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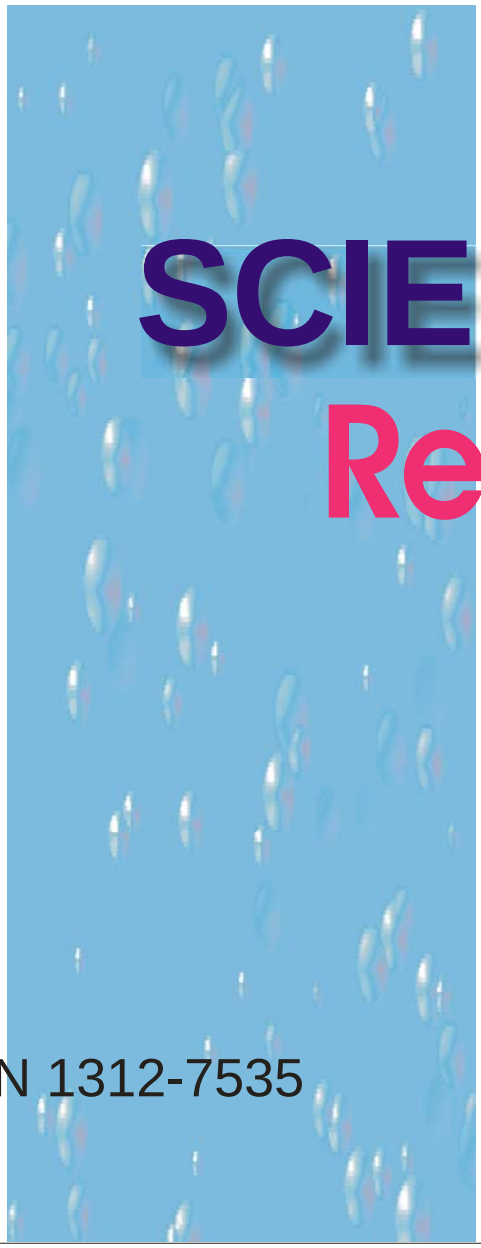

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European Innovation Initiatives and the Bulgarian Approach

Abstract: The study is dedicated to problems concerning European innovation strategy and its role for improving competitiveness and generating economic growth. The Commission seeks to develop the concept of "lead markets" where public authorities facilitate industry-led innovation by creating conditions for a successful market uptake of innovative products and services in a focused way. Primary targets are areas that respond to societal demands. The priority must be to establish strong innovation systems in all Member States. In terms of using EU funds to foster research and technology innovation, innovating could mean allocating structural funds for strengthening national research in addition to the already available Framework Programme and national R&D funds, rather than using these funds solely on infrastructure. That could be the stimulus for long term innovative environment foundation, increase the dynamics of innovation spread among the companies and create an opportunity to become a real innovator instead of passive technology user.

Several initiatives ought to be taken immediately to improve the possibilities for innovation in Bulgaria. The most important are: the creation and development of a national innovation programme; creation and development of an action plan for innovation; establishing dedicated funding schemes for financing innovation and supporting the creation of innovative firms; and creating a specific government body with responsibility for development and co-ordination of innovation policy.

Key words: European innovation policy, information and communication technologies /ICT's/, Bulgarian innovation approach.

On 12 September 2006, the European Commission adopted a 10 point programme for action at national and European levels to foster innovation as a main asset of the EU economy. The programme is intended as a basis for the discussion by European leaders at the informal Summit in Lahti, on 20 October 2006 and points the way forward to accompany industry-led innovation with public policies at all levels as a core element of the renewed Lisbon strategy for growth and jobs. The Commission seeks to develop the concept of "lead markets" where public authorities facilitate industry-led innovation by creating conditions for a successful market uptake of innovative products and services in a focused way. Primary targets are areas that respond to societal demands (e.g. areas such as transport or health, internal security, eco-innovation).

The Commission calls upon Member States to make the structural reforms necessary to deliver the results required. The accent is put on the fact, that Europe does not need new commitments from Member States but political leadership and decisive action. In its Communication, the Commission underlines that no fundamentally new governance structures would be necessary, but that there is a need to improve and refine the existing structure. This should address innovation at all levels.(1)

Priorities and strategy

The priority must be to establish strong innovation systems in all Member States. In this respect, the Commission underlines the importance of fostering innovation at regional level. It encourages Member States to involve regions more in the preparation and implementation of the National Reform Programmes, including by developing their own regional innovation strategies. Additional efforts need to be undertaken to facilitate policy learning and the diffusion of good practice across borders. In this respect, PRO INNO Europe will offer a platform that brings together regional and national policy makers with a view to facilitate trans-national cooperation in areas of common interest.

Information and Communication Technologies (ICT's) are vital to creating growth throughout Europe's economy and achieving its social and environmental goals. It is therefore crucial that Europe masters these technologies, rather than simply importing them. Half of the productivity gains in European economies are explained by the impact of ICTs. They are not simply an important sector of the economy, although the ICT sector is itself worth 6-8% of the EU's GDP. The importance of ICTs in reaching Europe's Lisbon goals, however, cannot be overestimated, as they are also vital to:

- improving competitiveness throughout the economy in the face of globalisation, boosting innovation, creativity and efficiency;
- scientific and technological development in areas as diverse as medicine and physics;
- modernising sectors as diverse as education, security, energy and transport, and making Europe's large public sector more efficient;
- tackling social challenges and improving quality of life while meeting the challenge of an ageing society. (2)

In short, ICT's are essential if Europe is to generate the economic growth and jobs required to fund its social model and protect its environment and quality of life. These benefits will only be reaped if Europe masters these technologies. Unfortunately, the EU spends less than its competitors on ICT R&D. Moreover, with 25 countries carrying out their own research programmes, there is a lot of duplication. In today's globalised world, Europe cannot afford this duplication. No single EU country or organisation can now afford to try and build all the know-how and skills to master these increasingly complex technologies.

The EU therefore has a twin strategy:

1. Carrying out its own research programmes to pool Europe's research resources:
- read the overview and browse some examples of Commission-funded research;
- stay up-to-date with the development of ICT research in FP7 - the EU's research programme for 2007-2013;
- go straight to the current IST Programme's website on CORDIS (FP6 - Sixth Framework Programme).
2. The Vienna Process - towards ICT research, aligning European, national, regional and private research helping to forge a common European strategy activities, to share experiences and work out strategies to support ICT in the NMS and ACC by earmarking structural funds for boosting the budgets of national R&D programmes.

Enlargement and globalisation are forcing Europe to accept change. And innovation is the way to pull up the continent's economy and secure long-term prosperity for its population. As numerous reports and conferences show, people are keen to talk about innovation, but how do actually go about innovating?

In terms of using EU funds to foster research and technology innovation, innovating could mean allocating structural funds for strengthening national research in addition to the already available Framework Programme and national R&D funds, rather than using these funds solely on infrastructure. That could be the stimulus for long term innovative environment foundation, increase the dynamics of innovation spread among the companies and create an opportunity to become a real innovator instead of passive technology user.(3)

To date, Europe continues to suffer from a dispersion of limited resources. The Innovation Policy Trend Chart lists 1340 innovation support schemes in use in 28 countries. The European Technology Platforms (ETP's) are an excellent instrument for greater collaboration and the achievement of critical mass. They bring together a wide range of public and private stakeholders to define and implement long-term research and technology agendas. They address from an early stage the framework conditions for bringing results of R&D work successfully onto the market. A strong commitment from national and regional public authorities to help ETPs to realise their goals would boost their prospects of success. Some ETPs have achieved such a scale and scope that achieving their key objectives now requires the setting up of dedicated public-private partnerships – i.e. the creation of Joint Technology Initiatives (JTI's) – which will lead to higher and more stable commitments for research investment over the longer term. Promising areas where the launch of JTI's is envisaged:

- Hydrogen and Fuel Cells;
- Nanoelectronics;
- Innovative Medicines;

- Embedded Computing Systems;
- Aeronautics and air transport ("Clean Sky").

New Member States and Accession Candidate Countries are Europe's driving force when it comes to economic growth, but the region is also often lagging behind regarding new technology and its adoption. It is obvious that Central & Eastern Europe can't rely on cheap labour for the industrial sector alone for its future, and that the region should become a competitive player in the Knowledge Economy. Innovation and R&D will be instrumental in achieving this goal. The Member States are being encouraged by the European Commission to allocate structural funds for strengthening national research. Similarly to the EC, they perceive structural funds as a funding stream complementary to the Framework Programme and national R&D funds.

Innovation in Bulgaria

Co-operation with EU Member States and with other candidate countries will very much help the development of innovation policy in Bulgaria. Scientific co-operation has existed for many years, for example in joint research projects and in EU research projects. What we need is for EU policy-makers to convince our government of the importance of investment in science and innovation as the only way to stimulate industrial recovery. In this context, the European Innovation Scoreboard (EIS) is a very important instrument in helping to create a new innovation policy, especially in a country like Bulgaria.(4)

Based on the Summary Innovation Index (SII), Bulgaria ranks in 26 th place out of 33 countries, although Bulgaria performs better than five of the EU member states. There are no data for innovation governance, innovation demand, innovation modes, and for peer group countries. Bulgaria is showing above average performance in ICT expenditures. It has average performance in tertiary education, youth education, the share of medium-high and high-tech R&D, and employment in high-tech services. Its performance on the share of business-funded university R&D is five times the EU average, but this could be because firms are incapable of performing R&D in-house. In terms of trends, there has been no improvement in public R&D. Business R&D has diminished slightly to 0.09% of GDP in 2005 from 0.11% in 2000. Exports of high technology products have increased from 1.6% in 2000 to 2.9% in 2005, but are still only at 16% of the EU average. Intellectual property rights (IPR) rates are extremely low (see Table1).

The business expenditures in research&development (BERD) indicators in Bulgaria are very well falling behind EU-25 levels. Its current value is 0.09 percent of GDP (falling down from 0.31 in 1996) and it reaches only 7 percent of the average level for the enlarged EU. The very high rate of university R&D financed by business is also more likely to be a sign of the weakness of public funding for academic R&D allied to weak internal capabilities (staff and equipment) of enterprises to undertake R&D. The result is very low rates of new to firm and new to market sales. A National Innovation Fund (BG 15) was set up in March 2005, which will finance market oriented innovative projects. This measure addresses the objective of financing, strengthening company research and co-operation between research, universities and companies. NIF offers the potential for improvement of innovation activities but is unlikely to be sufficient to change radically the current investment situation.(5)

While the investment promotion policy has been formulated and implemented aggressively since 2003 and yielded very positive results on the FDI inflows, the innovation promotion policy as an integral part of Bulgarian enterprise policy has been somewhat neglected. The innovation performance of the economy is supporting this hypothesis. For example, the R&D to GDP ratio has not improved much since 1996 and fluctuates around 0.4 percent. A further deterioration may be expected if the government policy does not support more private R&D

expenditure, which is at a very low level (around 20 percent of the total R&D expenditures). There are positive policy responses to this negative trend. However, the resources provided for these responses are still extremely insufficient to influence a positive move by the business sector, which would improve innovation performance on macroeconomic level. The main factors, which are constantly hindering the innovative performance of enterprises, may be summarised under six headings: low-tech product specialisation and export structure of the economy; predominantly low-tech employment; short-term planning horizon of enterprises; poor human resources management system within enterprises; lack of venture capital schemes; and lack of policy incentives for high tech employment.(5)

Main challenges

As with other lagging countries, Bulgaria face multiple challenges, particularly in terms of knowledge creation, with very low business R&D, low investment in total innovation expenditures, and negligible innovation outputs. The innovation drivers, most of which cover education, are generally closer to the EU average, with the exception of very low rates of life-long learning.

These characteristics suggest that innovation policy in Bulgaria needs to focus on improving the skills of the current workforce through more adult education and to substantially improve knowledge creation inputs. An increase in business R&D could depend on significant improvements to both the amount of public R&D and to the quality of public R&D, which could partly be measured through IPR. Bulgaria is also underperforming on innovation diffusion, as shown by low sales shared for both new-to-firm and new-to-market products. This could partly be due to poor demand conditions, for which there are no data for Bulgaria.

Some of the policy challenges are addressed adequately in the National Innovation Strategy (NIS), which was adopted in September 2004. The NIS formulates a policy mix, consisting of financial and non-financial measures. One of the main financial measures to encourage innovation has already been implemented, namely the National Innovation Fund. Although government institutions are making some progress in meeting other objectives, the complete implementation of other measures and targets cannot be taken for granted. Among the most important innovation policy objectives are: encouragement of the employment of young specialists in SMEs; cluster development; attracting FDI in R&D activities; setting up and encouraging of existing technology parks.

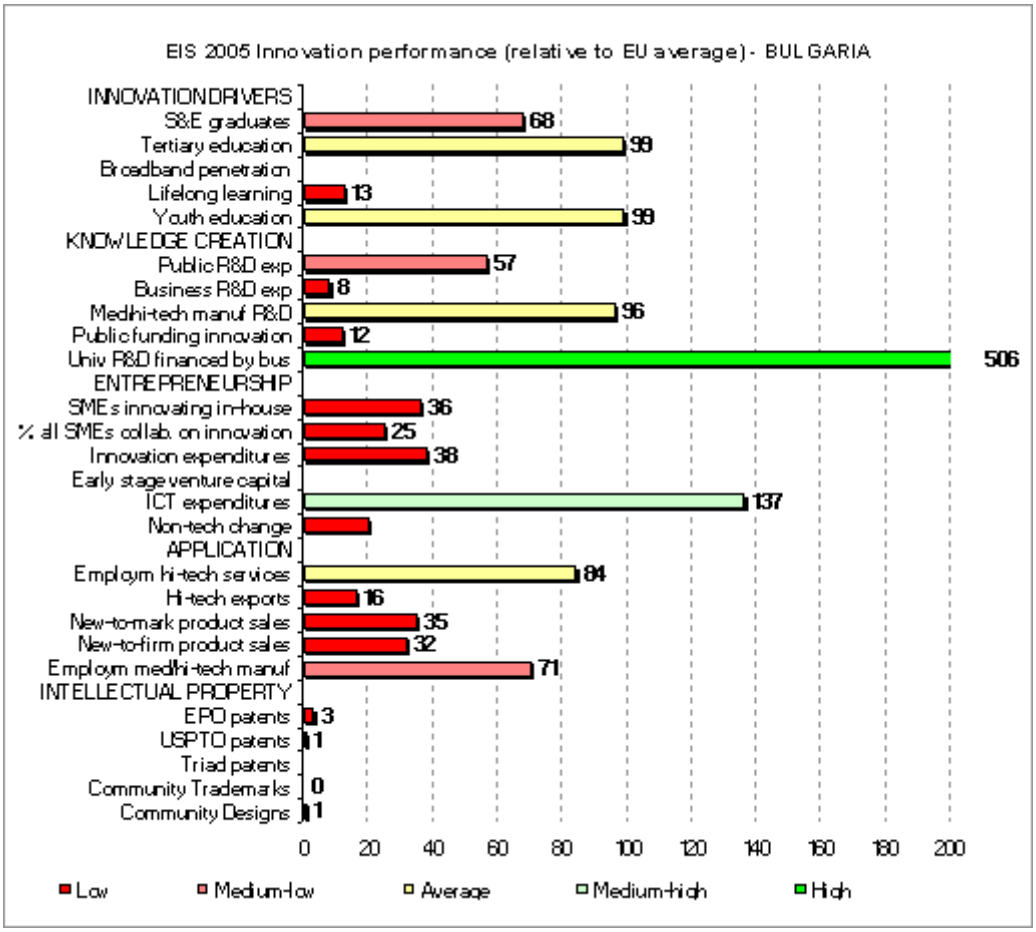

Table 1. Innovation Performance - Indicators

BULGARIA	2000	2001	2002	2003	2004	2005	Relative to EU25=100
Summary Innovation Index (SII)				**0,24**	**0,25**	**0,24**	
Relative to EU25=100				**57**	**58**	**56**	
Rank				**26**	**26**	**26**	
INPUT-Innovation Drivers							
S&E Graduates per 1000 population aged 20-29	**6,6**	**7,9**	**11,7**	**8,3**	**8,3**	**8,3**	**68**
Relative to EU25=100	**65**	**72**	**103**	**68**	**68**	**68**	
Population with tertiary education per 100 population aged 25-64	**18,2**	**21,3**	**21,2**	**21,3**	**21,7**	**21,7**	**99**
Relative to EU25=100	**91**	**106**	**104**	**100**	**99**	**99**	
Participation in life-long learning per 100 population aged 25-64	**1,4**	**1,4**	**1,3**	**1,4**	**1,3**	**1,3**	**13**
Relative to EU25=100	**18**	**18**	**16**	**15**	**13**	**13**	
Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	**74,9**	**78,2**	**77,5**	**75,6**	**76,0**	**76.0**	**99**
Relative to EU25=100	**98**	**103**	**101**	**99**	**99**	**99**	
INPUT – Knowledge creation							
Public R&D expenditures (% of GDP)	**0,41**	**0,37**	**0,40**	**0,39**	**0,39**	**0,39**	**57**
Relative to EU25=100	**62**	**55**	**59**	**57**	**57**	**57**	
Business R&D expenditures (% of GDP)	**0,11**	**0,10**	**0,09**	**0,10**	**0,10**	**0,09**	**8**
Relative to EU25=100	**9**	**8**	**7**	**8**	**8**	**8**	
Share of medium-high-tech and high-tech R&D (% of manufacturing R&D	**78,0**	**80,3**	**85,9**	**86,0**	**86,1**	**86,1**	**96**

expenditures)							
Relative to EU25=100	**87**	**90**	**96**	**95**	**96**	**96**	
Share of university R&D expenditures financed by business sector	**30,8**	**27,0**	**33,2**	**31,4**	**31,5**	**31,5**	**506**
Relative to EU25=100	**471**	**402**	**506**	**505**	**506**	**506**	
INPUT - Innovation & Entrepreneurship							
Innovation expenditures (% of total turnover)	**0,69**	**0,70**	**0,71**	**0,72**	**0,72**	**0,71**	**38**
ICT expenditures (% of GDP)	**8,7**	**8,6**	**8,5**	**8,6**	**8,5**	**8,6**	**137**
Relative to EU25=100	**134**	**135**	**137**	**136**	**137**	**137**	
OUTPUT – Application							
Employment in high-tech services (% of total workforce)	**2,51**	**2,71**	**2,66**	**2,69**	**2,70**	**2,70**	**84**
Relative to EU25=100	**82**	**82**	**84**	**83**	**84**	**84**	
Exports of high technology products as a share of total exports	**1,6**	**1,8**	**2,6**	**2,7**	**2,9**	**2,9**	**16**
Relative to EU25=100	**8**	**9**	**14**	**16**	**17**	**18**	
Employment in medium-high and high-tech manufacturing (% of total workforce)	**5,61**	**5,50**	**5,33**	**4,66**	**4,70**	**4,70**	**71**
Relative to EU25=100	**80**	**79**	**78**	**71**	**70**	**71**	
OUTPUT - Intellectual property							
EPO patents per million population	**4,2**	**2,6**	**3,7**	**3,5**	**3,4**	**3,0**	**3**
Relative to EU25=100	**3**	**3**	**2**	**3**	**3**	**3**	
USPTO patents per million population	**0,2**	**0,6**	**0,8**	**0,9**	**0,9**	**1.0**	**1**
Relative to EU25=100	**0**	**1**	**1**	**1**	**1**	**1**	
New community trademarks per million population	**0,1**	**0,1**	**0,6**	**0,3**	**0,3**	**0,3**	**0**
Relative to EU25=100	**0**	**0**	**0**	**1**	**0**	**0**	
New community designs per million population	**0,7**	**0,8**	**0,9**	**0,9**	**1,0**	**1,0**	**1**
Relative to EU25=100	**0**	**0**	**0**	**0**	**1**	**1**	

Source: European Innovation Progress Report 2006. Trend Chart. Country Pages. Bulgaria. EUR 22410. Luxembourg: Office for Official Publications of the European Communities, 2006, p. 222-223.

Today, the approach to developing innovation policy in Bulgaria is demand-driven, a kind of 'free-market' approach without government influence. There is still little understanding of the importance of innovation policy among decisionmakers and policymakers. And government funding of R&D is below 0.4% of gross domestic product (GDP). Our biggest challenge is to convince the government that the only way to come out of the serious economic crisis, and for industry to recover, is to invest in scientific and technological research and its transfer to industry.

Several initiatives ought to be taken immediately to improve the possibilities for innovation in Bulgaria. The most important are: the creation and development of a national innovation programme; creation and development of an action plan for innovation; establishing dedicated funding schemes for financing innovation and supporting the creation of innovative firms; and creating a specific government body with responsibility for development and co-ordination of innovation policy.

In the case of e-Government, Bulgarian policy makers have already designed a programme and strategy for this area. The purpose of a foresight exercise in this domain is to help stretch planning horizons beyond that considered in the existing plans, to raise awareness and to create new policy options. The overall objectives behind the initiation of two pilot foresight exercises in Bulgaria were to:

• Inform policy makers of possible future developments in each domain;

• Provide guidelines and recommendations that could be used in devising innovation policies for related sectors;
• Encourage long-term strategic thinking among all stakeholders and reach public consensus on the future course of development;
• Develop and strengthen networks and cooperation among various actors such as government agencies, private sector companies, universities and research centres;
• Mobilize the forces of those capable of action in these domains.
During workshop discussions the e-Government stakeholders expressed a common view that the foresight exercise should focus on the following priority topics:
• The development of e-Government services;
• The development of e-Government enabling technologies;
• Financial aspects of e-Government implementation;
• Education, vocational training and human resource development for e-Government;
• Legal aspects of implementation and development of e-Democracy;
• Development of the channels for provision of e-Services;
• The need of a differentiated approach for delivering e-Services to the targeted users.

Country groupings and developments in innovation

The 2002 Innovation Scoreboard introduces indicators on innovation in the Union's regions. The importance of regions is paramount in developing innovation performance, although difficulties in obtaining regional data comparable across the EU makes it easier to identify existing innovation 'hot spots' than future potential. Much of the most innovative industry in Europe is in regional or even local clusters, often close to universities or research institutions. Secondly, innovation policy needs to be developed at regional and city level, in addition to national and EU levels, if it is to respond to local conditions and needs. In many European countries, regional governments have shared responsibility (with national governments) for economic development policies, while in others they have primary responsibility. For all these reasons, the availability of regional indicators is essential for informing policy-makers' decisions.(6)

The huge variation between regions within countries demonstrates that a one-size-fits-all policy is of no more value at national level than at the EU level. This means that it is often as instructive to compare innovation policies and initiatives from regions with similar characteristics in different countries than between regions of the same country. Regions with concentrations of high-tech industry clearly require different policy approaches to innovation than regions where the biggest economic influence involves services such as tourism.

There is a limited number of very positive developments in innovation policy making. The adoption of the national innovation strategy has led to a more coherent framework for the further development of policy formulation and delivery. There are also further efforts to implement some of the strategy measures and to achieve the strategic goals (e.g. investment promotion and increasing innovation financing), while others have already been delayed. Although improving, the innovation policy implementation process is far from generating good practices, especially in areas such as shortening administrative lags, harmonising priorities on the regional governance levels and outsourcing policy delivery through better public-private partnership mechanisms.

Exhibit. EIS country groupings

Source: Innovation Scoreboard 2005. Country pages. European Commission, Brussels 2006.

The EIS 2005 comes with a strengthened methodology and a revised list of 26 indicators. It confirms that Sweden, Finland and Switzerland are the European innovation leaders, followed by Germany and Denmark. Most of the new Member States are engaged in the catching-up process, however, their slow pace is unlikely to allow for short-term convergence in Europe. In addition, should trends for the 25 Member States remain stable, the innovation gap between Europe and the US will not close, principally due to lower European performance in terms of patenting activity, ICT investments and education levels.

The EIS distinguishes between five key dimensions of innovation (innovation drivers, knowledge creation, innovation and entrepreneurship, applications, IPR), which provide further insight into the relative innovation strengths and weaknesses of European countries. Each country has its own agenda; however recent evidence suggests that an even performance on all dimensions is a positive driver for a strong overall innovation performance. This suggests, in particular for countries lagging behind, that policy would be more effective in improving overall innovation performance rather than on making further improvements in

areas of strengths only. Even leading countries are faced with the challenge to get more out of their good innovation performance (see Exhibit. EIS country groupings).

In this respect, innovation efficiency which measures how good countries are at transforming their innovation assets (education, R&D and innovation expenditures) into innovation results (turnover coming from new products, employment in high tech sectors, patents) is of particular interest. Switzerland, Denmark, Germany, Ireland, Italy or the Netherlands are especially high performers in this respect. One possible explanation for their success is that most of them benefit from an above average innovation demand from their population, as measured by the Innobarometer for 2005. In 2005 the network of Trend Chart correspondents appraisal of challenges based on the EIS results and additional national analysis led to three indicators being highlighted as particularly important from a policy perspective:

- rates of business expenditure on R&D (16 EU25 and three out of eight candidate/associate countries);
- share of science and engineering graduates (13 EU25 and three out of eight candidate/associate),

and

- participation in life-long learning activities (14 EU25 and one candidate country).

Compared to the 2004 exercise, the identified challenges have not evolved significantly. This may be in part due to the reliability/up to date nature of indicators which probably influences selection with notably few experts selecting indicators based on Community Innovation Survey (CIS) III1 data. It is also not always the case that the countries selecting specific indicators as a challenge are the worst performing in Europe, rather it can often reflect a national debate or concern about declining performance from a high level or relative performance compared to other strongly performing countries (e.g. France and UK on Business Expenditures in Research&Development /BERD/GDP/, Denmark on lifelong learning). Moreover, in the countries considered as 'innovation leaders', challenges tend to be less focused on single indicators but rather are more systemic or about 'equalising' innovation performance (e.g. Finland's and Sweden's concern to ensure SMEs take up greater role from flagging large firms).

The importance of these indicators reflect in many respects the political focus on boosting the intensity of innovation enterprises and the increasing emphasis given to the availability of trained people and developing and maintaining skills of employees with respect to new technologies and organisational methods. It is striking that the challenges related to human resource indicators are present in all types of European countries including two of the Nordic countries and Switzerland. Hence, difficulties with ensuring working-age citizens have appropriate technical skills and then maintaining this competence in the face of technological change appears to be independent of levels of economic development. Other factors in the national innovation systems of the countries concerned (teaching methods, promotion of innovation and technical careers, etc.) may provide a better explanation and warrant policy attention.

To foster European co-operation on specific technologies further and with a view to establishing European leadership in future strategic technologies, it is now time to make progress on the launch of the Joint Technology Initiatives (JTI's) as described in the Seventh Research Framework Programme. The intention is to submit a roadmap establishing the process that will lead to the presentation of proposals in this context in 2007 for the setting up of JTI's at an appropriate stage of preparedness.

The EU needs a focussed strategy to bring to market innovative products and services in promising areas. Lead markets can be a solution to this challenge: they are about creating conducive frameworks for innovation in specific areas of the economy where European firms

could have a globally leading role, but where due to reasons related to e.g. burdensome regulation and systemic failures in policy and legislative coherence, this potential remains currently unrealised. A concerted and prospective approach to public intervention, involving, as appropriate, actions e.g. in the areas of product market regulation, standardisation, IPR and public procurement as well as removing legal obstacles could play an instrumental role. This could help strengthen the demand side of innovation thereby setting the right conditions for innovation-driven lead markets to emerge and develop in Europe.(8)

Innovation policy in Bulgaria needs to focus on improving the skills of the current workforce through more adult education and to substantially improve knowledge creation inputs. An increase in business R&D could depend on significant improvements to both the amount of public R&D and to the quality of public R&D, which could partly be measured through IPR. Much further effort has to be invested into the IGS in terms of regional coordination of policy implementation, stimulating the access to internal financing of innovative activities and establishment of better linkages between research institutions and enterprises.

Following the established methodology the study analyzes the dynamics of the development of the national innovation system during the last year and the development opportunities in 2007 through five groups of indicators. This year a better opportunity was presented by the special Innovation Index of the Bulgarian enterprises, based on the results of the annual surveys of the Innovation Relay Center and with a profile of the Bulgarian innovative companies based on panel data and in-depth statistical analysis.(9) The Innovation Index of the Bulgarian enterprises indicates that most of them (over 65%) have not implemented any innovations during the last year. The index shows signs of the low ability to combine several types of innovation and of the implementation of innovation mostly with low degree of novelty by the Bulgarian companies (novelties only for the company or the national, but not the international market). The investigation of the present stage leads to following **conclusions and recommendations**:

- The market component of the Bulgarian innovation system is at early stage of development - Bulgarian enterprises have low degree of innovativeness.
- The innovation and the R&D components of the Bulgarian national innovation system develop in structural isolation from each other—the links between them are weak.
- The Bulgarian national innovation system is shaped primarily by its integration in and funding from European innovation networks and the changes in Bulgaria's public innovation policy and financing.
- The major barriers to innovation in Bulgaria are the lack of appropriate sources of financing (in the short term) and the lack of qualified personnel (in the long term).
- The Bulgarian national innovation system has started to slowly improve its performance, giving a clear sign that the time for action in this area has come.
- The government should direct more political, administrative and financial resources towards formulating and implementing the national innovation policy.
- Coordination between strategic documents, policies, administrative and financial instruments shaping the national innovation system should be improved.
- Cohesion and Structural Funds' resources for innovation should be carefully directed towards more complex, longer-term projects (vs. direct financing for enterprises) at national and regional level and should be implemented in coordination with other European programs.

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