Building the knowledge society: The case of European Union new member states

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The purpose of the Lisbon Strategy (2000, 2005), adopted by European Union member states is to establish an inclusive, dynamic knowledge based economy, with sustained economic growth and full employment. The building of knowledge-based economy/society (KBE/S) is the major common objective of the European Union, which not only improves the competitive position of the EU in the global economy, but also significantly contributes to the integrating processes within the EU. The current situation of substantial divergence as in the capacity to implement the transition to the Knowledge Economy/Society among EU member countries, especially among the new member states and the old ones, is an important hindrance to the process.

The arguments presented in the paper can be summarised in three main areas, which should be improved to promote the creation of the knowledge-based economy/society in the EU:

(i) Lack of linkages between theory/policy and practice/implementation in several areas, including ICT diffusion and use, R&D investment and links with the business sector;

(ii) Enhancement of life-long learning which will improve the human resources capabilities and thus enable the transition to a knowledge economy

(iii) Improved flexibility and strengthening of the education system, including better links between university and business.

Key words: *KNOWLEDGE BASED SOCIETY, KNOWLEDGE BASED ECONOMY, S&T POLICY, NEW EU MEMBER STATES*

1. Introduction

Sustained economic growth in the current global economy depends on the development of successful strategies that involve sustained use and creation of knowledge at the core of the development process. Putting the continuous creation and application of knowledge at the centre of the economic development process, a national economy essentially becomes a Knowledge Economy. A Knowledge Economy (KE) is the one that utilizes knowledge as the key engine of economic growth. It is an economy where knowledge is acquired, created, disseminated and used effectively to enhance economic development (Chen and Dahlman, 2006).

The purpose of the Lisbon Strategy (2000, 2005), adopted by European Union (EU) member states is to establish an inclusive, dynamic knowledge based economy, with sustained economic growth and full employment. The building of the Knowledge-based economy is the major common objective of the Union[1], which not only improves the competitive position of the EU in the global economy, but also significantly contributes to the integrating processes within the EU. Yet the implementation process proved to be a difficult one: even the official documents of the EU recognised that "in this new economic order, Europe cannot compete unless it becomes more inventive, reacts

[1] Terminus technicus European Union (EU), Europe and Union are, in this text, understood as synonyms.

better to consumer needs and preferences and innovates more".[2] Basic hypothesis of this paper is that the historic enlargement with 10+2 countries makes the implementation of the Lisbon Strategy due to the large differences in the level of economic development among the old and new members[3] even more challenging. Yet for the viable future of the economic, social and political unity of the EU, progress towards knowledge society/economy is essential. This necessarily calls for specific attention to the areas where the gap between the new member states (NMS) and the old members, as well as the gap among them can cause delays in the building of the knowledge economy/society.

The transition to the knowledge-based economy/society (KBE/S) is not so much a technological issue, but above all, a development issue with strong economic, social and cultural dimensions (Stare and Bučar, 2001). Poor understanding of the complexity and development dimension of the transition towards KBE/S can be a detrimental factor leading to slower than desired transition. The changes requiring a set of much wider socio-economic measures and the coordinated activity of different actors are more difficult to achieve and their implementation is more time-consuming (Bučar and Stare, 2006).

Currently, NMS are poorly equipped for the transition towards knowledge economy, and that the transition itself is not treated with sufficient policy (political?) attention. Lagging behind of NMS can have long-term negative consequences for Europe as a whole, since the transition to knowledge economy/society is a prerequisite for convergence. Insufficient convergence in turn may lead to Europe of a two- tier or multi-tier economy (Radošević, 2004b) or to an even more wide spread "variable geometry" concept4 than currently practiced. This, in the end, can have both political and economic negative consequences for the EU.

The observation of the European Innovation Scoreboard (EIS) (2006) on convergence is a starting point for the analytical presentation of the conditions needed for Knowledge Based economy in relation to the existing capacities in New Member States, which constitutes the core of the paper. The EIS (2006) gives the following description of the EU current situation:

> *"... There is no possibility for short-term convergence ... Slovenia and Hungary will reach the EU25 average under current conditions by 2015, for some other NMS the catching up process would take more than 50 years...*
>
> This also means that it would take more than 50 years for the EU25 to catch up to the US level of innovation performance ..." (EIS, 2006:4).

Subacchi (2004:19) was even more pessimistic. She was projecting

> "*44 years for Czech Republic, 40 for Hungary, 55 for Poland and 80 for Romania to catch the EU25 average ..."*[5]

[2] Communication from the Commission to the Council, the European Parliament, the European economic and social committee and the Committee of the Regions "Putting knowledge into practice: A broad-based innovation strategy for the EU". COM (2006)502.

[3] The word *old members* describe the group of EU15 states, members of the EU after the last enlargement in 1995. On the other hand, the word *new members* (NMS) describe the group of states entered in the EU in 2004 and in 2007.

[4] Variable geometry concept has been introduced in certain policy (political?) areas (research and development, for example), where only interested countries could participate in certain joint EU activities instead of seeking for common support of all member states.

[5] The European Innovation Scoreboard (EIS) (2007) observed that "the United States of America (USA) and Japan are still ahead of the EU25 in terms of innovation performance, but the innovation gap between the EU25 and Japan, and in particular with the USA is decreasing" (2007:4). At the same time the EIS (2007:10) reports that "there is a *process of convergence* in innovation performance in Europe: the catching-up countries are closing the gap with the EU25 and both the innovation leaders and followers are experiencing a relative decline in their innovation lead with the EU25. This relative decline is a straightforward result of the rapid increases in innovation performance in the new member states".

Understanding these *facti brutti* is pertinent to examine how to overcome these differences and yet not endangering the EU's goal of being a knowledge-based economy/society (KBE/S). Basic indicators for the most important elements of KBE/S are presented to identify the gaps among European countries and between the EU and other global players. The article points out some of the problems that the EU is facing in the process of converging to a knowledge society. In conclusion, the paper gives some suggestions on how to accelerate the process, especially in NMS, to avoid further divergence in the EU and maintain a stable socio-economic model.

2. Creating a knowledge-based economy/society

Knowledge economy/society is defined as a vast growth of services and intangibles, wide diffusion of information and communication technologies, a more intensive use of knowledge and therefore more attention devoted to education and the quality of human resources and last, but definitely not the least important, innovation (Bučar, 2004:3). Even more complex is the definition provided by EU R&D Commissioner Potočnik, who quotes knowledge society as "an innovative and life-long learning society, involving a community of scholars, researchers, engineers, technicians, research networks, and firms engaged in research and in the production of high-technology goods and service provision. It forms an innovation-production system, which is integrated into international networks of knowledge production, diffusion, utilisation, and protection" (Potočnik, 2007a).

According to the World Bank, the four pillars of the KBE framework are:

• An *economic incentive and institutional regime* that provides good economic policies and institutions that permit efficient mobilization and allocation of resources and stimulate creativity and incentives for the efficient creation, dissemination, and use of existing knowledge.

• *Educated and skilled workers* who can continuously upgrade and adapt their skills to efficiently create and use knowledge.

• An *effective innovation system* of firms, research centres, universities, consultants, and other organisations that can keep up with the knowledge revolution and tap into the growing stock of global knowledge and assimilate and adapt it to local needs.

• A *modern and adequate information infrastructure* that can facilitate the effective communication, dissemination, and processing of information and knowledge (Chen and Dahlman, 2006:4).

Investments in the four knowledge-based economy pillars are necessary for sustained creation, adoption, adaptation and use of knowledge in domestic economic production, which will consequently result in higher value added goods and services. This would tend to increase the probability of economic success, and hence economic development, in the current highly competitive and globalized world economy.

The Lisbon Agenda from 2000 determined the strategic goal of the EU of becoming "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*"*.[6] The strategy for achieving the drawn goals included the following actions:

• *Preparing the* ***transition to a knowledge-based economy and society*** *by better policies for the information society and research and development (R&D), as well as by stepping up the process of structural reform for competitiveness and innovation and by* ***completing the internal market****;*

• *Modernizing the European social model, investing in people and combating social exclusion;*

• *Sustaining the healthy economic outlook and favourable growth prospects by applying an appropriate macro-economic policy mix*.

[6] (Lisbon) European Council, 23th and 24th March 2000, Presidency conclusions.

All official documents stress (stressed out means to be under a lot of stress, so stress out doesn't work here...it has to be just stress, meaning they focus on something.) the necessity to enhance the transition of the EU to a knowledge society, as a warrant for an adequate response to competition outside the EU. The knowledge-based society in the EU should be based on three interconnected pillars:

(i) Investments in Information and Communication technologies (ICT) and the creation of information society,

(ii) Research and innovation framework and

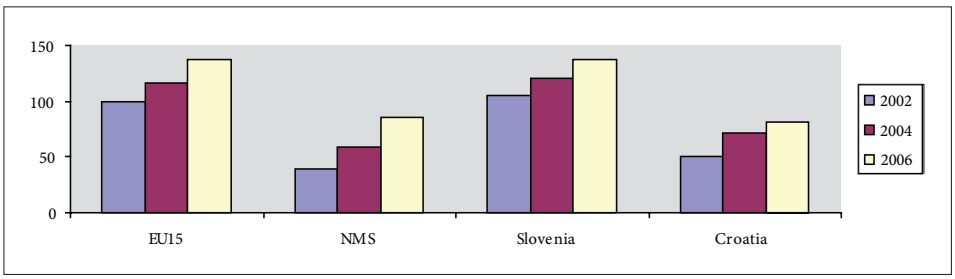
(iii) Education and Human capital (Kok[7] Report, 2004).

Each of the pillars will be examined in turn. However, it is believed that the fourth pillar on institutional regimes, identified by the World Bank is also highly relevant for NMS, but also for several other EU countries.

3. Developments in the area of information society

According to the Kok Report (2004:22), the benefits of the development of the ICT sector are underestimated in EU. Kok Report envisaged that the growth of e-activity is necessary for cutting costs and gaining comparative advantage towards other actors in the world economy. The diffusion of ICT has been cited for a long time as one of the areas where Europe lags behind the US (EIU, 2007; OECD, 2006). The promotion of e-activity should be supported by a comprehensive array of policies, promoting accessibility and usage of e-activities.[8]

Figure 1. Increase in internet access – households (EU15(2002)=100)



Source: Prepared based on EUROSTAT data, 2007; available at http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL (10th October 2007)..

The above figures show good aggregate data for NMS and EU15, but on the individual country basis, the data is not so satisfactory. In 2002, for example, Greece was the member state with the lowest level of household internet access with only 12 households (out of 100); on the other hand, in the Netherlands in 2002 more than 56 households had internet access. Four years later (in 2006) Greece doubled the number of households with internet access to 23, still being far below the EU27 average (49), leaving behind only Romania and Bulgaria. Among the NMS in 2006, Slovenia was at the first place, with the 54 internet household accesses out on 100. The problem that may arise in the

[7] The High Level Group Report is known as Kok Report, because Wim Kok, former Prime Minister of the Netherlands chaired this group of intellectuals and politicians that discussed the Lisbon Strategy and its effectiveness.

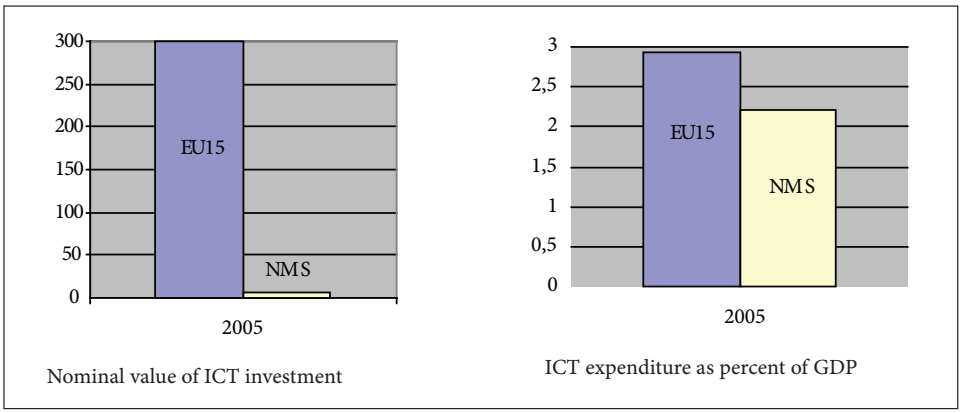
[8] More on business impact of ICT cf. Koutsoutos and Westerholt, 2005.

interpretation of the data on household internet access is equalising the access to the internet with the usage of the internet. Gaspar and Bogdanowicz (2007:399) explain that "the number of internet users is usually much higher than the number of households with internet access" and consequently equalising both groups (users and owners) is misleading.

In the field of the broadband lines, the situation is similar. The number of broadband lines subscribed in the percentage of the population was, in 2006, 23% in EU15 and 8% in the NMS. The availability of broadband lines has tripled in the period 2002-2006 in EU15, and in the NMS almost quadrupled. The lower multiplication of broadband networks in EU15 that in NMS can be attributed to the fact that the "broadband technology started to be deployed more actively in the EU15 since the early 2000, but in NMS gained popularity only after the 2003" (Gaspar and Bogdanowicz, 2007:399).

However, even though there are some steps in the right direction, the situation does not reflect the declarative promises. Several measures for more wide spread use of the broadband were proposed by the *Communication of the Commission – eEurope 2005* (COM (2002)263), but as observed in the Kok Report, the effect was limited. Consequently, the Kok Report (2004:22) argued that it was necessary to boost the broadband to at least 50%, if EU would like to promote ICT usage and reap benefits from these technologies.[9] At the same time, the Kok Report suggested that "more has to be done to bring down broadband access prices and to stimulate demand, and accelerate the roll-out of broadband networks, especially in rural areas" (Kok Report, 2004:22). [10]

Figure 2. ICT expenditure as percent of GDP and nominal value of ICT investment (in million €)



Source: Prepared based on EUROSTAT data, 2007; available at http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL (10th October 2007).

While access to ICT is important, at least as much attention needs to be devoted to the application of new technologies both by individuals as well as by the corporate sector. Here, too, the

[9] For more see the EC Staff Paper "Effects of ICT production on aggregate labour productivity growth".

[10] The broadband penetration in the corporative sector is almost equal in both NMS and EU15, but a large gap exists in the household sector, where broadband access in NMS increased considerably and almost doubled, but at the same time represents 60% of the EU15 average (Gaspar and Bogdanowicz, 2007). For the NMS countries, every change in broadband networks seems to be large, because the start-point of the NMS was far below the EU15 and so every small growth reflects as big step forward in closing the gap between NMS and EU15.

dynamics of growth of ICT applications are much lower in the EU than in the USA. One of the indicators, commonly used to measure this, is ICT expenditures as the percentage of Gross domestic product (GDP). The percentage for ICT expenditures has increased significantly in NMS, in some cases even surpassing the EU15[11], but the nominal value of ICT investments in NMS is still scanty.

Among the EU15, the highest percentage of GDP invested in ICT is in Sweden (4.4% GDP) and the lowest is in Greece; among NMS the highest ranked is the Czech Republic (2.9% GDP) and the worst is Lithuania, which invests, with 1.6% of GDP per ICT, still more than Greece. It is interesting that all efforts of the EU institutions, especially of the Commission for investing more in the ICT sector, gave trivial results.[12] Even though the ICT sector is one of the most propulsive sectors, there are many gaps in the implementation of ICT development. EIU (2007) and Gaspar and Bogdanowicz (2007) exposed three main causes for the regression of some EU member states in the field of ICT:

- Low demand capacity for ICT services and tools.
- Absence of innovation culture and life-long learning.
- Shortages in e-services supply, and lack and delay in appropriate policies for ICT.

The absence of innovation culture determines the demand capacity of citizens and the supply side, because both, consumers and producers are not willing or they do not have the possibility to change their attitudes towards innovation. The EIU (2007:15) observed that "Europe has no large shortage in technology, but there is a lack of entrepreneurial spirit, comparing to the USA". Consequently, the lack of innovative spirit displayed through the low use of new technologies reduces the demand for ICT. Gaspar and Bogdanowicz (2007) realised that in the NMS, and among some EU15 member states, the problem of ICT is their affordability, since lower incomes are available for ICT at equal or even higher prices in NMS than in EU15. On the other hand, the low demand for ICT is a consequence of low e-literacy, especially among older people. All these add up to a serious structural problem, affecting both, NMS and EU15.

The process of converging in the ICT use was built in the EU institutions that decided to fill the gap between the availability and use of ICT through supporting, promoting and enhancing the process of obtaining "key e-competences" including life-long learning and e–learning. The reasoning in the background was that the increase in e-competences would boost the demand for ICT, which in turn will press the governments and firms to increase the supply of e-services. These are, in some countries, underdeveloped or partially developed. For example, some governments have only partially developed its e-government, where access to the information is available to citizens online, but the interactive services are not yet operational. Gaspar and Bogdanowicz (2007:411ff) agree with our observation, warning that the problem of the spread of e-services lies in "restricted and slow development of e-services, and in weaknesses and insufficient level of regulation, especially in the field of e-signature and e-commerce".

The current ICT policy in EU is focused on of two programmes: i2010[13] and FP7. The latest, launched in 2007, continues the initiative i2010 and provides more than 9 billion € for boosting ICT. At the same time, the FP7 determines ICT development as the cause of "wide-ranging, complex,

[11] The key of understanding the ICT expenditures in NMS is the structure of ICT spending. According to the results obtained by Gaspar and Bogdanowicz (2007:396ff) the "...increase in ICT spending in NMS can be attributed to GDP growth during the transition period, but at the same time, the structure among IT and communication technologies (CT) spending is quite unbalanced. On one hand, communication technologies (CT) spendings' are quite high, even surpassing the EU average, while the reverse is true for the information technologies (IT). Moreover, the speed of IT expenditure growth remains well below the rise of expenditure on CT".

[12] The problem of analysing the ICT sector derives from different databases and definitions, which sometimes inhibit comparisons among countries (cf. Gaspar and Bogdanowicz, 2007).

[13] The i2010 strategy has three aims (i2010 web page http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm):

and multifaceted economic and social changes". It is clear that ICT progress is a necessary requisite for creating a KBE/S, is closely linked with, and determines changes in the EU society, but some problems, listed above, still exist.

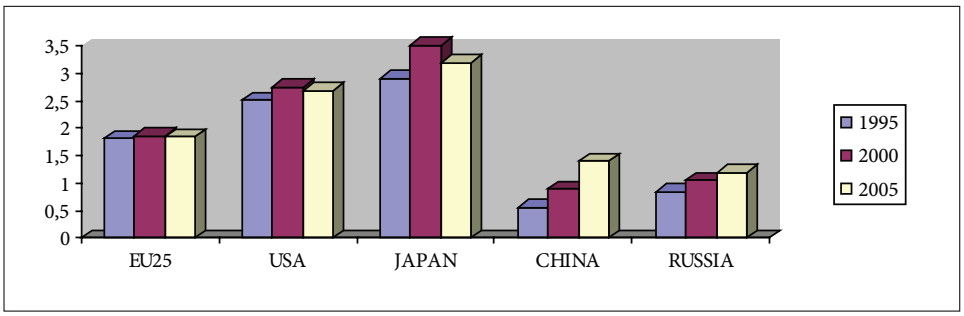
All EU member states, especially decision-makers ought to change their mentality towards ICT, and understand that ICT is a necessary tool for effectiveness and efficiency of business and government, and consequently its use needs to be enhanced, but not only through the transfer process, but also including adaptation and transformation of support measures. Europe is not as homogenous as the USA and therefore the measures have to be adapted to the local needs and be designed in a user-friendly manner. This design should take on board the fact that Europe is "greying", so the focus on ICT promotion should be directed also to the elderly, improving their digital literacy and acquiring e-skills (Gaspar and Bogdanowicz, 2007).

Finally, yet importantly, there is a necessity to enhance the public sector reform and to modernise the public organisations and business enterprises, which are providing public and business services. According to the supply-side theory, the demand for certain products will increase if the supply will be sufficient and cost will be low. This should be a corner stone of the EU ICT policy, through offering more possibilities for e-education on one side and more e-services and low-cost e-products on the other. The diffusion of ICT will produce economies of scale and improve cost-benefit balance (Gaspar and Bogdanowicz, 2007); consequently, ICT spillovers will enhance productivity and EU will be capable to reap the benefits of ICT and move closer to knowledge based economy and society.

4. Research and innovation

The second prerequisite of establishing a KBE is enhancing and boosting research and innovation in the EU. Among the working material for the Lisbon European Council (2000) was also the study of DG Research (DOC/00/7), saying that "research in Europe remains fragmented and compartmentalised" and that the "EU (in R&D spending) is again lagging behind its major competitors". Looking at the data, European investment in R&D as a percentage of GDP was stagnating in the period 1995–2005, while at the same time Japan and the USA expenditures for R&D were growing.

Figure 3. Gross domestic expenditure on R&D (GERD)



Source: Global R&D Report, 2007: 1; OECD Outlook, 2006: 210 and EUROSTAT, 2007.

1. To create a *Single European Information Space*, which promotes an open and competitive internal market for information society and media services,

2. To strengthen *innovation and investment in ICT research*,

3. To support *inclusion, better public services and quality of life* through the use of ICT.

The goal of 3% of GDP for R&D, set forth in Barcelona in 2002 (Presidency Conclusions, 2002), has been surpassed by some of the EU member countries (Sweden, Finland) but several members are far from reaching the target.[14] Already before the target of 3% was set (in 2002), Pavitt explained (1998) that the real problem, not addressed sufficiently in the nineties, is the gap existing within the European Union, among the EU member states. His explanation criticizes various analyses on the EU as a whole, overlooking differences among member states and taking R&D investments convergence as granted. One has to agree with Pavitt, especially when analyzing data at the micro level. The Gross expenditure on R&D (GERD) index in 1995 in EU15 was the lowest in Greece (0.49% of GDP) and the highest in Sweden (3.32% of GDP). Ten years later (EU15), in the 2005, the lowest percentage of GERD can still be found in Greece (0.61% of GDP) and remains the highest in Sweden (3.86% of GDP). Similarly, the results among NMS are also not very encouraging.[15]

Table 1. Comparison in GERD between NMS and EU15

NMS	GERD1995	GERD2005	EU15	GERD1995	GERD2005
Slovenia	1.57	1.47	Sweden	3.32	3.86
Slovakia	0.92	0.51	France	2.29	2.13
Czech	**0.95**	**1.42**	**Finland**	**2.26**	**3.48**
Hungary	0.73	0.94	Germany	2.19	2.51
Poland	0.63	0.57	The Netherlands	1.97	1.78
Bulgaria	0.62	0.5	UK	1.95	1.73
Latvia	0.47	0.57	Denmark	1.82	2.44
Lithuania	0.43	0.76	Belgium	1.67	1.82
Malta	n. a.	0.6	Austria	1.54	2.43
Estonia	n. a.	0.95	Ireland	1.26	1.26
Cyprus	n. a.	0.4	Italy	0.97	1.1
Romania	n. a.	0.4	Spain	0.79	1.12
NMS-average	**0.79**	**0.76**	Portugal	0.54	0.81
			Greece	0.49	0.61
USA	2.49	2.68	Luxemburg	n. a.	1.56
Japan	2.92	3.13	**EU15-average**	**1.85**	**1.95**

Source: Prepared based on EUROSTAT data, 2007; available at http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL (10th October 2007).

The data shows substantial differences in R&D investments among European states, including newcomers.[16] The progress towards KBE is subject to increased investment in knowledge creation

[14] Ambrecht (2003) exposed that "Europe may some day reach the goal of spending 3% on R&D, but this will not be met by R&D carried out in Europe, but elsewhere" (Armbrecht, 2003: 36). Similar statements on the EU R&D can be found also in Krahmer and Reger (1999: 761–762).

[15] Some authors explain that "in NMS the critical mass for conducting R&D is missing". Cf. DG JRC (2005) Implementation of REACH in the New European Member States: General Overview and Case Study Analysis. Available at http://www.eeb.org/activities/chemicals/REACH-IA-New-Member-States-IPTS-conclusions.pdf (10th October 2007).

[16] Radošević (2004a:369ff) called the position of the EU the "three-tier Europe". His explanation of "three tier" is as follows: "By this we mean that developed countries of central Europe (Slovenia, Estonia,

– i.e. in R&D. Within the EU, it is necessary to focus on creating conditions for the convergence in R&D investments of European states. Without almost converging to the same level of R&D sustainability Europe cannot face current and future challenges. The Lisbon aim of 3% investment in R&D is by now a target that is not likely to be reached by 2010, yet it is important to maintain it as a motivating factor. In fact, from the year 2000, the EU25 or EU27 GERD rate is mostly stagnating at the level of 1.85–1.88% of GDP. Even if currently undertaken programmes to enhance investment in R&D at the level of EU (7th Framework Programme, Innovation and Competitiveness Programme, etc.) or at the national level as suggested in National Reform Programmes are implemented, the rate of increase is not likely to be sufficient for the 3% target.

However, the Lisbon Agenda set the target of 3% GERD, 1% coming from the Governments and 2% R&D investment from business sector. In this field, the situation is even more apprehensive. According to the Kok Report (2004:11), only two countries in the business sector achieved the goal of investing 2% or more of GDP in R&D, all other member states being far below this "demarcation line". Pavitt in 1998 explained the paradox in government and business funding R&D in this way:

> "*The experience of the past forty years has taught us that the central agents in promoting and implementing technical change are business firms, not governments. /.../ Governments are major players only in sectors where they have had a major influence over product development and procurement, such as energy, telecommunications, military equipments and public transport. /.../ The record of government funding of R&D in large firms have not been proven successful, because when government subsidies are large, they divert management attention and competencies away from market-based entrepreneurship to subsidy-seeking" (Pavitt, 1998:562).*

Pavitt (1998), Kok Report (2004), and especially Aho Report (2006) emphasize that it is necessary for the EU R&D policy to focus more on indirect measures to support business R&D investment instead of direct subsidies. Pavitt (1998:564) clarified, that the crucial role of the EU and its institutions is in "creating favourable framework conditions for R&D, especially business R&D". Kok Report (2004:21) designates R&D as the "top priority of the EU growth that is to be supported by tax incentives for newly founded Small and Medium Enterprises (SMEs), and also that public-private partnership should be facilitated and encouraged".

Based on the Kok Report the renewed Lisbon Agenda (2005) states that ..."member states should develop their innovation policies promoting following objectives: support mechanism for innovative SMEs, promoting joint-research programmes, improving risk-capital access, etc". The Commission Communication from October 2005 (COM (2005)488) gave priority to nineteen fields where actions, promoting R&D should be taken. The array of policies to boost innovation in the EU is set also in the Aho Report (2006), which was the basis for the Commission Communication (COM (2006)502) on the innovation strategy of the EU. Acknowledging all these documents, it is difficult to understand why these policies are not implemented, and why the EU is still lagging behind its competitors.

The Aho Report found a simple explanation. It says that in the EU there is "a large gap between the rhetoric of a political system that preaches knowledge society and the reality of budgetary and other priorities that have shown little shift in preparing to engage with it" (2006:2).

Czech R., Hungary) are faring relatively well in terms of innovation capacities and are closer to the 'middle level' group of the EU than to the less developed Central and Eastern European Countries (CEECs) (Romania, Bulgaria, Latvia, Lithuania, Slovakia). Also, EU15 is divergent in terms of innovation capacities so that we can distinguish between high tech Europe (Nordic countries, UK), medium level Europe (France, Germany, etc.) and less developed EU15 with Greece, Portugal and Spain. Less developed EU15 and less developed CEECs are closer to each to other than to other groups of countries."

Table 2. Business expenditure on R&D (BERD) in the EU in years 2000, 2003, 2004

	Member state	2000	2003	2004	Change 2004/2000 (2000=100)
EU15	Belgium	1.45	1.33	1.29	89
	Denmark	1.51	1.84	1.67	110
	Germany	1.73	1.75	1.76	102
	Spain	0.14	0.28	0.42	300
	Greece	n. a.	0.2	0.2	100 (2003/2004)
	France	1.34	1.34	1.32	98.5
	Ireland	0.81	0.77	0.82	101
	Italy	0.53	0.55	0.55	104
	Luxembourg	1.58	1.58	1.34	85
	The Netherlands	1.11	1.01	1.03	92
	Austria	n. a.	1.42	1.51	106 (2003/2004)
	Finland	2.4	2.45	2.46	102
	Sweden	n. a.	2.93	2.92	99 (2003/2004)
	UK	1.21	1.3	1.15	95
	Portugal	n. a.	0.26	0.29	111 (2003/2004)
NMS	Czech R.	0.74	0.77	0.92	124
	Estonia	0.49	0.57	0.61	124
	Cyprus	0.05	0.08	0.09	196
	Latvia	0.18	0.14	0.23	127
	Lithuania	0.13	0.14	0.16	123
	Hungary	0.35	0.36	0.41	117
	Malta	n. a.	0.08	0.45	563 (2003/2004)
	Poland	0.24	0.16	0.18	75
	Slovenia	0.81	0.9	0.97	120
	Slovakia	0.43	0.31	0.25	58
	Bulgaria	0.11	0.1	0.11	100
	Romania	0.26	0.19	0.21	81

Source: Prepared based on EIS, 2006; 2007 and EUROSTAT, 2007 data.

The target for BERD is 2%, but as seen from the above table only Finland and Sweden surpassed the 2% line, other states are far below the goal. The average of BERD lays around 1.2% (1.78% in the US and 2.36% in Japan),[17] but there are 17 EU member states with BERD lower than 1%.[18]

During the period 2000–2004, almost all NMS (except Slovakia, Poland and Romania) increased their investments in BERD. This can be partly attributed to the transformation from the

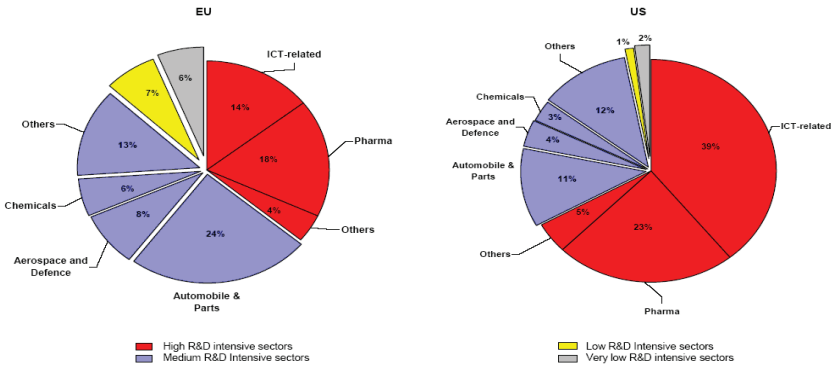
[17] The BERD in the EU has a similar destiny as GERD. In the 90s, BERD slightly increased, but later on, especially after the 2001, the trend of BERD is negative (DG R, 2007:21). Conversely, the BERD of EU competitors in world economy rose in the last years.

[18] Nearly a quarter of business R&D was in 2004 performed by SMEs in the EU (22.4%), a figure substantially higher than in the US (14.1%) and Japan (7.0%).

centrally -planned economies to market-economies, and to the entrance of multinational companies (MNCs), which, through their investments, enhanced transition of NMS on one side (Damijan-P., 2005) and increased BERD in the state-economy structure. By contrast, the BERD increase in EU15 was, in the same period, more or less steady. The Commission in its Press Release of 11th June 2007, stating ..."the problem of the low business R&D (BERD) is the major threat to the European knowledge-based economy", addressed the peril of BERD investments also.

The analysis conducted in the DG Research[19] (hereinafter DG R) clarified that the low percentage of BERD is not the only problem of the EU R&D funding. The DG R analysis showed that the EU has two problems: the low level of BERD and the BERD structure. The last one is problematic, because "in the EU at least 75% of BERD is directed in medium-tech manufacturing industries, on the other hand the USA BERD is mostly performed in high-tech industries". At the same time, the BERD structure is apprehensive, because for (in 10 years suggests the future, but for 10 years is about the last ten years that have passed) ten years it remained more or less the same. In the year 1995 more than 80% of BERD investment was investment in manufacturing, and 10% in services; nine years after the percentage of services in BERD increased to only 20% of total BERD (Grablowitz, Delicado and Laget, 2007).

Figure 5. Sectoral composition of R&D investment by EU and US companies (year 2005)



Source: DG R, 2007:25.

Not only do the BERD investments vary within EU, but the BERD structure is not the same in all member states. However, BERD investments' results are even more interesting as expected. More or less everybody expects that NMS will be "losers" and EU15 "winners", so that BERD will be lower in the NMS, but the data from DGR show us a different situation.

[19] Key figures 2007 on Science, Technology and Innovation. Towards a European Knowledge Area.

Table 3. BERD Position of EU27

Loosing momentum	Falling further behind	Catching up countries	Pulling further ahead
France	The Netherlands	Estonia	Austria
Luxemburg	Bulgaria	Cyprus	Denmark
Belgium	UK	Portugal	Germany
Sweden	Romania	Latvia	Finland
	Poland	Lithuania	
	Malta	Czech R.	
	Slovakia	Spain	
		Hungary	
		Greece	
		Slovenia	
		Italy	
		Ireland	

Source: DG R, 2007:59.

The catching up countries are those investing more and more in BERD, because their start-position was low and consequently every increase in BERD on the yearly basis is determined as BERD growth. On the other side, there are 'old' EU15 members, which achieved a 'solid' BERD composition and continue to increase BERD investments slow and steady. Consequently, it is possible to deduce that through higher investments in BERD the newcomers would have the chance to leapfrog some phases and to, if the EU15 BERD investments will remain steady, converge and finally close the BERD investments' gap (avoiding a two-tier Europe). It is quite logical that NMS have the possibility of leapfrogging, because of the foreign capital inflows, invested especially in high-growth sectors. In between, the EU15 BERD constitutes part of the medium-intensive R&D sector and that is the reason why the BERD in the EU15 is slow and steady. Nevertheless, the harsh EU reality remains.

Realising the potential of the EU and the current position the Aho Report recommended some measures to increase BERD and to give a fresh impetus to European innovation policy. It recommended creating an innovation-friendly framework, adopting several measures at the EU and national base, like establishing/finding/enhancing:

• *A lead user, which will be capable of taking higher initial costs and risks involved in early adoption of an innovation.*

• *An early market that will offer higher returns and risk reduction.*

• *Public procurement to drive demand for innovative goods.*

• *R&D grants and fiscal incentives.*

• *Adequate supply of venture capital.* (cf. Aho Report, 2006 and Communication (COM (2006)502))

All these measures have to be introduced to stimulate enterprises to increase BERD investments and to become more competitive. At the same time, it is necessary to admit that Europe is not homogenous and that among member states various economic, political and cultural differences exist that inhibit the uniform policy approach. Consequently, even though the policies are jointly accepted on the declarative level, there is the lack in the implementation process (cf. EIS, 2006). Implementation is limited by budget constraints and lack of human resources, but often the cultural heritage that determines the citizens' attitude towards innovation and innovation processes plays an important but disregarded role.

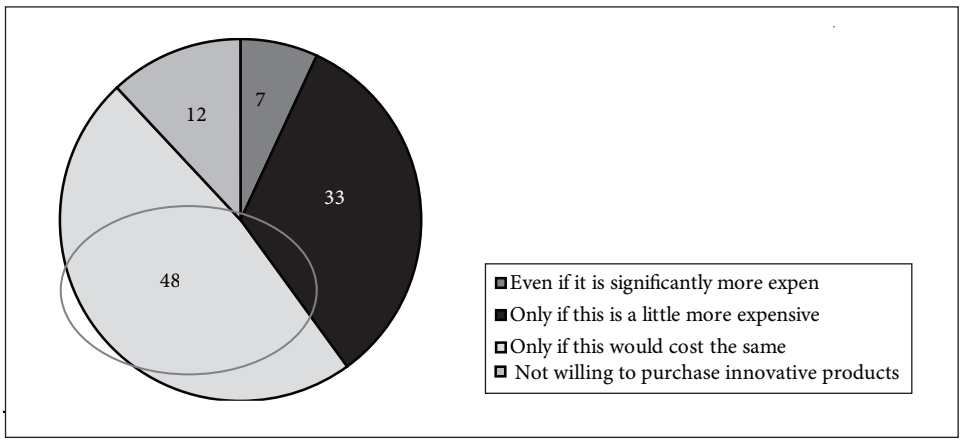
No innovation can exist without people, and one of the purposes of innovation is to make every-day life easier. Understanding this, one would expect that people favour innovation and in-

novation processes, but the results of Innobarometer 2005, on the "population innovation readiness" show a different picture.

The Innobarometer found that 49% of respondents in the EU25 were anti-innovation or reluctant about the innovation processes, while 51% were attracted or enthusiastic towards innovation (Innobarometer, 2005:3). A more detailed look at the results shows that the group of 'no-innovation' was composed mostly by women above 40 years, with a low level of education and employed as manual worker. On the other hand, the 'innovation attracted' group represents mostly men: young students, managers, with higher education and employed as white-collar workers. The explanation of the results obtained in Innobarometer is simple: higher educated people see a comparative advantage in using high-tech products to improve their life (functional literacy), and are consequently less reluctant in using them, comparing with the group of less educated people.

The Innobarometer also showed that the usage of innovation products is determined not only by the purpose of the products, but also by its price. It is interesting that respondents support the thesis that innovation enhances economic growth, but at the same time, they stress that innovative product will only be demanded if its price does not exceed the price of current product.

Figure 4. Replacing a product with the innovative one – EU25 level



Source: Prepared based on Innobarometer, 2005:14.

The figure above shows that EU25 citizens are prepared to embrace and accept new technologies and support innovation processes, but the hindering factor is often the cost of the innovative product process. The attitude towards EU innovation activity is clear: yes to innovation, but in particular to cost-cutting innovation.

Similar to the ICT sector, the problems of the R&D sector are on both, the demand and the supply side. On the supply side, it is necessary to increase different incentives for enterprises to increase their investments in R&D and especially, to boost BERD in high-growth instead of medium-growth sectors. At the same time, it is necessary to encourage, through other sorts of incentives, development of "lead users" and of the early markets that will take the initial costs, but will be entitled also to higher returns from the R&D development. Entrepreneurs have to understand that more BERD means more productivity and finally more effectiveness and efficiency, since it may lead to the cost-cutting process. On the demand side, a friendlier environment for innovation and innovativeness needs to be developed, with assigning less attention to cost cutting innovation and more to frontier innovation.

As seen in the above discussion, there is a problem of cultural heritage and atmosphere in the field of innovation. Public decision-makers have a hard task to change the mentality of EU citizens from semi-modernism and provincialism (Švarc and Lažnjak, 2004) to postmodernism, based on innovative approaches and actions. Consequently, the public procurement and demand for innovative products have to be enhanced not (only) by marketing actions, but by educating people that innovations are necessary for future development of the EU. In addition, the third pillar of the KE, the education and skills for KE/S has an important role to play.

5. Education and Skills for Knowledge economy/Society

Human capital and education are at the centre of a knowledge economy. More than ever, our level of education and skills will determine future social cohesion, prosperity and sustainability. Europe was once a beacon of educational performance, and a model for other countries to follow, but much has happened in recent decades to undermine Europe's education record. Too few resources are spent, too little self-responsibility is given to our schools and universities, and too little attention is being paid to other regions that are rapidly advancing their own education systems (The Lisbon Council Think Tank, 2007).

The above paragraph and the discussion until now demonstrated that behind ICT development and the prerequisites for increasing R&D spending, is the education and skills development for the knowledge-based economy. Here again, the EU faces a challenge of lagging behind some of the other more advanced economies/ societies in the world. According to Gordon (2004:2), the education system in the EU is problematic, because ...*"European cultural attitudes inhibit the development of ambitions and independence of teenagers and young adults, who are cradled in subsides such as free tuition for higher education, while American teenagers are expected to get out into the marketplace, work, and contribute real money to their own college education".*

Let's see what is the real position of human capital performance in the EU.

Table 4. Human capital performance in the EU27

	EU15	**NMS**	**Transition**		**EU15**	
			The best	**The worst**	**The best**	**The worst**
% of population with tertiary education	24	19	Estonia (28%)	Romania (11.1%)	Finland (35%)	Italy (12%)
% of S/E graduates	*12,7*	8.56	Lithuania (17.5%)	Malta (3.6%)	Ireland (23.1%)	Luxemburg (1.8%), Greece (8%)
% long-life learning	11.2	5.7	Slovenia (15.3%)[20]	Bulgaria (1.1%), Romania (1.6%)	Sweden (32%)	Greece (1.8%)
% of youth attainment level	74.6%	82.7%	Slovakia (91.8%)	Malta (48%)	Sweden (87.5%)	Portugal (48%)

Source: EIS, 2006.

The heterogeneity of the education systems in Europe and the necessity for a higher level of education in population, capable of responding to future challenges, were discussed in various documents and EU Commission Papers. For instance, already in the Communication (COM (2005)548),

[20] The data is not comparable to other available data, because the EUROSTAT broad definition allows including also courses like security at job place training etc.

the Commission identified indispensable competences for creating a knowledge-based society.[21] A year later, in the Communication from 2006 (COM (2006)502), education was determined as the "prerequisite for creating an innovation boost and innovation society". The Commission Staff Working Document prepared in July 2007 (SEC (2007)449) emphasised the necessity of "fostering an entrepreneurial mindset as well as the relevant skills among researchers, which can greatly contribute to the reduction of the cultural divide existing between research institutions and industry".

All these documents and Schleicher study (2007) stress that it is necessary to change the crux of the education process from passive education to a more proactive education and that "Europe's school systems will have to make considerable headway if they are to meet the demands of modern societies". The renewed education system has to encourage its own initiative, support creativeness, inventiveness and good practices. However, all the above actions, especially good practices need to be verified and transmuted (this means to change...did you mean transmitted?) to the national education system. The problem of immobility among pupils, students, teachers and researchers seriously inhibits the transfer of ideas and good practices; therefore, there should be more mobility within member states and between them.

Especially researchers' mobility and connectedness were addressed in the Kok Report (2004), Aho Report (2006) and various Communications from the Commission, but so far with limited success. The answer, why (especially) researchers' mobility has been inhibited, lies in the following findings: (i) the lack of movement is largely due to structural barriers (unpublished tenders) and lack of incentive for researchers and (ii) the research sphere in the EU is "greying", and older people are not prepared to change jobs if they are not forced to do so.

The first part of the problem of structural barriers is partly solved by establishing the European Researcher's Mobility Portal, whose goal is to provide information on Fellowships/Grants, Research Job Vacancies and other information necessary to researchers. At the same time, the Commission is encouraging the inclusion of researchers from various member states in the FP7, and in such a manner indirectly promotes the mobility of researchers.[22] The Green paper on the European Research Area (2007:8) suggests that researchers' mobility should be enhanced through "a single labour market with attractive working conditions for both men and women, involving notably the absence of financial or administrative obstacles to trans-national mobility. There should be full opening of academic research positions and national research programmes across Europe, with a strong drive to recruit researchers internationally, and easy movement between disciplines and between the public and private sectors – such mobility is becoming a standard feature of a successful research career". The proposals in the Green paper are strategically well defined, yet the road to their implementation is not going to be straightforward.

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[21] Between them the Commission listed following: (i) Communication in the mother tongue; (ii) Communication in the foreign languages; (iii) Mathematical competence and basic competences in science and technology; (iv) Digital competence; (v) Learning to learn; (vi) Interpersonal, intercultural and social competences and civic competence; (vii) Entrepreneurship; and (viii) Cultural expression.

[22] Commissioner Potočnik in his speech in Serbia (Potočnik, 2007b) at the Festival dedicated to students and researchers' mobility expressed his hope that the European Research Area (ERA) will enhance researchers mobility through offering:

• Attractive working conditions for both women and men, without obstacles to trans-national mobility;

• the full opening up of academic research positions and national fellowship programmes across Europe, with a strong drive to recruit researchers internationally and ease of movement between disciplines and between the public and private sectors;

• researchers being trained according to stringent quality standards, which meet the needs of both business and academia and which are recognized throughout Europe;

• openness to the world, attracting and facilitating access to non-EU researchers, while giving European researchers opportunities to spend time in research outside the EU, in the framework of a European career.

The mobility in Europe is an issue, which needs to be handled carefully and prudently. It is possible to agree that there is a lack of mobility within and between EU member states, but the promotion of the latter requires particular care. There is a strong possibility of one-way mobility, known as brain drain from countries/regions where R&D facilities are less developed and there are fewer financial resources available to scientists. Consequently, it is better to promote, at the initial stage, the mobility between institutions within one member state or promote short-term visiting fellowships among member states. Full liberalization of interstate mobility of researchers may cause brain drain within the EU and lead to additional differences in capabilities of the research sector across Europe.

The next part of the 'education' problem is the lack of scientists in the EU, especially S/E scientists. According to the Unctad World Investment Report (WIR) (2005:159), the EU lacks more than 700,000 S/E specialists to meet its target of devoting on average 3% GDP to R&D. This is a serious observation showing that something went wrong in the past years.

In the last ten years, the number of tertiary graduates in S/E has increased from 9 to 13 students per 1000 population, aged 20-29 years. The number is still too low if the EU is to become a more innovation-oriented society. Analyzing the above results, one can conclude that the EU education system is not at the level required for the transition to knowledge society. Yet it seems that the gap here among the old and the new member states is the narrowest one. In terms of number of S/E graduates, the education system in NMS is performing relatively well. What are often lacking are the linkages between the formal education and working practice, and in the so-called cross-fertilization of knowledge.[23] The main task for future actions in the field of education is to link the formal education process with practical experience as well as enhance the transfer of good practices in the education systems across the EU.

6. Concluding thoughts

The arguments presented in the paper can be summarised in three main areas, which should be improved to promote the creation of the KBE/S in the EU:

(i) Lack of linkages between theory/policy and practice/implementation in several areas, including ICT diffusion and use, R&D investment and links with the business sector;

(ii) Enhancement of life-long learning which will improve the human resources capabilities and thus enable the transition to a knowledge economy

(iii) Improved flexibility and strengthening of the education system, including better links between university and business.

In the heterogeneous EU of today, the transition to society, based on knowledge, is a complex one. This heterogeneity (when discussing positions on KBE) along with national specifics (social, historical and economic) often determine attitudes towards innovation, risk-taking, new (high) technology, change- all of the common attributes of knowledge society. The gap between EU15 and NMS needs to be addressed at different levels: at the EU level through structural funds, transfer of good practices, setting the agendas and targets, at the national level through national plans and pro-

[23] In a review of the secondary schooling systems of seven Central and East European countries, Ludger Woessmann (2003) analyzed data from the 1995 Trends in International Mathematics and Science Study (TIMSS) and clearly distinguished two groups of countries within the region: One group had moved decisively towards the features of Western European countries while the other could not yet demonstrate successful results of transition. The more advanced group, consisting of the Czech Republic, Hungary, Slovakia and Slovenia, outperformed most EU countries and had many traits similar to West European schooling systems. The schooling systems of the less advanced group, including Latvia, Lithuania and Romania, still featured characteristics of communist times and seemed not yet to educate a new generation to be competitive in EU labour markets.

grammes and even at the local level, raising the awareness of the global developments. The ambition of the NMS should be to create the possibilities of leapfrogging[24] and thus increase the pace of EU as a whole of becoming a KBE. Some of the possible actions are suggested in the table bellow.

Table 5. Actions in promoting the KBE

Individual level	Organizational level	EU level
• Encouraging 'hard' skills (graduates) • Supporting individual creativity and innovations • Increasing use of ICT • Improving the linguistic abilities • Encouraging re-skilling • Promoting life-long learning	• Discovering and developing talent • Increasing national investment in educational attainment • Managing the transition for individuals and regions • Competing in the global war for talent	• Adopting policies, but also adapting them • Transferring good practices and creating spillovers • Supporting a market for innovative products and services • Enhancing innovations in services, instead of manufacturing • Shifting from the supply side to the demand side

Source: The Lisbon Council Think Tank, Skills for the future, 2007.

Should the divergence continue and even grow, the losers will not be only NMS, but also the integration as a whole. The key question for Europe is the creation of a strong, internationally competitive Europe, based on knowledge as a comparative advantage. The most difficult issue in front of EU policy-makers is not the design of various resolutions and declarations, but a more decisive action in the implementation stage. The dichotomy between rhetoric and reality (Aho Report, 2006) needs to be overcome.

The analysis of the countries that were successful in history in catching-up with technologically and economically more developed countries by leap-frogging certain development stages shows that this was never achieved without a conscious action of the government[25]. Along with a modern economy, a modern government with a vision and an efficient institutional environment is needed to enable a dynamic and qualitative economic and social development (Stare and Bučar, 2006). This leads us to another issue: governance capability in NMS. Adequate governance capability is essential for the successful adoption and implementation of EU influenced policy instruments in the NMS. Attainment of governance capacity is a long-term process, and the complexities should not be underestimated. In particular, policy coherence and coordination are demanding characteristics of governance capability, yet essential for effective policy implementation. Benchmarking exercises and continuous monitoring and evaluation can contribute to faster development of this capacity, so participation of NMS in various European programmes and projects contribute to higher awareness of different stakeholders and improved evaluation practices.

In fact, Europeanization of ICT, R&D and innovation policies as well as education system reforms had several positive implications on the policies in NMS, particularly in the area of awareness rising, transfer of policy concepts, practices, and various mechanisms, used by more developed countries. Yet the capability to adjust the measures and instruments- best practices, seen in other environments to own environment and circumstances is, on the other hand, one of the essential ele-

[24] Term coined by Freeman and Perez (1988), Freeman and Soete (1997) and SPRU to denote a motion that countries not locked into past structures and industries can move straight into the technologies/ sectors of the future growth.

[25] Freeman (1989) points out the complexity of such undertakings: The success of any country to catch-up within next decades depends crucially on their ability for institutional innovation, infrastructure, investment in education, S&T and last, but not least, on the international economic system.

ments of good governance capability. The development of governance capability could contribute to the catching up process of the NMS and thus allow for smooth transition of these countries and the EU as a whole to a knowledge economy/society. However, it also requires a conscious effort of policy – makers to act in this direction.

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IZGRADNJA DRUŠTVA ZNANJA: SLUČAJ EUROPSKE UNIJE I ZEMALJA NOVIH ČLANICA

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Svrha je Lisabonske strategije (2000, 2005) koju je Europska Unija usvojila radi etabliranja dinamičke ekonomije bazirane na znanju s održivim ekonomskim rastom i punom zaposlenošću. Izgradnja ekonomije/ društva baziranog na znanju (KBE/S) je glavni zajednički cilj Europske Unije koja ne samo da poboljšava kompetitivnu poziciju EU u globalnoj ekonomiji, već i značajno doprinosi procesima integracije unutar EU. Trenutna situacija supstancijalne divergencije među državama članicama EU kao što je sposobnost prelaska na ekonomiju/ društvo bazirano na znanju važna je prepreka tom procesu.

Argumenti prezentirani u tekstu mogu se sažeti u tri osnovna područja koja bi trebalo unaprijediti da promoviraju stvaranje ekonomije/društva baziranog na znanju u EU:

(1) Nedostatak veza između teorije i prakse i prakse/ primjene u nekoliko područja, uključujući širenje i upotrebu ICT, investirane u istraživanje i razvoj i veze s poslovnim sektorom.

(2) Jačanje koncepta cijeloživotnog učenja koje će poboljšati sposobnosti ljudskih potencijala i tako omogućiti tranziciju prema ekonomiji znanja

(3) Poboljšana fleksibilnost i jačanje obrazovnog sistema, uključujući bolje veze između sveučilišta i biznisa.

Ključne riječi: *DRUŠTVO BAZIRANO NA ZNANJU, EKONOMIJA BAZIRANA NA ZNANJU, ZNANSTVENO TEHNOLOŠKA POLITIKA, ZEMLJE NOVE ČLANICE EU*