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Developing the Knowledge-Based Economy in Europe: The Perspective of Eight Countries

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Developing the knowledge-based economy in Europe: the perspective of eight countries¹

Summary

1. To review of the Knowledge-Based Economy (KBE) experience in Europe as well as to propose a European research programme evaluating and promoting prospects in the field of KBE – this was the general aim of the study. In the context of the Lisbon Strategy, methodology, conclusions and recommendations presented by the OECD, the European Commission, the World Bank and the United Nations Economic Commission for Europe have been exploited. In particular, the Knowledge Assessment Methodology (*KAM*), offered by the World Bank Institute in the Internet, has been applied in the analytical exercise on country level.
2. Detailed aims of this study read as follows:
 - determining the present stage of development of the KBE in 8 countries - 4 EU member states: the Netherlands, Sweden, the United Kingdom and Germany as well as 4 the Visegrad countries: the Czech Republic, Hungary, the Slovak Republic and Poland (the analysis on a country level has been followed by a representative sample of regions - in a comparative analysis of KBE indicators);
 - providing an insight into future challenges and possible actions / trajectories on country and regional levels, including TNCs and SMEs interdependence in knowledge management and KBE development (including the impact of foreign direct investment on creation and maintenance of social capital);
 - drafting an international, multiregional research programme.
3. The proposed international, multiregional research programme includes three perspectives of contributions:
 - the theoretical and conceptual reflection,
 - the empirical studies and monitoring process,
 - the pragmatically oriented activities, especially the advisory mission.

Within trajectories of 22 regions of the 8 European countries, we have foreseen monitoring of interactions of three communities creating knowledge-based economies and knowledge-based societies:

- the business community,
- the academic community,
- the community of public authorities (self-governmental and governmental).

A sample set of basic indicators – original values - provides a preliminary insight into the size of countries and the KBE development (Table 1).

¹ The modified and updated study prepared for Leon Koźmiński Academy of Entrepreneurship and Management, Warsaw in the framework of the research project – grant: (“Business strategies in Poland and knowledge management” (“*Strategie przedsiębiorstw działających w Polsce a zarządzanie wiedzą*”))

Table 1.

Sample basic indicators for the 4 EU member states and Visegrad countries, end of 90.

S	D	NL	UK	CZ	H	PL	SLK
Gross domestic expenditure on R&D (GERD) / GDP, %, 2000							
3,78	2,52	2,02	1,86	1,35	0,81	0,70	0,69
of which: state budget funds of GERD / GDP, %, 2000							
0,93	0,77	0,72	0,54	0,60	0,40	0,44	0,29
Population density, inhabitants per km(2), 1997							
23	230	379	243	131	109	124	110
GDP per capita, at purchasing power standard – PPS, current prices, 1997							
18.140	20.030	18.845	17.770	12.000	8.900	7.500	8.900
GERD, bln USD, 2000							
7,9	55,1	8,5	27,1	2,0	1,0	2,6	0,4
GERD, per capita, USD, 2000							
888	668	536	453	193	100	67	80
GDP at current prices, bln ECU/EUR, 2000							
246,7	2 025,5	401,1	1 547,9	55,0	50,3	171,0	20,9
Percentage of the population aged 25 to 64 having completed at least upper secondary education, women and men, 2000							
77,2	81,3	66,2	80,7	86,1	69,2	79,7	83,6

Source: Facts through Figures. Eurostat Yearbook at a Glance. 1997. Science and Technology in Poland in 2001. Central Statistical Office. Warszawa 2003. Eurostat Yearbook 2002. The statistical guide to Europe. Data 1990-2000. European Commission.

1. Introduction

The Knowledge-Based Economy (KBE) is the most important strategic element defining the Future of Europe of the XXI century. The European “To be or not to be” is determined by the capacity of our continent – of the Europeans - to build up the KBE as a leading element of the competitive position of Europe on the global scene. Our preparation to meet this challenge is well advanced in the field of theory and political declarations, but desperately weak in the field of empirical studies answering the fundamental question – how deeply the KBE is embedded into the European reality.

To eliminate this strategic deficiency a Grand European Research Programme should be designed and implemented in the very near future. This comparative study can be seen as an important step leading in this direction. This study is a follow up of the innovative ideas and approaches outlined in June 2001 by the Expert Meeting in Konstancin².

In this spirit we will design this study - and the future programme - as a presentation of four trajectories approaching different dimensions of the European Scene.

- the trajectory of four international organizations,
- the trajectory of four IHT countries and four Visegrad countries,
- the trajectory of 22 regions.

At present, the Lisbon Strategy reaches forward till the year 2010. The etymological explanation of the word “trajectory” dates back till the Middle Ages and the Latin language – *traicere* – meaning ‘to transfer’, ‘to shift’ and ‘to keep moving’ - all these verbs referring to actions of moving ahead, towards future. We follow this meaning of a trajectory and focus the study on the input of the best data available in order to:

- determine the present stage of development of the knowledge-based economy within the framework of a comparative analysis of 8 countries and a sample of regions;
- provide an insight into future challenges and possible actions / trajectories on country and regional levels, including the impact of foreign direct investment on creation and maintenance of social capital;
- present a draft framework of an international, multiregional research programme.

The presentation and evaluation of the four trajectories will create and strengthen a new intellectual and pragmatic climate for the design and implementation of a grand European Research Programme. This programme is presented in sections I and VII.

1.1 The Trajectories of Four International Organizations

The KBE is to a large extent the result of the creative activity of four international organizations: the OECD, the World Bank, the European Union and the United Nations – Economic Commission for Europe. This study is intended to mention the experiences of these four organizations, focusing attention on three dimensions:

- 1) the conceptual dimension,
- 2) the pragmatic dimension,
- 3) the empirical dimension.

The conceptual dimension is related to the theoretical reflection developed so brilliantly by the four organizations.

The pragmatic dimension is related to the ability of the four organizations to induce the member countries to promote policies, which create organic conditions for the development of

² A. Kukliński [ed.] *The Development of knowledge-based economy. The initiative 4+4+2.* The Expert Meeting. Konstancin - Poland, June 7th-10th 2001. Warsaw, August 2001.

KBE. This dimension is related to the ability of four organizations to create empirical information on the development of KBE. In our study we test the data – ‘banking resources’ of these organizations - in the field of KBE.

The empirical inquiry will be related to a joint comparative analysis of the empirical reality of KBE in the 8 countries meaning the four IHT countries and four Visegrad countries.

In this way a new foundation for the 4+4+4 model will be created.

The UN ECE perspective is worth of a brief explanation, because – unlike the three other – this organization has been less known for its KBE interest lately. However, the United Nations Economic Commission for Europe (*UN ECE*) has launched an initiative of monitoring and commenting on the development of the knowledge-based economy in all the European countries in transition and emerging market economies.³

We have thoroughly reviewed the regional report as well as the available country reports and highly appreciate this initiative. The regional report, edited in 2002, has revealed an approach focused on information technologies and proposed a weighted multi-criteria evaluation in the field of IT – The Knowledge-Based Economy Indexing.

The UN ECE reports have been designed to identify and disseminate the best practices in the European countries in transition and emerging market countries. The global perspective has been respected and the United States is the reference country for indexing (the proposed set of indexes is worth of a separate, methodological comment).

In our programme we propose to follow up research in the European perspective, referring to the EU member countries and the EU accession countries. Thus, sharing the intellectual assets of the UN ECE approach, we prefer a dimension of regions (including clusters), considered as promising the most pragmatic conclusions on the EU scene. Of course, the UN ECE reports on the Visegrad countries will be also considered as valuable input for the proposed programme.

1.2 The Trajectories of Four IHT Countries and Four Visegrad Countries

On September 7th 2000 the “*International Herald Tribune*”⁴ published a *sui generis* Manifesto signed by the Prime Ministers of the Netherlands, Sweden, the United Kingdom and by the Chancellor of Germany. In this Manifesto we read *inter alia*:

“We are committed to help Europe to become the most important knowledge-based economy in the world”.

It would be most interesting and useful to test to what extend the empirical reality of the four countries is reflecting the bold declarations of their political leaders.

The materials included in part 3 of the Konstancin volume⁵ are a good starting point for a comprehensive analysis of this type (see Annex IV – Country Cases).

In September 2001, in Budapest, the four Visegrad countries: the Czech Republic, Hungary, Poland and the Slovak Republic, created a working group – designed to promote the development of KBE. Unfortunately, this working group is a classical *paper tiger* with no follow up in real activity. It is now time to eliminate this intellectual and pragmatic deficiency. It is also necessary to reestablish the line of comparative studies related to the four Visegrad countries started in the Konstancin volume⁶.

³ *Regional Assessment Report. Towards a Knowledge-Based Economy. Foreword* by Brigita Schmoegnerova, Executive Secretary. UN ECE. UN. New York and Geneva 2002. The initiative envisages the preparation of country assessment reports on the biennium basis.

⁴ “*International Herald Tribune*”, September 7th 2000. Progressive Equation: Globalization plus Welfare.

⁵ A. Kukliński, op.cit. [ed.] J. Kotyński *Part Three – Poland in a comparative perspective*.

⁶ A. Kukliński, op.cit. *Part Two – Knowledge-based economy – the perspective of Central Europe*. See: Dalano D. *Is Catching Up Possible in Europe?* TIGER Working Paper Series. No 19. 2002.

1.3 The Trajectories of 22 Regions

The model 4+4+4 is a solution not sufficient in the conditions Anno Domini 2004. The three trajectories should be conceptually and substantially supplemented by a Fourth Trajectory, composed of the trajectories of 22 regions, following the recent paper of A. Kukliński⁷.

It is not enough to see the European and national dimensions of the development of KBE. The regional dimension is now extremely important as a scene of strategic interaction of three communities – the leading actors in the development of KBE:

- 1) the academic community,
- 2) the business community,
- 3) the community of regional governance.

The proposed programme will include a proposal – how to select 22 regions in the eight countries where the strategic triangle of the three communities should be tested. The regional trajectory will follow up the new route of inquiry into the nature of KBE⁸.

This route is related to the observation that the domains of knowledge-based society and the domain of knowledge-based economy are not two separated domains. Just the opposite – in theory and practice we should see only one integrated domain – the domain of knowledge-based economy and society.

There is a virtuous circle in the development of this integrated domain:

- the knowledge-based economy is constantly creating the knowledge-based society,
- the knowledge-based society is constantly creating the knowledge-based economy.

We are convinced that this virtuous circle is the strategic key to the success in the XXI century.

The performance of this virtuous circle should be tested in the reality of 22 European regions. This collection of regions would be composed of 4 regions from each of 3 ‘bigger’ countries, namely: the United Kingdom, Germany and Poland accompanied by 2 regions from each of 5 ‘smaller’ countries, namely: Sweden, the Netherlands, the Czech Republic, Hungary and the Slovak Republic. Such a sample of regions should meet – first of all - the criteria of representing specific features of KBE in a particular country (not just for a country ‘average’) as well as feasibility of the proposed research programme. As far as Poland is concerned, the programme would enhance the following - ”best practice” - administrative regions (capitals – in brackets): Wielkopolskie (Poznań), Dolnośląskie (Wrocław), Małopolskie (Kraków) and Mazowieckie (Warszawa)⁹. Not accidentally these regions are administrative units, in Poland - voivodeships, so it would be the case in the remaining seven countries. The purpose is totally pragmatic – to identify examples of the above mentioned feedback effects emerging between Knowledge-Based Societies and Knowledge-Based Economies. It has been proved successful and convenient exercise, but still necessary and promising research activity, to trace such interdependencies in Europe across countries and firms. Last but not least, the *mezo economy* perspective of regions calls to be exploited, inspiring and evaluating the influence of citizenship societies on the growth of knowledge-

⁷ Compare: *The development of the knowledge based-economy in Europe: The Regional Trajectory*. “*Geographia Polonica*”, Vol. 75, Spring 2002.

⁸ Compare the path breaking content of the issue *The Knowledge Society* of the “*International Social Science Journal*”. no. 171, March 2002.

⁹ Compare Kukliński A. *Science and technology in Poland AT the turn of the centuries*. [in:] Gorzelak G. [ed.] *Central Europe in transition: towards EU membership*. Regional Studies Association. Polish Section. Warsaw 2001. Gorzelak G. *The regional dimension of Polish transformation: seven years later*. [in:] Gorzelak G. ... (ed.) *Central Europe in transition: towards EU membership*. Regional Studies Association. Polish Section. Warsaw 2001.

based economy in their neighborhood, measured – among plenty of sophisticated parameters – by e.g. Human Development Index, calculated in the United Nations Development Programme (*UNDP*), applied also by the Institute for Management Development (*IMD*) in the *World Competitiveness Yearbook* and by the World Bank Institute (*WBI*) in the *Knowledge Assessment Matrix*.

The proposed selection of 22 regions enables application of the case study methodology, based on the best practice technique, taking the most of a questionnaire tool. The “best practice” relates also to the above mentioned four regions in Poland.

2. The Trajectories of Eight Countries: The KAM Scorecard

As the technical impediments (distance, geography and cost) to accessing and using the best knowledge about a given process, skill or market decrease, that knowledge becomes increasingly the key to competitiveness, locally and globally. At the same time, these efficiencies in information and knowledge flows make possible, and necessary, a closer link between research/development and downstream innovation, an increased rate of innovation, and shorter product life cycles in many major sectors of the economy.

The increase in global trade and foreign direct investment in recent years - facilitated by the ease of information flows - accelerates the impact of these changes. In an increasingly global economy - where knowledge about how to excel competitively and information about who excels are both more readily available - the effective creation, use and dissemination of knowledge is increasingly the key to sustainable economic and social development that benefits all. Innovation, which fuels new job creation and economic growth, is quickly becoming the key factor in global competitiveness.¹⁰

2.1 The World Bank Institute Approach – the Interactive KAM

The World Bank Institute’s program on Knowledge for Development uses the Knowledge Assessment Methodology (KAM), which consists of a set of about 70 structural and qualitative variables that benchmark how an economy compares with its neighbors, competitors or countries it wishes to emulate. Only these features might sound extremely promising for every country of our collection of 8. Furthermore, KAM helps to identify the problems and opportunities that a country faces, and where it may need to focus policy attention and investments. Such assets of KAM result from a “careful variety” of variables, which makes it similar to multi-criteria evaluation methods. Moreover, as the World Bank is concerned, the comparison for about 70 variables may be undertaken for a group of about 100 countries, which includes most of the developed OECD economies.

Here have been two purposes of the KAM application:

- *firstly* - to identify a preliminary set of variables for the present study as well as for the proposed programme on a regional level - results of these methodological considerations are presented in Tables 2 and 3;
- *secondly* - to take the most advantage of the interactive data base KAM in the form of preliminary observations on the analytical exercise on a country level (G7, Europe and Central Asia - E&CA and 8 sample countries).

The affluent data bases are adequate to the variety of circumstances in any research comparing economies of e.g. extremely different Human Development Index (*HDI*). This index, calculated by the UNDP, has been built into the KAM. It is not the case of our

¹⁰ *Building Knowledge Economies: Opportunities and Challenges for EU Accession Countries*. Final Report of the Knowledge Economic Forum. Paris, February 19-22, 2002.

proposed programme, though HDI for the 4 EU member countries varies from 0,92 to 0,94 and for the Visegrad countries – from 0,83 to 0,84. Having identified the close distance between these two groups of countries – not only in a geographical, but also in an economic dimension – we have arranged for scorecards – tools at disposal for users of *the Interactive Internet—based KAM exercise*¹¹.

There is a research tool within the framework of KAM, namely a standard scoreboard, enabling to select required sets of variables for intended comparisons. The standard scoreboard is composed of 14 variables arranged in four groups - as for four areas (or pillars) that are critical in the development of a knowledge-based economy. Performance indicators serve as introductory background for KBE and are followed by variables of:

- I. Economic incentive and institutional regime;
- II. Education and human resource;
- III. Innovation system;
- IV. Information infrastructure and communication technologies (ICT).

We have adjusted the standard KAM scoreboard to better meet the case of this comparative exercise. So, six variables have been left aside: regulations of financial institutions securing state financial stability, adult literacy, secondary enrollment and tertiary enrollment, manufacturing trade as % of GDP as well as number of researchers in R&D. To keep up with the reasonable number of variables, the above have been replaced by:

- public expenditure on education,
- management education locally available,
- university education for labor markets,
- foreign direct investment inflow,
- companies-universities research cooperation,
- venture capital locally available,
- high-technology products in exports.

In our opinion, the seven indicators introduced here to the standard KAM scorecard are closer to a regional perspective. Moreover, the replacement amplifies this conclusion, because it enforces the four areas (or pillars) approach. Furthermore, the proposed replacement preserves a balanced perspective reflecting both differences as well as similarities of compared countries (Table 2) and regions - in the proposed programme.

For the purpose of this study, Indicators from the KAM data base have been processed as follows:

$$\begin{aligned} & \text{a processed value of an indicator "x" for a country "i" =} \\ & = \text{an original value of an indicator "x" for a country "i" * 10 / value of an indicator "x"} \\ & \quad \text{for the reference country (here – the USA).} \end{aligned}$$

It means, that here values of so processed indicators may exceed 10. If a processed value of an indicator "x" >10, the original value of the indicator "x" for a country "i" exceeds a respective value of the indicator "x" for the reference country. This remark is important in the face of the Lisbon strategy goal, referring to global comparisons, also with the USA.¹²

¹¹ Based on *The Knowledge Assessment Methodology & Scorecards*. <http://www1.worldbank.org/gdln/kam.htm>. See also: Anuja Adhar Utz. *The Knowledge Assessment Methodology*. ECA Staff Training. Program on Knowledge for Development. World Bank Institute. July 17, 2001. Dahlman C. *The Knowledge Economy: Implications for Poland*. World Bank Institute. June 17, 2002.

¹² The reference country - USA – ranks at the first position not for all indicators, so the scale of the radar-type chart exceeds 10 (Figure 1).

Table 2

Variables used in the adjusted standard KAM scorecard

No.	KAM Code	Variable description
Performance indicators		
1	p1	Average annual GDP growth rate, %, 1990-1999
2	p2	Human Development Index (HDI), 1999 [<i>max. 1,00; based on three indicators: longevity (life expectancy at birth), education (adult literacy rate x 2/3 and combined primary, secondary and tertiary enrollment x 1/3), standard of living (GDP per capita at PPS)</i>]
I. Economic Incentive and Institutional Regime		
3	e4	Tariff and non-tariff barriers, 2002 (<i>barriers to trade, a part of the larger group of indices comprising The Index of Economic Freedom</i>)
4	e5	Property rights, 2002 (<i>based on a survey: private intellectual property rights are well protected? 1 = strongly disagree, 10 = strongly agree</i>)
II. Education and Human Resource		
5	h7	Public expenditure on education, as % of GDP, 1999
6	h13	Management education <u>locally</u> available (in first-class business schools), 2001 (<i>based on a survey; 1 = limited or poor quality, 7 = among the world's best</i>)
7	h15	University education for labor markets (meets the needs of a competitive economy), 2001 (<i>1 – 7 scale, based on a survey</i>)
III. Innovation System		
8	i2	Foreign direct investment, inflow as % of GDP, 1990-1999 average
9	i8	Companies-universities research cooperation (close collaboration between companies and <u>local</u> universities, 2001 (<i>based on a survey; 1 = minimal or nonexistent, 10 = intensive and ongoing</i>))
10	i10	Technical papers, number per million persons, 1997 (<i>scientific and engineering articles</i>)
11	i12	Venture capital <u>locally</u> available, 2001 (<i>based on a survey: entrepreneurs with innovation but risky projects can generally find venture capital in their country; 1 = disagree, 7 = agree</i>)
12	i14	High-tech products, as % of total manufacturing exports, 1999 (<i>e.g. aerospace, computers, pharmaceuticals, scientific instruments, electrical machinery</i>)
IV. Information Infrastructure and Communication Technologies (ICT)		
13	t1	Telephones. including mobile, per 1.000 persons, 1999 (<i>telephone mainlines + mobile phones</i>)
14	t4	Computers, per 1.000 persons, 1999
15	t10	Internet hosts, per 10.000 persons, 2000

Source: own presentation, based on [file:///A/The Knowledge Assessment Methodology and Scorecards.htm](file:///A/The%20Knowledge%20Assessment%20Methodology%20and%20Scorecards.htm). See: *ICT and Economic Growth. Evidence from OECD Countries, Industries and Firms*. OECD. 2003.

2.2 Preliminary Observations on KBE in E&CA and G7

Remodeling of the standard set of KBE indicators fulfilled *the first* of the above mentioned purposes of KAM application in this study. Achieving *the second* purpose - making the most advantage of the interactive data base KAM on a country level - was more troublesome, as it depended on the availability and quality of data. Again, the KAM proved its flexibility, as not only the 8 countries in question have been compared, but also *memorandum items* have appeared: the USA, G7 and countries of Europe & Central Asia (Table 3). Following the approach of four areas of KBE, revealed in Table 2, figures in Table 3 reflect a dispersed leadership in particular features of emerging KBE. If the first places are counted, Sweden has been an outstanding leader among its neighbors in Table 3 – with the first ranks for 11 indicators, followed by the Netherlands and the United Kingdom (the first ranks for three indicators in both cases; there are equal original values for two indicators).

Other countries have been taking the first place twice (Germany – ex aequo with other three countries from the EU, Poland and Hungary) and once only, but with no individual first place in the given set of indicators (the Czech Republic and Slovakia). We also have an exception of the variable "*tariff and non-tariff barriers to trade*", for which all of 8 countries proved satisfactory at the same high level. For the chosen set of variables, differences between countries have been smaller than might have been expected in comparison of well-established member countries of the EU with countries in transition. The level of variables differed considerably for variables of: performance, public spending on education, local availability of management education in first-class schools, foreign direct investment, availability of local venture capital and high-technology exports. Generally, gaps become more evident when we move from performance, economic incentives, education and human resources to innovation system as well as ICT.

The first and introductory comparison of two groups of countries – E&CA with G7 – has resulted in a similar shape of charts. The "*general advantage*" of G7 has been confirmed, though both groups of countries are close to each other in the field of education and human resource. The substantial differences have appeared in property rights protection, venture capital availability, high-tech exports as percentage of manufacturing exports and ITC diffusion within firms and – more generally – within societies (Fig. 1).

Table 3

Scorecard for the four EU member states and four Visegrad countries, with reference items for the USA, G7 (a) and countries of Europe & Central Asia (b)

No.	KAM Code	EU member countries (c)				Visegrad countries (d)				<i>Memorandum items</i>		
		D	NL	S	UK	CZ	H	PL	SLK	USA	G7	E&CA
Performance indicators												
1	p1	1,30	2,70	1,60	2,50	0,80	1,00	4,50	0,24	3,30	2,00	1,74
2	p2	0,92	0,93	0,94	0,92	0,84	0,83	0,83	0,83	0,93	0,93	0,79
I. Economic Incentive and Institutional Regime												
3	e4	8,00	8,00	8,00	8,00	8,00	8,00	8,00	8,00	8,00	8,00	6,63
4	e5	10,00	10,00	10,00	10,00	8,00	8,00	8,00	6,00	10,00	9,17	5,75
II. Education and Human Resource												
5	h7	4,30	5,10	7,30	4,70	4,50	4,40	5,00	4,20	4,70	4,99	4,80
6	h13	5,70	5,80	5,80	6,10	4,50	5,00	4,70	3,80	6,70	5,74	5,00
7	h15	5,30	6,75	5,97	5,90	5,36	6,97	4,44	6,15	6,60	5,57	5,47
III. Innovation System												
8	i2	0,53	3,95	5,40	2,61	3,50	4,54	2,39	1,18	1,13	1,15	1,98
9	i8	5,10	5,20	5,70	4,90	4,10	4,80	3,80	4,60	5,30	4,90	3,58
10	i10	6,09	6,54	6,82	6,47	5,32	5,15	4,64	5,25	6,40	6,15	4,29
11	i12	4,90	5,50	5,60	4,90	3,20	3,60	3,00	2,80	5,80	4,61	2,75
12	i14	17,00	33,00	22,00	30,00	9,00	23,00	3,00	5,00	35,00	22,14	8,07
IV. ICT												
13	t1	7,08	7,15	7,24	7,12	6,69	6,50	6,12	6,32	6,97	7,04	5,92
14	t4	5,69	5,89	6,11	5,71	4,67	4,31	4,13	4,70	6,24	5,69	4,09
15	t10	5,46	6,52	6,56	5,80	4,91	4,87	4,22	4,26	7,79	5,97	3,25

(a) G7: Canada, France, Germany, Italy, Japan, UK, USA.

(b) Europe & Central Asia: Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Turkey, Ukraine, Uzbekistan.

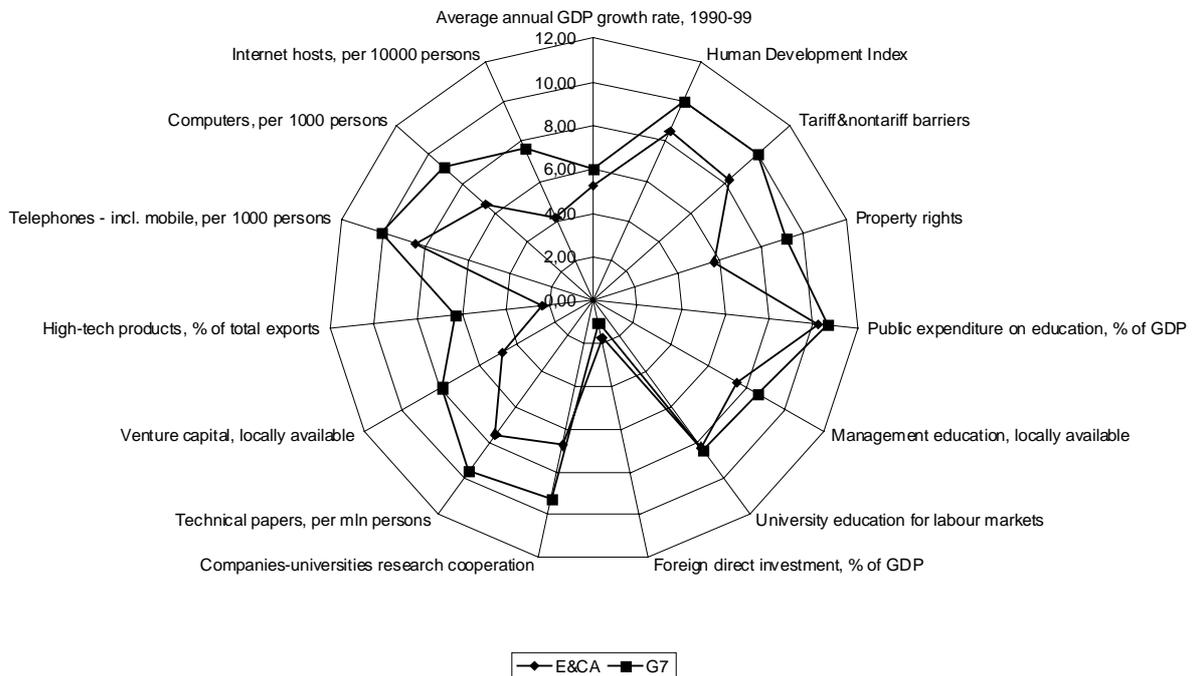
(c) D – Germany, NL – the Netherlands, S – Sweden, UK – the United Kingdom.

(d) CZ – the Czech Republic, H – Hungary, PL – Poland, SLK – Slovakia.

Source: own presentation, based on The 2002 Interactive KAM.

<http://www1.worldbank.org/gdln/kam.htm>.

Fig. 1. KBE Scorecard - countries of Europe&Central Asia (E&CA) versus G7 countries



Source: own presentation, based on the *KAM 2002, World Bank Institute*.

2.3 KBE Scorecard Review for Eight Countries

The second comparison refers to eight countries compared with two groups of countries and with each other.

8 countries versus G& and E&CA

Comparing our 8 sample countries with the G7 resulted in different conclusions on the KBE development in the EU member states and countries in transition. The G7 proved its advantages over the EU 4 sample countries for:

- performance indicators - in GDP growth rate (over Germany and Sweden) and in Human Development Index (over Germany),
- education and human resources - in university education for labor market and competitive economy (over Netherlands, Sweden and United Kingdom),
- innovation system – in FDI inflow as % of GDP and in high-tech products in exports (over Germany).

The G7 proved its advantages over every Visegrad country in all indicators, however, with exceptions of:

- performance indicators – in GDP growth rate (disadvantage versus Poland and Slovakia),
- education and human resource – in university education for labor market and competitive economy (disadvantage versus Czech Republic and Poland),
- innovation system – in FDI inflow as % of GDP (disadvantage versus Czech Republic, Hungary and Poland as well equal position as Slovakia) and also in high-tech products in exports (disadvantage versus Hungary).

On the contrary, comparing our group of 8 countries with the group of European and Central Asia countries proved rather the former advantages over E&CA in almost all indicators. However, with exceptions of advantages of E&CA in:

- performance indicators – in GDP growth rate (over Germany, Sweden, Czech Republic, Hungary and Slovakia),
- education and human resource – in public spending on education (over Germany, Czech Republic, Poland and Slovakia), in management education locally available (over Czech Republic, Poland and Slovakia, with equal position as Hungary) and in university education for labor markets and competitive economy (over Germany and Poland),
- innovation system – in FDI inflow as % of GDP (over Germany), technical papers per mln persons (over Poland) and in high-tech products in exports (over Poland and Slovakia).

8 countries compared with each other

Comparison with Czech Republic showed advantages over other three Visegrad countries in approximately half of indicators and - exceptionally - over the four EU countries in:

- performance indicators – in GDP growth rate (over Slovakia) and in Human Development Index (over Hungary, Poland and Slovakia),
- economic incentive and institutional regime – in property rights (over Slovakia),
- education and human resources – in public expenditure on education (over Germany, Hungary and Slovakia), management education locally available (over Slovakia) and university education for labor market and competitive economy (over Poland),
- innovation system – in all indicators over Poland and in FDI inflow as % of GDP (over Germany, United Kingdom and Slovakia), in technical papers per mln persons (over Hungary), in venture capital locally available and high-tech products in exports (over Slovakia),
- ICT – in three selected indicators – disadvantages versus the four EU member states and advantage over or equal position versus the other three Visegrad countries.

Comparison with Hungary revealed the case of a mosaic - meaning advantages over or equal position versus other three Visegrad countries in almost all indicators and ‘operational competition’ with the EU member states. The detailed picture of Hungarian advantages composed as follows:

- performance indicators – in GDP growth rate (over Czech Republic and Slovakia),
- economic incentive and institutional regime – in property rights (over Slovakia),
- education and human resource – in public expenditure on education (over Slovakia), in management education locally available (over Czech Republic, Poland and Slovakia), in university education for labor market and competitive economy (over all other 7 countries),
- innovation system – in FDI inflow as % of GDP (over Germany, Netherlands, United Kingdom, Poland and Slovakia, with equal position as Czech Republic), in companies research cooperation with universities (over Czech Republic, Poland and Slovakia), in technical papers per mln persons (over Poland), in venture capital locally available (over all compared countries, except equal position as Sweden) and in high-tech products in exports (over Germany, Czech Republic, Poland and Slovakia),
- ICT – in all three indicators (telephones – including mobile - and computers per 1.000 persons and Internet hosts per 10.000 persons) – over Poland and in Internet hosts per 10.000 persons – over Slovakia.

Advantages of Poland could be found in the following fields of the KBE:

- performance indicators – in GDP growth rate (over all other seven countries), in Human Development Index – equal position as Hungary and Slovakia,
- economic incentive and institutional regime – in tariff and non-tariff barriers (equal position as all other seven countries) and in property rights (equal position as Czech Republic, Hungary and Slovakia),
- education and human resource – in public expenditure on education as % of GDP (over Germany, United Kingdom, Czech Republic, Hungary and Slovakia) and over Slovakia - in management education locally available,
- innovation system – in FDI inflow as % of GDP (over Germany and Slovakia) and in venture capital locally available (over Slovakia), with no advantages in ICT, but equal position as Slovakia in Internet hosts per 10.000 persons.

Slovakia had advantages and equal positions in comparison with both the EU member states and Visegrad countries. Advantages were noticed for several indicators in the fields of KBE development, namely:

- education and human resource – in university education for labor market and competitive economy (over Germany, Sweden, United Kingdom, Czech Republic and Poland),
- innovation system – in FDI inflow as % of GDP (over Germany), in companies research cooperation with universities (over Czech Republic and Poland) and over Poland - in technical papers per mln persons as well as high-tech products in exports,
- ICT – in telephones, including mobile, per 1.000 persons (over Poland) and in computers per 1.000 persons (over Hungary and Poland).

The KBE in United Kingdom has been developed to a considerable extent, showing advantages in the following fields:

- performance indicators – in GDP growth rate (over Germany, Sweden, Czech Republic, Hungary and Slovakia) and in Human Development Index (over all Visegrad countries),
- economic incentive and institutional regime – in property rights (over all Visegrad countries),
- education and human resource – in public expenditure on education as % of GDP (over Germany, Czech Republic, Hungary and Slovakia), in management education locally available (over other three EU member states and all Visegrad countries) and in university education for labor market and competitive economy (over Germany, Czech Republic and Poland),
- innovation system – in FDI inflow as % of GDP (over Germany, Poland and Slovakia), in companies research cooperation with universities (over Czech Republic, Poland and Slovakia), in technical papers per mln persons (over Germany and all Visegrad countries), in venture capital locally available (over all Visegrad countries) and in high-tech products in exports (over Germany, Sweden and all Visegrad countries),
- ICT – in all three indicators - telephones - including mobile - and computers per 1.000 persons and Internet hosts per 10.000 persons – over all Visegrad countries as well as in Internet hosts per 10.000 persons – over Germany.

Sweden has had almost no disadvantages in comparison with the sample group of countries. So, bearing in mind the majority of advantages - meaning the considerably high level of KBE development in United Kingdom - the following advantages and – exceptionally – disadvantages were noticed:

- performance indicators – in GDP growth rate (over Germany, Czech Republic, Hungary and Slovakia) and in Human Development Index – over all other countries,
- economic incentive and institutional regime – in tariff and non-tariff barriers as well property rights – advantages or equal positions referred to all other countries,
- education and human resource – in public spending on education as % of GDP (over all compared countries), in management education locally available (over all Visegrad countries, with equal position as Germany and Netherlands and disadvantage versus United Kingdom), in university education for labor markets and competitive economy (over Germany, Czech Republic and Poland, with equal position as United Kingdom and disadvantages versus Netherlands, Hungary and Slovakia),
- innovation system – in FDI inflow as % of GDP, in companies research cooperation with universities and in technical papers per mln persons (over all other compared countries), in venture capital locally available (over all other compared countries, except equal position as Netherlands) and in high-tech products in exports (over Germany, Czech Republic, Poland and Slovakia, with disadvantages versus Netherlands, United Kingdom and Hungary),
- ICT – in telephones, including mobile, per 1.000 persons (over all compared countries, except equal position as Netherlands and United Kingdom), in computers per 1.000 persons (over all other compared countries) and in Internet hosts per 10.000 persons (over all other compared countries, except equal position as Netherlands).

Netherlands has developed the KBE to an extent similar to that of United Kingdom and relatively high degree as compared with its neighbors from the sample group of countries. The list of advantages for the Netherlands reads as follows:

- performance indicators – in GDP growth rate (over all compared countries, except Poland) and in Human Development Index (over all compared countries, except Sweden),
- economic incentive and institutional regime – in property rights (over all Visegrad countries),
- education and human resource – in public expenditure on education as % of GDP (over all other compared countries, except Sweden and equal position as Poland), in management education locally available (over all Visegrad countries), in university education for labor markets and competitive economy (over all compared countries, except Hungary),
- innovation system – in FDI inflow as % of GDP (over all compared countries, except Sweden and Hungary), in companies research cooperation with universities (over all compared countries, except Sweden and equal position as Germany), in technical papers per mln persons (over all compared countries, except Sweden and equal position as United Kingdom), in venture capital (over all compared countries, except equal position as Sweden) and in high-tech products in exports (over all compared countries),
- ICT – in telephones, including mobile, per 1.000 persons (over all Visegrad countries), in computers per 1.000 persons (over all compared countries, except Sweden) and in Internet hosts per 10.000 persons (over all compared countries, except equal position as Sweden).

In the sample group of countries Germany occupied a position ‘in-between’ the three EU member states and Visegrad countries, with advantages referring almost exclusively to the latter. Thus, the identified stage of KBE development in Germany deserves enumeration indicators in the fields of KBE development, disclosing advantages and equal positions, as follows:

- performance indicators – in GDP growth rate (over Czech Republic, Hungary and Slovakia) and in Human Development Index (over all Visegrad countries, with equal position as United Kingdom),
- economic incentive and institutional regime – in tariff and non-tariff barriers (equal position as all compared countries) and in property rights (over all Visegrad countries),
- education and human resource – in public expenditure on education as % of GDP (equal position as Hungary and Slovakia), in management education locally available (over all Visegrad countries, with equal position as Netherlands and Sweden) and in university education for labor markets and competitive economy (over Poland, with equal position as Czech Republic),
- innovation system – in FDI inflow as % of GDP – neither advantages nor equal positions, in companies research cooperation with universities (over all Visegrad countries and United Kingdom, with equal position as Netherlands), in technical papers per mln persons (over all Visegrad countries), in venture capital locally available (over all Visegrad countries, with equal position as United Kingdom) and in high-tech products in exports (over Czech Republic, Poland and Slovakia),
- ICT – in telephone, including mobile, per 1.000 persons (over all Visegrad countries with equal position as Netherlands and United Kingdom), in computers per 1.000 persons (over all Visegrad countries, with equal position as United Kingdom) and in Internet hosts per 10.000 persons (over all Visegrad countries).

The above analysis has been intended to present the review and not necessarily the ranking of countries in our sample group of 8. This review leads to conclusions on KBE development resulting from government policies (on the central and regional levels), TNCs strategies (entering from abroad as affiliates, mergers and acquisitions (M&A) and/or born as originally home countries companies) and – last, but not least - business strategies of SMEs in home countries, leading to initiatives in fostering innovative clusters, expanding competitive potential as well as creating and maintaining the framework of social capital for the Knowledge-Based Societies.

3. The Preliminary Assessment of Regional Trajectories

Measures to improve the climate for enterprises to innovate are increasingly being devised and implemented at regional levels, to take account of regions' specific strengths, weaknesses, hopes and ambitions. This trend brings the risk of designing and implementing regional strategies in isolation, failing to take advantage of experience gained elsewhere, not seizing opportunities to benefit from trans-regional and/or trans-national networking.

3.1 Diversity in Terms of R&D Intensity: The EU Regional Trajectories

At present, there are statistics on technology and science in Europe which enable identification of leading R&D and knowledge-intensive European regions.¹³ Based on the respective rates of R&D expenditure as well as rates of employment and number of patents - for the second half of 90. - the regional analysis identified the leading industrial high-tech regions.

At the EU level, R&D expenditures equaled 1,9% of GDP and this indicator for the top regions exceeded the EU average more than twice. The EU average reached 1,3% for R&D

¹³ See: *Second European Report on S&T Indicators. Key Figures*. European Commission. June 1999. *Statistics on Science and Technology in Europe. Data 1985 – 1999*. European Commission. 2001.

personnel as a percentage of labor force, while for the top regions it was almost three times higher (Table 4). Similar distance concerned number of patents and employment in high-tech industries as a percentage of total employment (Table 5). In other words, in the latter case considerable number of jobs has emerged in research-intensive industries. The levels of the four indicators - mentioned in Table 4 and 5 as A, B, C and D - for all the top 15 EU regions exceeded the EU average.

The geographical pattern of the top 15 innovative regions (bearing in mind that data are lagging and incomplete) confirmed concentration of such regions in Germany, Sweden, Finland, United Kingdom, Netherlands and France, both in the mid-90. and at the end of 90. This observation was confirmed by the composite indicator of science and technology (S&T), calculated by the European Commission as a weighted average of the four above mentioned indicators, with maximum value fixed at 100 points. The two top regions – Stuttgart and Oberbayern (both in Germany) – gained 93 points both, in other words, almost the excellent maximum. Regions ranked as the 14th - Noord-Brabant (NL) and the 15th – Ile-de-France (F) gained 58 and 57 points, respectively. All these regional records far exceeded the European Union average of 35 points (Table 6), which means their advantage of true innovation intensity.

Table 4

Top 15 EU regions, by R&D intensity and R&D personnel, 1995

Rank	R&D expenditure, as a % of GDP, 1995, (a)			Rank	R&D personnel (head count), as a % of labor force (LF), 1995 (b)		
	Region (country)	EU15 = 100	% of GDP		Region (country)	EU15 = 100	% of LF
1	Oberbayern (D)	245	4,7	1	Oberbayern (D)	269	3,4
2	Braunschweig (D)	236	4,6	2	Uusimaa (FIN)	261	3,3
3	Stuttgart (D)	232	4,5	3	Stockholm (S)	253	3,2
4	Tuebingen (D)	207	4,0	4	Braunschweig (D)	250	3,2
5	Koeln (D)	188	3,6	5	Wien (A, 1993)	239	3,0
6	Uusimaa (FIN)	187	3,6	6	Stuttgart (D)	209	2,7
7	Berlin (D)	174	3,4	7	Oestra Mellansverige (S)	209	2,7
8	Karlsruhe (D)	173	3,3	8	Karlsruhe (D)	193	2,5
9	Midi-Pyrenees (F, 1996)	173	3,3	9	Oevre Norrland (S)	190	2,4
10	Ile de France (F, 1996)	172	3,3	10	Koeln (D)	188	2,4
11	Rheinessen-Pfalz (D)	157	3,0	11	Tuebingen (D)	183	2,3
12	Bremen (D)	147	2,8	12	Ile de France (F, 1996)	183	2,3
13	Wien (A, 1993)	131	2,6	13	Vaestsverige (S)	176	2,2
14	Darmstadt (D)	125	2,4	14	Darmstadt (D)	170	2,2
15	Pohjois-Suomi (FIN)	123	2,4	15	Berlin (D)	168	2,1
A. EU15		100	1,9	B. EU15		100	1,3

Notes: (a) Not including B, L, NL, S and UK. (b) Not including B, L, NL and UK.

Source: Key Figures. Second European Report on S&T Indicators. European Commission. June 1999.

Table 5

Top 15 EU regions, by high-tech employment and patenting, 1996 and 1997

Rank	Employment in high-tech industries in manufacturing, as a % of total employment, 1997			Rank	Patent applications, per 1.000 population, 1996 (a)			
	Region (country)	EU15 = 100	%		Region (country)	EU15 = 100	No.	
1	Stuttgart (D)	271	20,7	1	Oberbayern (D)	427	397	
2	Karlsruhe (D)	227	17,3	2	Rheinessen-Pfalz (D)	401	373	
3	Rheinessen-Pfalz (D)	219	16,8	3	Stuttgart (D)	396	367	
4	Frache-Comte I(F)	219	16,7	4	Stockholm (S)	390	362	
5	Tuebingen (D)	204	15,6	5	Darmstadt (D)	377	350	
6	Braunschweig (D)	198	15,1	6	Freiburg (D)	333	309	
7	Unterfranken (D)	196	15,0	7	Uusimaa (FIN, 1995)	332	307	
8	Mittelfranken (D)	195	14,9	8	Mittelfranken (D)	304	282	
9	Piemonte (I)	187	14,3	9	Karlsruhe (D)	301	279	
10	Niederbayern (D)	178	13,6	10	Noord-Brabant (NL)	295	274	
11	Darmstadt (D)	173	13,2	11	Tuebingen (D)	260	242	
12	Schwaben (D)	171	13,1	12	Koeln (D)	257	238	
13	Oberbayern (D)	170	13,0	13	Duesseldorf (D)	235	218	
14	Alsace (F)	169	12,9	14	Sydsverige (S)	233	216	
15	Limburg (B)	168	12,9	15	Unterfranken (D)	228	212	
C. EU15			100	7,6	D. EU15		100	93

Note: (a) Not including EL, P and UK.

Source: as per Table 4.

Table 6

Composite indicator of Science and Technology (S&T) in the EU regions, mid 90.

Rank	Composite Indicator of S&T	
	Region (country)	max. = 100
1	Stuttgart (D)	93
2	Oberbayern (D)	93
3	Pheingessen-Pfalz (D)	76
4	Karlsruhe (D)	76
5	Stockholm (S)	75
6	Tuebingen (D)	73
7	Uusimaa (FIN)	72
8	Braunschweig (D)	72
9	Darmstadt (D)	68
10	Koeln (D)	66
11	Mittelfranken (D)	62
12	Ostra Mellansverige (S)	61
13	Shropshire, Staffordshidre (UK)	60
14	Noord-Brabant (NL)	58
15	Ile de France (F)	57
	EU-15	35

Note: (a) Weighted average of the four indicators from Table 4 and 5 (where possible).

Source: as per table 4.

As it was previously stated, for the 1995 - 1997, in the European Union R&D intensities varied across countries, though this was even more the case across regions. The following list refers to 1999 and provides the top 15 EU regions that invested most in research in the EU in relative terms - Business Enterprise Expenditure on R&D (*BERD*) - as a % of GDP; the EU average was at 1,25%:

- | | |
|-----------------------------------|--|
| 1. Braunschweig, Germany (4,60%) | 8. Sydsverig, Sweden (3,02%) |
| 2. Stuttgart, Germany (4,38%) | 9. Eastern, UK (3,01%) |
| 3. Vaestsverige, Sweden (4,22%) | 10. Rheinessen Pfalz, Germany (2,76%) |
| 4. Stockholm, Sweden (4,10%) | 11. Drmstadt, Germany (2,74%) |
| 5. Oberbayern, Germany (3,75%) | 12. Uusimaa, Finland (2,66%) |
| 6. Tuebingen, Germany (3,48%) | 13. Ile-de-France, France (2,46%) |
| 7. Pohjois-Suomi, Finland (3,14%) | 14. Oestra Mellansverige, Sweden (2,42%) |
| | 15. Noord-Brabant, Netherlands (2,38%). |

Moreover, there are – besides the regional level, several successful phenomena of KBE development: large metropolitan areas such as Greater Stockholm, Greater London, Greater Helsinki and Greater Paris, smaller regions with strong innovative business presence such as Noord-Brabant (Philips), Braunschweig (Volkswagen), Stuttgart (Mercedes, BMW) and even peripheral regions such as Pohjois-Suomi around Oulu - famous science-based Technical University.

Conversely, for 1999 the least performing regions in the European Union in terms of *BERD* as a % of GDP - defined as equal or less than 0,10% of GDP -, list as follows:

1. Ionia Nisia - Greece; Acores - Portugal (0,00%)
2. Dyfiki Makedonia and Vorelo Algalo - Greece; Calabria - Italy (0,01%)
3. Ipeiros and Notio Aigaio - Greece (0,02%)
4. Nisia Aigaiou - Greece (0,03%)

5. Crete - Greece; Baleares - Spain; Alentejo - Portugal (0,04%)
6. Thessalia - Greece; Sardegna - Italy; Madeira - Portugal; Aland - Finland (0,06%)
7. Canary Islands - Spain; Algarve - Portugal (0,07%)
8. Extremadura - Spain (0,08%)
9. Vorela Ellada - Greece; Sud - Italy (0,09%)
10. Dytiki Ellada - Greece (0,10%).

The list of top R&D regions remained almost the same during the second half of the 90., though it differs slightly in ranking. However, it is striking to see that low business expenditures for R&D is strongly biased towards the southern regions of the EU - with the Finnish Sland islands being the only exception in geographical terms. Many less favored regions in Europe show consistently low levels of R&D investment, coming from the business sector. This low level of business R&D activity results in sub-optimal absorptive capacities that could otherwise enable firms to take advantage of research activities undertaken elsewhere due to knowledge spillovers.

As far as investment in the knowledge-based economy is concerned, it also needs to bear in mind that Sweden, Finland and Denmark have all adopted country specific strategies and patterns. These strategies and patterns are due to differences in their industrial structure and its evolution. For instance, while Sweden and Finland share a considerable dependency on large and often R&D intensive multinationals, both in terms of employment and private research, the Danish economy is based more on small and medium sized firms.

All that is mentioned about the outstanding performance of Nordic countries and regions is not to say that the other EU countries do not have the similar kind of qualities,¹⁴ but, in the Nordic countries, a unique combination of various factors and specific societal environment favoring the investment for knowledge-based economy seems to prevail.¹⁵

The above observation on the societal environment proves its adequacy, because investment in R&D is not a short-run deal, but rather medium- and long-term task. Both government (*GERD*) and business (*BERD*) investment in R&D are risky enough to require venture capital. Also the scale of such expenditure should meet social preferences, because it influences all policy fields, including economic and innovation policies. Countries and regions much differ in terms of structure and dynamics of societal and cultural priorities. Thus, the development of the knowledge-based economies requires and involves the emergence of the information societies.¹⁶ These observations support the proposed international research programme on four trajectories.

3.2 Experiences of Linkages in Business Innovative Activities in Poland

In the context of innovative regions and the proposed research programme it is necessary to mention clustering of industry and services. Actions taken by central and local (regional) governments' cluster-based (cluster-oriented) policy influence business strategies.

¹⁴ See: *Innovating Regions in Europe*. RTTS/RIS Network. European Communities. 2000.

¹⁵ Based on *Statistics on Science and Technology in Europe. Data 1985-1999. European Communities 2001. EU research performance: substantial progress but important challenges need to be addressed. Third European Report on Science and Technology Indicators 2003*. European Commission. Brussels, 17 March 2003.

¹⁶ David P.A. *Science Reorganized? Post-Modern Visions of Research and the Course of Success*. All Souls College, Oxford & Stanford University. Dec. 1995. David P.A. Forey D. *An Introduction to the Economy of the Knowledge Society*. "International Social Science Journal". No. 171. March 2002. pp. 9 – 23. *The Age of Social Transformation - Emerging Knowledge Society and Entrepreneurship Society* [in:] Drucker P.F. *The Essential Drucker*. 2001. Baruk J. *Innovations, innovation culture and innovation level in industrial companies*. "The National Economy". No. 11-12/2002. pp. 78 – 94. *Towards a Knowledge-based Europe. The European Union and the Information Society*. European Communities. 2003.

The word “cluster” is usually accompanied by adjectives in the superlative, e.g. “the most advanced form of economic activity”, “the most updated modus of cooperation”, “the most efficient motor of economic growth”. The term “cluster” has been complemented and/or even replaced by “social capital”. Furthermore, the term “social capital” – not neglecting the economic fundamentals of clusters - reaches still more deeply into motivations and – generally – sociological dimensions of business strategies (Box 1).

We have focused the analysis on R&D activities underlying business strategies. Therefore, it is worth to notice, but not going into details here, that:

“...in the modern economy innovation is assumed to play a very important role. As a driving factor of long-term macro-economic growth innovation is one of the keys to sustainable development and prosperity of nations. Enterprises - and also the whole nations - need to innovate constantly if they are to maintain dynamic growth and competitiveness.”¹⁷

Box 1. Reasons for Clustering

The reasons for clustering grow directly out of the determinants of national advantage and are manifestations of their systemic character. One competitive industry helps to create another in a mutually reinforcing process. Such an industry is often the most sophisticated buyer of the products and services it depends on. Its presence in a nation becomes important to developing competitive advantage in supplier industry.

Source: Porter M.E. The Competitive Advantage of Nations. The Free Press. New York 1990. p. 149.

The weakness of innovation system in Poland result from the lack of adequate progress in emerging effective innovative clusters, creating knowledge and commercializing new products and processes. The strongest point of the Polish innovation system is the growing innovation expenditure in the manufacturing sector. The weakest point is still the low level of innovativeness in the service sector and within SMEs in manufacturing.

Data published by the Central Statistical Office in Poland (CSO) regards, i.a. cooperation of enterprises in industry and service sectors in innovation activities with other enterprises and institutions. Innovative cooperation presumes active participation in joint R&D and other innovation projects with other organizations – either other firms or non-commercial institutions. Pure contracting out of work, where there is no active cooperation, is not regarded as innovative cooperation.

The data have been collected by the CSO through a mail questionnaire and definitions used in the survey were fully in line with those recommended by Oslo Manual and used in the Community Innovation Survey in the EU member states. The target population was the total of firms employing more than 9 persons in the following service activities (according to NACE): wholesale trade and commission trade, transport, post and telecommunications, financial intermediation, computer and related activities, architectural, engineering and other technical activities. The share of innovating firms for Poland is largely influenced by trade enterprises, as they constitute 68% of the whole surveyed population and the share of innovating firms within them is considerably low - only 14%.

In 1997-1999, 7% of enterprises in the service sector in Poland participated in the innovative cooperation in at least one joint R&D or other innovation project with other

¹⁷ In order to meet an increasing demand for data on innovation, the Central Statistical Office of Poland continues efforts to develop and improve the innovation monitoring system. *Innovation Activities in Industrial Enterprises in Poland in 1998-2000*. Central Statistical Office. Warszawa 2002.

organizations. In the sub-population of innovating enterprises a share of innovative cooperators was significantly higher, accounting for about 40%.¹⁸

In order of decreasing frequency of established partnerships, the most popular partners for cooperation were:

- domestic suppliers of equipment, material, components or software,
- domestic consultancy enterprises,
- other domestic enterprises within the enterprise group (branch).

Universities and research institutes appeared to be of minor importance as partners for cooperation in innovative activities with service firms in Poland. Moreover, for small enterprises, foreign firms were more frequently chosen partners for innovative cooperation than Polish firms, which was not the case for medium and large firms (Table 7).

¹⁸ Innovation Activities in the Service Sector in Poland in 1997-1999. Central Statistical Office. Warszawa 2001. pp. 71-75 and 96-102.

Table 7

Enterprises in the service sector in Poland having cooperation arrangements on innovation activities with other enterprises or institutions, 1997 – 1999, by type and location of cooperation partner as well as size of service enterprise

Location a – Poland b – abroad	Total number of enterprises	Enterprises in the service sector having cooperation arrangements with									
		Other enter- prises within the group	Compe- titors	Customers	Consultancy enterprises	Suppliers (1)	Higher education institutions	Scientific units of PAN (2)	Branch R&D units	Other R&D units - Polish and foreign	
Total	a	938	235	33	126	255	688	67	19	80	15
	b	255	268	20	30	43	125	16	x	x	30
Small enterprises	a	583	162	18	73	203	406	37	-	24	8
	b	275	228	-	21	16	32	14	x	x	13
Medium enterprises	a	303	56	8	46	38	244	17	13	49	2
	b	155	28	16	9	23	75	2	x	x	16
Big enterprises	a	52	17	7	7	14	38	13	6	7	5
	b	25	12	4	-	4	18	-	x	x	1

Note. Size of enterprises by number of employees: small – 10 – 49, medium – 50 – 249, big – more than 249 employees.

(1) Suppliers of equipment, material, component or software. (2) Scientific units of the Polish Academy of Sciences.

Source: own presentation, based on *Innovation activities in the service sector in Poland in 1997-1999*. Central Statistical Office. Warsaw 2001.

According to the results of the survey in the industrial sector, in 1998-2000, 29% of innovating firms in Poland had cooperation arrangements on innovation activities with other firms or institutions. Innovating enterprises constituted an overwhelming majority, about 90% of the total number of industrial firms that have established cooperation agreement in innovations between 1998 and 2000.

There was a gradual increase in the shares of innovative cooperation from small to medium and big enterprises¹⁹.

In 1998-2000, industrial enterprises in Poland (with 10 or more employees) most frequently have chosen partners for joint innovation projects from (number of innovators by type of partners, as a share of innovative cooperators in manufacturing sector):

- enterprises within the same group (branch) – 43% ,
- suppliers (of equipment, material, components or software) – 39%,
- branch R&D units – 32%,
- clients – 25%,
- universities and other higher education institutions – 23%,
- other research institutions, domestic and foreign – 14%,
- consultancy – 8%,
- competitors – 7%.

In the industrial sector, unlike the service sector, majority of innovative cooperation arrangements concerned Polish partners. However, also in the industrial sector small firms had the most interest in foreign partners, followed by medium and big firms, both with similar shares of arrangements with foreign firms (Table 7 and 8).

On the regional level and for total number of firms (regardless their size), slightly more innovative cooperation arrangements with foreign than Polish partners was identified in the following voivodeships: Dolnośląskie, Łódzkie, Mazowieckie, Pomorskie, Wielkopolskie and Zachodniopomorskie (Table 9).

The proposed research programme would contribute to identification and eventually enhancement of TNCs – SMEs linkages in regional trajectories.

¹⁹ In the whole sub-population of small enterprises (with 10 to 49 employees), innovators and non-innovators, the share of firms involved in joint innovative projects was only 2,6%, While in the sub-population of very big firms (with more than 999 employees) – as much as 52,4%. *Innovation Activities in Industrial Enterprises in Poland in 1998-2000*. Central Statistical Office. Warszawa 2002. p. 138.

Table 8

Industrial enterprises in Poland having cooperation arrangements on innovation activities with other enterprises or institutions, 1998 – 2000, by type and location of cooperation partner as well as size of industrial enterprise

Location a – Poland b – abroad	Total number of enterprises	Industrial enterprises having cooperation arrangements with									
		Other enter- prises within the group	Compe- titors	Customers	Consultancy enterprises	Suppliers (1)	Higher education institutions	Scientific units of PAN (2)	Branch R&D units	Other R&D units - Polish and foreign	
Total	a	1224	357	71	274	116	455	341	66	482	167
	B	710	364	38	166	39	278	10	x	x	60
Small enterprises	a	376	152	19	117	10	155	71	12	106	38
	b	238	116	5	79	-	58	9	x	x	21
Medium enterprises	a	378	102	29	75	40	130	68	15	129	51
	b	204	120	16	37	10	78	1	x	x	13
Big enterprises	a	470	103	23	82	66	170	202	39	247	78
	b	268	128	17	50	29	142	-	x	x	26

Note. Size of enterprises by number of employees: small – 10 – 49, medium – 50 – 249, big – more than 249 employees.

‘(1) Suppliers of equipment, material, components or software. (2) Scientific units of the Polish Academy of Sciences.

Source: own presentation, based on *Innovation activities in industrial enterprises in Poland in 1998-2000*. Central Statistical Office. Warsaw 2002.

Table 9 Industrial enterprises in Poland having cooperation arrangements on innovation activities with other firms or institutions, 1998–2000, by type and location of partner and by region of Poland

Location a – Poland b – abroad	Total number of enterprises	Industrial enterprises having cooperation arrangements with									
		Other enter-prises within the group	Compe- titors	Customers	Consultancy enterprises	Suppliers (1)	Higher education institutions	Scientific units of PAN (2)	Branch R&D units	Other R&D units (3)	
Poland, total	a	1224	357	71	274	116	455	341	66	482	167
	b	710	364	38	166	39	278	10	x	x	60
Dolnośląskie	a	84	36	3	21	9	27	27	4	36	11
	b	55	39	2	6	4	16	3	x	x	5
Kujawsko- Pomorskie	a	97	33	2	21	10	36	18	2	41	9
	b	36	14	2	16	3	7	-	1	x	2
Lubelskie	a	46	6	1	12	-	23	7	1	19	10
	b	11	4	2	1	1	7	-	x	x	1
Lubuskie	a	30	8	1	8	4	13	11	1	11	1
	b	21	9	5	7	2	11	-	x	x	-
Łódzkie	a	73	20	3	8	14	23	23	8	35	13
	b	36	17	3	8	4	19	-	x	x	1
Małopolskie	a	122	27	13	31	11	49	36	3	38	9
	b	35	15	1	6	1	16	-	x	x	3
Mazowieckie	a	155	49	6	31	11	47	52	9	53	39
	b	114	49	4	37	6	43	6	x	x	17
Opolskie	a	33	7	5	9	5	14	10	3	15	8
	b	19	6	-	2	2	10	-	x	x	1
Podkapackie	a	56	16	1	7	6	13	20	3	27	4
	b	20	11	3	10	1	11	-	x	x	1
Podlaskie	a	29	9	1	9	1	12	3	-	6	3
	b	11	6	-	-	=	5	-	x	x	1
Pomorskie	a	50	10	3	7	14	17	19	3	28	5
	b	52	38	3	6	2	11	-	x	x	1
Śląskie	a	211	46	8	57	12	82	56	14	98	28
	b	84	47	5	12	4	40	-	x	x	10
Świętokrzyskie	a	59	20	8	12	3	30	14	2	18	7
	b	38	20	-	1	5	21	-	x	x	7
Warmińsko- Mazurskie	a	46	33	2	9	3	19	3	2	11	1
	b	30	21	1	9	1	13	1	x	x	2
Wielkopolskie	a	108	31	12	30	12	40	37	8	36	15
	b	121	56	6	45	3	32	-	x	x	7
Zachodnio Pomorskie	a	25	6	2	2	1	10	5	4	10	4
	b	27	12	1	-	-	16	-	x	x	1

Note. Size of enterprises by number of employees: small – 10 – 49, medium – 50 – 249, big – more than 249 employees.

(1) Suppliers of equipment, material, components or software. (2) Scientific units of the Polish Academy of Sciences. (3) Other R&D units – Polish and foreign.

Source: own presentation, based on *Innovation activities in industrial enterprises in Poland in 1998-2000*. Central Statistical Office. Warsaw 2002.

4. Management of Knowledge and Social Capital

In order to examine future challenges resulting from the possible impact of KBE development on strategic planning in a company (regardless – for a while - a company size) it would be useful to refer to fundamentals of knowledge management in the global networked business environment. .

4.1 Virtual Enterprises as Signs of KBE

Computers played a role of an ‘improved *abacus*’ for a long time. When this stage was finally crossed and the computer itself became a device as popular as a radio or television set, the nets under the guidance of Internet were created. They enabled the direct and teal time personal contact among people, institutions, enterprises even if they were thousands of kilometers away. Together with the Internet the new – virtual – possibilities of creating and operating the business appeared. It is important to underline the fact that they were still strongly settled in the reality.²⁰ An example of a virtual firm refers to a business service provider (Box 2).

Box 2. PeopleSoft and Real-Time Enterprises

Operating in real time gives immediate business visibility and responsiveness. Customers will be more satisfied, employees more productive and suppliers more efficient. Ultimately, business becomes more profitable.

PeopleSoft is the world’s leading provider of application software for The Real-Time Enterprise. PeopleSoft pure Internet software enables organizations to reduce costs and increase productivity by directly connecting customers, suppliers, partners and employees to business processes on-line, in real time. PeopleSoft’s integrated best-in-class applications include Customers Relationship Management, Supply Chain Management, Human Capital Management, Financial Management and Application Integration.

Real-time enterprises move business processes to the Internet and extend them directly to the people who need them – customers, suppliers, business partners and employees. Intermediates are removed. Accuracy is improved. Satisfaction is higher.

Every organization will have to operate in real time. Operating in real time saves tremendous costs. It significantly increases productivity. Organizations are realizing dramatic performance benefits today as they move their businesses to operate in real time.

A fundamental shift appears in the way business operates. The Real-Time Enterprise transforms the way business is done. Business processes become immediate. All relevant information is constantly monitored. And response to business change is instant.

Source: <http://www.peoplesoft.com>

This said, it is proper to comment on localization of business partners. Today the expression “firms doing business in a certain country” refers also to enterprises present in the Internet. This is the reason for quoting here business advice of a virtual firm known only from its Internet domain address, which appeared at the first place in response to a search for key words “knowledge management” at the end of June, 2003 (Box 3). So, the 12 imperatives for a Real-Time Enterprise might refer to any company including *e-business* in its strategy.

²⁰ Grudzewski W.M. Hejduk I.K. *Virtual Enterprise (Przedsiębiorstwo wirtualne)*. Difin. Warszawa 2002. p. 192. See: Piątkowski M. *Does ICT Investment Matter for Growth and Labor Productivity in Transition Economies?* TIGER Working Paper Series. No. 47. 2003.

Box 3. The 12 Imperatives for a Real-Time Enterprise

1. Standardize business processes.
2. Pure Internet Architecture.
3. Minimize customization.
4. Hold software vendors accountable.
5. Accommodate multiple databases.
6. Highly scalable applications.
7. Multilingual, multicurrency.
8. Interoperability among vendors.
9. Embedded business analytics.
10. Few vendors, broader product lines.
11. Change management.
12. Strong C.I.O.

Source: http://www.peoplesoft.com/corp/en/ent_strat/articles/12imperatives.jsp by Craig Conway, President and CEO, PeopleSoft.

It is needless to add that an “*e-approach*” to contemporary business requires not only contemporary, but future-oriented entrepreneurship, which, in turn, requires innovative learning as an opposite to maintenance learning. This enables *treating the future not as an enemy, but as a friend*, apart from reservations on lack of précised goals made towards innovation learning.²¹ Moreover, innovation learning, combining anticipation with participation, is crucial for managerial education and training. This approach is widely presented verbally, though equally widely ignored in business processes.²² It may prove useful to recall here a saying “learn or perish”, addressed – among others – to companies’ managers dealing with strategic planning.

In the knowledge-based economy, managerial innovative learning is a precondition for capabilities to communicate²³, that is to say – in the input-output perspective - to contribute to creation and to gain benefits from social capital. These capabilities, in turn, should be regarded as precondition for creating innovative clusters.²⁴

4.2 Social Capital, TNCs and SMEs Strategies of Rivalry and Cooperation

Social capital is defined as the application or exercise of social norms of reciprocity, trust and exchange for political or economic purposes.²⁵

Social capital is also described as the total stock of a society’s productive assets; including those that allow the manufacture of the marketable output that creates private-sector profits, and those that create non-marketed outputs, such as defense and education.

²¹*No Limits to Learning. Bridging the Human Gap*. The Report to the Club of Rome. PWN. Warszawa 1982. See also: Kupisiewicz Cz. *Paradygmaty I wizje reform oświatowych*. Wydawnictwo Akademickie “Żak”. Warszawa 1999. p. 184 – 211.

²² See: Wawrzyniak B. *Od koncepcji do praktyki zarządzania wiedzą w przedsiębiorstwie*. [w:] Zarządzanie wiedzą w przedsiębiorstwie. Materiały na konferencję. Polska Fundacja Promocji Kadr. Wyższa Szkoła Przedsiębiorczości i Zarządzania im. L. Koźmińskiego. Warszawa 2001.

²³ See: Collin S. *Internet w biznesie. Nowe perspektywy rozwoju (Doing Business in the Internet)*. Poltext. Warszawa 1998. Vassos T. *Strategie marketingowe w Internecie (Strategic Internet Marketing)*. Studio Emka. Warszawa 1999. Colecchia A. Schreyer P. *The Contribution of Information and /Communication Technologies to Economic Growth in Nine OECD Countries*. OECD Economic Studies. No. 34, 2002/1. pp. 153 – 172.

²⁴ See: Porter M.E. *The Competitive Advantage of Nations*. Free Press. London 1990. pp. 131 – 175.

²⁵ Cooke P. *Social Capital, Embeddedness and Regional Innovation*. Centre for Advanced Studies. Cardiff University. June 2003. p. 2.

Furthermore, capital means assets which are capable of generating income and which have themselves been produced. In more general usage, capital enhances any asset or stock of assets – financial or physical – capable of generating income.²⁶ So, in terms of economics and not only sociology, the social capital is also expected to generate income.²⁷

Empirical evidence of social capital importance for economic growth, indirectly referring to the knowledge-based economy, can be found in collective and individual papers concluding general research projects in the OECD countries²⁸ as well as detailed research of e.g. SMEs place in social capital in a sample of the EU member states.²⁹

Embeddedness of SMEs is important i.e. in providing initial support, including financial support for business development, needed complementing by autonomy for development beyond a highly circumscribed scale to be feasible. *Autonomy* of SMEs means exercising the social capital involved in non-local professional, industrial or social networks.

This evolution from embeddedness to autonomy allows four key kinds of social capital to be exercised (Box 4):

- integrity – by activating reputation resources associated with membership of a professional association,
- integration – continued community benefits at low or no cost, deriving from embeddedness by activated through expressing autonomy,

²⁶ Bannock G. Baxter R.E. Davis E. *Dictionary of Economics*. The Penguin Books. 1987.

²⁷ Compare: Woessmann L. *Specifying Human Capital*. “Journal of Economic Surveys”. Blackwell Publishing. Vol 17. No. 3. July 2003. A review of the measures of the stock of human capital used in empirical growth research – including adult literacy rates, school enrollment ratios and average years of schooling of the working-age population – reveals that human capital is mostly poorly proxied. (Abstract).

²⁸ See: Temple I. *Growth Effects of Education and Social Capital in the OECD Countries*. OECD Economic Studies. No 33, 2001/2. pp. 57 – 101.

²⁹ See: Cooke P. *Social Capital, Embeddedness and Regional Innovation*. Centre for Advanced Studies. Cardiff University. June 2003.

Box 4. Social capital kinds' features

Referring to the forms of social capital relevant to business practice and performance it is plain that integrity involves modest financial cost, but represents major personal human capital investment, and by virtue of rights to practice professionally, considerable economic opportunity. There is, at bottom, an interaction based on performance and “competence trust”, that is better characterized as a “traded” rather than an “untraded interdependence” in professional membership.

Integration, it can be argued, involves no membership fees and gives access to benefits (like pathways to modest amounts of cheap investment capital, or “proximity capital”, which can also include free business advice, openings to customers, etc.). Trust, based on community “goodwill” means some benefits are “untraded”, but if a cheap loan has to be repaid, its very cheapness may make it “wholesale” not “retail” but it is scarcely “untraded” either. So, this is the most hybrid form, nearest in spirit to “true” social capital, but containing important aspects of “traded” if not “arm’s length exchange”. The latter is more normal in network relationships, even when these are preferential, as for example, in networks of preferred suppliers in a value chain relationship. Buying and selling proceed albeit among economically “significant others”. *Trust, especially of the reputation or goodwill kind, is the key form taken by relational embeddedness, and the consequent social capital contributes significantly to the dynamic capabilities of the firm.*

Nevertheless, regular and long established network relationships among industry or professionally based SMEs consistently display *traded* interdependencies. Respondents typically find it hard to think of occasions on which network interactions do not involve financial transactions. When they do remember non-pecuniary interactions, often after considerable prompting, they either devolve into “advice”, as when new legislation or standards affect an industry and entrepreneurs seek pointers from one another as to how to deal with the changes, or rarely, interactions involve favours. A favour is seen as going beyond normal practice by, for example, performing an action that may be neither in nor against the immediate interest of the favour-provider. The action may not be expected to be reciprocated, because it may be outside the “convention set” of the favour-provider. However, some more conventional future favour exchange is not ruled out. So, linkage is also a strongly *traded* interdependency, but not without fragmentary “untraded” elements.

Finally, synergy is almost always “rent seeking” practice in the sense of a direct bid for government funding support, such as an investment grant or indirect, where the apparent gift of advisory time and resource is expected to result in some pecuniary or otherwise valuable reward. Good examples of the latter are not only political honors but also policy changes that result in lower taxation or preferential government contracts for firms whose owners make personal financial contributions to a political party in government.

Source: Cooke P. Social Capital, Embeddedness and Regional Innovation. Centre for Advanced Studies. Cardiff University. June 2003.

- linkage – membership of local and non-local networks by virtue of assets deemed to be of consequence to the interests of these,
- synergy – capabilities to link also to governance bodies, including government programs and policies.

Given that interesting and suggestive evidence for the importance of social capital has been compiled, further research on social capital appears to have a bright future. To live up to this promise, however, there are at least two potentially difficult questions that will need to be addressed. The first question concerns the origins and formation of social capital, the second, the precise mechanisms by which social capital, once formed, gives rise to particular

microeconomic and macroeconomic outcomes. It may seem that social capital resists the usual methods of analysis of economists, given that it is usually understood to be a property of groups rather than individuals. It will also be very difficult to discriminate between alternative theoretical models using macroeconomic data, and the prospects for further cross-country empirical research appear limited. Studies based at the level of firms or regions may ultimately be more informative.³⁰

Furthermore, enhancing the competitiveness of SMEs through linkages implies relationships with TNCs. The ability of SMEs to compete in the global market place depends on their access to certain critical resources, the most important of which are finance, technology and managerial skills. TNCs have been an important means for SMEs to gain access to new technologies and management know-how. The shift in corporate production strategies from simple integration to more complex integration has widened the opportunities for SMEs, while at the same time raised the requirements to entering TNCs networks. The current challenge for developing countries as well as for most of countries in transition is first to adopt policies to deepen the developmental effects of FDI by attracting TNCs willing to forge such linkages and then - to undertake measures to promote such linkages with SMEs.³¹

This said, we can quote a comment on capabilities of business sector to develop and implement strategies of cooperation in the field of R&D. There are at least three factors attracting TNCs to develop their R&D activities in host countries:³²

- innovation activities experience in local enterprises,
- skilled workforce / qualified human capital,
- dispersed and recognized cooperation culture in business.

The above quoted considerations refer directly to innovative companies contributing to development of knowledge-based economy. Similar findings appeared in regional case studies³³, but two observations might prove especially valuable for directing the future research in general, and particularly the research programme proposed in this study.

The first observation concerns “myths about knowledge management”, such as:

- *knowledge management = information system,*
- *technology may replace face-to-face contacts,*
- *build a system and everybody will enthusiastically begin to use it.*

These expressions again draw our attention from pure economic or financial indicators to soft or invisible assets as well as to emotional and interpersonal sphere of business and also to social capital at the microeconomic level. In order to summarize this section with a pragmatic phrase, we decided – instead of relating past research projects in detail – to move forward and quote one of tools for social capital analysis, applied lately by Prof. Phil Cooke (Table 10).

³⁰ Temple I. *Growth Effects of Education and Social Capital in the OECD Countries*. OECD Economic Studies. No 33, 2001/2. pp. 88 – 89..

³¹ *Enhancing the Competitiveness of SMEs through Linkages*. Executive Summary. UNCTAD. TD/B/COM.3/EM.11/2. 27 Sept. 2000.

³² Woodward R. *W jaki sposób bezpośrednio inwestycje zagraniczne (BIZ) wspomagają proces rozwoju gospodarczego?*. [w:] *Innowacyjność polskiej gospodarki*. [red:] M.Górzyński, R.Woodward. Zeszyty Innowacyjne CASE. Warszawa, styczeń 2003. s. 43-44.

³³ Dąbrowski J. Koładkiewicz I. *Praktyki innowacyjne polskich przedsiębiorstw*. Wyższa Szkoła Przedsiębiorczości i Zarządzania im. Leona Koźmiskiego. Warszawa 1998. pp. 144 – 159.

Table 10

Forms of Social Capital and Typical Trading Relations of SMEs

Trading Relations Forms of Social Capital	Spot-trading	Formal Contract	Informal Contract	Project
Low Social Capital	<i>NAMES OF IDENTIFIED FIRMS (SMEs)</i>			
Vulnerable Social Capital				
Infrequent High Trust				
Frequent, Traded Social Capital				

Source: Cooke Ph. Social Capital, Embeddedness and Regional Innovation. Centre for Advanced Studies. Cardiff University. June 2003.

The second observation refers to justification of combining innovation activities with social capital. Knowledge-intensive businesses are more engaged in social capital relations than average, though such networks are by no means confined to regional or local scales. Furthermore, innovative firms of whatever the sector background are also higher users of social capital and reveal better growth performance than non-innovators. Finally, firms in less favored regions are high users of social capital, even though that does not necessarily transform into high performance, except if they are innovative.

5. The Development of Knowledge-Based Economy in Europe: The Strategic Challenges of the XXI Century – A Grand European Research Programme

5.1 Introductory Remarks

In the latest publication of the European Commission³⁴ we find the following formulation:

“Europe’s leaders already acknowledge that the transition towards a knowledge-based economy involves a fundamental structural change, and that all the challenges facing Europe need to be reconsidered in the light of this new paradigm. At the Lisbon European Council of March 2000, they adopted a new strategic goal to transform the Union by 2010 into ‘the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion’. However, in this transition to a knowledge-based economy, Europe is already lagging somewhat behind the US, and can learn a lot from the US experience. The aim should not be to imitate the US, but rather to seek to define the European way to the knowledge-based economy. As the Lisbon Conclusions state: ‘The Union must shape these changes in a manner consistent with its own values and concepts of society.’ ”

5.2 The Research Programme

To our mind – the construction of this new paradigm can be interpreted as a sequence of three following assumptions:

Primo – knowledge is changing itself into an integrated driving force of the development of the economy and society. The scope and scale of this process is unprecedented in historical experiences.

³⁴ *Third European Report on Science and Technology. Indicators – 2003.* Towards a knowledge economy. European Commission 2003, Brussels, p. 1.

Secundo – we see a powerful virtuous circle constructing the bridge mechanisms and the mechanisms of mutual enforcement linking the processes of the development of the knowledge based economy and the knowledge based society.

Tertio – the new paradigm will transform itself into a material power creating the strong Europe of the XXI century³⁵. In this transformation an important role is allocated to the mechanisms of integration of spontaneous and guided development.

In the already quoted publication we read³⁶:

“In other words, while there is reason to be optimistic about the huge potential benefits from developing human resources in combination with new technologies and new forms of organizations, one should, however, be aware that the knowledge – based society may not be sustainable if left to itself. Its effects on multiple fields must be dealt with through a multi-dimensional and combined effort at the European, national and regional level. Moreover, in different areas Europe is facing great challenges and also seems to be ill-prepared to adapt successfully to the rapidly changing landscape. Demographic, social and economic challenges need to be reconsidered in the light of this fundamental transition.”

In this context we should notice “the knowledge economy growth into knowledge society” and vice versa. The observation of P.A. David and D. Foray³⁷ is especially interesting:

“The knowledge economy’s growth into the knowledge society hinges on the proliferation of knowledge-intensive communities. These communities are basically linked to scientific, technical, and business professions or projects and, as said, are characterized by their strong knowledge production and reproduction capabilities, a public or semi-public space for learning and exchange, and an intensive use of information technologies. Only when increasing numbers of communities displaying those very characteristics are formed by citizens, users, and the uninitiated being brought together by a shared interest in a given subject, will the knowledge society really begin to develop. But the challenges outlined above are going to be all the harder to meet.”

The challenge of the new paradigm and the challenge of structural transformation is a grand dilemma not only for Europe but also of the European Union. This grand institution must be transformed very deeply³⁸ to change itself into a real driving force of the new paradigm. The Union must follow the ancient suggestion – *Medice cura te ipsum*.

* * * * *

The emergence and development of the new paradigm is a challenging field for theoretical reflection, empirical studies and pragmatically oriented policies at the European, national and regional level. This field should be designed and implemented as network of grand European research programmes – “*The development of knowledge based society and economy in Europe*”. To start this process in the scale of enlarged European Union we propose a set of three research trajectories.

The first set – is related to the diagnostic analyses of the experiences of four international organization – the European Union, OECD, the World Bank, and the United Nations.

³⁵ Kukliński A. Skuza B. [eds] *Europe in the perspective of global change*. Polish Association for the Club of Rome. Warsaw, 2003.

³⁶ *Third European Report on Science and Technology ... op.cit.*, p. 4.

³⁷ David P.A. Foray D. *An Introduction to the Economy of the Knowledge Society*. “International Social Science Journal”.. no 171, March 2002. Compare also: Muller K. *KBS and its socio-cultural pattern. The situation of postsocialistic countries* [in:] A. Kukliński [ed.] *The Knowledge based economy*. Warsaw 2000.

³⁸ Compare: Kukliński A. *The First Pillar of the European Union*, [in:] A. Kukliński, B. Skuza [eds] *Europe in the perspective of global change*. Warszawa, 2003.

The second set – is related to the experiences of four old members of the European Union – Germany, United Kingdom, Netherlands, and Sweden and to the experiences of four Visegrad countries – new members of the Union – Czech Republic, Hungary, Slovakia, and Poland.

The third set – is related to the experiences of twenty two regions inside the eight countries listed above.

Following these assumptions the paper is organized along 3 trajectories:

- a) **the trajectory of four international organizations,**
- b) **the trajectory of eight countries,**
- c) **the trajectory of twenty two regions.**

a) The trajectory of four international organizations

“In the field of empirical social sciences there are four most important Institutions on the global scale: The United Nations, OECD, the World Bank and the European Commission. The influence of these Institutions on the development of social sciences is just immense not only in financial terms or in policy-oriented outputs; the methodology of large-scale comparative empirical studies is constantly developed in the framework sponsored by International Organizations. The analysis of the role of International Organizations in the development of social sciences is the topic of highest urgency.”³⁹

The comprehensive activities of these four organizations have contributed in a very creative way to the emergence of the new field of knowledge based economy and to a lesser extend to the new field of knowledge based society.

These contributions can be seen in three perspectives:

- 1) **the theoretical and conceptual reflection,⁴⁰**
- 2) **the empirical studies and monitoring process,⁴¹**
- 3) **the pragmatically oriented activities and especially the advisory missions.⁴²**

The contribution of the four international organizations are a natural strong point for the proposed European Research Programme.

b) The trajectory of eight countries

The eight countries represent a good sample of the European scene in the field of KBE and KBS. We find a proper representation of different levels of development, different scales and different orientations in relation of the welfare state.

We have already good examples in the field of comparative economic analysis⁴³ which can be easily extended using the rich materials of the World Bank, OECD and the European Union. It is more difficult to start and implement comparative studies related to the development of KBS.⁴⁴

³⁹ Kukliński A. *The development of social sciences* [in:] A. Kukliński, W. Orłowski [eds] Knowledge-based economy. The global challenge of the XXI century. Warsaw. 2000.

⁴⁰ Kukliński A. Orłowski W. [eds] *Knowledge-based economy ...*, op.cit.

⁴¹ *OECD – Science – Technology – Industry. Scoreboard 1999.* OECD, 1999.

⁴² Kukliński A. *Knowledge based economy. The global mission of the World Bank.* [in:] A. Kukliński, B. Skuza [eds] ... op.cit. Aubert C. J. *China and the knowledge based economy.* The World Bank, Washington D.C. 2001

⁴³ Mroczek W. *Trends in Trade in High-Technology. Products in eight European Countries* [in:] A. Kukliński [ed.] *The knowledge based economy in Europe.* Warsaw – Konstancin, August 2001.

⁴⁴ Compare however: K. Muller. *KBS and its socio-cultural ...* op.cit.

c) The trajectory of twenty two regions

In the development of KBE and KBS the regional trajectory is very important. The region is an efficient framework for an effective interaction of three communities creating KBE and KBS:

- 1) the business community**
- 2) the academic community**
- 3) the community of public authorities (self-governmental and governmental)**

Following *inter alia* the contributions of G. Eliasson⁴⁵, A. Kukliński⁴⁶ and Z. Chojnicki and T. Czyż⁴⁷ - we can outline a pattern of analysis to be applied in the inquiry of twenty two regions – four region in each of the three bigger countries – Germany, United Kingdom and Poland – and two regions in each of the smaller countries – Sweden, Netherlands, Hungary, Slovakia, and the Czech Republic. The regional trajectory can find comprehensive methodological and empirical interpretations in the numerous publications of OECD.⁴⁸

5.3 Concluding Remarks

The proposed Grand European Research Programme (4+8+22) should create a valid framework to answer the following fundamental questions:

- 1) To what extent the Lisbon agenda is a paper tiger or a real factor transforming the European reality?**
- 2) How to analyze, monitor and guide the crucial processes:**
 - “the knowledge economy growth into knowledge society”
 - “the knowledge society growth into knowledge economy”

This question is a real challenge for a broad coalition of broad interdisciplinary and multidisciplinary studies.

- 3) How to integrate the mechanisms of spontaneous and guided change of KBE and KBS at the European – national – and regional level?**
- 4) How to promote the dissemination of best practices in Europe in the field of KBE and KBS?**

We still have a long way to go in the design and implementation of the proposed Grand Programme. We hope, however, that the first step on this way is already accomplished.⁴⁹

⁴⁵ Eliasson G. *Global economic integration and the regional attractors of competence*. Stockholm. 2000.

⁴⁶ Kukliński A. *The development of knowledge-based economy in Europe. The regional trajectory*. “Geographia Polonica”, Vol. 75. Spring 2002.

⁴⁷ Chojnicki Z. Czyż T. *Poland on the road to knowledge based economy. A regional approach* [in:] R. Domański [ed.] *Recent advances in urban and regional studies*. Warsaw. 2003.

⁴⁸ Compare: OECD – *Territorial Outlook – Territorial economy*. OECD, Paris. 2001.

OECD – *Cities and regions in the New learning Economy*. Education and Skills. OECD, Paris. 2001. Especially important in these publications is the interpretation of theoretical reflections, empirical studies and policy-oriented recommendations.

⁴⁹ Europe is a deeply differentiated continent defined by pluralistic history and a pluralistic future. In this framework the development of KBE and KBS in Europe should be analyzed as a set of trajectories related to different path-dependency and different strategies for the future.

6. Conclusion

1. Since the mid-90., the expression *Knowledge-Based Economy (KBE)* has undergone an evolution from a topic of international research to policy recommendations and global competitive strategies. International organizations of the global reach have decided to monitor the cultural, sociological, technological and economic phenomenon of the KBE. The monitoring of the KBE results in a series of rankings, scoreboards and scorecards illustrating *the State-of-the-Art* in developing KBE. Nations have been compared with each other by not only the number of patents, but also by the rate of growth of number of patents, just like in a case of any other economic indicator. Consequently, nations not only try to, but must cope with the technological challenge. Poland joins the European Union “15” in 2004. In this multicultural society of nations, Poland also undertakes efforts to – first of all – create, and then - implement and monitor - the country strategy and policy instruments. The actions would be focused on keeping the pace with the international challenge of the KBE development, lately better known as implementation of the Lisbon Strategy. The performance of the Lisbon Strategy takes place at the business level in the form of strategies of particular enterprises.
2. In order to meet the KBE challenges, governments’ policies and firms’ strategies would be knowledge-based and refer to comparative studies, i.e. reports prepared by OECD and UN ECE. Benchmarking would produce “best practices”, but results of such studies need to be feasible for particular countries and firms, including firms based and active in networks as virtual businesses. The requirement of paying local taxes means that policies and strategies will not be just copied, but rather “made-to-measure” – to meet requirements of all actors in the competitive Knowledge-Based Economy.
3. Indicators in the Knowledge Assessment Methodology (*KAM*) exercise for the sample of 8 European countries illustrate the more uniform process of the KBE development in four EU member states: United Kingdom, Sweden, Netherlands and Germany than in Czech Republic, Hungary, Poland and Slovakia. In the EU accession countries this process has been concentrated more on education or institutional business environment and less - on innovation system or information infrastructure. Openness of the economy has been the common feature of all the 8 countries; such a path of development implies an unprecedented competitive challenge for Knowledge-Based Economies in transition and in shortage of local financial capital, with special regard to venture capital.
4. Social capital – defined as the application of social norms of reciprocity, trust and exchange for political or economic purposes – has been widely investigated neither in Visegrad countries, nor in other countries of Central and Eastern Europe. However, social capital must be regarded as the value complementing and not substituting financial capital. The shortage of local financial – venture - capital implies massive foreign direct investment performed predominantly by transnational corporations. TNCs would develop their R&D activities in host countries provided experienced local firms could absorb management, product and process innovations. The more social capital has been accumulated, the more chances to meet these international challenges. TNCs stimulate local social capital, but the scope of corporate social responsibility is conceptually quite unbound at the present time. These elements of business environment limit strategic choices of host countries’ SMEs in promoting local mergers and/or acquisitions as well as exploiting their competitive advantage of social capital in cooperation with TNCs.

5. Within the framework of the proposed research programme attention would be paid to the structure of knowledge-related investments resulting in tangible and intangible capital formation, which is performed on a country level as well as on a regional level. The proposed international research programme would refer – in particular – to developing the Knowledge-Based Economy in the regional dimension. This precise approach has been widely justified, at least, by:
- interdependent functioning of local, regional, country and international firms of various sizes, however, with regard to the interplay between TNCs and SMEs,
 - the local and regional nature of creating social capital,
 - interdependent growth of the Knowledge-Based Economy and the Knowledge-Based Society.

References

- Andersson T. [2001] *On the Knowledge-Based Economy*. [in:] The Development of Knowledge-Based Economy in Europe. The Initiative 4+4+2. [ed.] A. Kuklinski. The Expert Meeting. Konstancin – Poland. 7th – 10th June.
- Anuja Adhar Utz. [2001] *The Knowledge Assessment Methodology*. ECA Staff Training. Program on *Knowledge for Development*. World Bank Institute.
- Baruk J. [2002] *Innovations, innovation culture and innovation level in industrial companies*. “The National Economy”. No. 11-12.
- Benchmarking National Research Policies. The Impact of RTD on Competitiveness and Employment (IRCE)*. [2002] A STRATA-ETAN Expert Group Report. European Commission. Brussels.
- Błaszczuk D. [2002] *Optymalizacja zarządzania ryzykiem*. „Zarządzanie Ryzykiem”. Nr 11. Instytut Zarządzania Ryzykiem. Wyższa Szkoła Ubezpieczeń i Bankowości. Warszawa/
- Budowanie potencjału konkurencyjności przedsiębiorstwa*. [1999], [red:] M. J. Stankiewicz. TORUS. Toruń.
- Burzyński W. [2002a] *Innovation-oriented policy and export competitiveness*. [in:] Foreign Economic Policy of Poland 2001-2002. [ed.] J. Kotyński. Foreign Trade Research Institute. Warsaw.
- _____ [2002b] *Instrumenty pomocy horyzontalnej dla przedsiębiorstw. Pomoc publiczna na prace badawczo-rozwojowe*. [w:] wskazanie najbardziej efektywnych i skutecznych instrumentów pomocy publicznej dla przedsiębiorstw ... [ed.] T. Smuga. Foreign Trade Research Institute. Warszawa.
- _____ [2003a] *The Lisbon Strategy and Opportunities for innovation-oriented development of Polish economy and enhancing export competitiveness*. [in:] Foreign Economic Policy of Poland 2002-2003. [ed.] J. Kotyński. Foreign Trade Research Institute. Warsaw.
- Burzyński W. Karpińska-Mizielińska W. Smuga T. [2003b] *Wpływ pomocy publicznej na konkurencyjność przedsiębiorstw*. „Gospodarka Narodowa”. Nr 3.
- Burzyński W. Kukliński A. [2003c] *The Development of Knowledge-Based Economy in Europe: The Regional Trajectory – Model 4+4+4+22*. Paper on the conference “The Knowledge-Based Economy in Transition Countries”. School of Slavonic and East European Studies. University College London. April.
- Calak R. Jahns H. [2003] *The National Development Plan 2004-2006*. “European Communities” no. 5 (140). Foreign Trade Research Institute. Warsaw. May.

- Central Europe in Transition: Towards EU Membership*. [2001] Regional Studies Association. Warsaw.
- Cleaver K. [2002] *A Preliminary Strategy to Develop Knowledge Economy in European Union Accession Countries*. Working Paper. World Bank.
- Colecchia A. Schreyer P. [2002] *The Contribution of ICT to Economic Growth in Nine OECD Countries*. OECD Economic Studies. No.34.
- Comparative Studies on development of the Knowledge-Based Economy in Poland and other European countries*. [2001] [ed.] J.Kotyński. Foreign Trade Research Institute. Warsaw.
- Cooke P. [2003] *Social Capital, embeddedness and Regional Innovation*. Centre for Advanced Studies. Cardiff University. June.
- Czyżewski A. Góralczyk-Modzelewska M. Saganowska E. Wojciechowska M. [2003] *Regionalne zróżnicowanie kapitału ludzkiego w Polsce*. Zakład Badań Statystyczno-Ekonomicznych GUS. Warszawa.
- Dahlman C. [2002] *The Knowledge Economy: Implications for Poland*. World Bank Institute.
- David P.A. [1995] *Science Reorganized? Post-Modern Visions of Research and the Course of Success*. All Souls College, Oxford & Stanford University.
- David P.A. Foray D. [2002] *An Introduction to the Economy of the Knowledge Society*. "International Social Science Journal". No. 171.
- Dalanu D. [2002] *Is Catching Up Possible in Europe?* TIGER Working Paper Series. No. 19.
- Dąbrowski J. Koładkiewicz I. [1998] *Praktyki innowacyjne polskich przedsiębiorstw*. Wyższa Szkoła Przedsiębiorczości i Zarządzania im. Leona Koźmiskiego. Warszawa.
- Drucker P.A. [2001] *The Age of Social Transformation - Emerging Knowledge Society and Entrepreneurship Society* [in:] The Essential Drucker.
- Eastern Promise. Innovation in Six Accession Countries*. [2001] "Innovation & Technology Transfer". No. 2/01. European Commission. March.
- Europe in the Perspective of Global Change*. [2003] In Memoriam of Professor K. Secomski. [ed.] A. Kukliński, B. Skuza. Warsaw.
- EU research performance: substantial progress but important challenges need to be addressed*. [in:] Third European Report on Science and Technology Indicators 2003. [2003] European Commission.
- Freeman C. [1992] *Economics of Hope. Essays on Technology, Change, Economic Growth and the Environment*. Printer Publishers. London.
- Gajek B. Talaga D. [2002] *Zarządzanie wiedzą w Polsce – bilans doświadczeń*. Szkoła Główna Handlowa. Warszawa.
- Globerman S. [1997] *Transnational Corporations and International Technological Specialization*. "Transnational Corporations". Vol. 6. No. 2. August.
- Gorzela G. [2001] *The regional dimension of Polish transformation: seven years later*. [in:] Gorzela G. [ed.] *Central Europe in transition: towards EU membership*. Regional Studies Association. Warsaw.
- Holly R. [2002] *Strategie zarządzania ryzykiem – postawy wobec ryzyka*. „Zarządzanie Ryzykiem”. Nr 11. Instytut Zarządzania Ryzykiem. Wyższa Szkoła Ubezpieczeń i Bankowości. Warszawa.
- ICT and Economic Growth. Evidence from OECD countries, industries and firms*. [2003] OECD.
- Indicator Systems for Political, Economic and Social Analysis*. [1980] [ed:] Ch.L.Taylor. Science Center. Berlin.
- Innovating Regions in Europe. RTTS/RIS Network*. [2000] European Communities.
- Key Figures 2002. Science, Technology and Innovation. Towards a European Research Area*. [2002] European Commission.
- Kotler Ph. [1994] *Marketing. Analysis, Planning, Implementation and Control*. Prentice Hall.

Kukliński A. [2001a] *Kreowanie gospodarki opartej na wiedzy: polska droga z perspektywy OECD*. w:] Zarządzanie wiedzą w przedsiębiorstwie. Materiały na konferencję. Polish Foundation for Management Promotion. Leon Koźmiński Academy of Entrepreneurship and Management. Warszawa.

_____ [2001b] *Science and technology in Poland at the turn of the centuries*. [in:] Gorzelak G. et al. [ed.] *Central Europe in transition: towards EU membership*. Regional Studies Association. Warsaw.

_____ [2001c] [ed.] *The Development of knowledge based economy. The initiative 4+4+2*. The Expert Meeting. Konstancin - Poland. 7th-10th June.

_____ [2002] *The Development of the Knowledge-Based Economy in Europe: The Regional Trajectory*. "Geographia Polonica", Vol. 75, *Local Economies and Globalization*. [1995] OECD/GD/95/129. Paris.

Nonaka I. Takeuchi H. [1995] *The Knowledge-Creating Company. How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press.

Okoń-Horodyńska E. [1998] *The National Innovation System in Poland*. The Academy of Economics. Katowice.

Piątkowski M. [2002] *The Institutional Infrastructure of the 'New Economy' and Catching-up Potential of Post-Socialist Countries*. TIGER Working Paper Series. No. 16.

_____ [2003] *Does ICT Investment Matter for Growth and Labor Productivity in Transition Economies?* TIGER Working Paper Series. No. 47.

Pomykalski A. [2001] *Zarządzanie innowacjami*. Globalizacja, konkurencja, technologia informacyjna. Wydawnictwo Naukowe PWN. Warszawa.

Porter M.E. [1990] *The Competitive Advantage of Nations*. The Free Press. London.

_____ [1996] *What Is Strategy?* Harvard Business Review. Nov.-Dec.

Progressive Equation: Globalization plus Welfare. [2000] "International Herald Tribune". Sept. 7th

Regional Assessment Report. Towards a Knowledge-Based Economy. [2002] Foreword by Brigita Schmoegnerova, Executive Secretary. UN ECE. UN. New York and Geneva.

Raising EU R&D Intensity. Improving the Effectiveness of the Mix of Public Support Mechanisms for Private Sector Research and Development. [2003] European Commission.

STI Scoreboard. Towards a Knowledge-Based Economy. [2001] OECD.

Sektor przedsiębiorstw wysokiej technologii w Polsce. [2000] Instytut Badań nad Gospodarką Rynkową. Gdańsk.

State Aid Scoreboard. [2003] Spring 2003 Update. European Commission. COM(2003)225 final. Brussels, 30.04.

Statistics on Science & Technology in Europe. 1985-1999. [2001] European Communities.

Temple J. [2001] *Growth Effects of Education and Social Capital in the OECD Countries*. OECD Economic Studies. No. 33, 2.

The Sectoral Operational Programme. Enhancing Competitiveness of the Polish economy, 2004-2006. [2002] and [2003] The Ministry of Economy, Labor and Social Policy. Warsaw.

The Social Responsibility of Transnational Corporations. [1999] UNCTAD. New York.

The Spatial Context of Technological Development. [2001] International Workshop on Innovation Clusters and Interregional Competition. Kiel University. 12-13 Nov.

Third European Report on Science & Technology Indicators. [2003] Studies: Towards a Knowledge-Based Economy. European Commission.

Towards a Knowledge-Based Europe. The European Union and the Information Society. [2003] European Communities.

Trewin D. [2002] *Measuring a Knowledge-based Economy and Society. An Australian Framework*. Discussion Paper. Australian Bureau of Statistics.

Wawrzyniak B. [2001] *Od koncepcji do praktyki zarządzania wiedzą w przedsiębiorstwie*. [w:] Zarządzanie wiedzą w przedsiębiorstwie. Materiały na konferencję. Polish Foundation for Management Promotion. Leon Koźmiński Academy of Entrepreneurship and Management. Warszawa.

Wiedza a wzrost gospodarczy. [2003]. Zienkowski L. [red.] Wydawnictwo Naukowe SCHOLAR. Warszawa.

Woessmann L. [2003] *Specifying Human Capital*. "Journal of Economic Studies". Vol. 17. No. 3.

World Investment Report 1995. Transnational Corporations and Competitiveness. [1995] UNCTAD. New York and Geneva.

World Investment Report 2000. Cross-border Mergers and Acquisitions and Development. [2000] UNCTAD. New York and Geneva.

World Investment Report 2001. Promoting Linkages. [2001] UNCTAD. New York - Geneva.

World Investment Report 2002. Transnational Corporations and Export Competitiveness. [2002] UNCTAD. New York and Geneva.

Zarządzanie wiedzą w przedsiębiorstwie. Materiały konferencyjne. [2001] Polska Fundacja Promocji Kadr. Wyższa Szkoła Przedsiębiorczości i Zarządzania im. L. Koźmińskiego. Warszawa.

Żółtowski T. [2003] *Analysis and Evaluation of Costs and Benefits of Poland's Membership in the EU in the Field of Research, Technological Development and Innovation*. [in:] Costs and Benefits of Poland's Membership in the European Union. Natolin European Centre. Warsaw.

Internet references

http://europa.eu.int/comm/competition/state_aid/legislation/.

http://europa.eu.int/comm/economy_finance/epc/documents/annexd_en.pdf.

<http://www1.worldbank.org/gdln/kam.htm>.

[file:///A/The Knowledge Assessment Methodology and Scorecards.htm](file:///A/The%20Knowledge%20Assessment%20Methodology%20and%20Scorecards.htm).

<http://www.mgpips.gov.pl>.

<http://www.peoplesoft.com>.