007		2008		2009		2010	
	PL	EU	PL	EU	PL	EU	PL	EU	PL	EU
New S&E, SSH graduates	9,4	12,7	11,1	12,7	52,9	43,3	56,5	40,4		
Population with tertiary education	16,8	22,8	17,9	22,8	18,7	23,5	19,6	23,5	32,8	32,3
S&E and SSH doctorate graduates					0,86	1,11	0,7	1,03	0,9	1,4
Participation in life-long learning	5	11	4,7	9,6	5,1	9,7	4,7	9,5		
Youth education attainment level	90	76,9	91,7	77,8	91,6	78,1	91,3	78,1	91,3	78,6

Source: self study on the basis of EIS 2006 – 2009 nad IUS 2010.

Author's research draw a conclusion that despite the indicators have increased, the quality of education decreases: employers states that graduates knowledge, skills, abilities do not meet their requirements and very often graduates plan their careers accidentally (Tab. 5)

Tab. 5. EIS/IUS indicators in Author's studies.

Information from EIS and IUS	Conclusion of author's studies
Increasing number of S&E, SSH graduates	Studying is more and more popular, society's belief that "everybody can study" does not mean the increase of qualification. Industry, manufactures are looking for qualified workers with particular skills, knowledge, behaviour. The increasing number of university graduates do not mean that their qualification have increased. Innovation economy needs high skilled, qualified workers on each level of degree.

Population with tertiary education	This is a trend and do not have direct influence on innovation. Youths' ambition increases, which is not always connected with their predispositions and labour market expectations.
S&E and SSH doctorate graduates	The more universities graduates the more doctorate students and graduates. When the dissertation can be implemented that support innovation, if provides new studies, knowledge then there is an influence on innovation. The number of doctorate graduates without any additional information do not have influence on innovation.
Participation in life-long learning	This comes from economy demands and has an influence on innovation. The more flexible are workers, entrepreneurs the changes can be made easily and quickly. Participation in life-long learning presents attitudes of workers. They learn likely and quickly.
Youth education attainment level	Monitoring of results of exams gives internal knowledge of quality of education. This is effectiveness of teaching and its measurement. The indicator can be effective if compared with evaluation of graduates and employers.

Source: self study.

Analysis bring new question: How to measure educational area to improve innovation performance?

Methodology of research on graduates careers

Quantitative indicators are useful but not sufficient. There is a necessity to complement them with qualitative indicators. Any indicator of the amount of graduates of particular type of school does not give an exact information. We can observe particular trends connected with career planning of graduates of different types of schools. But we do not receive an accurate knowledge on the subject of decision process and data flows.

Author's research confirms the increasing tendencies of EIS and IUS indicators (Tab. 6)

Tab. 1 Educational aspirations of lower secondary schools graduates

Choice of school (first priority)	Percentage
General secondary school (GSS)	36,48%
General secondary school with profile (GSSP)	1,89%
Technical and vocational secondary school (TVSS)	30,82%
Basic vocational school (BVS)	10,06%
Other	2,52%
Undecided	21,38%

Educational aspirations of graduates of every type of secondary schools are connected with career paths. Most pupils are going to continue education (Tab. 7).

Tab. 7. Educational aspirations of secondary schools graduates

Educational aspirations of graduates	BVS	TVSS	GSSP	GSS
Work in learnt occupation	35,80%	36,19%		
Work in any job	31,48%	37,14%	16,87%	20,00%
Emigration for work	20,99%	22,86%	12,05%	20,00%
No explicit plans of career	0,62%	3,81%	1,20%	0,00%
To begin own business	8,02%	13,33%	4,82%	4,00%
Continuation of education	36,42%	43,81%	96,39%	60,00%
Undecided	7,41%	8,57%	2,41%	16,00%
Other plans	3,70%	3,81%	3,61%	12,00%

The tendencies are natural and understood in general secondary schools and general secondary schools with profile. The role of those school is preparation pupils to continue education. Population of 96,39% pupils of GSS and population of 60% pupils of GSSP wish to continue education. A lot of pupils in both types of vocational school graduates' is going to

continue education. Despite the vocational schools are focused on preparation its pupils to enter the labor market, TVSS graduates chooses universities and BVS graduates wish to continue education usually in their occupation in technical vocational schools.

Those processes demand changes. A population of 17,28% basic vocational school graduates and 30,47% of technical and vocational secondary schools graduates is not intend to take up employment (Tab. 8).

Tab. 8. Career paths of basic vocational school graduates and technical and vocational secondary school graduates

Educational aspirations of graduates	Basic vocational schools	Technical and vocational schools
Work and education	23,46%	38,09%
Education without taking up an employment	12,96%	5,72%
not intend to take up employment	17,28%	30,47%

Reaching following levels of degree is very important. Well educated graduate has more opportunities on labour market. Employers are searching for qualified workers with particular skills, qualifications, behaviours. Role of school is not only preparation to play role in economy. During many schools years young people learn to exist efficiently in society, to work, to actively participate in social and public life. Population of 17,28% of basic vocational schools and population 30,47% of technical and vocational schools graduates do not want to take up an employment. But, anyway, it is not bad result in the situation on many difficulties with unemployment of young people. Studies pointed out that many interviewed in basic vocational schools work in their occupation in their free time.

To make educational management more effective in local governments there is necessity to analyse not only graduates choices and educational needs but also reasons and determinates of those decisions. They are made mostly independently. From 10% to 33% interviewed pointed out the role of family and friends in those decisions. Educational system help in the area of vocational advisory (tutors, teachers, pedagogues, vocational advisors) is small.

Education quality is impossible to measure only with EIS/IUS quantitative indicators. External examination results seem to be satisfied in Poland (Tab. 9.) and, so far, they are considered as the most important indicator of education quality. But nobody discuss that completion of matriculation exam covers 30% of right answers and, it is just easy to pass matriculation exam on the basic level.

Tab. 9. Results of matriculation exam in PL and in Silesia Region between 2006 and 2010

	2006	2007	2008	2009	2010
Percentage of passed exams in Silesia Region	80,07%	89,99%	80%	81,18%	79,37%
Percentage of passed exams in Poland	79%	90%	79%	81%	81,50%

Source: Reports of Central Examination Commission in Poland.

Ministry of Education introduces measurement system of value-added educational indicator, based on comparison of results at the beginning education and at the end of education in particular school. But this is still internal measurement, which do not contain elements of labour market research. On the other hand employers are no satisfied with graduates of secondary schools qualifications, skills and knowledge.

Conclusion and questions do discuss

Educational indicators to improve innovation performance should be very synthetic, but cannot lose important information. Research on career paths of graduates will be carried out in 5 cycles: first internet questionnaire will be send a year after completion the school and repeated 3 times every 5 years. Evaluation of educational process at school will be carried out in particular categories: evaluation of proper preparation to work at your occupation/ evaluation of proper preparation to continue education; recommendation of the school for younger friends or for graduates children; support of creativity, innovation at school; work in accordance with qualifications or below qualifications; level of salary and job satisfaction. Indicators based on answers for above question can supplement innovation performance methodology. The concept can be firstly develop and tested in local governments, responsible for educational management in their areas, however it can be extended in every educational system.

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