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European Innovation Progress Report 2006

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The «European Innovation Progress Report 2006» is the annual synthesis report of the TrendChart initiative (Official responsible: Christophe Guichard) of the European Commission's Enterprise and Industry Directorate-General, Innovation Policy Development Unit (Head of Unit: Reinhard Büscher).

The present report was prepared by Lena Tsipouri (University of Athens, Greece) Alasdair Reid (Technopolis, Belgium), Anthony Arundel and Hugo Hollanders (MERIT - University of Maastricht) in liaison with the TrendChart policy monitoring netwook of national correspondents and the European Commission services.

The PDF version of this report is available for download (see: http://www.trendchart.org/tc_synthesis_annual.cfm) and includes summaries of recent innovation policy developments and trends in each of the EU25 as well as the Associated and Candidate countries.

The TrendChart serves the «open method of policy co-ordination» laid down by the Lisbon Council in March 2000 in the field of innovation. It supports organisation and scheme managers in Europe with summarised and concise information and statistics on innovation policies, performances and trends in the European Union (EU). It is also a European forum for benchmarking and the exchange of good practices in the area of innovation policy.

The TrendChart Product

The TrendChart on Innovation has been running since January 2000. It now tracks innovation policy developments in all 25 EU Member States, plus Bulgaria, Iceland, Israel, Liechtenstein, Norway, Romania, Switzerland and Turkey. It also provides a policy monitoring service for three other non-European zones: NAFTA/Brazil, Asia and the MEDA countries.

The Trend Chart website (www.trendchart.org) provides access to the following services and publications, as they become available:

- *A database of innovation policy measures across 33 European countries;*
- *A news service and related innovation policy information database;*
- *A «who is who» of agencies and government departments involved in innovation;*
- *Annual policy monitoring reports for all countries and zones covered;*
- *All background material for four annual policy benchmarking workshops;*
- *The European Innovation Scoreboard and other statistical reports;*
- *An annual synthesis report bringing together key of the Trend Chart.*

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ANNEX B COUNTRY BRIEFS

LIST OF EXHIBITS

ABBREVIATIONS

ANVAR	*Agence Nationale de Valorisation de la Recherche (National Agency for Research Exploitation)*
AWS	*The Austria Wirtschaftsservice GmbH (Austrian Economic Services Ltd)*
AWT	*Dutch Advisory Council of Science and Technology Policy*
BBW	*Federal Office for Education and Sciences*
BDPME	*Banque du Développement des Petites et Moyennes Entreprises (French Bank for SME Development)*
BERD	*Business Expenditures in Research & Development*
BMBF	*Federal Ministry for Education and Research*
BMWA	*Federal Ministry of the Economy*
CEECs	*Central and Eastern European Countries*
CIPE	*Comitato Interministeriale per la Programmazione Economica (Interministerial Committe for Economic Programming)*
CIS	*Community Innovation Survey*
CSF	*Community Support Framework*
CWTI	*Committee on Science, Technology and Information Policy*
DGE	*General Directorate for Enterprise*
EIS	*European Innovation Scoreboard*
ERA	*European Research Area*
FDI	*Foreign Direct Investment*
FGG	*Finanzierungsgaraniegesellschaft (Austrian Funding Warranty)*
FORFAS	*Irish National Policy Advisory Board*
GWF	*Swiss Science Agency*
IDA	*Irish Development Authority*
IPR	*Intellectual Property Rights*
MAP	*Ministry of Productive Activities*
MCYT	*Ministry of Science and Technology*
MEC	*Ministry of Education and Science*
MIT	*Ministry for Innovation and Technology*
MITYC	*Ministry of Industry, Tourism and Trade*
MIUR	*Ministry of Education, University and Research*
OCS	*Office of the Chief Scientist*
OECD	*Organisation for Economic Cooperation and Development*
R&D	*Research & Development*
RTD	*Research and Technological Development*
RTDI	*Research, Technological Development and Innovation*
SMEs	*Small and Medium-size Enterprises*
S&T	*Science & Technology*
SOFARIS	*Société française de garantie des financements des PME (French Agency for SME warranties funding)*
TAFTIE	*The Association for Technology Implementation in Europe*
TEKES	*National Technology Agency of Finland*
TUBITAK	*The Scientific and Technological Research Council of Turkey*

Note: *The Policy Measures in the TrendChart database are referenced by the ISO code of the country and the identification number of the measure. Ex: AT 12 is the Policy Measure number 12 for Austria.*

EXECUTIVE SUMMARY

Innovation is about change *and the ability to manage change over time. Innovation can be about the successful exploitation of new ideas in the form of a new or improved product or service but it can also be about the way in which a product or service is delivered. Equally, innovation can be about creatively marketing an existing product, or about changing the business model of a sector. Boosting innovation is at the core of the Lisbon Strategy since it is a key determinant of the ability of an enterprise, sector, region or country to remain competitive.*

In this context, the European Innovation Progress Report 2006 *provides a summary of the findings and analysis undertaken during 2005 under the umbrella of the European TrendChart on Innovation. The findings are based on empirical analysis of trends in key indicators (the European Innovation Scoreboard 2005 – EIS 2005) and a qualitative analysis of the public policy response to the challenges of strengthening national innovation systems across the 25 Member States of the European Union as well as associate and candidate countries.*

This report combines these two approaches by drawing on the findings of the EIS 2005 to identify for each country up to three key challenges *and then to appraise the extent to which the policy mix in each country is relevant and likely to contribute to overcoming the challenges. Moreover, effective policy requires strong governance processes including the capacities of key stakeholders to work together, access to policy intelligence, independent evaluations of the impact of policy, etc. Innovation policy governance is thus the subject of a specific analysis in chapter two of the report.*

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. 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 TrendChart correspondents appraisal of challenges based on the EIS results and additional national analysis led to three EIS 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 CISIII[1] 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 BERD/GDP, Denmark on life-long learning). Moreover, in the countries*

[1] CISIII: 3rd Community Innovation Survey (see: http://cordis.europa.eu/innovation/en/policy/cis.htm)

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.*

A single indicator, no matter how important, is insufficient for building a policy framework. Accordingly, the more in-depth analysis of policy developments responding to specific challenges was carried out at the level of the five main groups of EIS indicators:

- *Innovation drivers (indicators on human resources notably the structural conditions required for innovation potential);*
- *Knowledge creation (measures of the investments in R&D activities, considered as key elements for a successful knowledge-based economy);*
- *Innovation & entrepreneurship (measures of the efforts towards innovation at the level of firms).*
- *Application (measures of the performance, expressed in terms of labour and business activities, and their value added in innovative sectors;*
- *Intellectual property (measures the achieved results in terms of successful know-how).*

The policy response to each of the identified challenges was appraised based on a set of criteria ranging from a systematic and integrated approach responding to the challenge through a comprehensive set of measures to no specific measures addressing the challenge.

Policy responses to challenges in the area of **innovation drivers** *generally take the form of broad ranging plans of ministries of education, and there are few TrendChart measures in this field. The most complete response appear to be in the Netherlands on S&E graduates and in Denmark and Ireland on life-long learning.*

As noted above **knowledge creation** *is a main challenge for a majority of countries. There is a generalised commitment to raise public R&D investment levels with notably some specific pledges to raise investment annually for the coming years (e.g. Latvia and Lithuania) by a fixed target. On the enterprise side, there is also a new or renewed interest in fiscal incentives visible in 10 out of 19 countries facing the challenge of raising business R&D intensity. National 'innovation funds' aimed at supporting the creation of new high-tech enterprises have been created in Bulgaria, Estonia, Hungary, Italy and Poland. Finally, stimulating greater co-operation and synergies between enterprises and public or academic research centres is given increasing importance with the aim to improve the economic impact of research. This is notably the case in France with the competitiveness poles/clusters but also in Belgium and Greece.*

In the field of **innovation and entrepreneurship**, *the report underlines that a lot of effort is going on at the policy level to boost access to seed capital for innovative enterprises. Even in countries where access to finance does not appear statistically to be a major challenge, such as Finland. In Germany, a raft of venture capital related measures have been introduced since 2004 and likewise Ireland and the Netherlands have made major efforts to develop policy responses to this issues. In contrast, there is a less visible focus on and efforts to tackle weaknesses on non-technological innovation.*

In the area of **application of knowledge**, *evolving economic structures with a greater role for knowledge based services versus manufacturing leads to a common thread running across a number of the countries being the need to boost innovation in services as well as in manufacturing industry. This is the case in Belgium, Cyprus and Spain, but often there is only a limited or nascent policy response. This issue of policy to promote innovation in service is the subject of a separate analysis undertaken in the context of the preparation of a TrendChart policy workshop[2].*

Finally, in the area of **intellectual property** *despite less than rosy situations in many countries, few identify IPR as a major challenge. Perhaps many of the new Member States and cohesion countries see this as a 'logical outcome' of low levels of investment in knowledge. Policy responses generally take one of*

[2] *TrendChart Workshop on innovation in services, Helsinki, 19 and 20 June 2006. For more information, see: http://www.trendchart.org/ws_overview.cfm?id=10*

three forms: (a) measures to encourage SMEs to apply for patents; (b) programmes to disseminate patent information; and (c) efforts that encourage public sector research institutions to apply for patents. French and Danish efforts to restructure technology transfer structures and procedures from public research appear interesting for other countries to study.

In the countries studied there are from one to three ministries involved in policy design and sometimes implementation. Parliamentary committees, advisory councils and executive agencies co-exist with the ministries. In an ideal model, the division of labour between ministries and agencies is a split between policy design (the responsibility of the ministry following political decisions taken by government), and policy implementation (dealt with by the agencies on the instruction of the ministry). However, in practice the border lines between policy design and policy implementation *are not always clear-cut and in addition in many countries the agencies have an explicit or implicit role in policy design as well.*

Innovation governance structures *are very diverse. The typical models represented by a broader number of actors include strong inter-organisation co-ordination; strong co-ordination based on hierarchical relations with other policy making and implementation organisations/agencies as well as fragmented systems with more actors following individual agendas, some of them efficiently but with limited synergies and potential friction. Both bottom-up and top-down governance models are encountered. An additional layer of coordination refers to the relations between the national and the regional level. Self-governance of the regions ranges from full autonomy of the three Belgian regions to very centralized structures in Greece, Portugal and some of the new member states; different degrees of federal-regional interaction lies in-between the two extremes in other countries.*

It appears that effectiveness and efficiency of the governance system is not related to the type of model adopted and there is not one best practice recommended. The Anglo-Saxon and Nordic countries, which are transforming rapidly into the knowledge economy, demonstrate high growth rates and present above average Lisbon and EIS indicators. The UK is often used as a model. In the Nordic countries there is a long tradition of consensus seeking models. While structures there may differ from the Anglo-Saxon ones there is a systematic effort to involve stakeholders in the decision making process and proceed with a smooth implementation of policy design, since there are no objections once it is adopted.

Over the years there has been clear progress in innovation governance *with more countries adopting strategic policy making and explicit coordination. Similarly, there is an increasing effort to use appropriate tools for policy making design, in particular organise the collection of the necessary information to systematically evaluate, monitor indicators on national performance and use these indicators together with various other forms of intelligence as inputs for policy design. The UK and the Netherlands are pioneers in that respect, while Germany, Austria and Ireland have adopted intelligence gathering procedures more recently but quite effectively. Transnational learning is also increasing although more between agencies than between ministries, more between cultural and geographical neighbours, more at the level of information exchange than deeper links. The role of international organisations is crucial for this process. But despite evidence on progress made much remains to be done and several countries lie well behind the average.*

In conclusion, innovation is increasingly a political priority across the European countries*, yet innovation policy objectives are still defined very ambiguously. The majority of countries do not set clearly defined objectives and link them to measures. Quantitative targets are limited to the target of "3% of GDP on R&D with business providing two-thirds" inspired by the Barcelona objective. However, in some countries, policy formulation is more systematic with clear objectives, targeting multiple aspects of innovation performance and capacities and taking account of networks and interactions in the national innovation system. In this respect, the Netherlands appears to be a good practice case but this evolution is also evident in newly introduced strategies and action plans in Portugal and Latvia.*

Hence, while evaluation at programme level can sometimes provide evidence of whether a programme has reached a certain number of targets it rarely allows policy makers to arrive at conclusions concerning wider impacts of the policy measure on the 'health of the innovation system'. This is the challenge facing innovation policy makers across Europe in the coming years: to appraise and understand the impact of the broad set of policy tools at their disposal for encouraging and supporting enterprises to innovate and to adapt these tools to take account of the constant evolvement of the global market.

INTRODUCTION

Effective policy development requires access to timely and up to date information on trends in key indicators and access to knowledge on evolutions in the design, delivery and results of policy measures. Traditionally this 'policy intelligence' effort was focused on the country of a policy maker and perhaps one or two neighbouring or particularly well performing countries. Increasingly, policy makers have come to recognise the value of understanding the broader trends across a larger group of countries, of being able to identify a group of 'peer countries' facing similar problems or sharing opportunities, of learning from advanced as well as on occasions less-advanced countries in terms of methods and processes relating to policy governance.

Since 2000, the European TrendChart on Innovation (www.trendchart.org) has provided a service to European policy makers and other relevant stakeholders through three main pillars of activity:

- *The European Innovation Scoreboard which collects and analyses trends in key indicators across the EU25, associated and candidate countries and the US and Japan. The EIS has become over time the standard for benchmarking of policy indicators and its annual publication provokes a strong debate on the results at European and national levels.*
- *The policy monitoring network tracking developments in all 25 EU Member States, plus Bulgaria, Iceland, Israel, Liechtenstein, Norway, Romania, Switzerland and Turkey. Since 2004, it also provides a policy monitoring service for three other non-European zones: NAFTA/Brazil, Asia and the MEDA countries.*
- *The TrendChart Policy workshops which offer an opportunity for a group of selected innovation policy makers and practitioners to exchange know-how and debate good practice in a specific area of interest for improving innovation performance.*

This European Innovation Progress Report 2006 is structured around two main chapters:

- *Chapter 1 provides a summary overview of the results of the European Innovation Scoreboard for 2005.*
- *Chapter 2 identifies a series of key challenges for policy makers based on the EIS results and the country reporting of the policy monitoring network. It appraises how well the Governments of the various European countries are responding to the challenges identified by introducing or adapting policy measures designed to improve the innovation performance of their economies. It also provides a commentary on the types and effectiveness of governance structures for innovation policy as well as highlight a series of good practice cases.*
- *These chapters are complemented by a set of country briefs in annex providing detailed analysis of key national innovation policy challenges and responses and the European Innovation Scoreboard 2005 country data and findings.*

1 INNOVATION PERFORMANCE IN EUROPE

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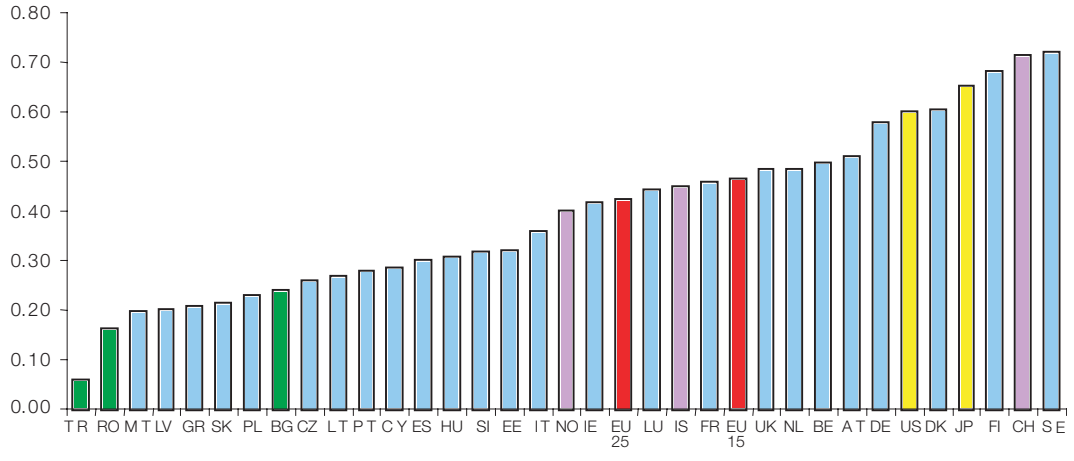
1.1 EUROPEAN INNOVATION SCOREBOARD: BASE FINDINGS

1.1 Overall innovation performance in Europe

The Summary Innovation Index gives an "at a glance" overview of aggregate national innovation performance. The EIS report on Strengths and Weaknesses gives more detailed information on the strengths and challenges of each country[3].
Exhibit 1 shows the results for the 2005 SII. As measured by the EIS indicators, Sweden, Switzerland, Finland, Germany and Denmark are the European innovation leaders. Estonia and Slovenia lead the group of new Member States. For Turkey, the US and Japan the SII value is an estimate based on a more limited set of indicators. The relative position of these countries in Exhibit 1 should thus be interpreted with care[4].

Exhibit 1. The 2005 Summary Innovation Index (SII)

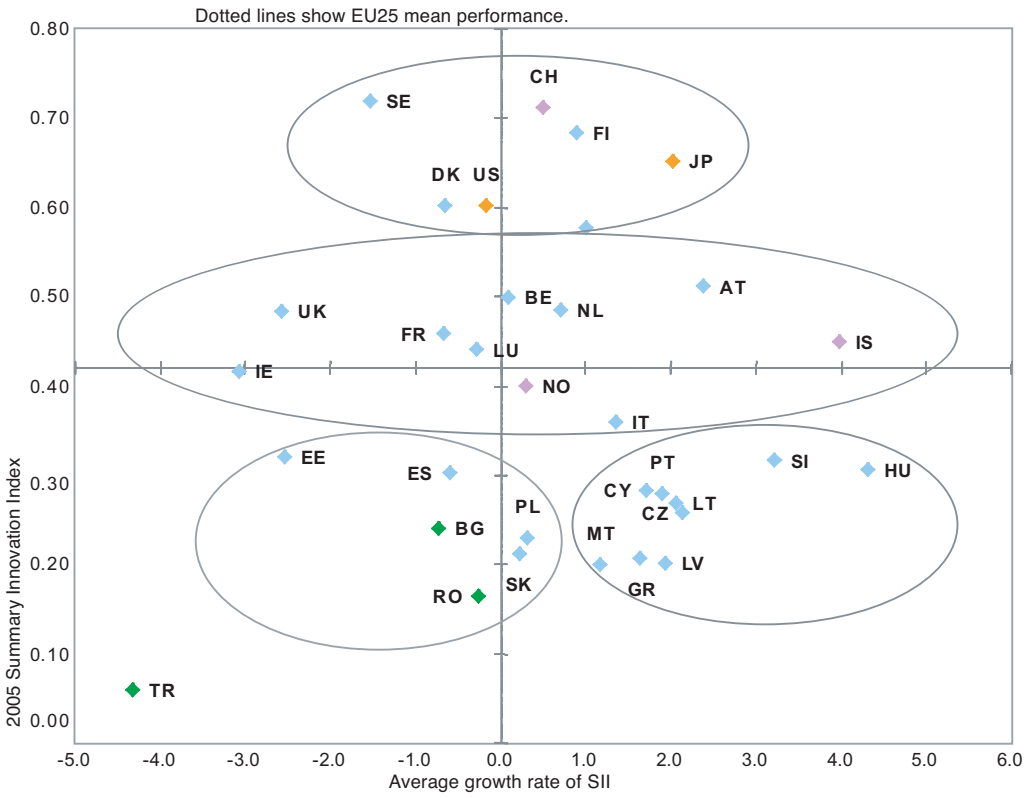


3 The EIS 2005 Strengths & Weaknesses report is available for download at http://www.trendchart.org/scoreboards/scoreboard2005/scoreboard_papers.cfm
4 The Technical Annex provides more details.
(see at http://www.trendchart.org/scoreboards/scoreboard2005/technical_annex.cfm)

Exhibit 2 shows the current performance as measured by the SII on the vertical axis against the short-run trend performance of the SII on the horizontal axis. This creates four quadrants: countries above both the average EU-25 trend and the average EU-25 SII are moving ahead, countries below the average SII but with an above average trend performance are catching up, countries with a below average SII and a below average trend are falling further behind, and countries with an above average SII and a below average trend are losing momentum.

It should be noted that Exhibit 2 is not comparable to any of the four-quadrant graphs in previous EIS reports as the horizontal axis shows the average annual growth rate of the SII[5] whereas previous reports showed the average trend increase for the various innovation indicators. The new methodology therefore better characterizes the SII evolution.

Exhibit 2. SII and trends



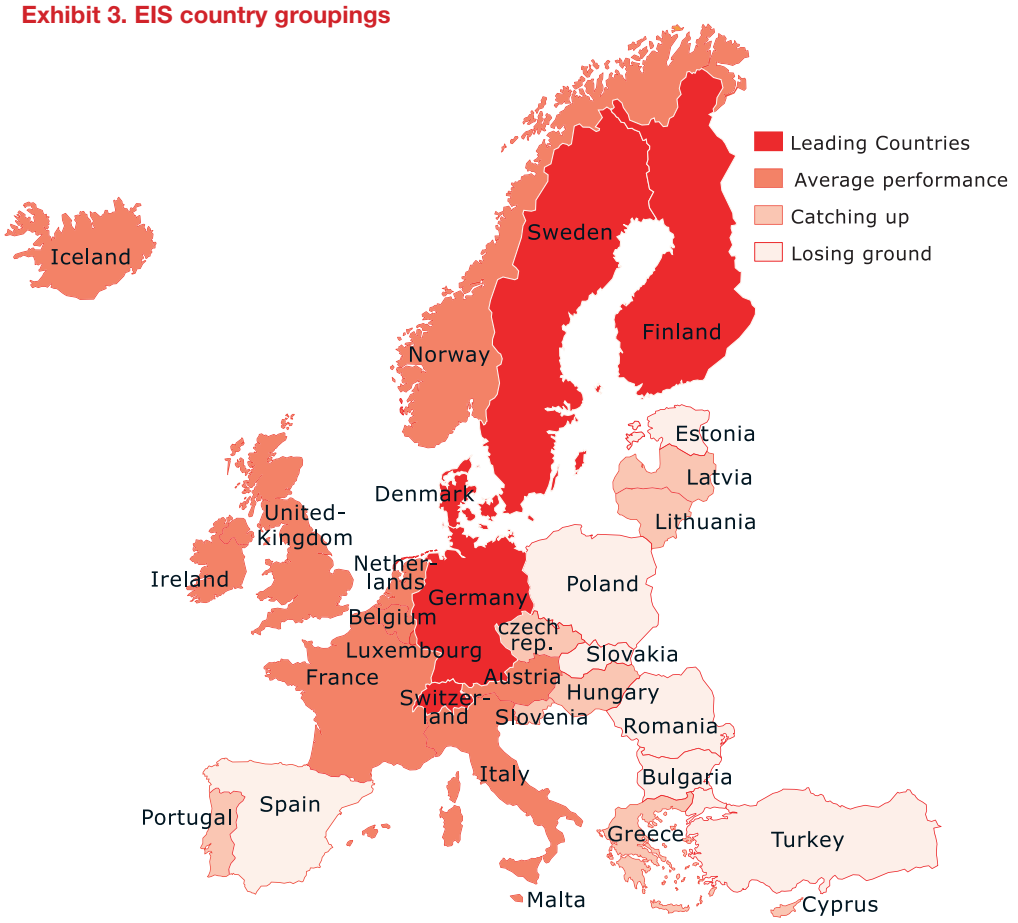
Notes: The circles in Exhibit 2 identify the four main country groupings: top = leading countries, middle = average performers, bottom right = catching up, and bottom left = losing ground.

Based on their SII score and the growth rate of the SII the countries can be divided into four groups:

- *Switzerland, Finland, Sweden, Denmark and Germany make up the group of "Leading countries". Of the leading countries, Sweden and Denmark show a below EU average SII growth rate.*
- *France, Luxembourg, Ireland, United Kingdom, Netherlands, Belgium, Austria, Norway, Italy and Iceland all belong to the group of countries showing "Average performance".*
- *Countries "Catching up" include Slovenia, Hungary, Portugal, Czech Republic, Lithuania, Latvia, Greece, Cyprus and Malta.*
- *Countries "Losing ground" include Estonia, Spain, Bulgaria, Poland, Slovakia, Romania and Turkey. Each of these four groups are circled in Exhibit 2 and mapped in Exhibit 3.*

5. The SII scores for 3 years – using the 2005 methodology for all 3 years –, the growth rate and the ranks for these 3 years are shown in Annex A.2 Table E. Although several countries show large changes in their SII score, the country ranking is very stable and shows almost no changes in rank with the exception of Ireland.

Exhibit 3. EIS country groupings

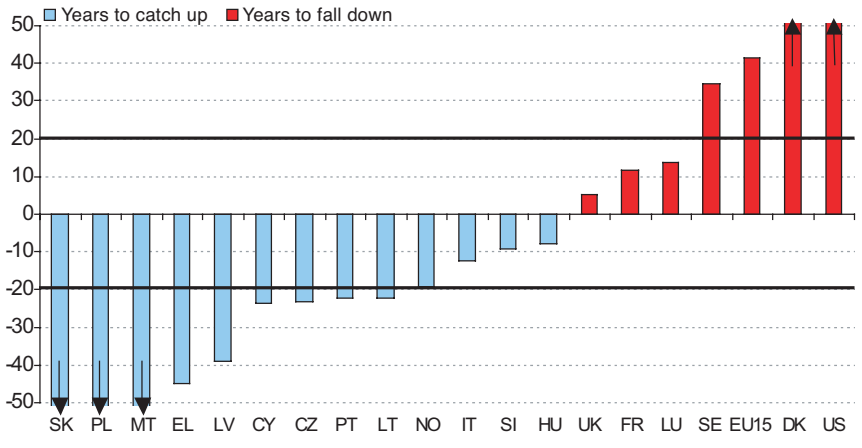


1.1.2. No short-term convergence is expected

Using a simple linear extrapolation of current performances and growth rates*, an estimate can be made for those countries either catching up or losing momentum on how many years it would take to either catch up or decline to the EU25 average level of performance. The estimates based on a linear extrapolation will become less reliable the longer the time period the estimate is based on. Exhibit 4 shows the estimated years to catch up to or decline to the EU25 average.*

None of the catching up countries is expected to be at the EU25 average by 2010. At best, Hungary, Slovenia, and Italy will reach the EU25 average under the current conditions by 2015. Under this scenario, for Malta, Slovakia and Poland the catching up process would take more than 50 years. This enormous time lag should raise questions on which dimensions of the innovation policy have to be better addressed in these countries. Similar questions need to be addressed in countries like France or the United Kingdom. They still show an average value of the summary index above the EU average, but might regress to the EU average, possibly within the next 5 to 10 years. Based on the current trends, it would also take more than 50 years for the EU25 to reach the US level of innovation performance.

Exhibit 4. Years to catch up or decline to EU25 average performance



Bold lines reflect 20 years to catch up or decline to the EU average. For countries having either both above average SII and growth rates or both below average SII and growth rates, years to catch up could not be computed as these countries are either expected to increase their lead, respectively gap, towards the EU25.

1.1.3. Five key dimensions of innovation performance

Innovation is a non-linear process.The 26 EIS innovation indicators have been classified into five categories to better capture the various aspects of the innovation process. These five categories cover different dimensions of innovation performance with a limited set of indicators. Innovation drivers measure the structural conditions required for innovation potential, Knowledge creation measures the investments in R&D activities, Innovation & entrepreneurship measures the efforts towards innovation at the firm level, Application measures the performance expressed in terms of labour and business activities and their value added in innovative sectors, and Intellectual property measures the achieved results in terms of successful know-how. Exhibit 5 shows the ranking of countries for each of these groups from the worst to best performer. Country colour codes correspond with those in Exhibit 3.

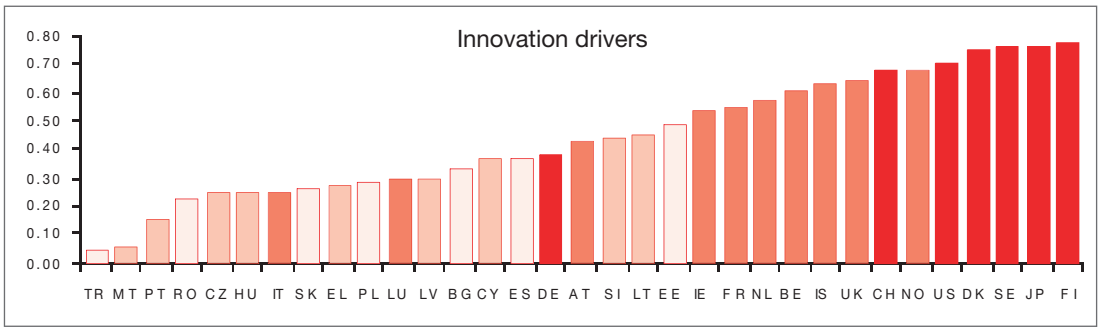
Countries generally perform at a comparable level *in each of these groups. However, there are some noteworthy* exceptions*. Germany, Italy and Luxembourg are performing worse in Innovation drivers, Switzerland in Knowledge creation and Iceland in Applications than in the other groups. Estonia, Latvia and Portugal are performing much better in Innovation & entrepreneurship and the Czech Republic and Ireland in Applications than in the other groups. The EIS report on Strengths and Weaknesses gives more detailed information on the strengths and challenges of each country[6].*

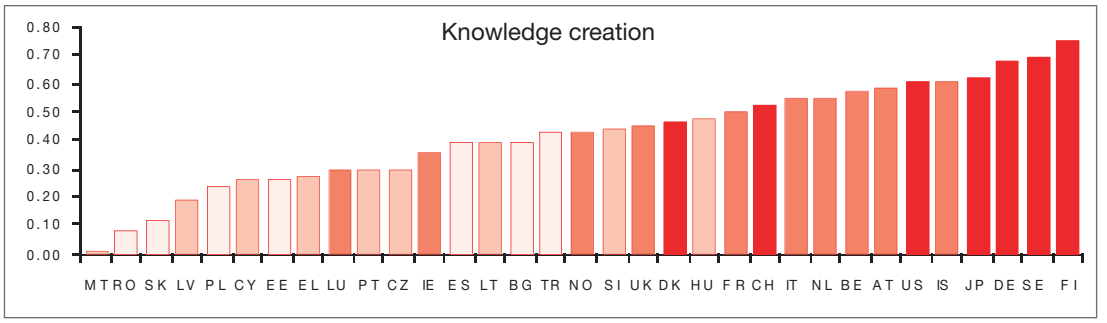
There is some evidence that countries with an even performance on each of the key dimensions perform better overall than countries with an uneven distribution (see Section 1.2.5). Germany's weak performance on Innovation drivers might thus hamper the effect of increased efforts in other key dimensions on the overall innovative performance of the country. A similar statement can be made for Knowledge creation in Denmark, the UK and Switzerland, and Innovation drivers in Austria and Portugal. The opposite might also hold true: a country can also over perform in one of the key dimensions without fully benefiting of an improved overall innovative performance. This might be the case for Innovation & entrepreneurship in Estonia and Portugal, and Applications in Ireland.

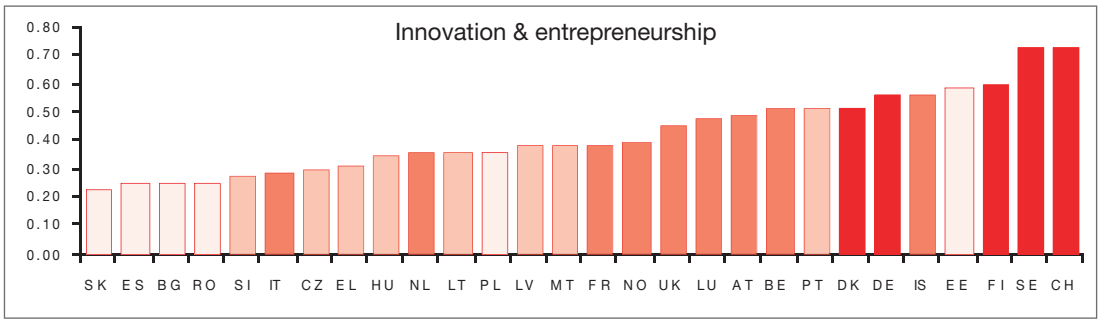
The information delivered by these 5 categories allows for a rapid identification of areas of weakness to be explored. However, further analysis and identification of strengths and weaknesses will have to be conducted through an in-depth study of the component indicators and external sources.

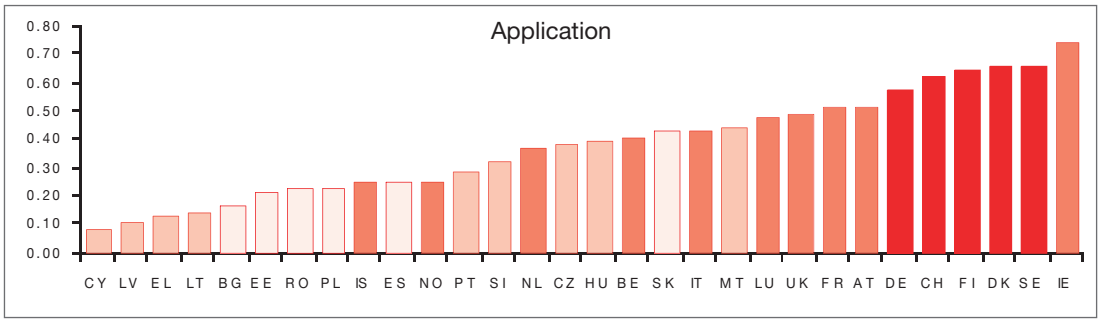
6. The EIS 2005 Strengths & Weaknesses report is available for download at http://www.trendchart.org/scoreboards/scoreboard2005/scoreboard_papers.cfm

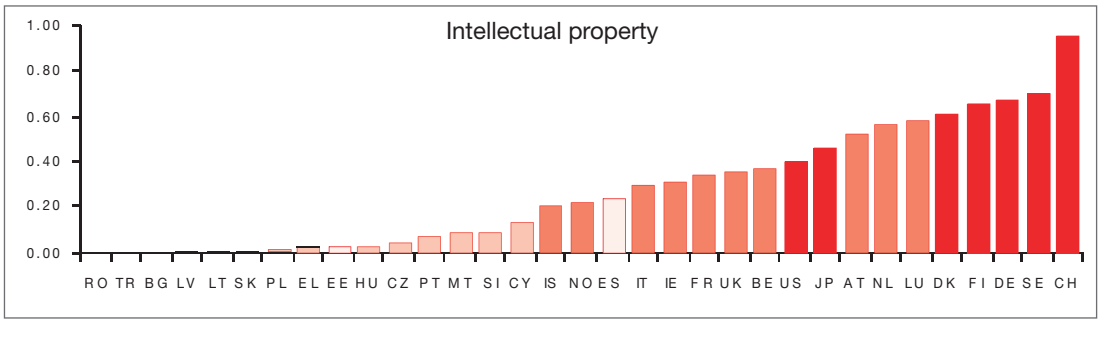
Exhibit 5. Innovation performance per group of indicators











1.1.4. innovation input and innovation output

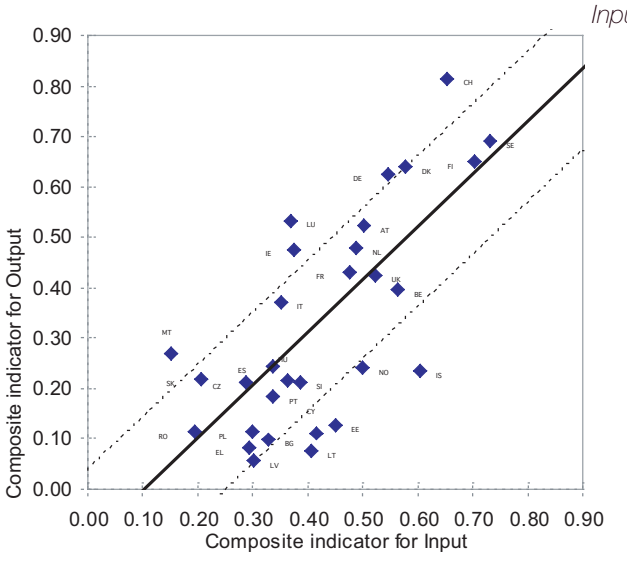
The concept of innovation efficiency *is a key dimension of innovation policy. Innovation efficiency can be measured as the ability of firms to translate innovation inputs into innovation outputs. The ratio between the EIS composite index for inputs (education, investment in innovation, etc) and outputs (firm turnover coming from new products, employment in high tech sectors, patents, etc) provides a measure of this relationship for national innovation systems. The composite indicator for Inputs is computed as the average of the 16 indicators covered in Innovation drivers, Knowledge creation and Innovation & entrepreneurship; the composite indicator for Outputs is computed as the average of the 10 indicators covered in Applications and Intellectual Property. Exhibit 6 shows the ranking of countries based on their SII scores and the composite indicators for Inputs and Outputs. Finland, Sweden and Switzerland are leading in both Inputs and Outputs.*

Exhibit 6. Input, output and SII ranks

	SE	CH	FI	DK	DE	AT	BE	UK	NL	FR	IS	LU	IE	NO	IT	EE	SI	HU	ES	CY	PT	LT	CZ	BG	PL	SK	EL	LV	RO
INPUT	1	3	2	5	7	9	6	8	11	12	4	18	17	10	20	13	16	19	22	14	21	15	27	23	25	28	26	24	29
OUTPUT	2	1	3	4	5	7	12	11	8	10	16	6	9	15	13	22	20	18	14	25	21	28	19	26	24	17	27	29	23
SII	1	2	3	4	5	6	7	9	8	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

Many countries have similar rankings on both Input and Output performance*. The most noteworthy* exceptions *are Belgium, Iceland, Norway, Estonia, Cyprus, Lithuania and Latvia, which all rank much better on Inputs than on Outputs. Luxembourg, Ireland, Italy, Spain, Czech Republic, Slovakia and Romania all score much better on Outputs. These results should, however, be interpreted with caution as many of the Output indicators measure intellectual property where there is an enormous range in performance (see Exhibit 5).*

Exhibit 7. Input and Output



The solid line shows the trend line between both indices.

Exhibit 7 graphs the composite index scores for Inputs against the scores for Outputs. The results give an indication of the efficiency with which a country transforms its innovation inputs (education, investment in innovation) into innovation outputs (turnover coming from new products, employment in high-tech sectors, and patents). Despite the fact there is no theoretical basis for assuming a linear relationship, and several aspects of innovation may only be partially covered by the EIS, this analysis is a first contribution to the discussions on the efficiency of innovation systems in Europe.

Countries above the diagonal line perform better on outputs than on inputs, suggesting that they are more efficient at transforming inputs into outputs than countries below the diagonal line. The picture is very diverse, with both highly innovative countries according to the SII, such as Germany and Finland, and mid performing countries such as Italy, falling above the diagonal line. On the other side fall most of the new Member States, with relatively large investments but poor performance on outputs. However, innovation is a long-term process and the evolution of the output performance of these countries will likely improve in the years to come, based on current investment in inputs. Among the more advanced countries, Iceland is an example of a country that is a poor performer on applications, despite a favourable general business environment with high investments in R&D and a good education level. This is partly explained by the emphasis in Iceland on long-term innovation strategies, based on biotechnology and the hydrogen economy, that have yet to pay off.

The receptiveness of a country's population *might be one explanation for the fact that some countries perform relatively better on outputs and other countries on inputs. Section 1.2.4 shows that most countries with above average shares of citizens attracted by new products and services also have output/input rates above the European trend. Similarly, countries with below average shares of citizens attracted by new products and services have below average output/input rates.*

1.1.5. Innovation performances and trends by country – challenges

Exhibit 8 identifies for each indicator the three European countries with the highest scores[7] and the results for the EU25, EU15, US and Japan. The innovation leaders Sweden, Finland, Denmark, Germany and Switzerland take up 60% of the leading slots.

Exhibit 8. Innovation performance leaders

	EU25	EU15	European leaders			US	JP
1.1 S&E graduates	12.2	13.1	IE (24.2)	FR (22.2)	UK (21.0)	10.9	13.2
1.2 Tertiary education	21.2	23.1	FI (34.2)	DK (32.9)	NO (32.3)	38.4	37.4
1.3 Broadband penetration rate	6.5	7.6	DK (15.6)	IS (15.5)	NL (14.7)	11.2	12.7
1.4 Life-long learning	9.9	10.7	SE (35.8)	IS (31.7)	CH (28.6)	--	--
1.5 Youth education	76.7	73.8	NO (95.3)	SK (91.3)	CZ (90.9)	--	--
2.1 Public R&D expenditures	0.69	0.70	IS (1.37)	FI (1.03)	SE (1.02)	0.86	0.89
2.2 Business R&D expenditures	1.26	1.30	SE (2.93)	FI (2.45)	CH (1.90)	1.91	2.65
2.3 Share of medium-high/high-tech R&D	--	89.2	SE (93.7)	DE (93.5)	IT (91.1)	90.6	86.8
2.4 Share of firms receiving public funding	N/a	N/a	AT (19.2)	FI (18.7)	IT (14.8)	--	--
2.5 University R&D expenditures financed by business sector	6.6	6.6	LV (23.9)	BE (12.7)	DE (12.5)	4.5	2.7
3.1 SMEs innovating in-house	N/a	N/a	CH (54.8)	IS (46.5)	AT (44.7)	--	--
3.2 Innovative SMEs co-operating with others	N/a	N/a	HU (32.9)	CY (22.6)	FI (18.6)	--	--
3.3 Innovation expenditures	N/a	N/a	CH (3.48)	UK (3.35)	MT (3.29)	--	--
3.4 Early-stage venture capital	--	0.025	SE (0.081)	FI (0.065)	DK (0.063)	0.072	--
3.5 ICT expenditures	6.4	6.3	SE (8.7)	EE (8.6)	MT (8.5)	7.8	8.0
3.6 SMEs using non-technological change	N/a	N/a	LU (74)	DE (65)	CH (63)	--	--
4.1 Employment in high-tech services	3.19	3.49	SE (4.85)	IS (4.81)	FI (4.68)	--	--
4.2 High-tech exports	17.8	17.2	MT (55.5)	IE (29.9)	LU (29.3)	26.9	22.7
4.3 Sales share of new-to-market products	N/a	N/a	SK (10.9)	PT (10.8)	LU (9.1)	--	--
4.4 Sales share of new-to-firm not new-to-market products	N/a	N/a	DK (25.6)	DE (23.4)	CH (20.5)	--	--
4.5 Employment in medium-high/high-tech manufacturing	6.60	7.10	DE (11.04)	SI (8.94)	CZ (8.71)	4.89	7.40
5.1 EPO patents	133.6	158.5	CH (460.1)	SE (311.5)	FI (310.9)	154.5	166.7
5.2 USPTO patents	59.9	71.3	CH (188.3)	SE (187.4)	FI (158.6)	301.4	273.9
5.3 Triad patents	22.3	36.3	CH (110.8)	FI (94.5)	SE (91.4)	53.6	92.6
5.4 Community trademarks	87.2	100.9	LU (571.2)	CH (180.0)	AT (158.8)	32.0	11.1
5.5 Community designs	84.0	98.9	DK (199.1)	CH (161.2)	DE (147.1)	12.4	15.1

7. European countries in Tables 3 and 4 are defined as the group of EU25 countries, Iceland, Norway and Switzerland.

Having the highest score does not necessarily qualify a country as an innovation leader in that particular indicator. In particular for (very) small countries a high score can be achieved due to their specialisation in certain sectors or products without achieving innovation leadership. In particular for high-tech exports the high scores for Malta and Luxembourg are most likely due to their industrial specialisation.

The US does better than the EU in 11 indicators, *while the EU only scores above the US in 5 indicators (S&E graduates, university R&D financed by business sector, employment in medium-high and high-tech manufacturing, community trademarks and community designs). Japan also does better than the EU in 11 indicators, while the EU only scores above Japan in 4 indicators (share of medium-high and high-tech R&D, university R&D financed by the business sector, community trademarks and community designs). Performance in intellectual property is biased due to the home advantage that local companies have in their local market. This home advantage explains the very high patent score for the US on USPTO patents and the poor performance for the US and Japan on both community trademarks and community designs within the EU. However, despite its home advantage, the EU is not outperforming the US and Japan in EPO patents.*

Exhibit 9. Innovation trend leaders

	EU25	EU15	European leaders			US	JP
1.1 S&E graduates	9.4	9.0	SK (17.9)	IT (16.7)	PL (16.5)	6.4	2.1
1.2 Tertiary education	4.3	3.8	MT (18.5)	PT (16.9)	PL (14.4)	2.6	6.2
1.3 Broadband penetration rate	--	49.5	IE (312.3)	LU (122.6)	IT (79.2)	--	--
1.5 Youth education	0.2	1.5	MT (9.4)	PT (6.1)	LT (4.2)	--	--
2.1 Public R&D expenditures	2.2	2.0	LU (24.0)	CY (16.2)	HU (14.0)	11.9	2.3
2.2 Business R&D expenditures	1.3	1.4	CY (26.5)	EE (22.5)	AT (12.1)	-2.1	10.8
2.5 University R&D expenditures financed by business sector	0.6	0.9	HU (41.5)	PT (23.5)	CY (23.3)	-12.9	6.8
3.5 ICT expenditures	6.9	-1.3	PL (6.9)	NO (4.0)	CH (2.3)	0.0	8.2
4.1 Employment in high-tech services	0.1	1.3	CY (9.9)	IS (8.3)	AT (8.3)	--	--
4.2 High-tech exports	-6.3	-6.2	CZ (22.5)	LU (17.6)	SI (16.1)	-4.5	-5.8
4.5 Employment in medium-high/high-tech manufacturing	-2.8	-3.4	IS (9.9)	SK (8.9)	CY (6.7)	-4.3	-2.4
5.1 EPO patents	5.3	5.2	SI (20.2)	MT (20.0)	NL (17.7)	3.3	9.9
5.2 USPTO patents	--	5.9	CY (37.9)	IS (20.4)	EE (19.9)	-0.1	5.5
5.3 Triad patents	1.2	1.0	CY (166.7)	LT (62.0)	LV (28.4)	-1.4	2.9
5.4 Community trademarks	15.6	13.9	PL (525.4)	EE (449.9)	CZ (240.2)	-1.9	13.9

Annual percentage change

Exhibit 9 identifies for each indicator, for which time series data are available, the three European countries with the highest growth rates and the results for the EU25, EU15, the US and Japan. The catching-up countries take up almost 50% of the leading slots. In particular Cyprus, has the highest growth rates in 7 indicators.

The EU shows a higher trend than the US in 10 indicators, the US scores above the EU in 2 indicators (public R&D and high-tech exports). Japan shows a higher trend than the EU in 9 indicators while the EU only scores above Japan in 3 indicators (S&E graduates, USPTO patents and community trademarks).

The role of intellectual property

The new member states show below average innovation performance, partly because almost all of them have extremely low rates of patenting. The analysis of the main challenges for these countries does not view this as an issue because low patenting rates are caused by very low investments in R&D. The challenge, over the short and medium term, is often to first focus on improving both public and private R&D expenditures. Once this is achieved, patent rates will probably increase, given appropriate infrastructural support, such as programmes to assist firms with filing patent applications. If patent rates do not increase after a sustained period of higher R&D expenditures, then low patent rates could develop into a main challenge, but this is not the case at present.

A long-term return for investing in innovation

Although Finland and Sweden are EU innovation leaders, both countries present below average static economic performance. For example, Finland's per capita GDP is below that of the majority of countries in the intermediate innovator group. More discouragingly, its labour productivity per hour worked in 2003 was only 92.6% of the average for the EU-15. The same problems with per capita income and labour productivity apply to Sweden. However, the GDP growth rate of both countries is significantly higher than EU average (65% above EU-15 average for Finland and 20% for Sweden on average between 1996 and 2004). It can therefore be expected that the return on investment in innovation will be a long term one. Taking full advantage of this long term investment will be the key challenge for the innovation leaders.

When more is not better

Innovation scoreboards assume that more of each indicator is always better. This is not, however, the case for some indicators, where the optimum level will depend on national circumstances. For example, more university R&D financed by business is usually better within the intermediate and leading countries, but this indicator can have a different interpretation in the lagging countries. Some of these countries have results for this indicator that are three or four times the EU average. This is possibly excessive and is linked to extremely low levels of business R&D. This forces firms with limited capabilities to perform creative innovation activities in-house to contract out R&D to other organisations. In a few countries, the level of university R&D funded by business has decreased over time as business R&D levels increased, creating more in-house capabilities.

Trademarks is another indicator that must be interpreted cautiously, because 'more' does not refer to the same conditions across countries. Within many of the new member states high community trademark registration reflects the activities of local affiliates registering the trademarks of their parent corporation. These trademarks have already been registered, often for years, in other more developed countries.

The share of R&D performed in the medium-high and high technology sectors is also open to different interpretations. In Finland, this share is low because of high levels of R&D in low technology and medium-technology manufacturing. Since Finland already excels in high technology manufacturing R&D, this result is a sign of strength and shows the acquisition of an R&D based strategy by firms across the manufacturing sector.

Business R&D

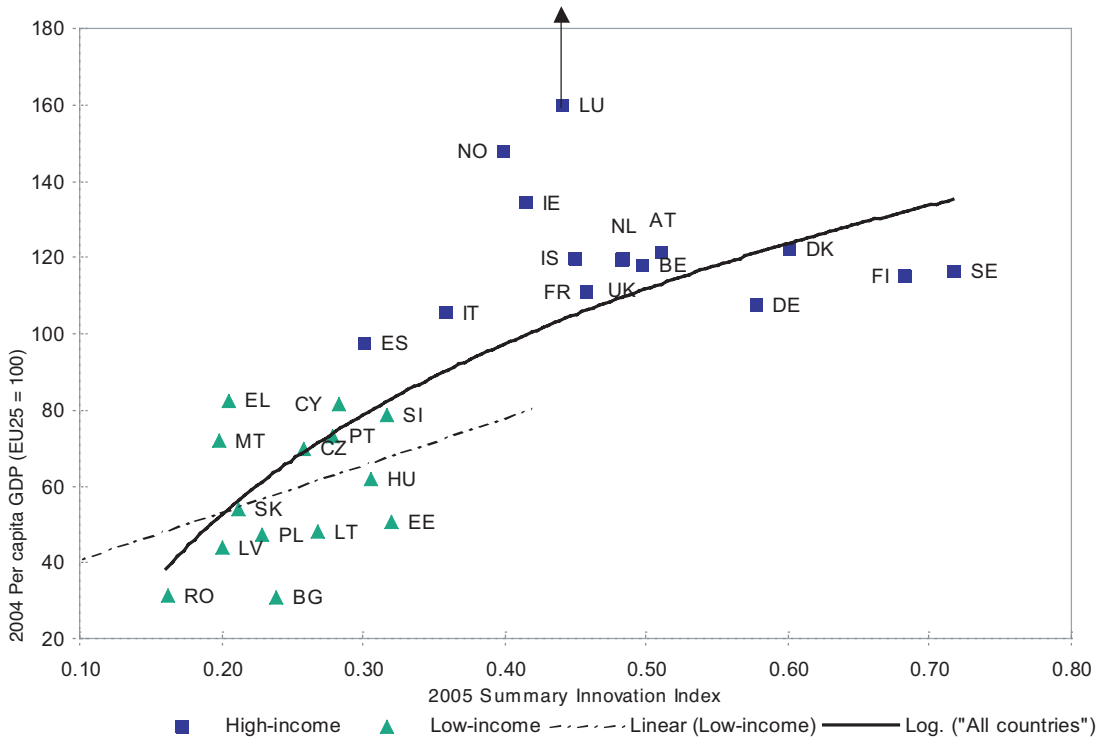
In many of the more innovative EU countries, business R&D has been declining instead of increasing, as required to meet the Barcelona objective of an average business R&D intensity of 2%. Notable declines in business R&D have occurred in Belgium, France, Germany, Ireland, the Netherlands and Sweden, while remaining stable in Finland, Italy and Luxembourg and only increasing in Austria, Denmark, and the UK. For those countries with a decline, the peak year for best performance in business R&D ranges between 1998 and 2003. The decline in business R&D could therefore be linked to the collapse of the dotcom bubble and high technology stocks. However, the decline in business R&D could also be due to other trends, such as a shift in R&D abroad combined with a decline in national competitiveness for research, that are worth following closely over the next few years.

1.2 ESI 2005 - THEMATICS

1.2.1 *Innovation performance versus economic performance*

The justification for policy actions in support of innovation is to combat market failures that prevent innovation to contribute fully to improvements in the quality of life and in quantitative measures of well-being such as higher GDP per capita, productivity, and economic growth. The link between innovation and growth has been extensively explored from both a theoretical and an empirical perspective. Although several different measures of innovation have been used in empirical research, including R&D spending, patenting, and the technological balance of payments, most empirical research has focused on the effect of innovation on productivity, either at the firm, industry or country level. The literature[8] on this issue finds that innovation, whether measured by R&D spending or patenting, has a significant effect on productivity.

Exhibit 10. Innovation performance and per capita GDP



Relative per capita GDP for Luxembourg is at 217. The log-linear trend line for all countries does not include Luxembourg and Norway.

The trend lines in Exhibit 10 suggest that per capita GDP levels are correlated with innovation performance, in particular for the "low-income" countries[9]. The richest countries prove to have close GDP levels for significantly different innovation performance. More generally the link between innovation and GDP remains difficult to establish at national level, considering the innovation is only one factor among other structural ones.

8. For a review of this literature, see Mairesse, J. and Mohnen, P. (1995). R&D and productivity: a survey of the econometric literature, Université du Québec: mimeo; or Cameron, G. (1998) Innovation and Growth: a survey of the empirical literature (manuscript).

9. Low-income countries are defined as those countries with a per capita GDP less than 90% of that of the EU25: TR, BG, RO, LV, LT, PL, EE, SK, HU, CZ, MT, PT, SI, EL, CY. High-income countries are defined as those countries with a per capita GDP of close to or above that of the EU25: ES, IT, DE, FI, FR, SE, BE, IS, JP, UK, NL, AT, DK, CH, IE, NO, US.

Exhibit 11 gives regression results between the SII and five macro-economic variables for two groups of countries. The results in the first row show a positive link for all countries between the SII and the 2004 level of per capita GDP and the 2003 level of labour productivity per hour worked. However, the link between the SII and the growth rates of both per capita GDP and two measures of labour productivity is negative. This means that in the most innovative countries, the incremental augmentation of economic indicators is lower than what is observed in less performing countries. This is closely linked to the overall economic situation, where it is much easier to progress fast when coming from lower levels.

Conversely, analysis of the CIS-3[10] data for the 15 countries covered by the Sectoral Scoreboard (see section 1.2.2 for a summary of the report on sector scoreboards) shows a significant positive correlation between innovative and economic performance at the sector level, after controlling for country-specific and sector-specific effects. Innovative performance at sectoral level and labour productivity growth as measured by the 1998-2000 growth rate of turnover per employee are positively correlated. More innovative sectors on average tend to have higher growth rates of labour productivity.

Exhibit 11. Regressions results for simple correlations between composite innovation indicators and economic performance indicators

	2004 GDP per capita	2000-2004 GDP per capita growth rate	Labour productivity per hour worked 2003[a]	2000-2003 Labour productivity per hour worked growth rate	2000-2003 Labour productivity per person employed growth rate
SII – all countries	*181.627 ****	*-5.584 ***	*111.989 ****	*-7.655 ****	*-5.891 ***
SII - Subset of 15 countries†	*55.591*	*-3.477*	*44.720*	*-3.184*	*-3.762*
			1998-2000 Labour productivity per person (turnover per employee) growth rate		
ISI – 25 sectors, 15 countries† (country and sector dummies)			*23.488 **		

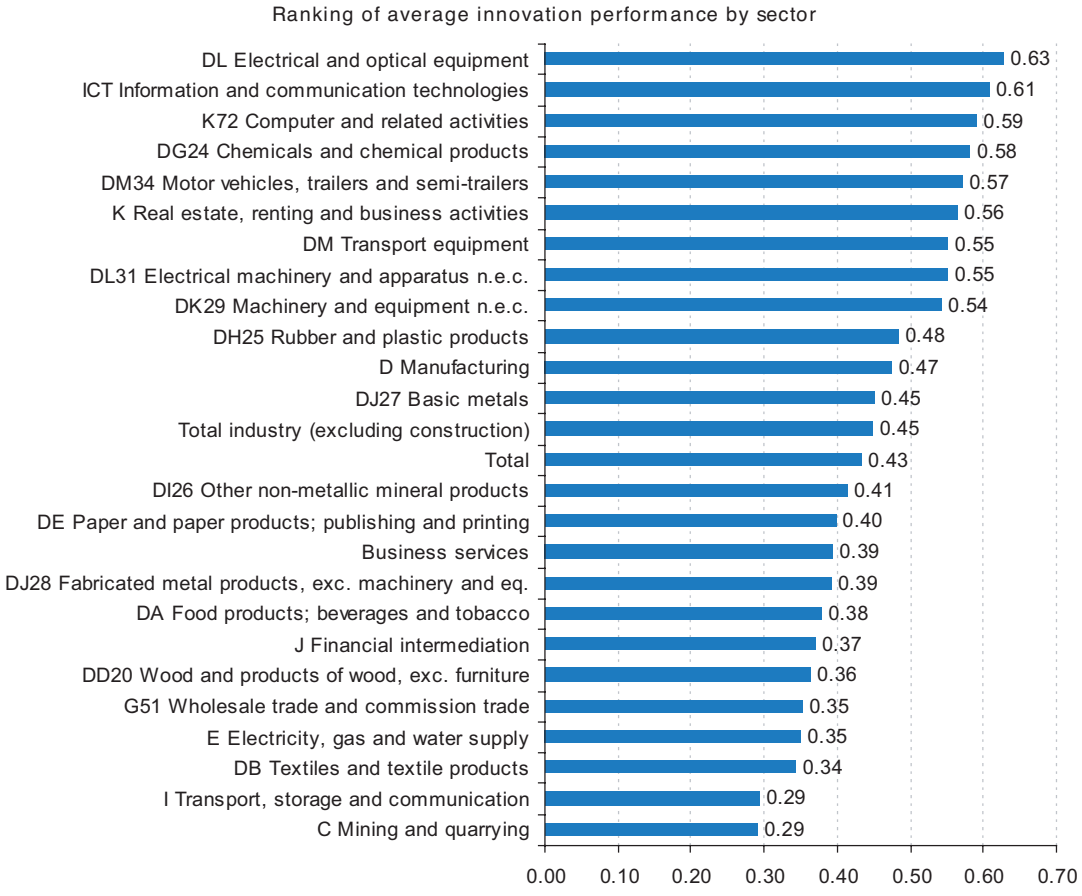
****/**/* Correlation is significant at the 1%-level/5%-level/ 10%-level. ISI = Innovation Sector Index.*
† Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain and Sweden.

10. Community Innovation Survey. http://www.cordis.lu/innovation-smes/src/cis.htm

1.2.2 Sector innovation scoreboards

As shown in the previous section, innovation performances per sector are positively correlated with economic performance*. Therefore larger differences in the innovative performance of different sectors are expected to directly impact their economic performance. The 2005 EIS report on Sectoral Innovation Scoreboards has developed composite indicators measuring innovative performance at the sector level*[11].

Exhibit 12. Average sector innovation performance



The 2004 EIS included, for the first time, an analysis of innovation performance by sector *for 14 sectors. The sector analysis for 2005 has been expanded to a total of 25 sectors for 15 European countries*[12] *and uses data for 12 indicators, of which 11 are taken from the CIS-3 survey (share of employees with higher education; share of firms using training for personnel directly aimed at the development and/or introduction of innovations; share of firms that receive public subsidies to innovate; share of firms innovating in-house; share of SMEs co-operating with others; innovation expenditures as a percentage of total turnover; share of total sector sales from new-to-market products; share of total sector sales from new-to-firm but not new-to-market products; share of firms that patent; share of firms that use trademarks and share of firms that use registration of design patterns). One indicator is taken from the ANBERD database from the OECD (R&D expenditures as a percentage of value-added). All indicators are identical to or very similar to those used in the 2005 EIS.*

The Innovation Sector Index *(ISI) measures average innovation performance for each of the sectors. The ISI is a composite indicator that is calculated for each sector using 12 innovation indicators. For all 15 countries most innovative sectors are Electrical and optical equipment (NACE DL), Information and communications technologies (ICT), Computer and related activities (NACE K72), Chemicals and chemical products (NACE DG24) and Motor vehicles, trailers and semi-trailers (NACE DM34). Least innovative sectors are Transport, storage and communication (NACE I) and Mining and quarrying (NACE C) (see Exhibit 12).*

11. For more details the reader is referred to the 2005 EIS report on Sectoral Innovation Scoreboards on the Trend Chart website http://www.trendchart.org/scoreboards/scoreboard2005/scoreboard_papers.cfm

12. Unpublished sector data were available for analysis for 15 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain and Sweden. Data for Ireland, the United Kingdom and all new member states are not available.

Exhibit 13. Sector Innovation Leaders

NACE	Sector	Leaders		
C_D_E	Total industry	Finland	Germany	Belgium
C	Mining and quarrying	Finland	Norway	Netherlands
D	Manufacturing	Finland	Germany	Belgium
DA	Food products, beverages and tobacco	Belgium	Sweden	France
DB	Textiles and textile products	Finland	Germany	Belgium
DD20	Wood and wood products	Germany	Finland	Austria
DE	Pulp, paper and paper products, publishing and printing	Finland	Germany	Luxembourg
DG24	Chemicals and chemical products	Austria	Finland	Belgium
DH25	Rubber and plastic products	Sweden	Austria	France
DI26	Other non-metallic mineral products	Germany	Finland	Sweden
DJ27	Basic metals	Finland	Austria	Sweden
DJ28	Fabricated metal products, except machinery and equipment	Finland	Belgium	Germany
DK29	Machinery and equipment n.e.c.	Finland	Germany	Netherlands
DL	Electrical and optical equipment	Finland	Belgium	Sweden
DL31	Electrical machinery and apparatus n.e.c.	Germany	Finland	France
DM	Transport equipment	Germany	France	Austria
DM34	Motor vehicles, trailers and semi-trailers	Germany	France	Austria
E	Electricity, gas and water supply	Portugal	Netherlands	Germany
G_TO_K	Services	Sweden	Finland	Germany
G51	Wholesale trade and commission trade	Sweden	Finland	Germany
I	Transport, storage and communication	Finland	Luxembourg	Belgium
J	Financial intermediation	Portugal	Luxembourg	Germany
K*	Business services	Belgium	Sweden	Greece
K72	Computer and related activities	Greece	Germany	Belgium
DL30, DL32, DL33, I64, K72	Information & communication technologies (ICT)	Finland	Belgium	Germany

* Includes NACE K72, K73, K74.2 and K74.3.

Exhibit 13 gives the sector innovation leaders in Europe. Innovation leaders are here simply defined as the best 3 ranking countries. For several sectors differences with other countries are only marginal. Finland and Germany are leading in about 15 sectors each. Small economies such as Finland, Austria and Belgium are highly innovative in several manufacturing sectors[13]. Finland, Germany and Belgium are overall leaders in the manufacturing sector.

Sweden, Finland and Germany are overall leaders in services. Portugal is leading in Financial intermediation, a result due to high scores on the three indicators measuring the protection of inventions and innovations. Greece is leading in Computer and related activities, a result due to remarkably high R&D expenditures, four times as high as the weighted average for these countries and more than twice as high as those of the next best country.

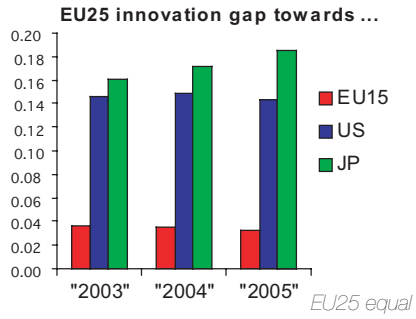
Despite their above average EIS 2005 innovation performance, Denmark and the Netherlands show a below average representation in sector leadership, with the Netherlands only leading in 3 sectors and Denmark in no sector at all. This suggests that these two countries perform relatively well in all dimensions of their economy, without showing a particular strong innovation leadership in many sectors.

13. The diversity of Finland's innovative strengths shows that Finland's innovative capacity is not limited to Nokia, as often suggested.

1.2.3 EU innovation gap with US and Japan

Based on a set of comparable data for 16 indicators[14], the US and Japan are still far ahead of the EU25. The innovation gap between the EU25 and the US is close to stable (Exhibit 14). About 70% of the innovation gap is, in statistical term, explained by lagging EU performance in three indicators (Exhibit 15): USPTO patents, population with tertiary education and ICT expenditures. Looking at individual indicators[15], we see a significant increase in the EU gap for public R&D expenditures and exports of high-tech products and an increase in the EU lead for university R&D expenditures financed by the business sector and community trademarks.

Exhibit 14. EU25 innovation gap towards US, Japan and EU15



EU25 equal to 0.00

Exhibit 15. EU25-US innovation gap explained

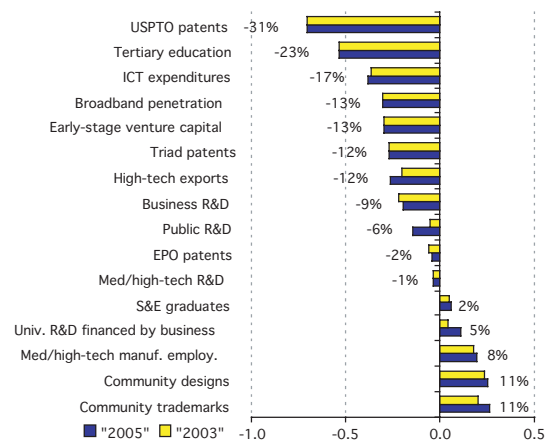
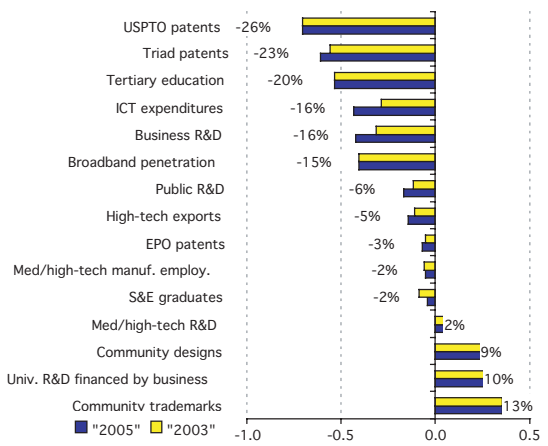


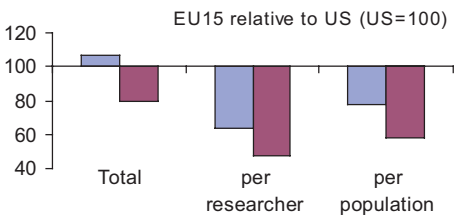
Exhibit 16. EU25-Japan innovation gap explained



The innovation gap between the EU25 and Japan *is increasing. The innovation gap is largely explained by lagging EU performance in three indicators: USPTO patents, triad patents and population with tertiary education (Exhibit 16). Looking at individual indicators, we see a significant increase between 2003 and 2005 in the EU gap for ICT expenditures, triad patents and both public and business R&D expenditures. Only for S&E graduates is the gap decreasing.*

The economic interpretation of these statistical differences is, however, to be conducted with care. For example, where the patenting performance does not only reflect a difference in terms of innovation performance, but also in term of business usages and sector coverage.

Exhibit 17. Leadership in science: Europe is leading in number of publications, but not in relative measures nor citations



Source: Dosi et al., EIS 2005 EU-US expert report

The EIS 2005 expert report "Evaluating and Comparing the innovation performance of the United States and the European Union"[16] evaluates and compares the innovation performance of the EU and the US in the fields of science output, R&D expenditures, education, patents and industry structure. The study notably suggests that Europe is behind the US in term of scientific output. Exhibit 17 illustrates the weak scientific output per capita in Europe, especially with regards to citations.

It confirms the leading position of the US with respect to R&D expenditures, underlining the well-known difference between the two areas with regard to the kind of public support to R&D whereby the US government is mainly focused on contracts and procurement (approximately 80% of the US government effort with a strong emphasis on defence and space). The US universities are also more integrated in the innovation process, largely contributing to the diffusion of an innovative spirit. The report also concludes that there is ample evidence of a widespread European corporate weakness given the fact that European firms have lower commitments to research and patenting and weak participation in the core international oligopolies.

14. For Japan data are available for 15 indicators as data for early-stage venture capital is missing.
15. Exhibit 8 & 9 contains the real data per indicator for the EU25, US and Japan.
16. Dosi, Giovanni, Patrick Llerena and Mauro Sylos Labini, "Evaluating and Comparing the innovation performance of the United States and the European Union", EIS 2005 expert report (available for download at http://www.trendchart.org/scoreboards/scoreboard2005/scoreboard_papers.cfm).

1.2.4 *Innobarometer – impact of innovation demand*

Sophisticated consumer demand should be an important driver for innovation products and services. One thesis is that firms primarily benefit from sophisticated consumer demand in their domestic market, while an alternative view is that export-oriented firms can build on sophisticated consumer demand in their foreign markets.

The 2005 Innobarometer[17] *provides a measure of innovation demand based on a survey of* 30,000 Europeans in the 25 Member States plus Bulgaria, Romania and Turkey. *A set of questions was asked to identify how European citizens feel attracted by innovative products or services. Their replies characterise the demand for innovation from customers, an element that is generally only approximated through inappropriate indicators.*

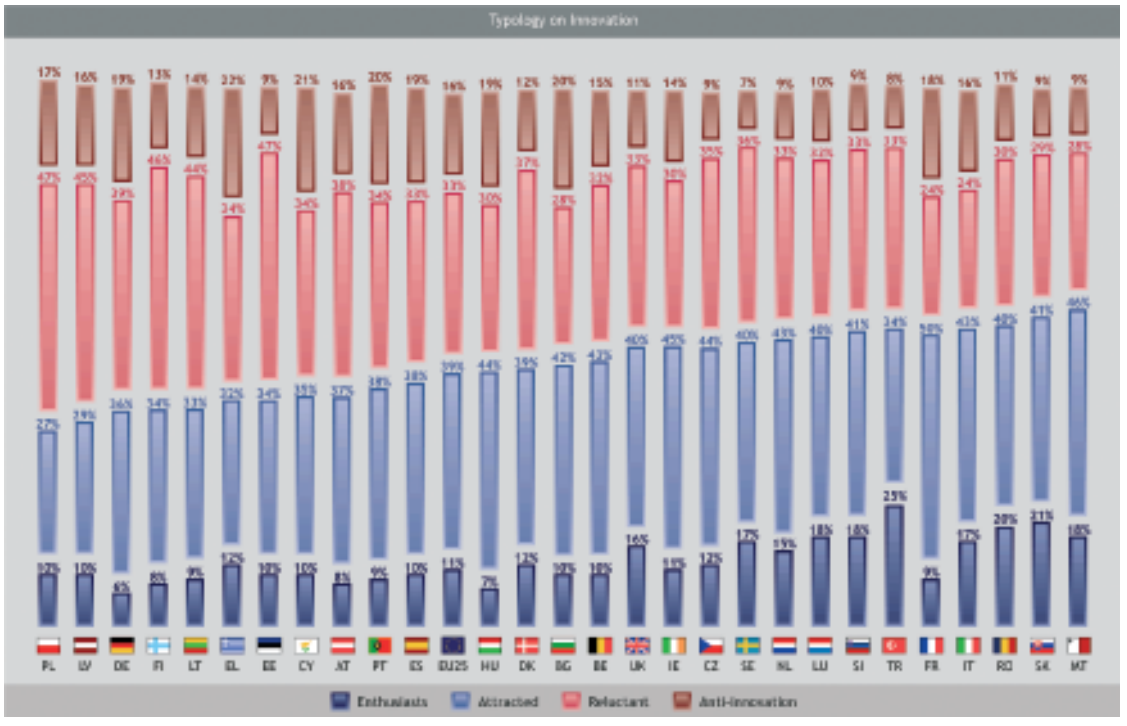
Innovative products or services were described as new or improved ones. For the first time, a typology based on attractiveness to innovative products or services is proposed for all Member States leading to 4 categories for EU-25 citizens (see Exhibit 18):

- *11% are enthusiasts towards innovation*
- *39% are attracted by innovation*

} *Pro-innovation*

- *33% are reluctant to innovation*
- *16% are anti-innovation*

Exhibit 18. Innobarometer 2005: Typology on innovation



The results indicate that Europe is evenly split between those attracted by innovation – those that are pro-innovation *– and those more or less* reluctant. *Malta, Slovakia, Romania and Italy are countries with the highest proportion of pro-innovation citizens. However there is no clear gap with the following countries. On the other hand, the Typology Analysis shows that citizens in Poland, Latvia, Germany and Finland are least ready to embrace innovation.*

The concept of pro-innovation is of interest as it could be an explaining factor for the differences in the transformation of innovation inputs into innovation outputs as described in section 1.1.4. The EIS 2005 indeed provides first clues of this relationship.

The case of countries with the highest proportion of pro-innovation citizens (Malta, Slovakia, Romania, Italy and France) is characteristic as these countries all have better results for the output indicators of the EIS than for the input indicators if compared with the European trend. More generally; among the 10 countries having the highest share of pro-innovation population, 9 have an output/input rate above the EU trend (Exhibit 7). Conversely, 7 countries among the 10 where the population readiness for innovation is the lowest have a below average output/input ratio. Significant exceptions in this last category are Germany and Austria, where results may indicate that the drivers for innovation do not lie in the public demand but rather come from the side of the firm.

17. ftp://ftp.cordis.lu/pub/innovation/docs/innovation_readiness_final_2005.pdf

1.2.5 National strengths and weaknesses

The EIS results by country, combined with EXIS[18] data for innovation demand and governance, were used to explore national strengths and weaknesses. Many countries show marked differences in innovation capabilities. For instance, the Czech Republic performs much better on innovation demand and applications than on intellectual property. An important question of policy significance is if the best policy response is to improve further the country strengths or to improve areas of weakness.

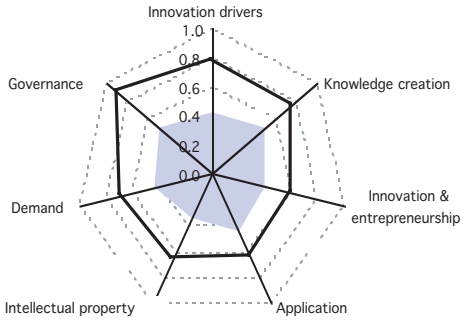
The optimal policy response will depend on specific national conditions *that might make it easier to improve the strengths rather than the weaknesses, or vice versa. In some cases building up the areas of strengths could have a positive influence on the weaknesses, as when investment in knowledge creation leads to higher levels of patenting. Alternatively, this might not occur if very poor performance in innovation and entrepreneurship acts as a barrier to an improvement in patenting.*

This example points to two opposing perspectives on how innovative capabilities develop. The first suggests that innovative capabilities can spill over from areas of strengths to areas of weakness. The second perspective suggests that all inputs must develop approximately equally – a 'blockage' in one field, such as poor knowledge creation or low levels of entrepreneurship, would prevent progress. Of course, both perspectives could also be true, depending on specific conditions or indicators.

A test of the second option is to correlate the variance for the seven composite indicators (the five EIS composite indices plus the two indices for demand and governance extracted from the EXIS report) against the SII. The variance is calculated after standardizing the results for each country to remove the performance effect, whereby some countries perform better on the EIS than other countries. A country with zero variance would perform identically on all seven composite indices. This could occur when all composite indices equal zero (very poor performance) or always equal to 1 (very good performance).

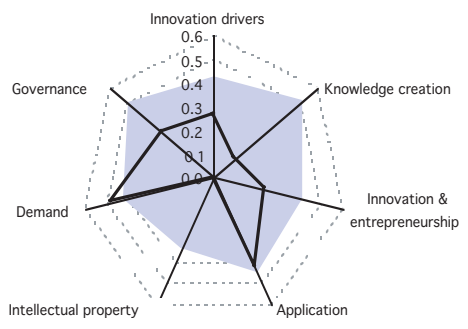
Low Variance

FINLAND



High Variance

SLOVAKIA



EU average in grey – source : Strengths and Weaknesses report EIS 2005 & EXIS report

18. For the EXIS report, see Arundel, A. and H. Hollanders, EXIS: An Exploratory Approach to Innovation Scoreboards (http://www.trendchart.org/scoreboards/scoreboard2004/scoreboard_papers.cfm).

Exhibit 19. Negative correlation between the SII and variance of 7 innovation dimensions

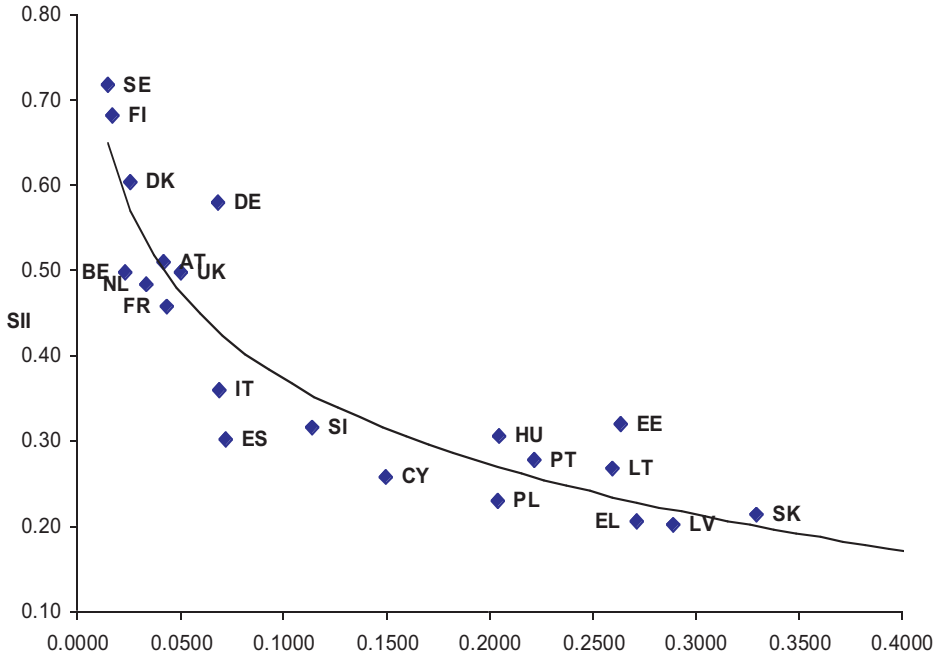


Exhibit 19 gives the correlation results between the variance and the SII for 21 countries for which there are complete data. Using a log-linear model, there is a statistically significant negative relationship, with performance on the SII declining with the amount of variance in the seven sub-indices ($R^2 = 0.84$, $p < 0.001$). This indicates that well-rounded and equivalent performance on all areas might increase innovation performance.

This implies that, given equal costs, policy would be more effective in improving overall innovation performance by concentrating on improving areas of weakness *rather than on making further improvements to areas of strength. It also suggests that for countries where innovation performance is high, marginal gains are optimised when all dimensions of innovation are addressed together. This analysis could be taken into consideration when discussing policy orientations.*

2 INNOVATION POLICY: CHALLENGES AND TRENDS

2 INNOVATION CHALLENGES AND POLICY TRENDS

This chapter of the report is based on the analysis of the network of country correspondents *responsible for monitoring innovation policy trends and appraising progress towards objectives in the EU25 and three candidate (Bulgaria Romania and Turkey) and five associated (Iceland, Israel, Liechtenstein, Norway and Switzerland) countries.*

The objective of this chapter is to distil from the extensive annual country reports *and the database covering* over 700 policy measures*, available for consultation via the TrendChart web site, a series of conclusions in terms of:*

- *the challenges facing innovation policy stakeholders are identified based on notably the European Innovation Scoreboard for 2005 (see preceding chapter) as well as other quantitative or qualitative indicators identified through the country reporting. The adequacy of the policy mix to respond these challenges is then appraised taking account of the additional measures proposed by the EU Member States' National Reform Programmes as part of the Lisbon process;*
- *the identification of key common trends for all or specific groups of countries covered by the TrendChart.*

2.1 A COMMON OBJECTIVE, DIVERSE CHALLENGES !

European countries, notably the EU25 and candidate countries, share a common set of policy objectives in terms of innovation based on the 'Lisbon strategy'*. The Lisbon European Council of March 2000 set the European Union a new strategic objective for the coming decade: to become the most competitive and dynamic knowledge-based economy in the world, capable of sustained economic growth with more and better jobs and greater social cohesion. Boosting innovation is at the core of the Lisbon Strategy since it is a key determinant of the ability of an enterprise, sector, region or country to remain competitive.*

Innovation is about change and the ability to manage change over time*. Innovation can be about the successful exploitation of new ideas in the form of a new or improved product or service but it can also be about the way in which a product or service is delivered. Equally, innovation can be about creatively positioning (or marketing) an existing product, or about changing the business model (a new 'paradigm', such as low-cost airlines). To borrow a concept from Tidd, Bessant and Pavitt (2005)[19], innovation can be classified into* four broad categories*, the '4Ps' of innovation:*

- *'product innovation – changes in the things (products/services) which an organisation offers;*
- *'process innovation' – changes in the ways in which they are created and delivered;*
- *'position innovation' changes in the context in which the products/services are introduced (e.g. moving from craft production to mass production);*
- *'paradigm innovation' – changes in the underlying mental models which frame what an organisation does.*

Poland: "The Polish Product of the Future Competition"

What it does

The main objective of this competition is to promote and disseminate the achievements with respect to innovations that have a chance to be introduced on the market. The competition is carried out in two categories, notably: "Product of the Future" and "Technology of the Future". In the competition, both natural and legal persons from EU Member States can participate and a condition for participating in the competition is submission of a proposal for a new innovative product or technology. The winners of the "Polish Product of the Future" Award receive a statuette, diploma, possibility of using the "Polish Product of the Future" branding, and assistance in product promotion.

Why it is successful

In the eight-year history of the competition, hundreds of innovative products and technologies in various technical areas have been submitted to the competition. The majority of projects that gained the Jury's recognition achieved economic success as well. Final products created on the basis of the submitted applications became popular on the Polish market, whereas some of them even became export products.

19. Tidd J., J. Bessant & K.Pavitt, Managing Innovation: integrating technological, market and organisational change (3rd Edition), 2005.

It is also useful to distinguish between **incremental innovation** *("doing what we do better") which is generally the most common form of innovation activity according to innovation surveys and* **radical innovation** *('new to the world') often based on longer term R&D. Equally, innovation may influence a component in an enterprise, or a sub-system (region, sector, etc.) or may be ubiquitous (system wide). When these concepts are put together, the result is what Tidd et al have termed an 'Innovation Space'.*

This provides a much more all-encompassing vision of innovation activity than the more traditional models focused on product development (and often viewed as a more standard series of steps, even if feedback is provided for, from idea to product) or the development and introduction of process technologies.

Applying this framework where innovation activity is extended to cover a much broader group of concepts has profound implications for innovation policy. It is apparent that more investment in research is a necessary but not a sufficient condition for innovation and competitiveness. Efforts to strengthen research have to be complemented by appropriate measures that improve the absorption of knowledge by enterprises. Innovation is closely related to the willingness to take risks and test new ideas on the market, and the availability of finance for innovation is one crucial factor. Innovation in certain markets, sectors and regions may be more incremental than radical (at least until the next paradigm shift or new technological breakthrough).

In this conceptual framework, innovation policy in Europe needs to take account of a much **broader range of potential levers and drivers** *which can be exerted to influence the rate and intensity of innovation activity in enterprises.*

Moreover, the conceptual model of an innovation space can be applied to a single enterprise or organisation, but increasingly the need to take account of interactions within a regional, sectoral or national system of innovation is emphasised. This originates from the observation that **firms do not normally innovate in isolation***, but in collaboration and interdependence with other organisations. These organisations may be other firms (suppliers, customers, competitors, etc.) or other not-for profit or public organisations such as universities, schools, and government agencies. The behaviour of enterprises is also shaped by institutions – such as laws, rules, norms and routines – that constitute incentives and obstacles to innovation (a good example being intellectual property rights rules, regulations and enforcement)*[20]*.*

Some of these concepts can seem abstract, however, a 2003 EIS technical paper[21] *used a set of indicators to characterise and group the then EU15 Member States, highlighting for instance that leading innovative nations such as the three Nordic countries (Denmark, Finland and Sweden) and the Netherlands built their success on cultural factors such as strong emphasis on equity, receptiveness to new ideas, union membership and trust. More recently, the Innobarometer 2005 showed that there are striking differences between the demand for new innovative products and services across the 25 EU Member States and candidate countries.*

Given this conceptual framework of a more complex **'innovation space'** *encompassing different categories of innovation activity of enterprises; the increasingly 'multiplayer game' nature of innovation where organisation of different shapes and sizes work together in networks (regional clusters, supply chains, product development consortia, etc) and the influence exerted by the innovation system in which an enterprise operates, the TrendChart policy monitoring exercise needs to be carried out in a framework which captures all the essential forms of possible policy intervention.*

Exhibit 20 on the next page summarises the new policy monitoring framework for innovation policy used by the TrendChart network since 2005. Given the comments above, and the diversity of national performance and challenges faced by the Member States described in this report, it is clear that not all Member States will need to activate all these levers of innovation policy at the same time. Each Member State must find a policy mix that is appropriate for the specific challenges and issues faced at the present time.

20. Edquist C., Systems of Innovation: perspectives and challenges in Fagerberg J., D.C. Mowery & R.R.Nelson (2005) The Oxford Handbook of Innovation.
21. http://www.trendchart.org/scoreboards/scoreboard2003/pdf/eis_2003_tp5_national_innovation_systems.pdf

Exhibit 20: TrendChart Innovation Policy Framework 2005

1.	Improve innovation governance and strategic intelligence for policy-making
1.1	*Development of a strategic medium-to-long term vision of innovation challenges and innovation potential (at sectoral, regional, inter-regional, national and supra-national levels)*
1.2	*Increase understanding of the nature of drivers and barriers of innovation activity in enterprises with a view to informing the policy-making process*
1.3	*Improve the effectiveness of the policy-cycle in order to increase the impact of public intervention on innovation activity and outputs in enterprises*
1.4	*Encourage mutual policy learning and networking between policy-making at regional, national and EU levels.*
2.	Foster an innovation friendly environment
2.1	*Enhancing the role of public procurement and standardisation as drivers of new innovative products and services by enterprises*
2.2	*Reducing the administrative and transaction costs for enterprises in fulfilling their legal, administrative, fiscal, etc. obligations*
2.3	*Maximising the positive influence of new legislation or regulations on innovation activity in enterprises*
2.4	*Increase rates of expenditure on research and technological innovation in enterprises*
2.5	*Encourage the uptake of strategic technologies, notably ICT*
3.	Encourage technology & knowledge transfer to enterprises and development of innovation poles and clusters
3.1	*Facilitate access of enterprises to skilled personnel*
3.2	*Facilitate the acquisition and transfer of knowledge and technologies to enterprises, encouraging in particular cross-border initiatives*
3.3	*Increase the availability, range and quality of specialised services to enterprises in order to increase the effectiveness of their in-house innovation activities*
3.4	*Increase the availability of innovative infrastructures to facilitate knowledge exchange and product/service development by enterprises*
3.5	*Ensuring that the future skills base in the region/sector/country will correspond to the innovation needs of enterprises*
3.6	*Facilitate the development of collaboration between enterprises and universities as well as other actors with a view to joint innovation activities and knowledge exchange*
4.	Promote and sustain the creation and growth of innovative enterprises
4.1	*Increase the number of new innovation intensive enterprises created and their survival*
4.2	*Provide adequate infrastructure to new technology based firms (including start-ups and spin-offs) to facilitate their survival and growth*
4.3	*Favouring the entry of innovative enterprises and business models to sectoral, regional or national markets*
4.4	*Increase the availability of private sector innovation financing to enterprises*
4.5	*Optimising the legal/regulatory framework for the development of private innovation financing*
4.6	*Provide adequate support to enterprises aimed at new and developing markets*
5.	Strengthen entrepreneurial innovation including the protection and commercialisation of intellectual property
5.1	*Upgrading innovation related skills and diffusing new technologies in enterprises*
5.2	*Increase rates of non-technological innovation in enterprises*
5.3	*Favouring the protection and optimising the exploitation of intellectual property as a driver for innovation*
5.4	*Increase the rate of commercialisation / marketing of the results of innovation activity in enterprises*

2.2 KEY CHALLENGES FOR NATIONAL INNOVATION SYSTEMS IN EUROPE

Based on the European Innovation Scoreboard results and the annual country policy trends and appraisal reports, a sub-set of three to four key challenges (see exhibits on following pages) have been selected for each of the 33 countries concerned by the TrendChart exercise. The objective of this exercise is two-fold:

- *stimulate a debate about policy priorities with respect to the identified challenges in each country;*
- *identify common challenges for specific clusters of countries.*

Exhibit 2 on the following page summarises these key challenges using the EIS indicator framework. Challenges related to weaknesses in national innovation governance systems are discussed in the next section.

In general, the group of indicators related to innovation drivers (mainly concerning human resource potential) concentrates the largest number of challenges; followed by knowledge creation. Three EIS indicators clearly dominate in terms of the number of countries concerned by poor absolute performance or declining trends in performance, the indicators are:

- *rates of* **business expenditure on R&D** *(16 EU25 Member States and three out of eight candidate associate countries);*
- *the share of* **science and engineering graduates** *in the (13 EU25 Member States and three out of eight candidate/associate countries), and*
- *participation in* **life-long learning activities** *(14 EU25 Member States and one candidate country).*

Five other indicators also stand out but less significantly in terms of the number of countries for which their performance poses a challenge, these are:

- *Population with tertiary education*
- *Broadband penetration rates,*
- *Business financed university R&D*
- *SMEs innovating in-house, and*
- *Early stage venture capital*

It is striking that the challenges related to innovation drivers are present in all types of European countries including two of the Nordic countries and Switzerland. Hence, difficulties with developing working-age citizens with 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.

The table below is based on the 2005 annual country reports. The scoring system concerning the policy response is as follows:

- ★★★ *A systematic and integrated approach to responding to the challenge through a comprehensive set of measures*
- ★★ *Specific measures (one or more measures which are however insufficient to respond fully to challenge)*
- ★ *Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Reform Plan, etc.)*
- ○ *No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development)*

"average.

Exhibit 21: Innovation challenges and policy responses in Europe

Country	Top three challenges identified through European Innovation Scoreboard	Measures to meet challenges
Austria	• *Below average level of tertiary education and S&E graduates* • *Broadband access and ICT investment* • *Percentage of university R&D funded by industry.*	★★ ○ ★★★
Belgium	• *Weak position in application of knowledge* • *Public R&D expenditure* • *Human resources for innovation (S&E graduates and Life-long learning*	★★ ★★ ★★
Bulgaria	• *Knowledge creation: low investment in innovation, in particula BERD* • *Insufficient effort to boost human potential for innovation through life-long learning* • *Industrial structure with low and declining med-hi-tech manufacturing employment and exports of high-tech products*	★★ ○ ★

Country	Top three challenges identified through European Innovation Scoreboard	Measures to meet challenges
Cyprus	• *S&E graduates* • *Marginal increase in public R&D expenditures* • *Very low BERD and absence of early stage venture capital* • *Innovation promotion in the service sector*	★ ★★ ★★ ○
Czech Republic	• *Educational inputs notably S&E graduates and life-long learning constrain future innovation based developments* • *Marginal increase in public and business R&D expenditures leading to slow catch up in knowledge creation potential,* • *Low and negative trend of HERD financed by business (as indicator of co-operation in innovation systems).*	★ ★★ ★
Denmark	• *SMEs using non-technological change* • *Life-long learning* • *Hi-tech patents*	★ ★★★ ★★★
Estonia	• *Very low level of investment in R&D (both public and private)* • *Bottleneck in skilled labour supply (S&E graduates and low rates of life-long learning)* • *Low HERD financed by business as indicator of limited co-operation in innovation system*	★★ ★★ ★★
Finland	• *Need for widespread innovation in enterprises* • *New Community trademarks (falling behind)* • *Maintain momentum of attractiveness to investments*	★★ ○ ★★
France	• *Increase BERD through improved public-private partnerships* • *Foster non-technological innovation* • *Boost life-long learning rates.*	★★★ ★★ ○
Germany	• *S&E graduates,* • *Life-long learning and youth education* • *Early stage venture capital (significantly falling behind)*	★★ ★★ ★★★
Greece	• *BERD and SMEs innovating in house* • *Broadband penetration and ICT investment* • *Weak performance on life-long learning*	★★ ★★ ★★
Hungary	• *Weak position in S&E graduates;* • *Potential for innovation diffusion weak (life long learning & broadband penetration).* • *Low level of innovation expenditure (BERD) in enterprises*	★ ★★ ★
Iceland	• *Limited supply of human resources for innovation;* • *Low employment in medium-high-tech manufacturing* • *Innovation outputs as measured by intellectual property indicators*	★ ★★ ★
Ireland	• *Low broadband penetration inhibiting innovation diffusion* • *Insufficient participation in life-long learning* • *Business investment in R&D and early stage VC;* • *Low-levels of university-industry co-operation*	★★★ ★★★ ★★ ★★
Israel	• *Innovation expenditure in traditional sectors* • *University reform* • *Governance and policy capabilities*	★ ○ ○
Italy	• *S&E graduates and population with tertiary education* • *Business R&D* • *Early stage venture capital*	★★ ★★★ ★★
Latvia	• *Very weak investment in both public and private R&D;* • *Number of S&E graduates remains a bottleneck to future innovation activity.* • *Boosting co-operation in innovation system.*	★★ ★★ ★
Lithuania	• *Low-levels of life-long learning, broadband penetration and ICT expenditure slow technology diffusion;* • *Extremely low business expenditure on R&D with low in-house innovation activities and as yet limited co-operation and clustering.* • *Weak position in innovation outputs (IPR, exports of high-tech products, etc.).*	★★ ★★ ★★
Luxem-bourg	• *S&E graduates* • *Public R&D Expenditures* • *Innovation expenditures*	★ ★★ ★★

Country	Top three challenges identified through European Innovation Scoreboard	Measures to meet challenges
Malta	• *S&E graduates and population with tertiary education* • *Life-long learning* • *BERD and SMEs innovating in-house or in collaboration* • *Coordination of innovation policy between the various ministries*	★ ○ ★★ ★
Nether-lands	• *S&E graduates, allied to below average youth education attainment level* • *Below average BERD, public expenditure and business financed university R&D also showing a negative trend.* • *Potential for creating new strategic innovators (currently below average) threatened by declining early-stage venture capital.*	★★ ★★ ★★
Norway	• *Below average business investment in R&D and innovation* • *Relatively low level of public funding of innovation* • *A key limitation on the future innovation potential is the supply of S&E graduates* • *University R&D financed by industry remains below average (weak linkages in innovation system)*	★★ ★★ ★ ★★
Poland	• *Finance (loans)* • *Industry – science cooperation* • *Clustering*	★★ ★ ○
Portugal	• *Population with tertiary education, and LLL (less emphasis on S&E and youth education)* • *BERD and the creation of innovative capabilities in firms* • *Innovation governance (in particular the lack of flexibility and the need to reduce bureaucratic and "audit type" controls)*	★ ★★ ○
Romania	• *SMEs innovate in house* • *BERD* • *Early stage VC*	★★ ○ ★
Slovakia	• *Business investment on R&D is very weak and very low number of strategic innovators;* • *Slovakia's performs strongly on employment in high-tech manufacturing but a dual economy due to foreign investment;* • *Performance on key innovation drivers (tertiary education levels and life-long learning rates).*	★ ★★ ★★
Slovenia	• *Comparatively good performance on innovation drivers is weakened by the level of S&E graduates (trend is negative);* • *Positive trend for BERD could be supported by increasing public support currently below EU average.* • *Potential for diffusion of knowledge is constrained as measured by low ICT investment and broadband penetration*	★★ ○ ★★
Spain	• *Life-long learning* • *Innovation expenditure* • *Hi tech manufacturing and services*	★ ★★ ★★★
Sweden	• *Decrease in innovation activity of large industrial groups leads to need to stimulate growth of smaller, strategic innovators;* • *Below average rates of high-tech exports, reflecting industrial structure,* • *Co-operation and linkages in innovation system could be improved (e.g. business financed university R&D)*	★★ ★ ★
Switzer-land	• *A main relative weakness is the share of S&E graduates, but offset by immigration;* • *Lower than average rates of public funding of innovation and university R&D financed by business suggesting some weakness in innovation system interactions.*	○ ★★
Turkey	• *Population with tertiary education* • *Broadband and ICT* • *Increasing university-industry cooperation* • *NTBF creation and the provision of early stage venture capital*	★ ★★ ★★ ★
UK	• *Business expenditure on R&D is a challenge due to strong dependence on a few sectors / large companies.* • *Innovation capabilities of SMEs remain below average.* • *University R&D financed by business has been declining.*	★★ ★★ ★★★

Exhibit 3 : Summary of key challenges per country

	Identified Challenges per country	
		Candidates/
EIS Indicators	EU 25	Associates
INPUT - Innovation drivers		
S&E graduates	*AT, BE, CY, CZ, DE,EE, HU, IT, LV, LU, MT, NL, SI*	*IS, NO, CH*
Population with tertiary education	*AT, IT, LV, MT, PT, S*	*TR*
Broadband penetration rate	*EL, HU, IE, LT, SK, SI*	*TR*
Participation in life-long learning	*BE, CZ, DE, DK, EE, FR, EL, HU, IE, LT, MT, PT, SK, ES*	*BG*
Youth education attainment level	*DE, NL*	*IS*
INPUT - Knowledge Creation		
Public R&D expenditures	*BE, CY, CZ, EE, LV, LU*	
Business R&D expenditures	*CY, CZ, EE, FR, EL, HU, IE, IT, LT, LV, MT, NL, PL, PT, SK, UK*	*BG, NO, RO*
Share of med-high / high-tech R&D		
Entreprises receiving public funding	*PL, SI*	*CH, NO*
Business financed university R&D	*AT, CZ, EE, FR, IT, PL, SE, UK*	*CH, NO*
INPUT - Innovation & entrepreneursh		
SMEs innovating in-house	*EL, FI, MT, PL, SE, UK*	*RO*
Innovative SMEs co-operating with others	*LT, MT, PL, SK, UK*	
Innovation expenditures	*LU, ES*	*IL*
Early-stage venture capital	*CY, DE, IE, IT, NL*	*RO, TR*
ICT expenditures	*GR, LT, SI*	
SMEs using non-technological change	*DK, FR*	
OUTPUT - Application		
Employment in high-tech services	*CY, ES*	
Exports of high technology products	*BE, SE*	*BG*
Sales new-to-market products		
Sales new-to-firm not new-to-market products		
Med-hi/high-tech manufacturing employment	*BE, ES*	*BG, IS*
OUTPUT - Intellectual property		
EPO, USPTO, trademarks, designs	*DK, LT, FI, FR*	*IS*

Source: Annual TrendChart country reports 2005

Issues related to broadband communication rates *(used as a proxy for the potential to diffuse technology and know-how in the knowledge society) concern an important group of countries, but these tend to be more peripheral (such as Ireland) or less developed countries (Greece, Lithuania, Slovakia, Turkey). Statistics are not available for Bulgaria and Romania. These countries would otherwise most probably join this group of countries clearly facing barriers to full exploitation of the potential of e-commerce and e-government services.*

All countries in Europe with the exception of the Nordic countries and a number of the other high-income countries (Germany, Austria, Switzerland) are underperforming in terms of BERD as a percentage of GDP*. The group of countries for which this indicator has been selected as a major challenge in 2005 tend to be from the lower income countries with the exception of the Netherlands, Norway and the UK. These three more advanced countries all have specific issues related to business investment in R&D, which relate more to their relative under-performance compared to their main comparators than the EU25 average, with e.g. the UK having similar strengths and weaknesses as Sweden but significantly underperforming in relative terms on the knowledge creation indicators. In the case of the Netherlands on the other hand the absolute decline is real and can only be partly explained by industrial strategies such as off-shoring of R&D by major industrial firms.*

A significant number of countries face challenges relating to co-operation in the innovation system *(captured by indicators such as business financed university R&D or innovative SMEs co-operating with other SMEs). The first indicator is often used in the policy analysis as a way of measuring the intensity of relations between the science base and industry. The indicator poses some difficulties in terms of interpretation since in a number of less-innovative European economies, the relative performance on this indicator is high, but this is usually taken to reflect weak internal capabilities of SMEs to undertake innovation and innovation systems still dominated by a technology based approach to innovation.*

The relatively lower number of challenges related to innovation and entrepreneurship *indicators should be treated with some caution. This reflects in part the outdated nature of many of the indicators based on CIS survey results dating back to 2000. CIS IV results should feed into the analysis in 2006 and are likely to provoke a strong debate on innovation patterns, trends and dynamics in specific countries and regional and sectoral innovation systems. Availability of early-stage venture capital remains a key blocking factor in a sizeable group of countries, although the number of countries identifying this issue as a major obstacle could be considered as surprisingly low.*

What is more surprising are the relatively limited number of countries for which output indicators related to the application of innovation *(notably employment in high-tech services and manufacturing, exports of high technology products and intellectual property) are considered as challenges. Only Belgium, Cyprus, Spain and Iceland and Bulgaria are considered as facing key challenges related to employment structure concerning medium-high tech manufacturing and services.*

Equally relatively few countries identify performance on patents, trademarks*, etc. as a problem despite an overall poor performance of Europe in terms of protecting and exploiting intellectual property.*

2.3 IS INNOVATION POLICY RESPONDING TO THE CHALLENGE?

This section reviews the extent to which the innovation policy mix in the EU25 Member States and the eight candidate and associate countries appears to be responding to the challenges identified through the European TrendChart EIS and policy reporting exercises. To simplify the detailed analysis country-by-country which can be found (in annex B), a scoring system similar to that applied in the 2004 Innovation Policy in Europe report[22] is applied.

Annex B details the score attributed to the policy response for each challenge identified in each of the countries analysed. In what follows, a cross-cutting analysis of the nature and relevance of the policy approaches adopted to deal with the main challenges identified for each of the five main groups of indicators of the EIS is proposed.

Rating	Criteria
★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
★★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
★	*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
○	*No specific measures addressing the challenge (possibly debate but no policy development)*

2.3.1 Challenges concerning innovation drivers

As noted above, the set of EIS indicators concerning innovation drivers concentrates a large share of the identified challenges at national level. This undoubtedly reflects growing concern about the adequacy of education and life-long learning systems to maintain Europe's competitive position in terms of knowledge generation and updating. Clearly there challenges related to the share of population with tertiary education and youth education attainment levels are important long-term factors which can slow the shift to a knowledge economy, the willingness of a population to adopt new innovative products or work place organisational innovation. The solutions for such challenges lies however, more firmly in the domain of education policy with science, technology and innovation policies only able to influence such indicators at the margins.

Amongst this group of indicators, the availability of sufficient S&E graduates *is a key bottleneck for future knowledge-based developments in many EU Member States and candidate countries, as well as associate countries. Trend performance in almost all countries concerned is positive (with the exception of Cyprus and Malta) and the EU as a whole has a higher share of S&E graduates than the US, although the EU remains a percentage point behind Japan.*

Nevertheless, the availability of sufficient S&E graduates is a significant issue in the 16 countries concerned by this challenge which have rates falling between 18% (Luxembourg) and 90% (Belgium) of the EU25 average, with most of the new Member States performing well below average (Cyprus and Malta respectively 30% and 25% of the EU average, Hungary 39%) but also more developed economies such as Austria (67%), Italy (65%) and the Netherlands (60%) also significantly under-performing.

Most countries concerned by this challenge acknowledge it in policy declarations and a fair number have begun to introduce measures (as summarised in exhibits 23 and 24) with however a sizeable time-lag before it can be expected that such measures will lead to a significant increase in S&E graduates.

22. http://trendchart.cordis.lu/annualreports/report2004/Innovation_policy_europe_2004.pdf

Exhibit 23: Policy response to increasing the number of S&E graduates

Countries	Rating	Criteria
Netherlands	★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
Austria, Belgium, Estonia, Germany, Italy, Latvia, Slovenia	★★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
Cyprus, Czech Republic, Hungary, Iceland, Luxembourg, Malta, Norway	★	*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
Switzerland	○	*No specific measures addressing the challenge (possibly debate but no policy development)*

Exhibit 24: Measures to increase the number of S&E graduates

Country	Illustrative measures taken to respond to challenge
Austria	*University reform (University Act of 2002) giving universities more autonomy* *Funding of doctoral programmes (AT 73)*
Belgium	*Federal measure to reduce wage costs of researchers by reducing social security contributions* *Measures at Federal and regional level to promote S&T education and careers*
Cyprus	*New engineering departments in the University of Cyprus* *Establishment of a technical university*
Czech Republic	*Specific measures in National Innovation policy (draft)* *Strategy for human resource development*
Estonia	*Doctoral schools (measure funded under Structural Fund programme)*
Germany	*Green Card programme DE 45* *Educational reform – including measures to respond to low rate of female S&E students*
Hungary	*Development of the infrastructure of education and training, HU 83* *Employment of PhD, MSc or MBA students, HU 85*
Italy	*Broad reform of educational system 2003* *Tax incentives for recruiting non-resident researchers (IT 43)*
Latvia	*Amendments to taxable income law (encouraging employers to invest in* *Increased budget for places in natural sciences and engineering* *Two programmes to improve quality of teach of sciences (LV 78) and supporting doctoral programmes and postdoctoral research (LV 77)*
Luxembourg	*Creation of University of Luxembourg in 2003 (LU 14)*
Malta	*Specific incentives introduced in 2005 budget for recruitment in private sector of S&E graduates* *Review of State Higher Education Funding – possible new measures in future*
Netherlands	*Delta Plan Science & Technology (2003)*
Slovenia	*Young Researchers Programme (SI 1)*
Iceland	*Increasing Number of Students in Science and Engineering (IS 26)*
Norway	*Strategy Science-of course ! (2002) to improve teaching of mathematics and science in primary education* *Commitment to Research white paper (2004-2005) proposes specific measures to support student and additional post-doctoral research places*
Switzerland	*Commitment to support young scientists in latest (2004-2007) national Education and Research plan*

The country which seems to have adopted the most comprehensive approach is the Netherlands with the Delta Plan Science & Technology, published jointly in 2003 by the ministers of Education, Culture and Science, of Economic Affairs and of Social Welfare and Employment. The plan focuses primarily on how to educate more young people in science and engineering with a target is to raise the number of young people entering scientific and engineering courses by 15% by 2007. The measures include improving scientific education, improving the attractiveness of careers involving scientific and engineering know-how, making science and engineering more attractive to children and youngsters for instance through science centres, improving immigration all of the highly skilled.

In a number of countries, there is a perceived need to take action to **strengthen basic education and training infrastructure** *in order to increase the capacity to educate more scientists and engineers. This has included the creation of new departments or even universities (Cyprus and Luxembourg) or by increased investment in existing education and research training infrastructure, notably supported by the Structural Funds (Hungary, Latvia). In a number of member states, a wider reform the higher education funding or institutional system (Austria, Germany, Italy, Malta) has also been undertaken with however varying results. The Austrian country report underlines that the university reform inspired by the University Act of 2002 has so far had little impact on boosting S&E graduate numbers and may even be contradictory with this aim.*

United Kingdom: The Higher Education Innovation Fund 2 (HEIF 2)

What it does

HEIF 2 is a partnership between the Department of Trade and Industry/Office of Science and Technology (DTI/OST), Higher Education Funding Council for England (HEFCE), and the Department for Education and Skills (DfES). This fund provides finance to promote enterprise in higher education institutions (HEIs), and networking between HEIs, businesses and potential users of research outputs. The funding is awards with the aim of increasing HEIs' capacity to respond to the needs of business, public services and the wider community and to transfer knowledge.

The fund consists of a total of Euro 260m for the period 2004-2006, and consolidates three earlier funding schemes. It therefore provides a consolidated third stream of funding, complementing core funding to institutions for research, and for learning and teaching. Funding is available in the form of grants and venture capital investments. A network of 22 new centres for knowledge exchange activity is also included in the HEIF 2 funding. These centres aim to provide specialised shared services for business and community partners.

Why it is successful

Prior to HEIF 2, fragmentation of measures was considered to be a problem in the UK. Fragmentation resulted in a complex system, which reduced the take up and impact of each individual measure. HEIF 2's success, evident in high take up, is said to be due to the fact that it bundles together previously separate and more complicated measures.

Increased support for increasing the number of **places available at graduate and post-graduate levels** *is clearly visible in a number of countries notably through the funding of doctoral programmes or schools (Austria, Estonia, Latvia). In Germany, specific action has been taken to increase the number of women entering science and engineering careers. The gender balance is also considered a challenge in Austria, where the extremely low share of women in technical sciences is already posing a significant problem in certain sectors. The need to also invest more in order to raise the quantity and quality of teaching of science and technology at primary and secondary education levels is also recognised, for instance, in Norway, Latvia, Germany and the Netherlands.*

Finally, Belgium, Germany, Italy, Latvia and Malta have all taken measures **to facilitate or reduce the cost of recruitment of researchers** *by enterprises as a way of stimulating the demand for researchers. This type of measure includes 'green cards' in Germany and reduced social charges or taxes in Belgium, Italy and Latvia. In Slovenia, the Young Researchers Programme (SI 1) was opened to enterprises in 2001 but the country report underlines that more could be done to promote this scheme to enterprises. In Hungary, a similar reduction of labour taxes when hiring additional researchers is only open to higher education institutes. The Belgian experience in opening this type of initiative to enterprises could be usefully studied by Hungary. In the short-term with a relatively*

fixed supply of S&E graduates, this type of measures seems likely to result in increased mobility internationally (including attracting returning researchers which is a stated goal in many countries) with an expectation that in the long-run this will also boost the number of young people going into such professions nationally.

In a number of the countries concerned by this challenge, the commitment to take action has been expressed in recent strategic thinking but it needs to be followed up by concrete measures, these include the Czech Republic, Iceland and Switzerland.

Slovenia: "The Young Researchers Programme"

What it does

The "Young Researchers Programme" aims to encourage more young people in Slovenia to pursue careers in research. It provides funding to around 1200 MSc and PhD students each year. The Programme was initially set up in 1985 and has lowered the average age of researchers in the public research sector in Slovenia.

An evaluation of the Programme concluded that although it was successful, only a very small number of participating researchers subsequently left public research for jobs in business sector. Consequently, the Programme was extended at the end of 2002 with a special call for young researchers from business sector only. A special sub-programme, opened only to young people from business sphere, who continue to be employed in business sector and have a constant link with business in their training, was designed to resolve this weakness. Another modification of the Programme was introduced in 2005 by the Agency for Research, which is responsible for executing science and research-related public projects financing. The Agency decided to give more emphasis to the selection criteria for the mentors of the participating students. During the first round of the selection process, the mentors: i.e. professors and senior researchers, suitable for coaching will be selected. Only at the second stage will the applications from potential young researchers be considered. Also, a more favourable treatment is to be given to the applications coming from technical sciences and engineering in line with the Agency's focus on responding to the needs of the industry.

Why it is successful

Both internal and external evaluations arrived at positive conclusions regarding the Programme. Part of its success was the fact that the responsible office continuously resolved administrative problems. Furthermore, the adaptations to the design of the Programme on the basis of the findings of evaluations and feedback show that the Programme designers are flexible.

Exhibit 25: Challenges for life-long learning

Countries	Rating	Criteria
Denmark, Ireland	★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
Belgium, Germany, Greece, Hungary, Lithuania,	★★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
Czech Republic, Estonia, Portugal, Slovakia, Spain	★	*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
Bulgaria, France, Malta	○	*No specific new measures addressing the challenge (possibly debate but no evidence of policy development)*

Low rates **of participation in life-long learning** *in over half of the countries monitored by the EIS pose a real difficulty given that a central characteristic of a knowledge economy is that individuals need to continually learn new skills and ideas. Indeed, the 15 countries for which life-long learning has been identified in 2005 as one of the top three key challenge could be joined by several others including Italy, Hungary, Poland and Romania which also have rates of participation well below the EU25 average. Somewhat more surprisingly, Denmark, which has one of the highest rates of life-long learning in the EU25, is also included in this group. In this case, from a national perspective there is a perceived need to maintain the lead compared to other Nordic countries. Denmark has embarked on a reform of the vocational educational and continuing training system, tying the various education programmes together into a single coherent and transparent adult education system.*

As can be seen from the table below (exhibit 26), most of the countries concerned by this challenge are involved in a similar exercise to that of the Danish case, with on-going reviews and reforms of the life-long learning system. Only a few limited training related programmes are identified in the TrendChart policy measure database. One example is the learning regions measure (DE 53) in Germany (co-funded by the European Social Fund), which seek to promote life-long learning and the development of a learning society by supporting the building up of networks of educational organisations on a regional level as well as by developing innovative actions to implement life-long learning principles.

Exhibit 26: Measures taken to respond to the challenge of life-long learning

Country	Illustrative measures taken to respond to challenge
Belgium	*Strategic actions plans in Flanders and Wallonia*
Czech Republic	*Strategy for human resource development*
Denmark	*Reform of vocational educational and training system*
Estonia	*A lifelong learning strategy is being developed*
France	*No significant new developments*
Germany	*Learning regions programme (DE 53)* *Reform of vocational training*
Greece	*Range of programmes funded but need for re-organisation of life-long learning system*
Hungary	*Promoting life-long learning and adaptability (HU 82)*
Ireland	*White paper on adult education and range of implementing measures*
Lithuania	*Scheme aimed at improvement of quality of human resources for R&D and innovation*
Malta	*Need to step up investment in life-long learning related to innovation*
Portugal	*Life-long learning one of four priorities in 2005 Technology Plan*
Slovakia	*Strategy 'Concept of life-long learning in Slovakia; various actions supported through Structural Fund operational programmes*
Spain	*Reform of training model for life-long apprenticeship*
Bulgaria	*Need for significant reform of education and training system*

As much as **inadequate life-long learning systems** *can be considered a major barrier to a well functioning national innovation system, the generalised separation of the debate on enterprise and innovation policies from those on education and training is evident in the TrendChart country reporting. Mostly the debate on skills-development, learning networks of enterprises and training organistations, etc. is treated only in a perfunctory manner. A 2004 TrendChart workshop did however consider in more detail the issue of human resources and skills for innovation.*

The output paper[23] *for this workshop provides a good summary of some of the key issues related to developing improved synergies between innovation and life-long learning policies. Two key observations arising from this workshop are worth reiterating with respect to the need to not only respond to the general challenge of improving life-long learning systems but to link such improvements as closely as possible with enterprise skills needs and innovation management capacities.*

A first crucial observation is that public support actions can never substitute the role of companies and private initiatives *in the timely identification of, and meeting, new skills needed for innovation. The main difficulty faced by the supply side is getting companies to articulate their needs. Providers are willing to provide a training supply that matches demand, but need to get a real picture of what this demand actually entails.*

23. http://trendchart.cordis.lu/reports/documents/Workshop_4_2004_Outputpaper_Paper.pdf

Various schemes that address this problem exist, including assessment of companies in conjunction with employees, unions etc; creating conditions in companies to develop the possibilities / skills to voice their needs, or at the very least begin to identify them; developing systems of skills and skills needs (typifying training actions) to help companies define what they need; developing networks on the early identification of skills needs; promoting discussion with training providers and firms; and schemes to promote human resource development in firms. A final consideration of matching is of course the ability of SMEs to contact and work with training suppliers, consultants, guides etc. There is perhaps the need to provide assistance (and promotion) in this respect if matching is to be successful.

A second critical issue is persuading companies to invest in innovation management. *Innovation management is a relatively new science for (small) businesses, and selling the concept is important. Understanding where firms are coming from is a crucial step if policy makers and training providers are to get into companies, speaking their language and understanding their business needs will help translate innovation management into a concept they can better understand. Identifying leaders, using associations, and developing networks may be a good way in which to better understand companies at large, perhaps even as a way in which to promote the uptake and the delivery of custom made innovation management skills training.*

2.3.2 Challenges for knowledge creation

Knowledge creation is obviously a necessary if not sufficient condition for innovation. From a policy perspective the group of indicators capturing this aspect of the national innovation systems performance in the EIS are amongst those on which the policy maker can most directly influence change. Amongst this group of indicators, the challenge of increasing business expenditure on R&D is clearly a priority reflecting the considerable gap between current rates of BERD with respect to GDP and the EU level objective of two-thirds of gross expenditure on R&D being sourced from the business sector.

Exhibit 27: Intensity of the policy response to BERD challenge

Countries	Rating	Criteria
France	★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
Cyprus, Czech Republic, Estonia, Greece, Hungary, Ireland, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, United Kingdom	★★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
Slovakia, Bulgaria	★	*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
Romania	○	*No specific measures addressing the challenge (possibly debate but no policy development)*

Boosting business expenditure on R&D *is seen as a key challenge for the largest number of countries. This reflects in part the wide-spread availability of this indicator and the fact that it is also a long-standing accepted measure of the intensity of effort by enterprises to invest in innovation. It is however strongly influenced by the structure of an economy since science-based sectors (e.g. pharmaceuticals, chemicals and some areas of electronics) invest more in in-house R&D than other sectors where innovation is more related to marketing, design or non-technological aspects. A related indicator, namely the share of medium-high-tech and high-tech R&D as a % of manufacturing R&D expenditure, which was introduced in 2005, has not been identified as a key challenge. This indicator may in fact be more important since it enables a better view on shifting patterns of investment in future technologies.*

Surprisingly, the intensity of BERD *is considered as a challenge for France and the UK, two countries with slightly above EU25 average performance on this indicator. The inclusion of these two Member States is based on specific issues related to business investment in R&D. In the case of France, the performance standing at 106% of the EU25 (with a*

slightly negative trend) is considered as insufficient compared to other key competitors such as Germany (139%). The challenge for France in raising BERD is paired in policy discussion to the weak linkages between enterprises and research organisations (as measured by the business financed university R&D indicator). The French commitment to raising BERD has been long-standing and has been recently reinforced with a number of additional measures including the merging of ANVAR (national agency for research commercialisation) and BDPME (Bank for Development of SMEs), which created a single national agency (OSEO) for supporting the development of SMEs. Additionally, the Beffa report[24] in 2005 highlighted the need for French public R&D expenditure to be re-directed towards medium-term programmes for industrial innovation (to be managed by a new national agency for industrial innovation) in order to shift French industry towards a specialisation in higher-tech sectors. Specific measures taken recently in favour of industrial R&D expenditure include a new tax measure expected to show first results in 2006 and a raft of measures resulting from the 1999 Innovation Act.

France: "The Young Innovative Company status (JEI)"

What it does

The objective of JEI is to help young innovative companies overcome their first years of existence by extending them tax credits related to R&D investment. The measure addresses the following aspects: the policy goals following from the Lisbon strategy; the fact that companies in France are investing less in R&D than in other countries; the fact that small and young innovative companies are weaker in their first years of existence.
There are 5 conditions that make a company eligible for this type of support: to be an SME with less than 250 employees, and less than 40M€ turnover or a balance sheet lower than 27M€; to be less than 8 years old; to have engaged in R&D expenses amounting to at least 15% of total costs (NB: not all R&D expenditures are eligible, for example technology watch expenditures are not); to be independent i.e. at least half of capital must be detained by physical persons, other SMEs, research or higher education institutions or their subsidiaries, capital risk companies, mutual funds for innovation, business angels, etc.

Why it is successful

It is regarded as a very positive measure for research and innovation. The adoption of the JEI status responds to two important challenges: a lack of funding during the first years of firms' development, and a weak investment rate in R&D by the private sector in general, and by SMEs in particular.

In the UK, which is also performing only marginally above average on the BERD indicator (at 103% of the EU25 level), the marginal increase noted in recent years has not being enough to reverse a decline in high-tech exports or the importance of medium-high tech manufacturing (although the importance of the service sector in the UK economy is another explanatory factor with innovation activity being less well captured by BERD statistics for this sector). A recent measure taken to focus public funding on technologies of direct relevance for UK business is the creation of a Technology Strategy Board which will determine priorities for close to €500 M of Department of Trade & Industry funding during 2005-2008. The board's input will, in particular, shape further competitions for funding national technology programmes.

Two other more advanced countries also fall into this group of countries challenged by the need to raise BERD rates, namely the Netherlands and Norway. In both cases, the structure and composition of their economic (respectively dominated by the service sector and resource based) is an explanation of performance below 90% of the EU25 average. This poses specific difficulties in raising BERD levels but governments in both countries continue to actively pursue this goal.

For other countries for which the share of BERD in GDP has been identified as a challenge, the situation is more dramatic with the need in the case of the eight new Member States to close considerable gaps with the EU25 average position (ranging from 6% of the EU25 average in Cyprus to 29% in Hungary). However, old Member States such as Greece, Italy and Portugal are all well under 50% of the EU25 for this indicator. In some cases, a significant positive trend can be observed (Estonia at 22.5% or Cyprus with 26.5% shift) while in others an already negative situation is worsening (Poland at -20.5% and Slovakia at -14.4%).

24. http://lesrapports.ladocumentationfrancaise.fr/BRP/054000044/0000.pdf

Linking the extent to which policy options, which in the new Member States are very new having been largely introduced since 2004 with the financial support of the EU Structural Funds, is difficult. For instance, Estonia's positive trend for this indicator may be in part ascribed to the launching since 2002 of public funding for R&D financing in enterprises, however such affirmations need to be confirmed with longer time series and more in-depth empirical analysis. Similarly, in Norway, a positive trend in BERD may be attributable to the introduction of the SkatteFUNN (NO 33) tax incentive, but an evaluation would be required to assess additionality. Similarly, in Ireland a range of measures are used to encourage more R&D, but the TrendChart report notes that only limited analysis has been undertaken to identify the relationship of support funding to industrial R&D expenditure. The Polish report on the other hand underlines that the existing system for financing enterprise level R&D activities is too weak and incomplete which may in part explain the difficulty to counter the negative trend.

Recent policy action to raise the intensity of business invest in R&D *can be identified in most of the countries for which this is a challenge since 2004. A range of specific direct support measures (grant and loan schemes) already exist and in some of the countries considered for this challenge these have been revised or new schemes introduced during 2004-5. The table in exhibit 28 below provides an overall synthesis of the types of measures taken per country. More details can be found in the annex country briefs and full country reports for 2005.*

Exhibit 28: Measures taken to respond to the challenge of raising BERD

Country	Illustrative measures taken to respond to challenge
Czech Republic	*New tax reduction allowing increased depreciation of intangible R&D results came into force in 2005* *INOVACE: support to increasing technical and utility value of SMEs products and services (CZ-29)*
Cyprus	*Research Promotion Foundation Framework Programme includes a measure providing for co-financing by private sector.*
Estonia	*R&D financing programme on-going* *Launch of new Estonian Development Fund planned in 2006*
France	*2004 tax measure to encourage companies to increase R&D spending* *In process of launching Competitiveness Clusters and Agency for Industrial Innovation.*
Greece	*On-going range of measures deriving from research and investment policies supported under Structural Funds*
Hungary	*Tax incentives introduced* *Research and technology innovation fund*
Ireland	*2005 R&D action plan foresees broad range of measures including R&D tax credits*
Italy	*New initiative: Technology Transfer pilot projects (IT 57) for less-favoured regions* *National Research plan for 2005-7 to support public-private research labs (IT 58)* *2005 Competitiveness Decree proposes creation of Fondo Rotativo*
Latvia	*Various programmes on-going supported by the Structural Funds* *Commitment to raise annually research funding by 0.15% of GDP.*
Lithuania	*National agreement to raise public funding of R&D* *Tax legislation changed to facilitate deduction of R&D costs*
Malta	*Tax deduction for R&D expenditure increased in 2005*
Netherlands	*Broadening of definition of R&D under WBSO (NL 5) tax scheme* *Innovation subsidy for collaborative projects (NL 45)* *SBIR pilot (NL 50)*
Poland	*Act on National Capital Fund & Act on supporting innovation activities – explicitly aimed at achieving a seven-fold increase in BERD by 2010 – including fiscal incentives, R&D expenditures classified as costs, etc. (both adopted 2005)*
Portugal	*2005 Technological plan including reinstating a system of tax incentives for R&D activities.* *IDEIA (Applied R&D in companies, PT 33) supports R&D consortia between enterprises and S&T organisations.*
Slovakia	*Draft of innovation law foresees tax allowances mentioned* *SIRPCD measure introduced (SK 08) to support industrial research and product development*
United Kingdom	*Grant for research and development (former SMART and SPUR) re-launched and now managed regionally* *CRD (UK 65).*
Bulgaria	*National Innovation Fund will support market oriented innovative projects.*
Norway	*Announced increase in direct industry-oriented R&D programmes*
Romania	*Stimulation of BERD placed high in priorities for 2005, possibly including consideration of R&D expenditure as fiscally deductible.*

A general commitment to increase public resources in support of industrial R&D *is observable in the majority of the countries. For instance, the governments in Latvia and Lithuania have both made a commitment to annual increase of public funding for R&D; in Ireland a target of raising annual BERD from €971 million in 2001 to €2.5 billion in 2010 was set in an Action Plan adopted in November 2004; similarly in Poland, the 2005 Act on supporting innovation activities is explicitly aimed at achieving a seven-fold increase in BERD by 2010.*

The clearest trend in policy actions to respond to insufficient levels of BERD is a new or renewed commitment to fiscal incentives for R&D*. New developments in tax-based incentives for industrial R&D are visible in 10 of the 19 countries concerned. In some cases, this concerns the reinforcement of existing schemes such as in France, Ireland and the Netherlands. In the new Member States concerned (Czech Republic, Hungary, Lithuania, Malta, Poland,), this type of measure is generally still at the development phase (announced in various plans and strategy documents). This suggests a shift from a philosophy where it was considered to be enough to keep corporate tax rates as low as possible in order to boost industrial development, to one where the specific nature of R&D expenditure and the time-lag between such expenditures and the likely impact on business performance needs to be better taken into account in corporate taxation legislation.*

A second type of instrument currently in vogue is the creation of national research or innovation funds *aimed at supporting the creation of new high-tech enterprises and research and technological development and innovation activities in existing enterprises (and associated public or academic centres). Such funds have been recently launched or are in the process of creation in Bulgaria, Estonia, Hungary, Italy and Poland. In some cases, the funds are a response to lack of seed and venture capital (Estonia and Poland) by aiming at creating new technology based firms, in others, the objectives of the funds mission is broader including funding market oriented research projects or strategic research programmes in co-operation with public research organisations (Bulgaria and Italy).*

The Hungarian case is particularly interesting since it involves a mix of state funding with an obligatory contribution paid by medium-sized and large enterprises. The so-called innovation contribution is charged on the basis of the adjusted net revenues of the previous year: 0.2% in 2004, gradually increasing to 0,3% in 2006. As an incentive to conduct R&D activities, the contribution to the Fund is reduced by the amount of direct costs of in-house R&D activities, as well as those commissioned from a public research unit or from a non-profit research organisation, financed by own sources. There are two major features of the Fund. First, it helps re-orienting private sector resources towards innovative activities, assisted by matching public funds. Second, contributions to the Fund do not disappear in the state budget: instead, their use in the transparent, dedicated RTDI Fund can be monitored, and should directly or indirectly benefit the private sector, as stipulated in the legislation creating the Fund. It is also a legal requirement that resources of the Fund be spent through competitive calls.

Hungary: "Research and Technological Innovation Fund"

What it does

The specific objectives of the "Research and Technological Innovation Fund" have been to increase GERD and provide a stable source for this aim, amidst recurring and strong pressures for cutting the central budget. It is aiming to address competitiveness, a highly relevant challenge for Hungary.

The underlying Act has created a stable and reliable financial ground for research, development and innovation activities, and the Research and Technological Innovation Fund is likely to increase GERD because of its rules: contributions from companies, plus an automatic matching fund from the central government. Given the socio-psychological context in Hungary, it is also an important feature of the Fund that the contributions paid in by firms do not disappear in the state budget: instead, their use in the transparent, dedicated Fund can be monitored, and should directly or indirectly benefit the private sector, as stipulated in the legislation creating the Fund. It is also a legal requirement that resources of the Fund be spent through competitive calls.

Why it is successful

This Act can be deemed good practice in innovation governance because of four reasons: Transferability. It seems to be transferable or adaptable to other countries facing similar challenges; 'Innovativeness'. It is an unusual, innovative method of financing RTDI activities in two respects. First,

contributions by businesses are not paid to the central budget as taxes, but as a levy to a dedicated Fund. Second, the central budget should match the contributions paid in by firms; Strategic Orientation/Coherence. This measure directly addresses a national innovation policy objective and is coherent with EU innovation policy priorities, namely to increase both BERD and GERD. As a critical success factor, this Law has been enacted after lengthy consultations with businesses and policy-makers working on other, related fields, notably finance.

A third option being pursued to stimulate increased BERD is to stimulate greater **co-operation and synergies between enterprises active or potentially active in R&D with public or academic research centres**. *This objective is pursued notably through programmes focused on key technologies for the future of national economies or by the creation of competitiveness or innovation clusters and poles. The French competitiveness clusters programme (FR 62) is one of the most important of such initiatives to have been launched in 2005. 67 clusters, gathering together enterprises, training centres and public and academic research organisation specialised in specific technologies at a regional or inter-regional level, have been selected following a competitive call. The aim of the programme is clearly wider than simply raising BERD, rather the objective is to initiate industrial growth and strengthen the economic and technological potential of the regions concerned.*

2.3.3 Challenges concerning innovation & entrepreneurship

The third set of 'input' indicators in the EIS model capture, to the extent that available data allows, some of the core factors driving entrepreneurial innovation. The six indicators measure the efforts to undertake or support innovation in firms both in terms of product and process innovation and the diffusion of new technologies such as ICT. The relatively outdated nature of the existing results for the Community Innovation Survey (CIS4 data not being available in the EIS2005) which account for four out of six indicators probably explains the relatively low number of countries for which one of these indicators have been selected. Nevertheless in total 14 countries out of 32 identify one of the four CIS based indicators as representing a specific challenge. The most frequently selected indicator is the share of SMEs innovating in-house. Amongst the other indicators in this group, a key challenge remains the availability of early-stage venture capital identified for seven countries in 2005.

Exhibit 29: Policy responses to boosting early stage venture capita

Countries	Rating	Criteria
Germany	★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
Ireland, Italy, Netherlands	★★ / ★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
Romania, Turkey		*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
Cyprus	○	*No specific measures addressing the challenge (possibly debate but no policy development)*

The fact that only seven countries select **access to early-stage capital** *as a challenge should not to be taken to mean that this issue has been solved in the 25 others. A good point of comparison can be made with Finland, which is far from being a laggard in terms of support for venture capital, with the transparent financing system considered amongst the best performing (0.063% of GDP invested in early-stage venture capital). The country report underlines however, that national venture capital markets remain rather small relative to GDP. A range of actors are involved in supporting venture capital markets from Tekes, to SITRA to Finnvera and the Finnish Industry Investment Ltd (both state owned companies). Government support and public involvement in the development of Finnish venture capital has been notable. However, the country report highlights that "growth in funding for innovation has come to a complete standstill" with "private capital avoiding participation in early-stage financing". Hence, measures like the Tekes Start-up loan for technology companies have been introduced.*

Broadly speaking, three of the seven countries have established a relatively comprehensive **framework in support of venture capital**. *In comparison to*

the Finnish performance, Germany Ireland and the Netherlands lag behind with only around 0.022% of GDP being invested in early-stage venture capital. In all three countries, however, there has been a concerted effort to improve the effectiveness of public support measures for high-tech start ups and venture capital investments. In Germany, most measures introduced since 2004 concern improving access to finance for technology based start-ups. The existing Federal programme to support the venture capital market (DE 12) was redesigned in order to address the changing environment after the crisis in the new market in 2001; and an umbrella fund (ERP/ EIF Fund) started in early 2004 to provide funding to venture capital companies that invest in young technology based firms. The new High-tech start fund launched in 2005 offers funding for the commercialisation of research results from universities through spin-offs.

In Ireland, while the availability of venture capital has improved, real seed capital is considerably more difficult to secure. Despite a number of measures taken to improve the overall situation, more needs to be done and the lack of a well-developed business angel network is another part of the innovation financing challenge.

In Italy and Romania, the situation is particularly poor as concerns early stage venture capital (0.005 and 0.003% of GDP respectively) with both countries proposing to create specific funds aimed at supporting the development of venture capital markets for the creation of research intensive and high technology enterprises.

Exhibit 30: Measures to boost early stage venture capital

Country	Illustrative measures taken to respond to challenge
Cyprus	*No specific measure for venture capital*
Finland	*Capital loans for R&D (FI 4)* *Start-up loan for technology companies (FI 22)*
Germany	*High-tech Start-up Fund (DE 76) launched* *Federal Venture Capital Programme (DE 12) redesigned*
Ireland	*Seed and venture capital fund established in framework of national development plan (2000-2006) (IE 8)* *Business expansion scheme and seed capital relief (IE 21)*
Italy	*High tech fund of funds planned to provide direct support to ventura capital activities*
Netherlands	*Seed facility for high-tech start-ups launched in 2005 – final part of Technopartners programme (NL 43)*
Romania	*Proposal to create national risk capital fund for R&D and innovation*
Turkey	*TTGV Girisim Fund (TR 28)*

In Cyprus and Turkey, where official statistics do not exist to measure precisely the extent of the problem, access to early-stage venture capital is recognised as a challenge. In the latter country, the legislative framework for venture capital is not sufficiently attractive and in this context the World Bank has supported the TTGV Girişim Fund (TR 28), a government backed instrument established 2004. The Fund's target is to invest in early stage technological start-up companies in sectors of ICT, biotechnology and healthcare, and advanced microelectronics.

Italy: "The NEXT fund"

What it does

The declared objectives of the fund consist of investments in non-quoted new technology based companies with a particular emphasis on the scientific networking. The fund offers companies not only financial resources but also managerial tools and technological consultancies that are expected to speed up their internationalisation process.
The NEXT fund that has been set up in the Lombardy region is a closed fund with a maximum temporal extension of 14 years and a capital of €60 million. It is managed by Finlombarda gestioni SGR, which includes participation by Regione Lombardia, Camera di Commercio di Milano and the University Consortium Politecnico Innovazione. Investors are guaranteed by a specific fund of €20 million allocated by the regional government. The fund has also been subscribed by some of the major banks operating in Italy. This fund can either invest in other equity funds, promoting the local venture capital industry, or invest directly into new companies through co-financing with other private actors.

Why it is successful

The NEXT fund is an innovative initiative that arises in response to a local need in a sector (finance for innovation) that has been largely neglected in Italy; it has a precise objective: to develop in the Lombardy region a Venture Capital market oriented towards innovation and new technology development; it has clearly identified target (SMEs in early-stage or start-up phases operating in innovative sectors); several regional key actors have taken part in the initiative; it has been mentioned as a good practice case in a study performed by the COTEC Foundation titled: "Technology Transfer and Innovation Policies: new challenges ahead in selected Mediterranean countries" (2004). Last but not least, the NEXT fund is also an example of trans-national learning since the managerial framework of the fund has been inspired by the successful experience of the "Yozma" fund in Israel, which has generated from the original capitalisation of $210 million a cash flow of $2800 million.

2.3.4 Challenges concerning the application of knowledge

The set of five indicators which measure innovation outputs through the application of knowledge *provide a broad measure of performance of the national innovation system in terms of performance and value added in innovative sectors. The countries which have identified specific challenges relating to this group tend to do so with respect to insufficient levels of employment in high-tech sectors or relatively low shares of high-tech exports. At best, in the short-term, governments can hope to influence the capacity of specific sectors of the economy to produce and export higher-technology and knowledge content products and services through direct support measures or regulatory change (e.g. to facilitate the shift of labour or capital from declining lower tech sectors to higher tech sectors). However, these indicators are also dependent on historic strengths of national economies in specific sectors and on the capacity of education and training systems to re-skill workers and produce new graduates with appropriate skills. One obvious solution is to target foreign direct investment with a higher R&D or technology content but this increasingly requires that a country can prove it has the local knowledge base and supplier network in place to support the foreign investor.*

Exhibit 31 : Policy responses to improve the application of knowledge

Countries	Rating	Criteria
	★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
Belgium, Iceland, Spain Sweden	★★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
Bulgaria	★	*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
Cyprus	○	*No specific measures addressing the challenge (possibly debate but no policy development)*

A common thread across a number of the countries is the need to boost innovation in services as well as in manufacturing industry*, this is the case in Belgium, Cyprus and Spain. In Belgium, for instance, despite a range of measures, there remains a concentration of both investment (business expenditure, number of R&D active firms) and outputs (patenting concentrated in a few larger companies often foreign owned), allied to significant geographical and sectoral disparities, in innovation activity. Specific competitiveness clusters or poles are now being supported and an increased sectoral focus can be observed (e.g. Brussels Capital has proposed to focus innovation support on three-to-four key sectors for the region's economy).*

Exhibit 32: Measures to improve the application of knowledge

Country	Illustrative measures taken to respond to challenge
Belgium	*Relatively wide range of measures but more could be done, for instance, to increase support to innovation in services or boost high-tech exports of manufactured products*
Cyprus	*No significant measures addressing important service sector – main focus remains manufacturing to support increase in high-tech exports*
Spain	*National Reform Programme foresees increased effort to internationalise five key sectors* *A number of other programmes in past have targeted various efforts to increase technology content of manufacturing and service products.*
Sweden	*Generalised effort to foster high-tech start-ups and increase knowledge content in SMEs*
Bulgaria	*National Innovation Fund proposed.* *Guarantee Fund for Micro credit (BG 03) aims to help SMEs with absorption of technologies*
Iceland	*Several specific measures ranging from programmes on specific technologies (nano-technology, IS 28) to Impra Innovation Centre (IS 15)*

In contrast, in Cyprus, despite a need to support higher value added services, support measures remain focused almost exclusively on manufacturing. Swedish efforts are focused on boosting high-technology exports with a notable recognition that an over-dependence on several large industrial groups needs to be balanced by a larger number of high-tech smaller firms active in export markets.

Netherlands: "Subsidy scheme pilot innovation vouchers"

What it does

The Ministry of Economic Affairs (EZ) launched the new "Subsidy scheme pilot innovation vouchers 2004" (NL 47) in September 2004. The innovation vouchers enable SMEs to buy knowledge from the knowledge base. Innovation vouchers make it easier for SMEs to 'buy' knowledge and to submit requests for knowledge Innovation vouchers shorten the time-to-market. The main goal of the pilot scheme is to let SMEs become acquainted with knowledge suppliers by using the innovation vouchers – and thus to lower barriers.
In this scheme the SME gives a voucher to the innovation institution who then gives the voucher to an executing body of the Ministry of Economic Affairs, who then pays the innovation institution. Thus, the subsidy is granted to the knowledge institutes that have performed a knowledge transfer project (with own resources and for own risk) and have submitted one or more valid innovation vouchers in relation to that project.

Why it is successful

This can be regarded as a good practice as it attracted massive interest among the SMEs. Based on the experiences with the first round, a second round was launched in March 2005 with 400 innovation vouchers. Again, the vouchers were sold out on the first day with more than 1700 applications. The innovation vouchers can be considered a good practice for several reasons. It was based upon consultation with stakeholders and upon an analysis of the strengths and weaknesses of the Dutch NIS. Moreover, the subsidy scheme was explicitly launched as a pilot scheme, to allow for learning. Another good aspect of the new scheme is that the innovation vouchers address three key problems: SMEs that are not sufficiently innovative, insufficient public-private interaction between demand and supply, and an incentive structure for knowledge institutes which is insufficiently oriented towards demand.

2.3.5 Challenges concerning intellectual property

The final set of challenges reflects the importance of intellectual property as one measure of the results achieved by knowledge creation and the need to commercialise successfully this know-how. An EIS 2005 technical paper has examined the issue of how policy measures in favour of IPR can be linked to performance or target setting[25]. The paper argues that policies to support IPR can be grouped under three broad categories: a) policies to encourage SMEs to apply for patents; b) programmes to disseminate patent information; and c) policies to encourage public sector research institutions to apply for patents.

Exhibit 33: Policy responses to improving IPR management

Countries	Rating	Criteria
Denmark	★★★	*A systematic and integrated approach responding to the challenge through a comprehensive set of measures*
Iceland	★★	*Specific measures (one or more measures implemented which are however insufficient to respond fully to the challenge)*
Lithuania	★	*Policy development under way to respond to challenge (planned or newly launched measures e.g. announced in National Lisbon Action Plan, etc.)*
Finland	○	*No specific measures addressing the challenge (possibly debate but no policy development)*

In the four countries for which IPR has been identified as a specific challenge, these three types of measures are visible in one or more cases. Denmark has faced up to a relative decline in its position on US high-tech patents balanced somewhat with a corresponding increase in EU patents, by introducing first a new law on patents in 2000 which was followed up by a number of financial support and information dissemination on IPR measures. Most recently, the Act on Technology Transfer at public research institutes enables universities to establish a limited company to commercialise and transfer know-how to enterprises.

The Danish approach is mirrored in France where the SAIC measure (FR 51) similarly seeks to bring together in a single structure activities related to the promotion and commercialisation of universities IP and know-how. The SAIC manage research contracts, patent policy, etc. within a budgetary framework separate from that of the university and more flexible. A national network (www.curie.asso.fr) gathers together the people involved in the commercialisation structures and facilitates the exchange of good practice.

Iceland is below EU average on all EIS IPR indicators and has taken a number of legislative steps such a signing the WIPO Patent Cooperation Treaty. It is expected that the introduction of the new legislative framework will contribute to raising awareness on IPR among Icelandic companies. The Finnish case is rather specific since the country only underperforms on community trademarks and the issue is not considered a major challenge by policy makers. In Lithuania, the situation is the opposite with a very weak performance on IPR which has led to the drafting of a strategy on IPR; which has yet to be implemented however. The need to build a 'patenting support infrastructure' and to set up a network of qualified patent consultants and legal representatives has been highlighted as a priority by the country report.

Exhibit 34: Measures supporting intellectual property

Country	Illustrative measures taken to respond to challenge
Denmark	*Act on Technology Transfer at Public Research Institutions (DK 20)*
Finland	*No specific measures concerning trademarks (indicator under-performing) but existing measures such as TULI programme (FI 6) favouring exploitation of research results.*
France	*Generalisation of technology transfer offices at public research institutes (SAIC FR 51)*
Lithuania	*Strategy for intellectual property rights drafted but not implemented.*
Iceland	*Signed WIPO treaty end 2004 and reforming legislative framework as part of effort to raise awareness amongst companies on IPR*

25. See Scoreboard paper 2005, Policy Indicators and Targets: measuring the impact of innovation policies. Available at http://www.trendchart.org/reports/scoreboards/scoreboards2005/scoreboards_papers.cfm

2.4 RECENT TRENDS IN EUROPEAN INNOVATION POLICY

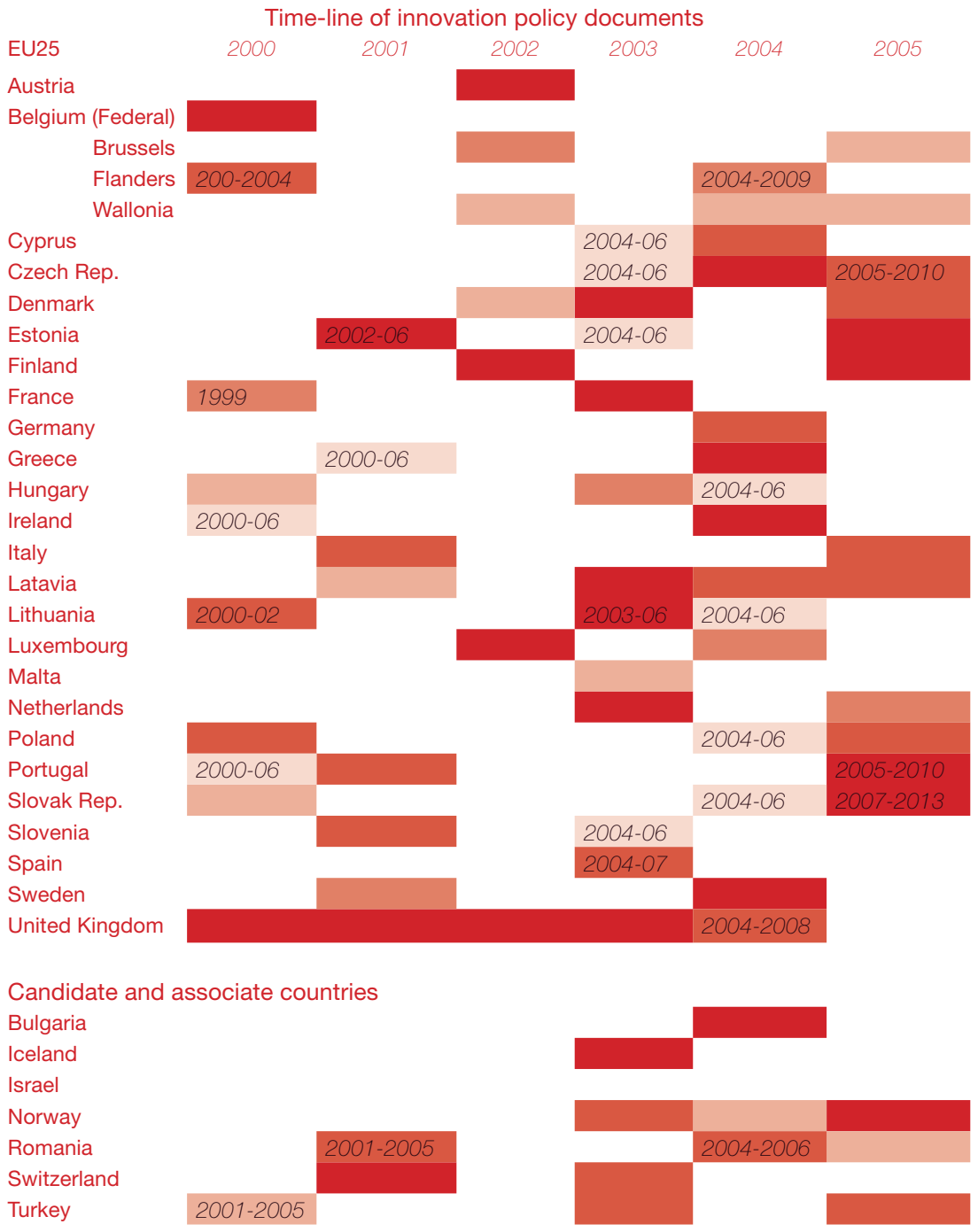
2.4.1 *Evolution in key policy objectives and targets since 2004*

The period since 2000 has seen a significant evolution in innovation policies *across the European Union, influenced by the objectives set by the Lisbon Strategy. This evolution has been even more evident in the new Member States and candidate countries, where innovation policies are generally less mature. The changes affect public policy priorities and objectives of horizontal or sectoral character, specific structures and tools for their implementation, and strategies both in the public and business sectors. In general the policy documents have evolved from simple declarations of intent at government level to more complex inter-departmental action plans and operational measures at both national and regional levels. These plans and measures are increasingly based on consultations and surveys of enterprises, foresight exercises and in depth analysis of factors influencing competitiveness.*

As can be seen from the time-line table overleaf, formal documents describing innovation strategies*, objectives and measures are available now in almost all of the EU25 and the associate and candidate countries. However, in a number of countries innovation policy still remains a minor part of broader science and technology policies often dominated by basic or academic research issues (e.g. in Greece, Spain and Romania). Nonetheless, even in science and technology oriented policies it seems that a traditional science-push approach is gradually being replaced by a more systemic vision of innovation. However, often the only target indicator used in policy documents remains the percentage of R&D investment in GDP (inspired by the Barcelona objective); some documents, however, include other more relevant indicators with respect to innovation policy targets, these reflect a concern to monitor the output or impact of innovation policies on enterprises (e.g. the Netherlands, and newly introduced strategies and action plans in Portugal and Latvia).*

The drafting of National Development Plans *as part of the planning process for the adoption of the current round of EU Structural Funds has helped most of the cohesion countries (Greece, Portugal and Spain) and the 10 new Member States to develop more appropriate strategies and targets. Already in 2005 some new Member States used strategic reflection on the EU 2007-2013 programming period to further develop innovation-oriented strategic documents to be reflected in their National Development Programmes (e.g. Czech Republic, Slovakia). Similarly, the candidate countries are developing national plans and strategies in support of SMEs in general as well as research and innovation policy.*

Exhibit 35: Time line of Innovation Policy Documents : 2000-2005



The general overview leads to a picture that is to a large extent a continuation of the general trend described in the last year's annual report (Innovation Policy in Europe 2004). During 2005, important policy documents were adopted in several countries, especially in new Member States, but also in e.g. Denmark, Portugal and Italy. The following documents are worth highlighting:

Portugal *approved a Technological Plan for the Growth agenda with one of the main objectives to give a new impetus to innovation. The Technological Plan agenda foresees for instance the creation of 200 technology-based start-ups, doubling risk capital funds for innovating firms, launching of a placement scheme for young scientists and engineers as well as management graduates to support innovation in SMEs; a system of tax incentives for R&D activities and attracting technology-based FDI;*

Denmark *introduced an Action Plan on Venture Capital. The government has set the goal that by 2010 Denmark will have one of the best functioning venture capital markets in Europe. The plan includes ten initiatives paving the way for more venture capital investments from private investors as well as from Pension Funds. It is expected that the action plan will lead to a doubling of the total investments in unlisted securities in 2010. Among the initiatives proposed are establishment of a new venture fund, tax deductions for investment in unlisted securities, creating better framework conditions for business angels;*

Action Plan for Innovation in Enterprises was adopted in Italy*. The programme will focus on fostering modernisation of enterprises (specially SMEs) mainly through upgrading ICT. Italy adopted also the National Research Plan 2005-2007 which builds on the previous plan from 2003;*

The Polish Parliament *adopted an Act on Supporting Innovation Activities. The Act's main goal is to improve the competitiveness and innovation capacity of the Polish economy by increasing business expenditure on R&D and improving the management of public resources allocated for R&D. In particular the Act foresees the introduction of technology credits, a technology loan fund, possibility of granting a status of R&D centre to eligible businesses; fiscal incentives for investing in new technologies (changes to the personal income tax and corporate income tax regimes), introduction of a VAT rate of 22 percent on R&D related services, etc.;*

The Czech Republic *published two relevant documents namely, the National Innovation Policy and the Long-term Principal Research Directions. Czech National Innovation Policy will have four main goals: transforming research and development into a source of innovation, establishing a working public-private-partnership, improving human resources for innovation, making the performance of the State administration in research, development and innovation more effective. These general goals are accompanied with a list of 48 proposed measures that often refer to the future Structural Fund operational programmes. The document sets a target of increasing R&D expenditure from the state budget so that the target of 1% of GDP is reached by 2010;*

The new Strategy of Development of Slovenia*: development of vision and priorities for the period 2006-2013 was discussed by the Slovenian government. Several priorities are linked to innovation such as the effective creation, transfer and application of knowledge for economic development and employment. As for the quantified targets, public research investment should grow to 1% of GDP and measures are to be introduced to stimulate business investment to grow to 2%. The text of the strategy was debated by the government and is to be passed on to the Parliament. It remains to be seen how the current debate on the budget will influence the strategy and its implementation;*

In the context of Lisbon process the Strategy of Competitiveness Development in Slovakia *up to 2010 was adopted by Slovak Government. The strategy has four major priorities related to knowledge-based economy: human resources and educational policy; information society policy; research, development and innovation policy and business environment policy. The 'Law on the Organisation of State Support to Research and Development' prepared by the Ministry of Education was the first important piece of legislation aimed at the implementation of the strategy. Targets set by the strategy were incorporated into several long-term economic strategies. For instance, the Ministry of Economy published a White Paper on the 'Systemic Structure of the Slovak National Economic Strategy for the period 2005-2013'. The Paper states the main targets, principles and priorities of the social and economic development of Slovakia. It should be seen in the context of the next EU programming period;*

Latvia *introduced the Single Economic Strategy 2005-2010. The overall objectives are improving the business environment, providing healthy conditions for competition and a well-functioning infrastructure base. The goals put forward by the*

strategy are accompanied with 50 quantifiable target indicators, e.g. increase in the number of SMEs per 1000 inhabitants from 18 to 30 in 2010 and 50 in 2030; the share of the middle and high-tech sectors in the industrial structure is to be increased from 30% to 50% by 2010. Ministry of Economy issued an action plan with an aim to implement systematic measures for support to SMEs, including improved access to funding through the Latvian Guarantee Agency, the establishment of a risk capital fund and the simplification of access to the Structural Funds;

Two White Papers were published in Norway *in 2005.* Commitment to Research *places focus on internationalisation, fundamental research and research based innovation and value creation. It supports the Barcelona target of 3 % of R&D investment in GDP by 2010. A very interesting development is innovation policy is laid out in On regional policy. The White Paper supports adjusting innovation policy to regional contexts through e.g. the promotion of cooperation at the local and regional level between authorities, industry and institutions for research and education.*

The developments in the new Member States, although mixed, show that the innovation agenda in these countries gradually develops towards a more mature phase. The initiatives include more advanced topics (e.g. fiscal instruments, financial engineering, etc.) and attempt to approach economic and innovation planning in a more holistic way. This appears often to be driven by the EU level agenda and Structural Fund imposed planning horizons, but also reflects genuine ambition to create more innovation friendly environment, similar to this in more advanced countries. Policy coordination and evaluation will remain a very important issue in years to come as many initiatives are introduced without deeper analysis of possible impact or spill-over effects. The economic and public budget situation will influence the character and scope of innovation policies, notably in the less favoured regions. In conclusion, recent policy documents implemented by new Member States should be seen in the context of preparations to make the best possible use of the Structural Fund resources for improving innovation capacity. It will be interesting to follow up with this analysis in 2007 when the cohesion countries will enter decisive phase in launching their 2007-2013 programmes.

2.4.2 New innovation policy measures in 2005

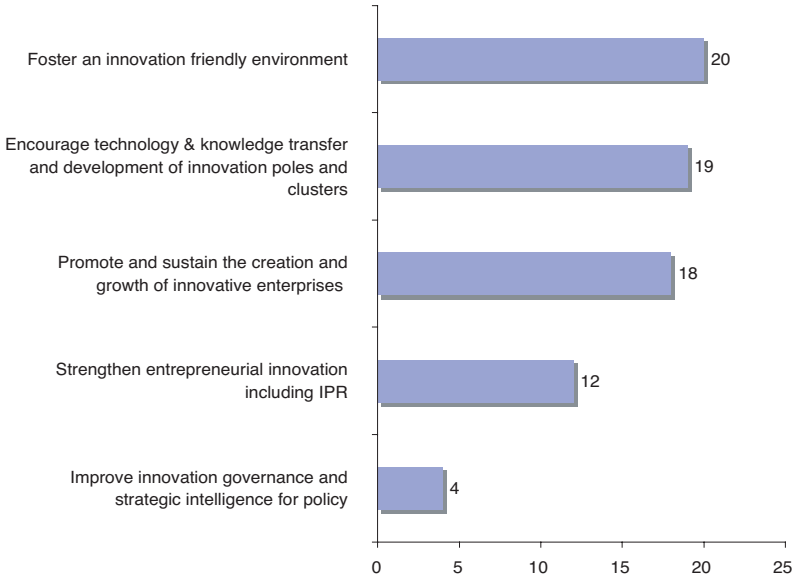
This section is a concise review of new innovation policy measures identified via the network of TrendChart country correspondents in 2005. A total of 53 new measures were introduced into the policy measure database in 2005[26]. Italy (11 measures), Hungary (10) and Czech Republic (8) were the most active introducing more than half of all schemes monitored by TrendChart. These numbers may be seen as a proxy indicator of policy activity in the field of innovation. Obviously, the numbers depend on the size of the country and phase of the policy cycle. Many countries that introduced measures in preceding years currently find themselves in implementation phase and did not introduce many new actions as is the case in Finland, Austria or Latvia.

The measures introduced cover a wide spectrum of innovation policy categories ranging from regulatory issues to direct (financial support) and indirect innovation support measures for enterprises. The accent in 2005 has been on supporting new or existing innovative SMEs *either with a direct access to funding or by encouraging enterprises to collaborate with the research community. Nearly* 40% of measures in 2005 aim at fostering innovation friendly environment. *Schemes in this area focused especially on increasing expenditure on research and innovation in enterprises (eight measures), encouraging the uptake of strategic technologies, notably ICT (seven measures in Italy) as well as to lesser extent introducing new legislation on innovation activity in enterprises (four).*

As in the previous year's report, the 2005 reports provide evidence of a sustained interest in measures on technology transfer and clusters *(19) as well as on support to creation and growth of innovative companies (18). As in the preceding year very few measures were introduced in field of improving innovation governance and strategic policy intelligence (three out of four in new Member States and candidate countries).*

26. This section in the last year's report included the newly created as well as significantly modified measures. The number of measures analysed was therefore significantly higher (126). In this report we cover only newly started measures in the period January-September 2005.

Exhibit 36: Thematic attribution of measures in 2005 by IPM category

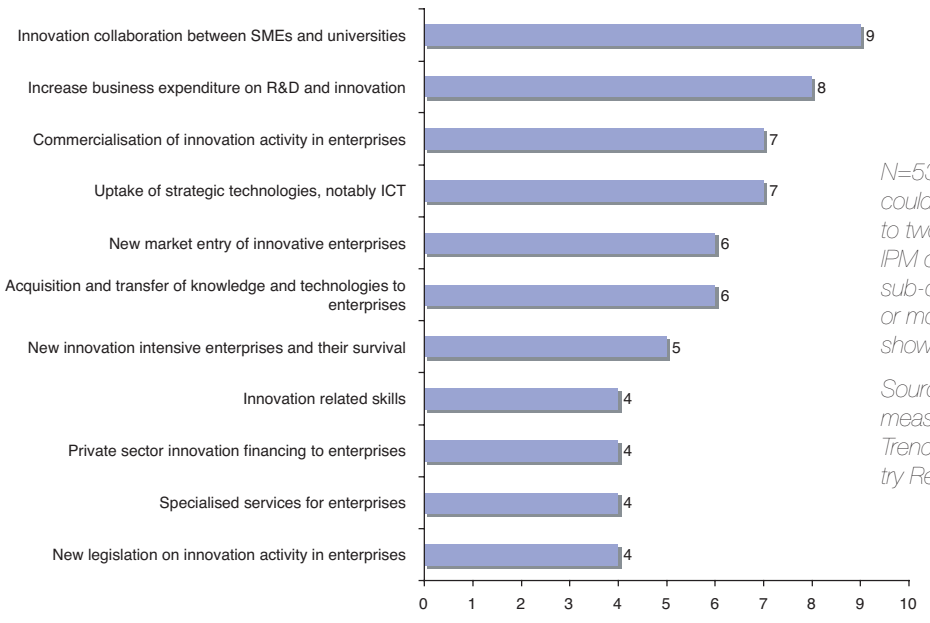


N=53 Numbers don't sum up to 53 as one measure could be attributed to up to two subcategories of IPM categorisation.*

Source: Summary of new measures identified in TrendChart Annual Country Reports 2005

Exhibit 37 below presents the thematic scope of the new measures in 2005 by IPM sub-categories. The results confirm importance the governments grant to policies and specific actions on building clusters and bridging business and science*, especially as regards support to joint projects by SMEs and universities (9 new measures). Measures in this area started in five countries, most notably in Hungary (4) and Italy (2).*

Exhibit 37: Thematic focus of 2005 policy measures by IPM sub-category



N=53. One measure could be attributed to up to two sub-categories of IPM categorisation. Only sub-categories with 4 or more measures are shown.

Source: Summary of new measures identified in TrendChart Annual Country Reports 2005

Other most themes in which new measures were introduced include increasing innovation expenditures in enterprises (8), increasing rates of innovation commercialisation (7), market entries of innovative start-ups (6) and facilitating knowledge acquisition and transfer in companies (6). The measures focusing on uptake of strategic technologies (7) were all introduced only in Italy.

The following paragraphs summarise **two significant trends** *identified from the new measures launched during 2005.*

Innovation poles as a means of boosting collaboration between enterprises and the research community

Probably the most well known nation-wide attempt to encourage collaboration between SMEs, Universities and other innovation actors through **clusters** *has been the* ***Competitiveness Poles programme (Pôles de Compétitivité)*** *(FR 62) launched in France. The poles are expected to gather companies, training centres and public and private research organisations around innovative joint projects. Due to an unexpectedly high number of applications the available funding was doubled from EUR 750 million to EUR 1.5 billion for 2006-2008. A list of 67 approved cluster projects (out of 105 applicants) was published in July 2005. The clusters cover areas such as aeronautics, ICT, life sciences, but also more traditional sectors such as wood, meat or construction. Similar schemes are now operational in the Flemish (BE 74, Poles of Excellence) and Walloon (new measure) regions of Belgium and in Greece (Regional Innovation Poles, EL 63).*

More traditional schemes favouring **university-industry technology transfer** *have also been established. A scheme setting up* ***Regional Knowledge Centres in Universities*** *was initiated in Hungary (HU 87). The centres are supposed to closely co-operate with businesses and contribute to technological and economic development of a region. Expected results are e.g. intense academia-industry co-operation in regions and high rate of commercialisation of R&D results. Italy launched a new funding scheme to promote pilot projects in technology transfer (TT) from the R&D system to SMEs: TT Pilot projects (IT 57) are focused on the less favoured Italian regions. The measure aims at e.g. promoting innovation and technology transfer through networks of innovation actors and industrial associations clustered around centres of excellence.*

New funding mechanisms supporting innovative start-ups and companies with a high growth potential

A number of new measures have been introduced to support the creation and growth of innovative companies, especially by improving their **access to funding and markets** *as well as providing support for innovation commercialisation. The initiatives often took form of setting up seed- and start-up funds for high-growth enterprises as in e.g. Germany, UK, Belgium, Italy or Bulgaria. The UK established the* ***Enterprise Capital Funds - ECFs*** *(UK 70). The scheme is designed to be commercial funds investing a combination of private and public money in companies with a high growth potential that seek up to £2 million of equity finance, but whose funding needs are currently not met. Overall budget of ECFs will amount to around 290 million euros.*

The German ***High-tech Start-up Fund*** *(DE 76) offers venture capital investment to founders of technology-based start-ups. The main target groups are spin-offs from public research institutions and universities as well as corporate spin-offs. In average, start-up projects will receive funding of about €0.5m. The overall budget (2005-2010) is 262 million euro. Similarly in Italy a 100 million euro High Tech Fund for SMEs (IT 55) was established to promote creation and development of innovative enterprises in high technology sectors. A new fund was set up also in Flanders, Belgium. VINNOF (BE 73) - the Flemish Innovation Fund – started with 75 million euro donated by the Flemish authorities.*

Worth a mention in this context – also to better understand differences between different countries is a similar initiative in Bulgaria. The ***National Innovation Fund*** *(BG 15) was introduced as envisaged in National Innovation Strategy adopted in August 2004. The Fund is a governmental instrument for subsidising innovative projects on a competitive basis. The Fund starts with the budget of 2.5 million euro, but will be enlarged to 4 million in 2006 and 7 million in 2007. The Strategy envisions the budget to reach around 50 million euro in 2013.*

Support in access to funding is also a focus of measures introduced in the Czech Republic, e.g. ***Zaruka*** *(CZ 32) and* ***Progres*** *(CZ 34). The first assists SMEs with implementation of business plans and help in obtaining subsidized guarantees to bank loans, leasing, venture capital or operational loans. The latter supports companies in getting subordinated loans for realizing their development business plans in selected sectors. Many new Member States seem not to be in the phase of innovation policy development to afford (literally and as a metaphor) setting up a fully operational venture capital fund.*

Apart from schemes providing and enhancing access to funding also **other 'soft' measures supporting innovative companies** *were introduced in 2005, especially in the new Member States. In Estonia, the* ***Innovation Audit Programme*** *(EE 28) was initiated. The programme targets SMEs offering them*

the possibility to have an innovation audit (IA) carried out by a professional consultant. Based on the IA results, the consultant in collaboration with the audited company puts together a concrete action plan. In the Czech Republic, PORADENSTVI *(Counselling – CZ 35) scheme is to facilitate access to training and advisory services for future SMEs supporting them in their start-up phase, their development and growth.*

Greece: "The ELEFTHO Programme"

What it does

The encouragement of the entrepreneurship in knowledge-intensive industries of high value added is an important issue for economic policymakers in Greece. Incubators and S&T parks can improve the opportunities for the creation and development of new ventures in new technological and business areas. In the 1990s, Greece launched a scheme for the development of public S&T parks with mediocre results. The ELEFTHO Programme complements this older scheme and addresses its deficiencies by subsidising private initiatives to establish and develop S&T incubators and parks.

The ELEFTHO Programme, launched after 2002, required proposals offering not only material infrastructures for new firms, but also consulting services, networking etc. International experts evaluate the proposals. All projects satisfying the criteria are selected, until the full commitment of the available budget, which took place in early 2005 with some 10 approved projects. The approved projects primarily focus on ICTs and niche markets of traditional industries (i.e. food).

Why it is successful

One of the success factors behind the ELEFTHO Programme is the willingness to depart from a policy line that did not appear to be delivering the desired results. It would have made little sense to multiply the number of publicly funded parks when the existing ones were proving stagnant.

Another success factor is the mobilisation of the private sector to develop institutional linkages, and to introduce competition with public incubators. When mobilising the private sector with the help of public funds, care was taken to ensure that these subsidies were approved at the European level. The competition created between public and private incubators may help both to raise their effectiveness.

2.4.3 Thematic focus on Innovation in Services[27]

Traditionally considered as a heterogeneous 'left-over' collection of activities that are not included in the agriculture ('primary') or industry ('secondary') sectors, the services sector has, until recently been a neglected area of economic policy making. However, the decline in 'traditional' manufacturing reported in many countries has often been accompanied by an upsurge in the service sector as a major contributor to the economy.

The role of R&D as a source of innovation in the service sector is not well understood. Moreover, existing definitions of R&D and innovation are not always appropriate outside of the industrial, manufacturing or technological frameworks. Thus the significance of innovation in services has not, until recently, received much recognition within government policy making*. The academic literature notes that few innovation support policies address innovation in services (e.g. Howells, 2000) and that ostensibly sector neutral measures manifest a bias towards manufacturing or technology development activities (e.g. Miles, 2005). Thus existing national portfolios of innovation support measures tend to be underutilised by service companies.*

However, policy imperatives have focused attention on the potential of innovation in services by both the European Commission and the OECD. To obtain more empirical evidence on the occurrence of innovation policy attention and support activity to services across Europe, a survey has been conducted among the TrendChart network of policy correspondents indicating the following results summarised below.

Several countries have produced figures and statistics *on the role of the service sector (for example Belgium, Spain, Iceland, Norway) although it should be noted that OECD, EUROSTAT and CIS figures on the sector are also available. Evidence on the signifi-*

27. A thematic report on "Innovation in Services" was prepared by Paul Cunningham, PREST, as input for a TrendChart Workshop on held in Helsinki on 19 and 20 June 2006. For more information, see: http://www.trendchart.org/ws_overview.cfm?id=10

cance of the service sector in the national economy seems to be accumulating.

Countries such as Finland, Germany and, to a lesser extent, Denmark, Belgium and the Netherlands, together with Iceland and Norway are leading in terms of **policy debate** *on the significance of the service sector and on the issue of innovation within it. Debate is also noted in Austria, Italy, Ireland, Sweden, Latvia, Malta, Slovenia and to some extent, Cyprus, Spain and the UK.*

As far as the mention of innovation in services in **policy documents** *is concerned, a "leading" group may be identified (comprising Denmark, Finland, Germany, the Netherlands and Sweden) where innovation in services has received significant policy attention. A "following" group in which some reference to innovation in services has been observed in policy documents includes Belgium, Cyprus, Ireland, Italy, Latvia, Malta, Norway, Portugal, Spain, Turkey and the United Kingdom, and to a lesser extent, the Czech Republic and Estonia. Finally, a third group where the topic appears to have attracted no or very little policy attention comprises Austria, France, Greece, Luxembourg, Poland, Slovenia, Slovakia and Switzerland.*

Finland

CUBE – The "Building Services technology programme 2002-2006" , is an example of a technology programme which ties together services and new technological opportunities for business development. It has aimed to develop internationally competitive building services and technology-based service products for commercial and residential spaces; strengthen the service capacity of building services technology in the real estate business; make available spaces that accommodate user needs, with an emphasis on modernising the existing real estate base; produce added value for real estate owners through life cycle economic and functional spaces; and utilise ICT and energy technology innovations.

FinnWell – The "Healthcare technology programme 2004-2009" , includes a clearly identified service aspect: the underlying idea of the programme is that technology only improves the quality and profitability of healthcare services if new procedures are simultaneously developed in as innovative a manner as the products themselves.

Recently Tekes has launched a new "Serve - Innovative Services technology programme (2006-2010)". As its name indicates services are a focus of the programme which aims to encourage the development of innovative service concepts and service business models in companies; strengthen and diversify service related innovation activities, especially in SMEs; improve productivity and quality of service activities in various industries; and boost academic research in the area of service innovation and service business.

In general, most innovation support measures appear to be of a **horizontal** *nature (i.e. open to both manufacturing and service companies), although there is frequently a* **manufacturing or technology bias** *(which may be a consequence of the national industry structure). However, the number of specific service-orientated measures appears to be growing.*

Norway

Until January 2006 there was a "specific research programme (Puls)" administered by the Research Council of Norway. This has been merged into a larger research programme - "BIA (User-directed Innovation Arena)". Puls aimed to promote increased innovation and knowledge content in the Norwegian service sector, included trade and logistics, through R&D based innovation, effective innovation processes in networks of cooperating actors, increased competence within service firms, increased international cooperation as well as improvement of the knowledge base related to the importance of services.

The new "BIA programme" of the Research Council of Norway is an explicitly horizontal and neutral measure focusing on research based innovation independent of branch and project focus and targeting knowledge intensive firms and their cooperating R&D environments more generally. There is also an explicit requirement that project participants must cover the whole value chain of the innovation process supported by the Council, not only technological innovation processes.

Only a handful of countries report specific examples of innovation support measures with an explicit or strong orientation towards the services sector*. These are Finland, Italy, Portugal, Cyprus, the Czech Republic, and Norway. Examples of measures with a clear service focus are reported in Norway and Finland (see below). Several other countries note that some horizontal measures explicitly include service companies, including Austria, Belgium, Germany, Luxemburg, Malta Spain, Iceland and Turkey.*

In a addition to a handful of measures which target services in general, specific services fields *are also targeted including: building & construction; healthcare; leisure and tourism; logistics & transport, frequently as a consequence of the role that such industries play in the national economy.*

Relatively few agencies appear to monitor or assess the uptake *or distribution of innovation support measures on a sectoral basis, including uptake by service sector firms. These include Germany, Italy, the Netherlands, Spain, Sweden (with quite detailed figures), Cyprus, Lithuania and Slovenia.*

2.5 DEVELOPMENTS IN POLICY GOVERNANCE

2.5.1 Governance structures

Governance in innovation policy is challenging because the innovation process itself is very complex. On the one hand, innovation is interconnected with other policy areas like research, education, internal market, etc., but on the other it remains important to distinct innovation policy from other policy areas to make sure that specific innovation issues are addressed in a good manner. Involvement and real commitment of stakeholders at regional and national level to cooperate and learn from each is important to improve innovation policies and competitiveness.

In all the countries studied there are one to three major ministries involved in policy design and sometime implementation as well as parliamentary committees, advisory councils and executive agencies. However, innovation governance structures are very diverse. They may be classified under a taxonomy based on the type and degree of hierarchies and co-ordination, however these are ideal types and most countries have elements of more than one system:

- *A broader number of actors with strong inter-organisation co-ordination throughout the policy cycle. In general this model is accompanied by an active stakeholder involvement, though of different type and intensity. The Nordic countries, the Netherlands and the Anglo-Saxon culture are good examples of this practice. However, it is necessary to identify the 'natural' ceiling in the creation of co-ordination mechanisms, to avoid their proliferation and additional bureaucracy.*
- *Strong co-ordination based on hierarchical relations with other policy making and implementation organisations/agencies. The German and French systems, Israel and Italy are examples of this type, but the same model is also encountered in less mature innovation governance systems, such as Romania or Latvia.*
- *Fragmented systems with more actors following individual agendas, some of them efficiently but with limited synergies and potential friction. The majority of the countries belong to this category; however in most cases there are visible efforts to improve co-ordination through the establishment of advisory boards and agencies adopting a coordinating role.*

An additional layer of co-ordination refers to the relations between the national and the regional level. Self-governance of the regions ranges from full autonomy of the three Belgian regions, to very centralised structures in Greece, Portugal and some of the new member states, with different degrees of state-federal interaction in others.

Regarding the sharing between design and implementation *in many Member States, the governance structure foresees a division of labour between one or more ministries on the one hand, and one (or more) agencies on the other. A traditional agency form is the mono-principal: an agency, which works for one 'boss' or Ministry (e.g. Enterprise Ireland, TEKES). Another agency model is the "multi-principal", which acts as an intermediary for several sponsoring ministries.*

In an ideal model, the division of labour between ministries and agencies *is a split between policy design - the responsibility of the ministry following political decisions taken by government - and policy implementation dealt with by the agencies on the instruction of the ministry. The argument often put forward in favour of outsourcing programme management to an external organisation is that this im-*

proves efficiency. However, in practice the border lines between policy design and policy implementation are not always clear-cut and, in addition, in many countries the agencies have an explicit or implicit role in policy design as well.

Work undertaken in the context of a TrendChart Policy Workshop[28] has shown that the border-lines and responsibilities between policy makers and agents differ from country to country. In 57% of countries (or 12 out of 21 surveyed) an implementation agency exists and has some role in the implementation of policy.

In the remaining nine countries another organisation has the responsibility for programme management and administration. In 6 out of 9 of these countries the Ministry itself has the responsibility for programme management and administration. Countries such as Germany and the UK have no permanent agencies, but outsource specific programme implementation to different public or private sector contractors.

The following exhibit 38 shows the responsibility sharing among ministries and implementing agencies:

Exhibit 38 : Approaches to sharing of responsibility for innovation policy in 11 EU countries

Country	Policy Design	Programme design	Programme management	Programme administration tasks
Latvia	*Full Responsibility Ministry*		*Shared responsibility*	*Full responsibility Agency*
France	*Full Responsibility Ministry*	*Full responsibility Agency*		
Portugal	*Full Responsibility Ministry*	*Shared responsibility*	*Full responsibility Agency*	
Ireland	*Full Responsibility Ministry*	*Shared responsibility*	*Full responsibility Agency*	
The Netherlands	*Full Responsibility Ministry*	*Shared responsibility*	*Full responsibility Agency*	
Luxembourg	*Full Responsibility Ministry*	*Shared responsibility*	*Full responsibility Agency*	
Finland	*Shared responsibility*	*Full responsibility Agency*		
Estonia	*Shared responsibility*		*Full responsibility Agency*	
Austria	*Shared responsibility*		*Full responsibility Agency*	
Slovenia	*Shared responsibility*		*Full responsibility Agency*	
Slovakia	*Shared responsibility*		*Full responsibility Agency*	

Source: TrendChart Policy Workshop: A European Innovation Agency? How to improve innovation policy governance in Europe? April 2006, Workshop Output Paper

In fact, the **effectiveness and efficiency of the governance system** *is not related to the type of model adopted. Neither are the bottom-up (a collection of initiatives from practitioners providing innovation services) or the top-down (providing strategic direction from high level policy makers) governance model to be encouraged. The former is important since the environment should determine the services that are necessary to introduce, if they do not already exist. But good top-down governance is needed as well as exemplified by the US, where top-down often is combined with considerable freedom of researchers and clear societal goals. Moreover, one can argue that there is no time for a real bottom-up approach. Strong governance is not necessarily top-down governance: both bottom-up and top-down models are necessary, as well as the 'middle field'.*

The more **modern and dynamic approach** *deals with innovation as a transversal component of public policy, for which co-ordination is required to streamline initiatives of the individual civil services and avoid overlapping. But various forms of co-ordination are observed in this context and can be efficient: formal or informal, top-down or bottom up, strict or flexible. Hence the description hereafter refers to groups of countries and their characteristic features, conclud-*

28. TrendChart Policy Workshop "A European Innovation Agency? How to improve innovation policy governance in Europe?", April 2006.

ing with some general remarks on key issues and interesting practices.

The more dynamic approach appears to fit best in some of the most vibrant economies of the EU, namely the Anglo-Saxon and Nordic countries, which are transforming rapidly into the knowledge economy, demonstrate high growth rates and present above average Lisbon and EIS indicators:

The UK *is often used as a model. There, the Department of Trade and Industry plays a dominant role in industrial research as well as in investment promotion, while maintaining the strong and diversified university system, funded by the sectoral research councils. The UK Government aims to operate a policy of "joined-up government" – which attempts to ensure that policy decisions and implementation are co-ordinated across all government departments and agencies. The Chief Scientific Adviser, the Council for S&T, the parliamentary Select Committee and the Director General of Research Councils are all contributing to the co-ordination of the mechanisms. A particularly interesting feature introduced in the UK is the decision to operate a policy of "joined-up government" - which attempts to ensure that policy decisions and implementation are co-ordinated across all government departments and agencies.*

In Ireland*, all governmental departments are considered responsible for supporting innovation in their respective areas of competence, but central bodies such as an Interdepartmental Science and Technology Committee, chaired by the Minister for Enterprise, Trade and Employment, the Cabinet Technology Committee and the Chief Science Advisor bear responsibility for co-ordination. Each department has its own S&T (Science and Technology) implementing organisations, but the stronger components are in the Department of Enterprise, Trade and Employment: FORFAS, the Office of S&T, Enterprise Ireland, Enterprise Strategy Group, Science Foundation and the IDA. The Department of Education and Science is responsible for the universities and the research councils and plays a crucial role in basic research funding but cooperates efficiently with the Department of Enterprise.*

In the Nordic countries *there is a long tradition of consensus seeking models. While structures may be different from the Anglo-Saxon ones there is a systematic effort to involve stakeholders in the decision making process and proceed with a smooth implementation of policy design, since there are no objections once it is adopted. The Finnish RTDI policy-making system is the most studied one. It has remained almost unchanged over twenty years, since the founding of the National Technology Agency of Finland (Tekes) and the renaming of the Science Policy Council as the Science and Technology Policy Council in 1986. The "two ministries with strong co-ordination" model applies also in Finland: Strong co-ordination structures exist starting at the highest level with a S&T Policy Council chaired by the Prime Minister and composed of representatives from four other ministers, as well as ten representatives from the academic sector and the economy.*

The other Scandinavian countries *also address multi-level co-ordination. The Swedish and Norwegian cases are very similar among themselves, as the main responsibility for developing national industry-orientated innovation policies is divided between three ministries: the Ministry of Education and Research, the Ministry of Trade and Industry and the Ministry of Local Government and Regional Development. Changes envisaging improvement in the current period include a new bill on research, to improve the strategy and organisation of public R&D investment in Sweden and the creation of the "Innovation Bridge" to support knowledge based innovation. In Norway, the Research Council was reorganised, establishing a large innovation division and regional offices. The Danish government has also made an effort to link policies and close the gap between the research and industrial policies through innovation. It has established the Ministry of Science, Technology and Innovation, which has most responsibilities for innovation and high technology business development, originally held by the Ministry of Industry and the Ministry of Education (universities). In addition, a Globalisation Council was established recently to deal with innovation in the global competitive context. A particularly interesting co-ordination feature is the Danish Council for Research Policy, created 2004, which advises the Minister for Science, Technology and Innovation on matters concerning research policy but the Parliament and other ministers may also ask for the Council's advice.*

Two of the big countries with a very strong research system, notably Germany and France *still follow a more traditional approach. There is more regulation than in the countries mentioned above but they are both in a transition to stronger co-ordination. In Germany the Federal Government plays a crucial role, as it attempts to provide innovation-friendly framework conditions and follows a strategic vision on R&D. There are two dominant ministries, the BMBF (Federal Ministry for Education and Research) and the BMWA (Federal Ministry of the Economy), the latter being in direct contact with the industry, sup-*

porting industrial research, start-ups and the legal framework for competition and IPRs, in co-operation with the Federal Ministry for Justice. University development is entrusted to the Länder. Co-ordination between the policies set by both the Federal and the Länder *governments takes place in joint commissions as well as via informal co-operation at parliamentary level Innovation policy in Germany is centrally designed but it is strongly influenced by various stakeholder groups. Presumably the most important ones are industry associations and professional associations.*

The French system *is dominated by the large public research organisations on the one hand, and by a strong ANVAR (integrated into OSEO last year) for the promotion of innovation on the other. The traditional split between academic research and innovation remains visible, but there are recent efforts to bridge it. In the last decades, several reforms were introduced, learning from good practices in Germany, Japan and elsewhere, moving the research-policy competence from education to industry and then from industry to education and back again. Nevertheless, the implementing organisations remain stable, adding new structures in an effort to shift innovation promotion responsibility to the regions. There are now successful innovation policies at regional, and even, local level. In the current period there were significant changes: The new institutions created addressed the funding of research on one side, through the National Agency for Research, and of innovation on the other side, through the OSEO, a grouping of ANVAR, BDPME and SOFARIS. Moreover, a General Directorate for Enterprises (DGE) in the Ministry in charge of Industry was created to bring about more efficient support measures in favour of firms and deal more effectively with innovation and competitiveness issues. The DGE resulted from a merger of the two divisions in charge of innovation-related matters (Division for Industry, Information Technologies and Post and the Division for regional action and SMEs). The Ministry launched the "poles de competitivité" initiative, to reinforce economies of scale and scope as well as regional clustering. Of particular relevance is the creation of the French Industrial Innovation Agency in 2005, with a mission to develop French industrial capacities and the country's technological potential by selecting and supporting large industrial research and development programmes, especially in their early phase of research.*

The Netherlands *constitutes a different and very interesting example of increasing efficiency in the innovation governance. The two main ministries in the institutional set up for designing and delivering innovation policy in the Netherlands are the Ministry of Economic Affairs for technology and innovation policy and the Ministry of Education, Culture and Science. The main characteristic of the Dutch policy is its strong link with the overall economic development and investment policy, as well as a strong focus on co-ordination through the Council on Science, Technology and Information Policy, which operates at cabinet level and prepares the collective decisions to be taken by the Cabinet. At the level of the ministries, the co-ordinating role is played by the interdepartmental Committee on Science, Technology and Information Policy (CWTI). The CWTI tries to secure inter-departmental co-ordination to develop an integrated vision, while the Committee and the Council for Science, Technology and Innovation, are seconded by advisory bodies (AWT and Royal Academy of Sciences), the Association of Universities, the Central Planning Office and the Central Statistical Office, which provide analysis and assessments to the policy-making bodies and contribute to the adoption of shared visions. An additional important mechanism is the Innovation Platform (IP) was launched by the Cabinet with the objective to propose strategic plans to reinforce the Dutch knowledge economy and to boost innovation. It is headed by the Prime Minister. Advisory Councils, implementation agencies and professional organisations help gather intelligence and adopt modern governance techniques.*

More specific cases are those of Belgium and Switzerland, due to the federal character *of their states. In Belgium the regional governments have complete authority over innovation policies in all areas except fiscal measures. Flanders is showing several good practices. Switzerland, at federal level, provides for general technological infrastructures, including the education of engineers as well as funding for the "cantonal" universities and for research projects. In Switzerland, two institutions (the former BBW -Federal Office for Education and Sciences- and the GWF -Swiss Science Agency) merged in the State Secretariat for Education and Research. Similarly in Austria there are mixed federal and state responsibilities. Two new bodies were created during the last two years in order to simplify the structures of the innovation policy: The Austria Wirtschaftsservice GmbH (AWS) (merger of Bürges Development Bank, Finanzierungsgaraniegesellschaft (FGG), Innovation Agency, and the labour market promotion schemes for enterprises) and the "Forschungsförderungsgesellschaft" (Society for the Support of Research) acting as an umbrella organisation for the formerly independent Austrian Space Agency, the Bureau for Innovation and Technology, the Industrial Research Promotion Fund, and the Technologie Impulse Ge-*

sellschaft (Technology Impulse Society).

The more traditional model is also very visible in the Southern countries*, notably Italy, Spain, Portugal and Greece. However, inside the group there are still strong discrepancies: In Italy two Ministries play a major role in innovation policy making (besides the Ministry of Economy and Finance), the Ministry of Education, University and Research (MIUR) and the Ministry of Productive Activities (MAP). The former plays a dominant role in public knowledge production, while innovation competences are gradually transferred to the regions. The role of the Minister for Innovation and Technology (MIT) is the co-ordination, steering and encouragement of actions by other public administrations to foster the implementation of the Information Society in the country. Co-ordination takes place in an important recent policy formulation committee called CIPE. The latest developments suggest an improvement of governance including strategic choices set out in the 2003-2006 Science and Technology (hereafter S&T).*

Spain *seems to be adopting a similar approach after the last elections and the split of the MCYT (Ministry of Science and Technology) into a Ministry of Industry and a Ministry of Education and Science and an Inter-ministerial Commission on S&T divides structures but is expected to ensure co-ordination. Major changes took place in the Spanish system in 2004, when the Ministry of Science and Technology (MCYT) created in 2000 closed and two new Ministries were created and took over the MCYT's responsibilities: the Ministry of Education and Science (MEC) (formerly known as Ministry of Education and Culture) and the Ministry of Industry, Tourism and Trade (MITYC).*

The structures seem less clearly cut in Portugal*, where the co-ordination of policies is assigned to the Minister Assistant to the Prime Minister, while an Inter-ministerial Commission on Innovation and Knowledge and an Innovation and Knowledge Mission-Unit will be operating. In Portugal there have been repeated changes in the innovation governance model including a significant reshuffling after the last general elections. Although the size is not comparable, the structure of innovation policymaking in Greece looks much more to that of France, than to any other country, probably due to the degree of centralisation of the government decision-making and the importance of the public sector in the economy.*

Governance features are similar in most economies of the Central and Eastern Member States*, where the science or technology push model dominates. In these same countries market and government failures still hamper the establishment of networks and clusters of knowledge generation and exploitation. The challenge is not any more to the transition from a technology/science push to a market pull policy, but to establish a complex interactive multi-actor governing system enhancing/ encouraging/ generating innovation and furthering knowledge production. These remarks should not overshadow the substantial progress made towards a more informed, evidence-based and well structured policy. Mostly linked to the expectation of the membership and the need to design development plans supported by the Structural Funds most countries have created new ministries, implementation agencies and co-ordination councils in the last 2-3 years. Despite the set up of new structures co-ordination is limited and there are no visible efforts to promote it. Similarly the process of stakeholder involvement does not appear in the priorities of any of the eight countries.*

Although this design is too recent to be appraised it is clear that some countries have made more progress than others:

- *In the* Czech Republic *the current system is in a process of redesign in view of a multi-annual policy until 2010. The systems considered as most successful are studied to be used as models for the current reform;*
- *In* Hungary *with a major institutional reform effected in 2003 the Ministry of Education plays a key role in the formation and implementation of science and education policies. The Research and Technological Innovation Council offers support while the National Office for Research and Technology is responsible for the implementation of the government's technology policy. The Education and Science Committee and Economic Committee of the Parliament are the highest-level political consultative bodies in the field of RTDI policy in Hungary;*
- *In* Poland *responsibility for RTDI is shared between three ministries. In March 2003, the Department of Innovation was created and has since has been in charge of developing and implementing an innovation policy. The Council of Science which has replaced the State Committee for Scientific Research support S&T policy making, while the Polish Agency for Enterprise Development is responsible for implementation of economic development programmes, especially aimed at small and medium-size enterprises (SMEs);*
- *Institutional improvements were introduced also in* Slovakia and Slovenia*. Slovakia transferred the competences for innovation policy from the Government Council to the Ministry of Economy for better implementation. Slovenia re-established the*

Ministry of Science and Technology and the innovation competent staff of the Ministry of Economy was transferred to the Ministry of Higher Education, Science and Technology;

- *The* **Baltic countries** *share a division of power between two major ministries but are involved in serious restructuring to create the necessary councils for co-ordination, while their parliaments are also involved in the debate. Estonia, apparently using Finland as a model, adopted very early a modern structure with two Ministries sharing responsibilities; a clear separation between design and implementation organisations as well as various co-ordination mechanisms reaching as high as the Prime Minister's level contribute to an efficient governance system. Latvia seems to be one of the few countries, where the power of the Ministry of Education is higher than that of the Economy;*

- *The* **smaller countries**, *such as Luxembourg, Cyprus, Malta and Iceland may be considered as a special case, since the number of organisations is more limited and co-ordination is easier because of the small size of the administration and can be effective even if only based on informal links. All of them tend to develop one central ministry and one university and put emphasis on the innovativeness of few productive sectors with a local competitive advantage, where they concentrate their resources (i.e. materials production, shipbuilding, fisheries, financial services, tourism). Malta is expecting new innovation and research governance structures. The Baltic countries will probably tend to develop in this direction in the future.*

- *In the* **candidate countries** *the degree of adaptation to higher efficiency and the models vary: Romania has integrated innovation in the Ministry of Education and Research, with an interministerial council playing a co-ordination role. Bulgaria has adopted a more "dynamic" orientation with a well structured system of competent ministries, co-ordination Councils, a clear separation of policy design and implementation and an ambitious reporting system. As the reform only took place in 2004 it is too early to appraise its implementation. Turkey, with support from the World Bank, adopted more US-like structures with TUBITAK playing a key role in research and innovation promotion. In particular, Turkey's Supreme Council for Science and Technology decided to create a "Turkish Research Area" as a platform to define strategies and integrate the ERA.*

- **Israel** *is also a country, which may attract attention by the fact that policy design is hierarchical and based on technology push, however very effective, partly due to the strong involvement of private actors through venture capital. The structure of Israel's R&D system focuses on the Office of the Chief Scientist (OCS) of the Ministry of Industry, Trade and Labour, which is responsible for implementing technological R&D support programs at both the domestic and international levels. The OCS is a single-level organisation with no intermediate levels that directly manages its principal activity of supporting industrial R&D, while program managers manage each of the other programs. There is no high-level co-ordination structure in Israel. The National Council for Civilian Research and Development was established in 2004; however its budget is very provisional and very small and does not allow for any significant activity. This institution never took a leading role in setting national priorities in Science, Technology and Innovation; in coordinating among ministries; etc. Rather, this function is fulfilled by the OCS.*

Exhibit 39 : Appraisal of policy making processes in the TrendChart countries

Tool for policy making/ co-ordination	Criteria	Ranking[1] (*, ** or ***)
Strategic policy making (national strategies, white papers, etc.): prevalence of evidence based and open consultation procedures	* *Almost no background discussion, studies and stakeholder participation* ** *At least some attempt to these activities are systematically pursued* *** *All of the above items are systematically taken into consideration*	* - ** *Austria, Belgium, Bulgaria, Cyprus, France, Greece, Italy, Latvia, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia, Slovenia, Sweden* *** *Czech Republic, Germany, Denmark, Estonia, Finland, Iceland, Ireland, Netherlands, Norway, Poland, Spain, Switzerland, Turkey, UK*
Existence of co-ordination mechanisms (high-level councils, inter-ministerial committees, etc.)	* *No mechanisms for co-ordination* ** *Few, rather fragmented and bilateral co-ordination processes* *** *Well organised coherent system of policy co-ordination*	* *Czech Rep., Poland* ** *Austria, Belgium, Bulgaria, Cyprus, Germany, Estonia, France, Greece, Italy, Latvia, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey* *** *Denmark, Finland, Iceland, Ireland, Netherlands, Norway, Switzerland, UK*
Systematic review process for innovation policy	* *Almost no policy documents and hence little assessment* ** *A few, ad hoc reviews* *** *Systematic policy review*	* *Luxembourg* ** *Belgium, Denmark, Estonia, Italy, Greece, Iceland, Latvia, Lithuania, Malta, Portugal, Romania, Slovenia, Sweden, Turkey* *** *Austria, Bulgaria, Cyprus Czech Rep., Germany, Finland, France, Ireland, Netherlands, Norway, Poland, Slovakia, Estonia, Switzerland, UK*
Design and implementation of innovation policy measures	* *Very centralised/closed system for designing and implementing policy* ** *Consultation and partnerships exist mainly on an ad hoc basis* *** *Systematic interaction with all stakeholders*	*/** *Slovenia* ** *Austria, Belgium, Bulgaria, Estonia, France, Greece, Italy, Latvia, Luxembourg, Poland, Portugal, Romania, Slovakia, Turkey* *** *Cyprus, Czech Rep., Germany, Denmark, Finland, Iceland, Ireland, Lithuania, Malta, Netherlands, Norway, Spain, Sweden, Switzerland, UK*

1Indicative ranking based on the assessment of the TrendChart network of correspondents
Source: National TrendChart Country Reports, no data for Hungary, Israel

By using a more qualitative approach, the conclusion seems to be that in the majority of the countries studied there is an increasing emphasis on innovation and on its effectiveness leading to the modernisation of innovation governance mechanisms*. The changes envisage mostly co-ordination to increase effectiveness, economies of scale and reduction of overlapping. In some cases the improvement of governance is demonstrated by a broader stakeholder involvement (UK), while in others more emphasis is given to enhancing strategic thinking at national level (Ireland). Increasing stakeholder involvement is also apparent in some cases (Italy). All large countries, as well as the Nordic countries, continue to reinforce*

the institutions promoting innovation at regional level. Small countries such as Luxembourg, Cyprus, Malta and Iceland are debating on their international strategic collaborations and the prioritisation of their funding.

A large of part co-ordination is latent and takes place through the **informal networks of the main relevant institutions**, *which are the business firms. More and more educational and public research institutions are contributing to these networks, in the frame of the knowledge economy, increasing the share of the "bottom up" co-ordination process in policy making and implementation. At the same time, pressure for transparency increases, leading to the establishment of high level councils, inter-ministerial committees and the like. Stronger may be the pressure for focusing the priorities of the public support both to R&D and to supporting actions to innovation, particularly in the smaller countries and in the regions.*

Intensity of effort at regional level *accompanies strong innovation policies at national level. The more sophisticated the national innovation policy, the higher the involvement of regions in innovation policy elaboration and implementation. The penetration of an innovation culture in all segments of economic activity impacts quite simultaneously the various levels of public administration. Therefore, the need for co-ordination rises as the actors proliferate. The intervention of the EU through the structural programmes, the action plan for innovation and the framework programme for RTD have contributed to the awareness creation of broad segments of the European economy. Remote regions, which struggle for what is considered as elementary needs by traditional development economics, such as transportation means, education and health infrastructures, are reconsidering their priorities in view of the importance of human capital, entrepreneurship, new technologies etc in the knowledge based globalised world economy.*

Finally it is important to draw attention to some interesting features observed more and more in some of the successful models:

- *There is a* **different degree of stability** *in the innovation governance. The most stable system with only minor changes is observed in Finland, while the other Nordic countries, Israel and part of the Belgian system also introduce changes gradually. On the other extreme Portugal and Spain seem to move back and forth. Most countries lie in between with limited major changes over the years;*
- *There are many* **efforts to improve efficiency recently**. *The Lisbon process may lie behind these changes in the EU15 member states, while the accession and the design of the Community Support Frameworks was a major driver for most of the new member states;*
- *There seems to be a* **new generation of high level modern co-ordination mechanisms** *like the Innovation Bridge in Sweden, the Innovation Platform in the Netherlands and "joined-up government" in the UK. The Danish Council for Research Policy also constitutes an interesting feature of co-ordination via an informal mechanism. More and more countries see the Prime Minister as the most appropriate level for co-ordination, thus giving innovation a more prominent role (Finland, the Netherlands, Estonia).*

2.5.2 Policy-making and evaluation

As the innovation agenda shifts more to the focus of economic policy in Europe there is an increasing effort to use **appropriate tools for policy making design**, *in particular organise the collection of the necessary information to monitor systematically indicators on national performance and use these indicators together with various other forms of intelligence as inputs for policy design.*

Some countries are pioneers in that respect (the UK, the Netherlands), while many others have adopted this intelligence gathering procedures more recently but quite effectively (Germany, Austria, Ireland). Still others have only in very recent years started this process (Italy, Spain); hence it is difficult to assess its effectiveness. One should note that despite the tendency to adopt intelligence tools it seems that this is more advanced in terms of rhetoric and design than in actual resources earmarked for making this procedure effective (as in particular reported in the case of Italy). In the policy making phase most countries adopt relevant documents, after an informed debate. These documents constitute the guidelines of their policy design for the medium term. While in some countries these take the form of White papers in others they are the result of the programming of European Structural Funds programming documents.

The **strategic policy making** *in the participating countries has achieved some level of sophistication, since half of the countries use systematically evidence and open consultation procedures, while another half are taking initiatives to this same direction.*

Evaluation is a tool gaining importance *in innovation. Certain features are important to keep in mind, when analysing it. They can be summarised in terms of a number of key points*[29] *:*

- *The culture of evaluation is developed to a very uneven extent around Europe, and while this suggests that there are countries and regions that are underutilising the approach, at least it means that there is good practice we can draw upon.*
- *In the more advanced cultures, evaluation has moved on beyond being a simple auditing of performance, and is becoming an integral part of a learning-based approach to policymaking and programme formation.*
- *Evaluations can cumulatively provide increasing insight into the operation of the innovation systems within which innovation programmes are seeking to operate.*
- *Innovation programme evaluation can learn a great deal from experience in research programme evaluation, but this area of evaluation poses challenges of its own that need to be addressed.*
- *There is no "magic bullet" in evaluation: no single method that can answer all of the main questions of an evaluation study, and be applied in all types of study. Typically, evaluations will need to use a mixture of methods chosen to fit the needs of the particular study.*
- *Effective use of evaluation requires informed users, who appreciate the necessary limitations of any individual evaluation study.*

The countries are split between systematic and ad hoc policy reviewing*, to raise the quality and standards and between systematic and ad hoc interaction with all stakeholders in designing and implementing innovation policy measures. In the majority of the countries, the evaluations and appraisals are published and debated only occasionally, however there are a few countries where all evaluations are published or discussed publicly, such as the Netherlands, Norway, Switzerland and the UK. The majority of the countries studied treat evaluation on an ad hoc basis, on the request of specific departments or funding bodies, they constitute the average performance. Some countries do better than that with systematic evaluations (such as the Netherlands, Ireland, Germany and Estonia), whereas others (like Italy, Luxembourg and some of the new members states) do less than the average. A similar picture emerges as far as the externalisation of the evaluation activities. In the larger number of countries, a share of evaluations is contracted out to independent contractors, while in a smaller number, external experts are involved systematically and the quality of evaluation reports is appraised. In very few countries (Italy and Luxembourg), the rule is still the internal implementation of evaluations.*

Good policy making and evaluation is connected to co-ordination-led governance*, because there evaluation and assessment activities have developed very strongly. One more common denominator of good model is the high share of the business sector in the Gross Expenditure for RTD. In Sweden and Finland, large companies play a dominant role and may be possibly driving the national governance system towards a more coherent approach. This also happens in Ireland through inward investment by large multinationals. In Germany and the Netherlands an evaluation culture has emerged in the last years and there is a high density of controls of public funding and parliamentary accountability.*

29. European Commission, DG Enterprise and Industry (2006), Supporting the monitoring and evaluation of innovation programmes: A Practical Guide to Evaluating Innovation Programmes (available at: http://cordis.europa.eu.int/innovation-policy/studies/gen_study14.htm)

In a standardised appraisal the picture offered is as follows:

Exhibit 40: Appraisal of evaluation culture in TrendChart countries

Tool for policy making/ evaluation	Criteria	Ranking[1] (*, ** or ***)
Existence of an "evaluation culture" in field of innovation policy	★ *Rare evaluations of innovation measures only monitoring or auditing.* ★★ *Evaluations of measures are carried out on an ad hoc basis on the request of specific departments or funding bodies.* ★★★ *Measures are systematically evaluated at key milestones in their implementation.*	★ *Italy, Latvia, Lithuania, Luxembourg, Malta, Poland* ★★ *Austria, Belgium, Bulgaria, Cyprus, Czech Rep., Iceland, Norway, Portugal, Romania, Slovakia, Slovenia, Sweden, Switzerland, Turkey, UK* ★★★ *Czech Rep., Germany, Estonia, Finland, Greece, Ireland, Netherlands, Spain* ★★/ ★★★ *France*
External versus internal evaluations of innovation policy measures	★ *Evaluations are carried out internally as a general rule* ★★ *A share of evaluations is contracted out to independent contractors but this is not a generalised practice.* ★★★ *Evaluations respect good practice criteria (involve systematically external experts, evidence based, quality appraisal of evaluation reports, etc.)*	★ *Czech Rep., Italy, Luxembourg, Slovakia* ★★ *Austria, Belgium, Bulgaria, Cyprus, Denmark, France, Iceland, Latvia, Lithuania, Malta, Portugal, Turkey, UK* ★ / ★★ *Romania, Slovenia* ★★★ *Germany, Estonia, Finland, Greece, Ireland, Netherlands, Norway, Poland, Spain, Sweden, Switzerland*
Transparency and publication of results of evaluations	★ *Little or no transparency concerning results of measures* ★★ *Evaluations and appraisals are published or debated occasionally* ★★★ *All evaluations are published or discussed in a public forum.*	★ *Luxembourg* ★★ *Austria, Belgium, Bulgaria, Cyprus, Czech Rep., Denmark, Estonia, France, Italy, Ireland, Iceland, Latvia, Lithuania, Malta, Portugal, Slovenia, Spain, Turkey* ★★★ *Finland, Greece, Netherlands, Norway, Poland, Romania, Slovakia, Sweden, Switzerland, UK* ★★/ ★★★ *Germany*

1Indicative ranking based on the assessment of the TrendChart network of correspondents
Source: National TrendChart Country Reports, no data for Hungary, Israel

This systematic characterisation suggests that **most countries are now in an intermediate position**. *The lowest scoring is in the existence of a real evaluation culture, where six countries lack it and more than half of the rest see it as a fragmented rather than a systematic procedure. The countries with efficient governance are those with the deeper culture for evaluation, suing external evaluations and making the results publicly available (UK, Norway, Ireland, the Netherlands, Germany, Switzerland). Most countries lie somehow in the middle, denoting that there are some efforts to establish evaluation as a constituent element of the innovation policy cycle, but they remain fragmented and are not yet embedded in the national culture. In some other countries a much better appraisal in evaluation than in their governance system (Greece, Spain, Poland) is suggested. The explanation of this ambitious rating may be an overestimation of the role of the evaluation procedures of the Community Support Frameworks.*

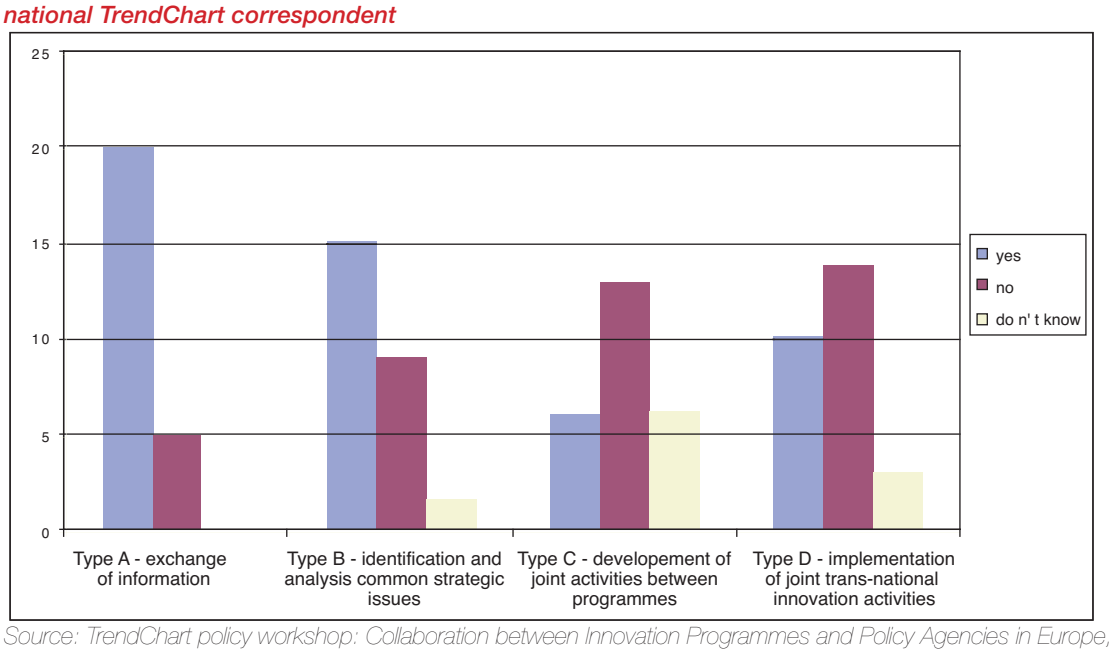
When identifying the areas, where evaluation takes place it is clear that evaluation of research activities (projects and programmes) as well as research organisations is more mature than the evaluation of innovation programmes.

2.5.3 Policy benchmarking and transnational learning

Benchmarking and transnational learning use is increasing gradually, although only in exceptional cases there is a regular or consistent process of "intelligence gathering" from foreign sources. *The heaviest users are those who are already well equipped with effective mechanisms for innovation policy making. The bigger and richer countries, in particular the UK, Germany and France launch either systematic or frequent exercises to learn from countries beyond Europe, in particular the US and Japan and to a lesser extent Canada and South Korea. Exchanges and studies to learn about the local system also increase for China and India but more as a tool for improving knowledge about these countries and benchmarking in certain areas of high tech research (biotechnology and nanotechnology in particular) than for policy learning.*

Agencies seem more open and willing to learn from foreign partners *than ministries and other government departments.* Four types of networking *are distinguished, each of them taking the collaboration a step further: (a) Systematic exchange of information and good practices, (b) Identification and analysis of common strategic issues, (c) Development of joint activities between national or regional programmes and (d) Implementation of joint trans-national innovation activities. Exhibit 41 overleaf shows the relative frequency of these type of networking for agencies in 26 European countries:*

Exhibit 41: Current collaboration activities between innovation agencies in Europe as reported by national TrendChart correspondent



Source: TrendChart policy workshop: Collaboration between Innovation Programmes and Policy Agencies in Europe, April 2005 TrendChart survey

But it is now important to take collaboration a step further *and go beyond the exchange of good practice. The key of good European governance is not institutional building as such, but facilitation of performance of excellences and processes. A future governance model should be a competitive performance model based on excellent knowledge and high quality process facilitation.*

Some of the smaller but more advanced countries *are also increasingly using benchmarking and try to exploit transnational learning on a more systematic basis. Cultural links help very much in this direction; hence Ireland has always used benchmarking implicitly and learned considerably from the UK and the US. As the economy flourished and resources were not a problem anymore three agencies (IDA, Enterprise Ireland and Forfás) undertake routine scanning of strategic information on technology/innovation developments and policies in other countries The Annual World Competitiveness Report is also a systematic benchmarking exercise of the Davos Forum. Finland is again a case of particular interest with a very systematic approach in benchmarking and international intelligence gathering participating in many global networks. The co-operation with other countries is gradually developing at the level of innovation policy implementation.*

For most countries this type of information is collected on an ad hoc basis either in the context of the OECD or the EU or as a response to specific needs. When it comes to bilateral or multilateral policy learning certain patterns seem to emerge:

- *The element of* **cultural affinity and geographical proximity** *seems to be a driving force behind initial steps towards transnational policy learning. As suggested for Ireland other countries, which have a more limited scope, have also looked for good practices in geographically and culturally neighbouring countries. Luxembourg has traditionally learned from France, Germany and Belgium. Cyprus is learning mainly from the UK and Greece, the Nordic countries among themselves and the Baltic countries from Finland, Israel from the US, the Central European Countries from Austria and the Eastern ones from the Nordic countries.*
- **Size seems to be a driving force** *for learning as well. Smaller countries appear to feel more vulnerable and look early enough for good practices elsewhere. This was clearly expressed by Luxembourg. Similarly Malta, although of an ad hoc character, is involved in a big number of projects, spectacular if one considers how recent its innovation policy is. But also larger countries like Portugal and Greece are increasingly looking for information beyond their territory.*
- **Late entry also plays a role**. *Countries, where policy design is more recent are using more benchmarking than countries where innovation policy was created in earlier decades on an ad hoc basis. Turkey is a good example of systematic intelligence gathering from international organisations (including the World Bank) and bilateral contacts with many European countries, mainly the UK, Germany and partly Greece. The CEECs are using learning on an ad hoc basis for their recent, CSF-triggered innovation policy design. Poland is using transnational policy learning from Sweden and the Netherlands. In that sense cross border initiatives like Interreg, Era-net etc. have been very helpful for the smaller and less mature innovation policies.*
- **Exchange or hiring of innovation policy staff/experts** *to/from other countries. Germany is taking this initiative on a very systematic basis. The involvement of senior policy makers/executives in transnational networks appears to be a very effective method. Other countries use their embassies for getting that type of information on a more (France) or less (Sweden) systematic basis.*
- **Implementing policy co-operation** *with other countries: bilateral or multilateral programmes on innovation (such as TAFTIE and the Nordic Innovation Council – see box below), and ad hoc benchmarking among countries, which goes deeper than the broader international benchmarking exercises (such as the Innovation and Technology Analyses in Germany and Foresight exercises in France and the UK).*
- **Some countries have a tendency to co-operate bilaterally more than others** *(e.g. Franco-German co-operation, or the Ibero-American pilots).*
- *Trying to make out benchmarking exercises to assess comparative innovation performance (scoreboards, etc.) or policy vis-à-vis other countries* **more systematic***: Spain for instance is running a new project to develop a benchmarking policy tool, which is launched and agreed by the Confederation of Employers and Industries of the Madrid Region, suggesting that Southern countries and the business sector are getting more involved in the process. Luxembourg has created an Innovation Observatory.*

Cases of Multilateral Co-operation of Innovation Agencies aiming at policy learning

In addition to the evidence from the individual ministries or agencies, which often takes a bilateral form, several forms of trans-national collaboration and co-operation in the field of innovation have been established of which TAFTIE and the Nordic Innovation Centre are well known examples.

TAFTIE was created in the early nineties and has stimulated mutual learning between the 17 national and regional technology and innovation programme management organisations from 16 European countries. Its main purpose is to encourage knowledge exchange and international co-and it acts as a knowledge centre for governments in setting up and implementing programmes.

The Nordic Innovation Centre was founded by the Nordic Council of Ministers in 2004 aiming i.a. to facilitate and strengthen inter-Nordic innovation policy initiatives in order to promote and enhance more effective policy-making. This includes: creating platforms for knowledge-sharing, initiating joint Nordic projects improving the policy framework, exchanging good practice and advising on next practice, establishing and strengthening networks within the Nordic innovation system. T

The Research, Technology and Innovation Agencies in Europe are also strongly networked through STARMAP to exchange 'good practice' to deliver efficient and effective innovation programmes. The professionalisation of these organisations has progressed considerably in the last decade and tools and approaches to monitor and evaluate activities have become more sophisticated.

The codification of a standardised approach for the overall appraisal of policy benchmarking and learning initiatives reflects the situation analysed above. Most countries dispose of ad hoc formal mechanisms *for policy learning; only Italy, Latvia, Slovakia and Estonia seems to have none, whereas only Germany, Iceland, Switzerland, Finland and to some extent France present systematic efforts. Similarly eighteen of the countries studied apply foreign experience in designing their policy measures or use foreign experts only occasionally or on an ad hoc basis. Italy seems to be more isolated in that respect, whereas the same countries as above plus Cyprus, Estonia, the Netherlands, Poland, Romania and Turkey do it systematically. For this last group the influence of the EU tools is visible. In terms of exchange of personnel as a means for transnational learning the countries are split but there is no country using this tool systematically. Labour policies may be the barrier behind that; hence this could be an area for the design of future policy measures with specific incentives in the context of the Competitiveness and Innovation Framework Programme (CIP). Networking senior policy makers is apparently used a lot more frequently and systematically than junior or middle personnel exchange.*

Benchmarking initiatives *are carried out by most countries, although* mainly in the frame work of international exercises *(OECD, EU, World Bank, etc.). However, a number of medium sized countries like Austria, the Czech Republic, Denmark, Finland, Ireland, the Netherlands, Norway, Estonia and Switzerland are using them more systematically and incorporate their results in new policy making.*

Concluding from the overview overleaf, (see exhibit 42) one can say that there are certain tendencies, which appear to be crystallising:

- *Bigger and rich countries competing for high tech areas globally are using policy benchmarking and try to learn from their competitors within and outside Europe already for a long time. While foreign intelligence gather was triggered by information for FDI or research capabilities it is gradually shifting to innovation. The UK and Germany are the most prominent models in that respect.*
- *Some medium sized successful countries, like the Scandinavian countries (Sweden in particular) and the Netherlands are moving rapidly into this direction learning from both inside and outside Europe.*
- *Most other countries use benchmarking in the context of the OECD, the EU or the Davos Forum with increasing but fragmented and ad hoc national efforts to learn and adapt (Southern countries, CEECs, smaller countries). This ad hoc process is obviously more developed in some countries than in others (Italy).*
- *The most interesting feature of the analysis is that among the last category there is clear evidence very recently of an effort to pass from the fragmented exercise to codified projects, as demonstrated by the Innovation Observatory in Luxembourg, the formal benchmarking exercise of Spain. In this context the Finnish pioneering approach of "the co-operation with other countries gradually developing at the level of innovation policy implementation" is also a matter for further study, using the "Nordic co-operation" model as a benchmark.*
- *An area for future policy measures with specific incentives in the context of the Innovation Framework Programme could be the exchange of innovation policy staff as a means for systematic transnational learning.Concluding from the above overview, one can say that there are certain tendencies, which appear to be crystallising:*
- *Bigger and rich countries competing for high tech areas globally are using policy benchmarking and try to learn from their competitors within and outside Europe already for a long time. While foreign intelligence gather was triggered by information for FDI or research capabilities it is gradually shifting to innovation. The UK and Germany are the most prominent models in that respect.*
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- *An area for future policy measures with specific incentives in the context of the Innovation Framework Programme could be the exchange of innovation policy staff as a means for systematic transnational learning.*

Exhibit 42: Appraisal of policy learning practices in TrendChart countries

Tool for policy learning	Criteria	Ranking[1] (★, ★★ or ★★★)
Formal mechanisms for policy learning (studies, innovation observatories, study visits, etc.)	★ *No mechanisms exists* ★★ *Ad hoc mechanisms* ★★★ *Very systematic efforts*	★ *Italy, Latvia, Slovakia, Spain* ★★ *Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, Czech Rep., Greece, Ireland, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Sweden, Turkey, UK* ★★★ *Germany, Finland, Iceland, Switzerland* ★★ / ★★★ *France*
Application of foreign experience in designing measures (e.g. involvement of foreign experts in design phase)	★ *No or very occasionally* ★★ *Occasional or ad hoc basis* ★★★ *Systematically*	★ *Italy* ★★ *Austria, Belgium, Bulgaria, Czech Rep., Denmark, France, Greece, Latvia, Lithuania, Luxembourg, Malta, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK* ★★★ *Cyprus, Germany, Estonia, Finland, Iceland, Ireland, Netherlands, Norway, Poland, Romania, Turkey*
Exchange or hiring of innovation policy staff/ experts to/from other countries	★ *No* ★★ *Ad hoc* ★★★ *Systematic schemes*	★ *Austria, Belgium, Bulgaria, Czech Rep., France, Ireland, Italy, Latvia, Luxembourg* ★★ *Cyprus, Germany, Denmark, Estonia, Finland, Greece, Iceland, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK* ★★★ -
Involvement of senior policy makers /executives in transnational networks (e.g. TAFTIE, etc.)	★ *No* ★★ *Yes to one* ★★★ *Yes to all*	★ *Italy, Czech Rep., Slovakia* ★★ *Austria, Belgium, Bulgaria, Denmark, Estonia, Greece, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovenia* ★★★ *Cyprus, Germany, Finland, France, Iceland, Ireland, Netherlands, Norway, Spain, Sweden, Switzerland, Turkey, UK*
Carrying out benchmarking exercises to assess comparative innovation performance (scoreboards, etc.) or policy vis-à-vis other countries	★ *No* ★★ *Ad hoc benchmarking exercises* ★★★ *Benchmarking is a systematic process & results are incorporated into policy*	★ *Italy, Latvia, Luxembourg* ★★ *Belgium, Bulgaria, Cyprus, Denmark, Estonia, France, Greece, Iceland, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, Turkey, UK* ★★★ *Austria, Czech Rep., Germany, Finland, Ireland, Netherlands, Norway, Spain, Switzerland*
Implementing policy co-operation with other countries: bilateral or multilateral programmes on innovation, etc.	★ *There is no formal co-operation* ★★ *There are common innovation actions responding to specific opportunities* ★★★ *Many longer terms agreements*	★ *Czech Rep., Luxembourg, Romania, Slovakia, UK* ★★ *Austria, Belgium, Bulgaria, Cyprus, Denmark, Italy, Finland, Ireland, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovenia, Sweden, Turkey* ★★★ *Germany, Estonia, France, Greece, Spain, Switzerland* ★★/★★★ *Iceland*

1 Indicative ranking based on the assessment of the TrendChart network of correspondents
Source: National TrendChart Country Reports, no data for Hungary, Israel

Good practice cases in benchmarking

Three examples merit attention in the context of benchmarking policies: On the one hand Luxembourg and Spain have identified the relevance of benchmarking recently and are adopting efforts to use this tool more effectively, Spain through an initiative of the private sector, Luxembourg through public policy. The third major example is Finland, where benchmarking has always been important but is constantly improving as an effective tool, which not only measures the country but develops into a systematic policy design instrument. These examples in more detail are as follows:

Spain*: The Confederation of Employers and Industries of the Madrid Region (CEIM) have agreed to run an international project to develop a benchmarking policy as of June 2005. The main objective of the project is to develop a methodology to assess the impact of innovation policies carried out in the participating regions, especially with regard to analysing their effect on SMEs. This analysis will provide a resource for benchmarking in the participating regions and identify successful actions that can be exported to improve innovation policy-design in the regions.*

The project is methodologically demanding and will be divided into four major stages. The first two stages will involve an impact assessment methodology development, while the last two will be devoted to benchmarking and policy construction in the regions.
Conclusions and policy construction. Based on the benchmarking analysis, successful actions in each region will be determined and 'exported' to the other participating regions. This co-operation between the regions could range from:
o Straightforward exchange of good experiences and practices
o Actions requiring additional regional/national founding
o Further European-level joint projects

In Luxembourg *the procedures for benchmarking and trans-national learning were formalised by the creation of the Innovation Observatory in 2002. Developed in the framework of the e-Luxembourg project, the Observatory had several missions, one of which is to help systematically use benchmarks, through building up an exhaustive, qualitative information source on innovation in Luxembourg for both national and international structures such as the Luxembourg Government, Ministries and the European Commission, as well as researchers and professionals working in the field.*

This trend of using more benchmarking and engaging more intensively in trans-national learning is confirmed by the Luxinnovation's innovation report and by the competitive¬ness report, both of which use benchmarking methods and compare Luxembourg's performance to that of other countries. Some recommendations of the reports are based on measures applied in other countries.

In Finland *evaluations, benchmarking activities and other means of policy intelligence were since a long time used extensively by the policy makers in order to identify national strengths, weaknesses, opportunities and threats. Studies and reviews carried out by international organisations, such as the OECD, have been highly valued by national innovation policy makers. In the past the national policies were often designed after international examples and by imitating policy doctrines abroad and/or developed by OECD.*

During the last decade the situation has changed. Instead of being a follower, Finland is seen as a model country of successful innovation policy making. The interest in trans-national benchmarking has not disappeared.. Decision makers and politicians are facing new challenges in the changing position but this does not mean that trans-national policy learning is less important today; international benchmarking is still regarded as very feasible but not the sole basis for policy making. The most interesting feature in this context is an annual Nordic Benchmarking shared by Tekes - Finland, Nutek and Vinnova from Sweden and the Research Council of Norway since 1998. The topics of the Nordic Benchmarking are defined according to mutually identified policy learning needs and the collaboration takes place at the highest operational level.

In addition, benchmarking goes well beyond Europe now. In recent years the key Finnish innovation policy actors (e.g. ministries, Tekes, Sitra) have commissioned reviews covering development in a given country or a region which is especially interesting from the Finnish economy's and industry's point of view. Reviews published recently have covered China, India, North-West Russia, South Korea and Taiwan. An extensive benchmarking of the challenges and opportunities Finland faces amidst economic globalisation was carried out in 2004; Prime Minister Vanhanen assigned a committee to investigate Finland's position in the global economy.

To further support the potential of exchange and policy learning the European Commission supports enhancing **transnational policy co-operation between different regional and national innovation actions and programmes**. *Beside the existing IRCs the Commission has launched new INNO-Nets actions (following the model of ERA-Nets in the field of research)in the framework the new «PRO INNO Europe» initiative[30]. A further potential role for the EU is to support the Member States with prospective intelligence, in order to be better prepared for societal, technological and market trends that have an influence on European competitiveness.*

30. http://cordis.europa.eu/innovation/en/policy/pro-inno.htm)

3 CONCLUSIONS: IMPACT OF INNOVATION POLICY ON GROWTH AND JOBS

3 CONCLUSIONS: IMPACT OF INNOVATION POLICY ON GROWTH AND JOBS

The previous chapter has charted the developments in innovation policy in 33 European countries during 2005 *and attempted to compare their pertinence with respect to the challenges identified through the European Innovation Scoreboard exercise. The questions addressed are essentially the relevance and coherence of the existing policies and it remains difficult to draw conclusions in terms of effectiveness or impact of the various national policy mixes reviewed in the TrendChart annual country reports.*

The question of whether the policy mix is effective in improving innovation performance *is one which would require much more extensive and regular evaluations at national levels and sophisticated econometric analysis of correlations between policy interventions and outcomes in terms of enterprise level innovation performance. In a limited number of countries such analysis is undertaken but in most countries policy-makers are at best able to follow longer term changes in key indicators without being able to make any direct link with the policies they have pursued.*

The TrendChart annual country reports of 2005 included a chapter on the issue of policy effectiveness. A number of issues arise from the contributions of the network of country correspondents in addressing this question.

Firstly, in the vast majority of countries innovation policy objectives are still defined very ambiguously. *Most countries do not set clearly defined objectives at a more strategic level or link the expected outcomes to specific sets of measures. A good practice example of this issue is the Dutch "From Policy Budget to Policy Accountability" case where policy makers have an obligation to formulate performance indicators for every section of the budget; for every indicator a target is set and every instrument has to contribute to meeting a given target.*

Exhibit 43 below summarises the analysis of the country reports with respect to the level of sophistication of objective and target setting for innovation policy.

Exhibit 43: Sophistication of objective and target setting in the EU25

Sophistication of objectives and target setting for innovation policy	Member State
Specific innovation policy objectives and quantified targets	*Hungary, Latvia, Netherlands, Portugal, Sweden, UK*
General qualitative objectives for innovation policy, few if any quantified targets	*Austria, Belgium, Czech Republic Denmark, Estonia, Finland, France, Germany, Poland, Spain, Slovenia*
No specific targets or objectives for innovation policy	*Cyprus, Greece, Italy, Luxembourg, Lithuania, Malta, Slovakia*

The table should be read with some caution, as for instance the Portuguese report points out the good position of a number of the new Member States or cohesion countries 'reflects the existence of targets required by the main Structural Fund operational programmes'. Hence, the questions are more subtle: are the targets well defined? Do they effectively translate an ambition? Do the targets address the most relevant issues from an integrated innovation policy perspective?

Secondly, targets, when set, are often limited to the Barcelona objective *of "3% of GDP on R&D with business providing two-thirds". While this target is important for mobilising R&D funding in general, it has a limited value in* understanding the more complex dynamics of modern innovation systems *or the relation between formal R&D investment and economic structures of national or regional economies. For example, the presence of certain large companies, of specific high R&D intensity sectors, etc. can explain as much the outcome in terms of R&D expenditure as all the efforts of policy makers. Innovation as discussed and defined in the introduction is a much broader phenomenon. Again the Dutch case is illustrative, the 3% target is regarded as*

an input indicator, whereas the policy mix and its instruments are designed in view of an optimal output, addressing the specific strengths and weaknesses of the Dutch national innovation system. The Dutch targets include raising the share of new improved products as a percentage of turnover underlining a commitment to more market driven innovation.

Thirdly, even where targets are set and the policy mix is judged to be as optimal as possible, improved innovation performance does not always follow*. Continuing again with the Dutch example, the country report highlighted that "the set of instruments is well developed compared to that of its competitors, addressing the important issues concerning the functioning of the innovation system. However, at the moment, indicators show a declining performance of the Netherlands, especially in areas which have been identified as targets for the new innovation policy". The Dutch case is not unique, most observers consider the UK to be another example of a good practice approach to policy design, target setting and evaluation methods, the UK policy mix is broad ranging and appears to respond to most of the weakness of the national innovation system. Yet trend performance of many innovation indicators are not improving markedly over the period since the late nineties. Hence, while evaluation at programme level can sometimes provide evidence of whether a programme has reached a certain number of targets it rarely allows policy makers to arrive at conclusions concerning wider impacts of the policy measure on the 'health of the innovation system'.*

This is the challenge facing innovation policy makers across Europe *in the coming years:* to appraise and understand the impact *of the broad set of policy tools at their disposal for encouraging and supporting enterprises to innovation and to adapt these tools to take account of the constant evolving of the global market.*

It is a challenge that the renewed Lisbon Strategy for growth and jobs aims to address *and which will continue to be analysed and assessed during the coming years within the framework of a new broad European innovation policy initiative called '*PRO INNO Europe[31]*.*

31. http://cordis.europa.eu/innovation/en/policy/pro-inno.htm

4 ANNEXES

A – EIS 2005

A.1 REVISED INDICATORS AND METHODOLOGY

The European Innovation Scoreboard (EIS) covers the 25 EU Member States, Bulgaria, Romania and Turkey, the associate countries Iceland, Norway and Switzerland, as well as the US and Japan. The indicators of the EIS summarise the main elements of innovation performance.

The 2005 EIS has been revised in collaboration with the Joint Research Centre (JRC)[1]. The number of categories of indicators has been revised and increased from four to five and the set of innovation indicators has been modified and increased to 26. The correlation between indicators was evaluated which allowed to abandon several of them and add new ones allowing to capture information on new dimensions of the innovation performance. The methodology for the composite innovation index has been reviewed. The 2005 EIS Methodology Report (MR) describes and explains all changes in full detail. The report is available on the Trend Chart website[2].

The innovation indicators are assigned to five categories and grouped in two main themes: Inputs and Outputs.

Innovation Inputs:

- *Innovation drivers (5 indicators), which measure the structural conditions required for innovation potential;*
- *Knowledge creation (5 indicators), which measure the investments in R&D activities, considered as key elements for a successful knowledge-based economy;*
- *Innovation & entrepreneurship (6 indicators), which measure the efforts towards innovation at the level of firms.*

Innovation Outputs:

- *Application (5 indicators), which measure the performance, expressed in terms of labour and business activities, and their value added in innovative sectors;*
- *Intellectual property (5 indicators), which measure the achieved results in terms of successful know-how.*

[1] *Joint Research Centre (JRC), Unit of Econometrics and Statistical Support to Antifraud (ESAF) of the Institute for the Protection and Security of the Citizen (IPSC).*

[2] *http://www.trendchart.org/scoreboards/scoreboard2005/scoreboard_papers.cfm*

Exhibit 44[3] shows the 5 main categories, the 26 indicators, and the primary data sources for each indicator. In total, nine indicators are new compared to the EIS 2004. These are identified in Exhibit 44 below.

Exhibit 44: EIS 2005 Indicators

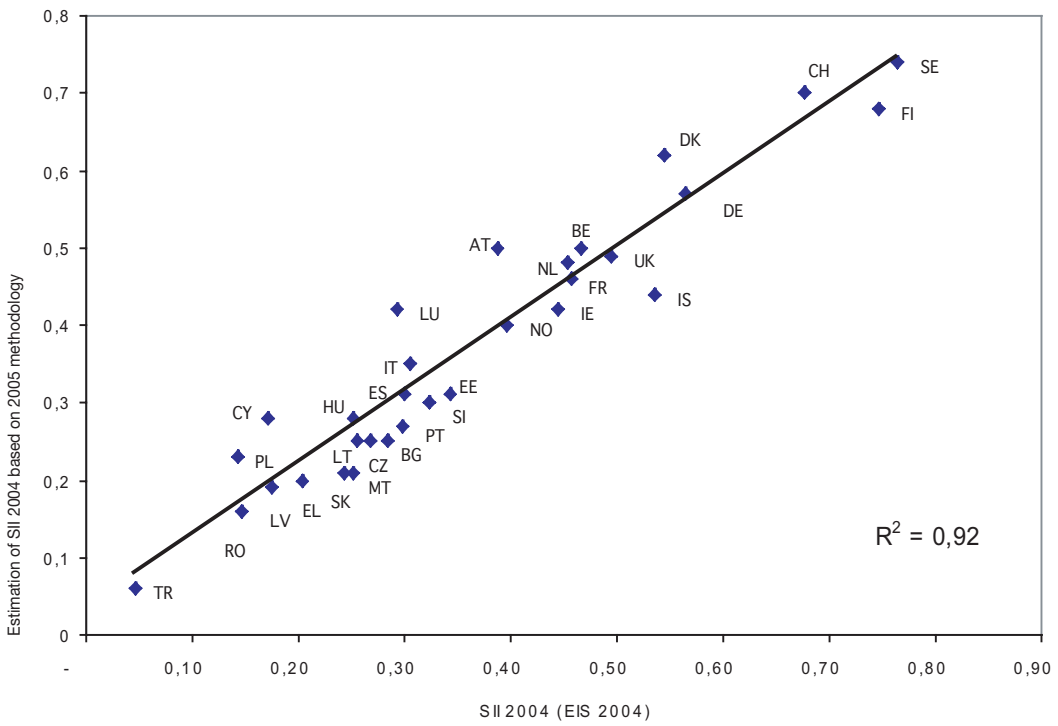
	INPUT - Innovation drivers	
1.1	S&E graduates per 1000 population aged 20-29	Eurostat
1.2	Population with tertiary education per 100 population aged 25-64	Eurostat, OECD
1.3 NEW	Broadband penetration rate (number of broadband lines per 100 population)	Eurostat
1.4	Participation in life-long learning per 100 population aged 25-64	Eurostat
1.5 NEW	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	Eurostat
	INPUT – Knowledge creation	
2.1	Public R&D expenditures (% of GDP)	Eurostat, OECD
2.2	Business R&D expenditures (% of GDP)	Eurostat, OECD
2.3 NEW	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	Eurostat, OECD
2.4 NEW	Share of enterprises receiving public funding for innovation	Eurostat (CIS)
2.5 NEW	Share of university R&D expenditures financed by business sector	Eurostat, OECD
	INPUT - Innovation & entrepreneurship	
3.1	SMEs innovating in-house (% of all SMEs)	Eurostat (CIS)
3.2	Innovative SMEs co-operating with others (% of all SMEs)	Eurostat (CIS)
3.3	Innovation expenditures (% of total turnover)	Eurostat (CIS)
3.4	Early-stage venture capital (% of GDP)	Eurostat
3.5	ICT expenditures (% of GDP)	Eurostat
3.6	SMEs using non-technological change (% of all SMEs)	Eurostat (CIS)
	OUTPUT – Application	
4.1	Employment in high-tech services (% of total workforce)	Eurostat
4.2 NEW	Exports of high technology products as a share of total exports	Eurostat
4.3	Sales of new-to-market products (% of total turnover)	Eurostat (CIS)
4.4	Sales of new-to-firm not new-to-market products (% of total turnover)	Eurostat (CIS)
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	Eurostat
	OUTPUT - Intellectual property	
5.1	EPO patents per million population	Eurostat
5.2	USPTO patents per million population	Eurostat
5.3 NEW	Triadic patent families per million population	Eurostat, OECD
5.4 NEW	New community trademarks per million population	OHIM[4]
5.5 NEW	New community designs per million population	OHIM[4]

The Methodology Report researches in detail how to improve the methodology of calculating summary innovation indices using two different normalisation techniques (standardisation (z-scores) and re-scaling) and four different weighting schemes (budget allocation, factor analysis, benefit of the doubt and equal weighting). The Methodology Report provides a Robustness Analysis using a Monte Carlo experiment, which consists of a set of 300 simulations of evaluation of the composite indices based on a random selection of the normalisation and weighting scheme applied. The Robustness Analysis shows that country groupings and rankings are relatively stable and insensitive to the different weighting and normalisation schemes. For the computation of the 2005 Summary Innovation Index (SII) it was thus concluded to keep the methodology as simple as possible, with equal weighting applied to all indicators.

3 Annex Table D gives full definitions for all indicators and also provides brief explanations why each new indicator was included.

4 Office for Harmonization in the Internal Market (Trade Marks and Designs): http://oami.eu.int/

Exhibit 45: New SII methodology ensures continuity



The new methodology led to the removal of 5 redundant indicators, which were replaced with 9 new indicators that capture new dimensions of innovation performance and allow for further analysis. Considering the high political visibility of the Summary Innovation Index and the European Innovation Scoreboard, a requirement for any changes to the EIS was to ensure continuity with previous years. Exhibit 45 correlates the original 2004 SII scores and a recalculation of the 2004 SII using the 2005 methodology. The high correlation coefficient of 0.92 illustrates that the new methodology does not significantly change the relative innovation performance of countries as measured by the SII.

However the position of several countries is impacted by this evolution, where Denmark, Austria, Luxembourg or Cyprus will benefit from a better position. Iceland on the contrary will have a lower SII with the new methodology. The relative position of all other countries remain stable.

A.2 – EIS 2005 TABLES

Annex Table A: European Innovation Scoreboard 2005 – Current performance

		EU25	EU15	BE	CZ	DK	DE	EE	EL	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT	NL
1.1	New S&E graduates	12.2	13.1	11.0	6.4	12.5	8.4	8.8	--	12.6	22.2	24.2	7.4	3.6	8.6	16.3	1.8	4.8	3.1	7.3
1.2	Population with tertiary education	21.9	23.1	30.4	12.3	32.9	24.9	31.4	20.5	26.4	23.9	27.8	11.6	29.8	20.0	25.2	22.8	16.7	11.1	27.5
1.3	Broadband penetration rate	6.5	7.6	14.0	0.7	15.6	6.7	7.6	0.2	6.7	8.2	1.7	6.1	2.0	1.5	2.5	5.7	2.2	3.5	14.7
1.4	Participation in life-long learning	9.9	10.7	9.5	6.3	27.6	7.4	6.7	3.9	5.1	7.8	7.2	6.8	9.3	9.1	6.5	9.4	4.6	5.0	16.5
1.5	Youth education attainment level	76.7	73.8	82.1	90.9	76.1	72.8	82.3	81.9	61.8	79.8	85.3	72.9	80.1	76.9	86.1	69.8	83.4	47.9	74.5
2.1	Public R&D expenditures	0.69	0.70	0.56	0.50	0.80	0.77	0.53	0.41	0.48	0.81	0.40	0.60	0.27	0.25	0.54	0.20	0.62	0.19	0.75
2.2	Business R&D expenditures	1.26	1.30	1.33	0.77	1.84	1.75	0.28	0.20	0.57	1.34	0.77	0.55	0.08	0.14	0.14	1.58	0.36	0.08	1.01
2.3	Share of medium-high-tech and high-tech R&D	--	89.2	83.8	85.4	86.7	93.5	69.8	--	78.3	87.2	84.6	91.1	71.9	--	62.1	--	87.8	83.3	85.2
2.4	Enterprises receiving public funding for innovation	n/a		11.5	3.7	3.2	12.1	2.4	8.9	8.9	10.3	--	14.8	11.0	2.0	--	7.4	7.3	1.5	14.7
2.5	University R&D expenditures financed by businesses	6.6	6.6	12.7	1.0	2.7	12.5	6.3	6.9	6.4	2.9	4.8	3.8	2.9	23.9	7.4	--	10.6	0.2	6.8
3.1	SMEs innovating in-house	n/a		38.3	23.3	25.9	43.4	29.8	17.5	22.9	29.2	--	28.8	39.2	14.9	22.1	28.0	13.2	2.9	18.0
3.2	Innovative SMEs co-operating with others	n/a		9.6	5.3	16.6	9.2	11.3	6.3	4.4	9.3	--	2.7	22.6	6.2	12.3	8.1	32.9	1.6	8.0
3.3	Innovation expenditures	n/a		2.65	0.92	2.15	2.50	1.43	2.08	1.04	2.53	0.24	1.54	2.55	1.40	1.74	1.29	0.30	3.29	0.79
3.4	Early-stage venture capital	--	0.025	0.028	0.001	0.063	0.021	--	0.008	0.012	0.029	0.023	0.005	--	--	--	--	0.002	--	0.027
3.5	ICT expenditures	6.4	6.3	6.4	7.1	6.7	6.2	8.6	5.1	5.2	6.0	5.4	5.3	--	7.6	5.8	6.8	7.1	8.5	7.5
3.6	SMEs using non-technological change	n/a		49.0	40.1	26.0	65.0	52.5	59.0	46.0	23.0	--	49.0	--	35.7	30.7	74.0	29.3	13.4	38.0
4.1	Employment in high-tech services	3.19	3.49	3.94	3.18	4.50	3.32	2.32	1.75	2.35	4.07	3.92	2.93	2.00	2.31	1.66	2.94	3.14	2.96	3.72
4.2	Exports of high technology products	17.8	17.2	7.4	12.3	13.4	14.7	9.4	7.4	5.9	20.4	29.9	7.1	4.2	2.7	3.0	29.3	21.7	55.5	18.8
4.3	Sales of new-to-market products	n/a		5.1	1.4	5.9	4.5	4.5	2.9	4.5	5.8	--	8.1	1.4	1.5	4.3	9.1	0.8	4.8	3.8
4.4	Sales of new-to-firm not new-to-market products	n/a		13.9	5.9	25.6	23.3	5.4	8.9	2.9	11.9	--	5.8	3.9	4.1	10.6	4.4	2.0	1.3	2.5
4.5	Employment in medium-high/high-tech manufacturing	6.60	7.10	6.42	8.71	6.12	11.04	3.35	1.99	5.15	6.50	6.28	7.42	1.24	1.85	3.03	1.36	8.27	6.14	4.06
5.1	EPO patents per million population	133.6	158.5	148.1	10.9	214.8	301.0	8.9	8.1	25.5	147.2	89.9	74.7	9.9	6.0	2.6	201.3	18.3	17.7	278.9
5.2	USPTO patents per million population	59.9	71.3	70.4	3.9	83.8	137.2	2.7	1.9	8.0	68.1	32.4	30.3	2.1	0.3	0.5	96.3	4.9	2.5	86.6
5.3	Triad patents per million population	22.3	36.3	35.1	0.9	47.6	70.3	1.5	0.6	2.8	36.1	11.9	13.5	1.2	1.1	0.3	38.0	3.3	0.8	53.8
5.4	Community trademarks per million population	87.2	100.9	81.6	27.1	139.9	116.6	22.2	24.9	129.4	73.1	134.9	83.6	116.2	3.0	4.9	571.2	11.4	67.7	127.8
5.5	Community industrial designs per million population	84.0	98.9	92.2	10.5	199.1	147.1	5.2	1.1	71.1	69.8	69.1	129.2	2.8	5.2	6.4	131.1	9.3	7.6	125.9

Annex Table A: European Innovation Scoreboard 2005 – Current performance (continued)

		EU25	EU15	AT	PL	PT	SI	SK	FI	SE	UK	BG	RO	TR	CH	IS	NO	US	JP
1.1	New S&E graduates	12.2	13.1	8.2	9.0	8.2	8.7	8.3	17.4	13.9	21.0	8.3	9.4	5.2	7.7	9.2	9.3	10.9	13.2
1.2	Population with tertiary education	21.9	23.1	18.3	15.6	12.5	19.0	12.8	34.2	28.2	29.2	21.7	10.6	9.7	28.2	29.2	32.3	38.4	37.4
1.3	Broadband penetration rate	6.5	7.6	8.7	0.5	6.4	3.8	0.4	11.0	12.1	7.4	--	--	0.3	14.5	15.5	11.4	11.2	12.7
1.4	Participation in life-long learning	9.9	10.7	12.0	5.5	4.8	17.9	4.6	24.6	35.8	21.3	1.3	1.6	--	28.6	31.7	19.1	--	--
1.5	Youth education attainment level	76.7	73.8	85.3	89.5	49.0	89.7	91.3	84.6	86.3	76.4	76.0	74.8	--	82.9	53.9	95.3	--	--
2.1	Public R&D expenditures	0.69	0.70	0.70	0.43	0.52	0.63	0.26	1.03	1.02	0.68	0.39	0.17	0.47	0.67	1.37	0.82	0.86	0.89
2.2	Business R&D expenditures	1.26	1.30	1.42	0.16	0.26	0.90	0.31	2.45	2.93	1.30	0.10	0.23	0.19	1.90	1.67	1.10	1.91	2.65
2.3	Share of medium-high-tech and high-tech R&D	--	89.2	82.9	77.4	68.2	85.0	68.6	88.1	93.7	91.1	85.9	50.3	--	90.1	--	72.7	90.6	86.8
2.4	Enterprises receiving public funding for innovation	n/a	n/a	19.2	0.7	13.7	4.1	1.8	18.7	9.1	3.8	1.0	1.7	--	5.3	4.8	8.0	--	--
2.5	University R&D expenditures financed by businesses	6.6	6.6	4.1	6.0	1.5	9.6	0.3	5.8	5.5	5.6	31.4	8.5	22.0	6.0	10.9	5.0	4.5	2.7
3.1	SMEs innovating in-house	n/a	n/a	44.7	12.5	36.2	14.9	15.7	23.8	35.2	22.4	9.4	12.5	--	54.8	46.5	28.8	--	--
3.2	Innovative SMEs co-operating with others	n/a	n/a	13.2	8.2	7.0	8.8	3.8	18.6	13.4	7.2	2.3	3.4	--	10.4	12.6	12.5	--	--
3.3	Innovation expenditures	n/a	n/a	--	2.25	2.62	0.92	2.40	2.50	--	1.61	0.69	1.00	--	3.48	1.70	1.22	--	--
3.4	Early-stage venture capital	--	0.025	0.013	0.007	0.026	--	0.002	0.065	0.081	0.038	--	0.003	--	0.038	0.048	0.032	0.072	--
3.5	ICT expenditures	6.4	6.3	6.4	7.2	7.1	5.2	6.0	7.1	8.7	7.9	8.6	1.5	3.2	7.8	--	6.2	7.8	8.0
3.6	SMEs using non-technological change	n/a	n/a	58.0	--	51.0	50.8	10.1	47.0	44.0	--	8.5	77.3	--	63.0	54.0	38.0	--	--
4.1	Employment in high-tech services	3.19	3.49	3.32	--	1.45	2.67	2.54	4.68	4.85	4.40	2.69	1.45	--	4.04	4.81	3.85	--	--
4.2	Exports of high technology products	17.8	17.2	15.3	2.7	7.4	5.8	3.4	20.6	13.1	21.0	2.9	3.3	1.8	22.3	2.0	3.7	26.9	22.7
4.3	Sales of new-to-market products	n/a	n/a	7.6	3.4	10.8	3.5	10.9	5.1	--	1.7	2.1	7.6	--	--	2.0	1.9	--	--
4.4	Sales of new-to-firm not new-to-market products	n/a	n/a	10.6	9.6	15.1	3.4	2.8	16.4	--	16.7	3.8	1.3	--	20.5	7.7	7.0	--	--
4.5	Employment in medium-high/high-tech manufacturing	6.60	7.10	6.21	4.35	3.17	8.94	8.00	6.85	7.03	6.27	4.66	5.32	--	7.09	2.02	4.53	4.89	7.40
5.1	EPO patents per million population	133.6	158.5	174.8	2.7	4.3	32.8	4.3	310.9	311.5	128.7	3.7	0.9	1.0	460.1	121.8	131.3	154.5	166.7
5.2	USPTO patents per million population	59.9	71.3	65.4	0.4	1.3	8.4	1.9	158.6	187.4	64.5	0.8	0.2	0.2	188.3	58.0	55.1	301.4	273.9
5.3	Triad patents per million population	22.3	36.3	34.2	0.3	0.8	4.0	0.8	94.5	91.4	30.0	--	0.0	0.1	110.8	14.9	24.2	53.6	92.6
5.4	Community trademarks per million population	87.2	100.9	158.8	14.3	47.8	38.6	3.0	82.7	111.5	105.8	0.3	1.1	1.0	180.0	58.7	23.9	32.0	11.1
5.5	Community industrial designs per million population	84.0	98.9	143.6	5.2	26.3	24.6	5.9	91.7	89.0	65.8	0.9	0.0	2.0	161.2	17.3	41.0	12.4	15.1

Annex Table B: European Innovation Scoreboard 2005 – Years used for current performance

		EU25	EU15	BE	CZ	DK	DE	EE	EL	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT
1.1	New S&E graduates	2003	2003	2003	2003	2003	2003	2003	--	2003	2003	2003	2002	2003	2003	2003	2000	2003	2003
1.2	Population with tertiary education	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
1.3	Broadband penetration rate	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
1.4	Participation in life-long learning	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
1.5	Youth education attainment level	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2003	2004	2004
2.1	Public R&D expenditures	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2002	2003	2003	2003	2003	2003	2003
2.2	Business R&D expenditures	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
2.3	Share of medium-high-tech and high-tech R&D	--	1999	2001	2002	1999	2002	2002	--	2001	2002	1999	2001	2002	--	2002	--	2002	2001
2.4	Enterprises receiving public funding for innovation			CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3
2.5	University R&D expenditures financed by businesses	2002	2002	2001	2003	2003	2003	2003	2001	2003	2002	2003	1996	2003	2003	2003	--	2003	2003
3.1	SMEs innovating in-house			CIS3	CISlight	CISlight	CISlight	CIS3	CIS3	CISlight	CIS3	--	CISlight	CISlight	CISlight	CIS3	CISlight	CISlight	CIS3
3.2	Innovative SMEs co-operating with others			CIS3	CISlight	CISlight	CIS3	CIS3	CIS3	CISlight	CIS3	--	CISlight	CISlight	CISlight	CIS3	CISlight	CISlight	CIS3
3.3	Innovation expenditures			CIS3	CISlight	CISlight	CISlight	CIS3	CIS3	CISlight	CIS3	CIS3	CISlight	CISlight	CISlight	CIS3	CIS3	CISlight	CIS3
3.4	Early-stage venture capital	--	2002-03	2002-03	2002-03	2002-03	2002-03	--	2002-03	2002-03	2002-03	2002-03	2002-03	--	--	--	--	2002-03	--
3.5	ICT expenditures	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	--	2004	2004	2002	2004	2004
3.6	SMEs using non-technological change			CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3
4.1	Employment in high-tech services	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
4.2	Exports of high technology products	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
4.3	Sales of new-to-market products			CIS3	CISlight	CISlight	CISlight	CIS3	CIS3	CISlight	CIS3	--	CISlight	CISlight	CISlight	CIS3	CISlight	CISlight	CIS3
4.4	Sales of new-to-firm not new-to-market products			CIS3	CISlight	CISlight	CIS3	CIS3	CIS3	CISlight	CIS3	--	CISlight	CISlight	CISlight	CIS3	CISlight	CISlight	CIS3
4.5	Employment in medium-high/high-tech manufacturing	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
5.1	EPO patents per million population	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002
5.2	USPTO patents per million population	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002
5.3	Triad patents per million population	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
5.4	Community trademarks per million population	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
5.5	Community industrial designs per million population	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2003

Annex Table B: European Innovation Scoreboard 2005 – Years used for current performance (continued)

		EU25	EU15	AT	PL	PT	SI	SK	FI	SE	UK	BG	RO	TR	CH	IS	NO	US	JP
1.1	New S&E graduates	2003	2003	2003	2003	2003	2003	2003	2002	2003	2003	2003	2003	2003	2003	2002	2003	2003	2003
1.2	Population with tertiary education	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2003	2004	2004	2004	2003	2003
1.3	Broadband penetration rate	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	--	--	2004	2004	2004	2004	2004	2004
1.4	Participation in life-long learning	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	--	2004	2003	2004	--	--
1.5	Youth education attainment level	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	--	2004	2004	2004	--	--
2.1	Public R&D expenditures	2003	2003	2002	2003	2003	2003	2003	2003	2003	2003	2003	2003	2002	2000	2003	2003	2003	2003
2.2	Business R&D expenditures	2003	2003	2002	2003	2003	2003	2003	2003	2003	2003	2003	2003	2002	2000	2003	2003	2003	2003
2.3	Share of medium-high-tech and high-tech R&D	--	1999	2002	2001	2001	2002	2002	2002	2001	2001	2002	2002	--	2000	--	1998	2000	2001
2.4	Enterprises receiving public funding for innovation			CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	CIS3	--	--
2.5	University R&D expenditures financed by businesses	2002	2002	2002	2003	2003	2003	2001	2003	2003	2003	2003	2003	2002	2002	2001	2003	2003	2003
3.1	SMEs innovating in-house			ClSlight	CIS3	CIS3	ClSlight	ClSlight	ClSlight	CIS3	CIS3	CIS3	ClSlight	--	CIS3	CIS3	CIS3	--	--
3.2	Innovative SMEs co-operating with others			ClSlight	ClSlight	CIS3	ClSlight	ClSlight	ClSlight	CIS3	CIS3	CIS3	ClSlight	--	CIS3	CIS3	CIS3	--	--
3.3	Innovation expenditures			--	ClSlight	CIS3	ClSlight	ClSlight	CIS3	--	CIS3	CIS3	ClSlight	--	CIS3	CIS3	CIS3	--	--
3.4	Early-stage venture capital	--	2002-03	2002-03	2002-03	2002-03	--	2002-03	2002-03	2002-03	2002-03	--	2002-03	--	2002-03	2001-02	2002-03	2001-02	--
3.5	ICT expenditures	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2003	2004	--	2004	2004	2004
3.6	SMEs using non-technological change			CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	CIS3	--	CIS3	CIS3	CIS3	--	--
4.1	Employment in high-tech services	2003	2003	2003	--	2003	2003	2003	2003	2003	2003	2003	2003	--	2003	2002	2003	--	--
4.2	Exports of high technology products	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
4.3	Sales of new-to-market products			ClSlight	ClSlight	CIS3	ClSlight	ClSlight	ClSlight	--	CIS3	CIS3	ClSlight	--	--	CIS3	CIS3	--	--
4.4	Sales of new-to-firm not new-to-market products			ClSlight	ClSlight	CIS3	ClSlight	ClSlight	ClSlight	--	CIS3	CIS3	ClSlight	--	CIS3	CIS3	CIS3	--	--
4.5	Employment in medium-high/high-tech manufacturing	2003	2003	2003	2002	2003	2003	2003	2003	2003	2003	2003	2003	--	2003	2002	2003	2001	2002
5.1	EPO patents per million population	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002
5.2	USPTO patents per million population	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002
5.3	Triad patents per million population	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	--	2000	2000	1999	2000	2000	2000	2000
5.4	Community trademarks per million population	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
5.5	Community industrial designs per million population	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004

Annex Table C: European Innovation Scoreboard 2005 – Trend performance

		EU25	EU15	BE	CZ	DK	DE	EE	EL	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT
1.1	New S&E graduates	9.4	9.0	5.4	9.2	8.1	0.8	13.2	--	10.8	6.4	1.4	16.7	-0.5	9.8	10.6	--	4.1	-3.6
1.2	Population with tertiary education	4.3	3.8	4.9	2.7	8.2	3.6	2.5	8.4	5.6	2.9	11.7	8.3	5.0	3.8	6.9	11.2	8.9	18.5
1.3	Broadband penetration rate	--	49.5	29.1	--	32.4	29.4	--	--	45.8	77.6	312.3	79.2	--	--	--	122.6	--	--
1.5	Youth education attainment level	0.2	0.1	1.0	-0.1	--	-0.7	0.7	1.2	-2.7	-1.2	1.0	3.3	-2.4	2.5	4.2	-1.7	--	9.4
2.1	Public R&D expenditures	2.2	2.0	-0.3	3.5	2.6	2.7	3.3	-5.1	6.1	0.4	10.7	5.4	16.2	-5.5	6.4	24.0	14.0	--
2.2	Business R&D expenditures	1.3	1.4	-5.6	2.2	10.9	1.3	22.5	0.0	9.4	-1.0	-2.9	1.6	26.5	3.8	9.5	0.0	3.4	--
2.5	University R&D expenditures financed by businesses	0.6	0.9	8.1	-1.2	--	3.1	-8.2	14.0	-9.2	2.9	-4.4	--	23.3	--	-25.2	--	41.5	--
3.5	ICT expenditures	6.9	-1.3	-3.0	-8.9	-1.2	-0.5	-12.8	-4.6	-2.2	-0.6	-1.5	0.6	--	-6.5	-4.1	--	-12.4	0.4
4.1	Employment in high-tech services	0.1	1.3	4.1	1.0	-3.4	5.0	-11.7	4.0	-0.4	1.9	-1.6	0.6	9.9	2.7	-9.1	-2.7	1.9	-4.0
4.2	Exports of high technology products	-6.3	-6.2	-6.9	22.5	-2.5	-2.2	-26.6	9.2	-1.9	-9.7	-13.8	-6.8	7.0	10.0	9.5	17.6	1.7	-3.3
4.5	Employment in medium-high/high-tech manufacturing	-2.8	-3.4	-3.5	-1.5	-3.8	-0.2	-12.3	-5.3	-2.8	-5.0	-6.5	-0.9	6.7	3.7	-2.4	-9.8	-0.9	-19.0
5.1	EPO patents per million population	5.3	5.2	0.2	-0.6	12.7	4.5	8.8	7.0	5.0	4.9	10.6	3.5	-9.9	16.5	--	--	10.3	20.0
5.2	USPTO patents per million population	--	5.9	2.2	14.4	0.6	8.4	19.9	4.2	11.0	2.6	9.9	4.4	37.9	-53.3	--	--	7.0	-20.1
5.3	Triad patents per million population	1.2	1.0	-2.8	-7.8	6.7	0.6	-11.0	-23.6	4.5	-2.1	9.0	4.4	166.7	28.4	62.0	-2.0	17.3	-14.9
5.4	Community trademarks per million population	15.6	13.9	18.5	240.2	1.5	16.2	449.9	17.5	18.4	12.7	10.3	13.2	50.5	--	--	4.0	198.3	130.8

		EU25	EU15	AT	PL	PT	SI	SK	FI	SE	UK	BG	RO	TR	CH	IS	NO	US	JP
1.1	New S&E graduates	9.4	9.0	7.2	16.5	13.8	1.2	17.9	2.5	11.2	3.8	8.9	16.6	--	13.6	12.8	8.5	6.4	2.1
1.2	Population with tertiary education	4.3	3.8	11.0	14.4	16.9	12.0	9.3	2.8	1.7	0.1	3.5	4.5	8.2	6.2	9.3	-1.3	2.6	6.2
1.3	Broadband penetration rate	--	49.5	24.1	--	58.4	--	--	51.4	35.4	67.1	--	--	--	--	--	--	--	--
1.5	Youth education attainment level	0.2	1.5	--	0.8	6.1	1.2	-1.6	-1.3	0.1	-0.3	-1.2	-0.9	--	0.5	3.9	0.0	--	--
2.1	Public R&D expenditures	2.2	2.0	3.8	2.0	-4.5	-1.0	7.1	2.0	4.4	5.3	-2.5	19.0	10.3	--	4.7	9.4	11.9	2.3
2.2	Business R&D expenditures	1.3	1.4	12.1	-20.5	10.0	4.1	-14.4	2.5	-1.6	2.3	-4.7	-7.1	-3.3	--	5.7	8.2	-2.1	10.8
2.5	University R&D expenditures financed by businesses	0.6	0.9	--	-13.5	23.5	10.9	--	1.4	7.7	-10.1	5.2	-6.6	8.9	-1.1	20.8	-4.4	-12.9	6.8
3.5	ICT expenditures	6.9	-1.3	0.5	6.9	1.9	-9.5	-9.3	1.7	-0.2	0.2	0.0	-52.9	-41.5	2.3	--	4.0	0.0	8.2
4.1	Employment in high-tech services	0.1	1.3	8.3	--	6.7	4.0	-6.6	3.7	-3.2	-0.4	-0.4	1.9	--	2.3	8.3	-2.1	--	--
4.2	Exports of high technology products	-6.3	-6.2	6.7	1.9	15.6	16.1	-4.6	-2.7	-12.0	-9.1	30.6	-10.3	-28.6	4.7	8.5	-1.3	-4.5	-5.8
4.5	Employment in medium-high/high-tech manufacturing	-2.8	-3.4	-3.2	-6.8	-5.9	1.9	8.9	-3.1	-4.6	-7.7	-8.0	0.8	--	-4.7	9.9	0.7	-4.3	-2.4
5.1	EPO patents per million population	5.3	5.2	9.1	12.0	7.6	20.2	--	1.9	-2.2	6.5	3.2	-13.7	0.3	0.3	8.8	2.4	3.3	9.9
5.2	USPTO patents per million population	--	5.9	6.2	-13.6	18.8	3.0	--	14.6	8.6	3.2	61.1	-3.7	58.7	1.5	20.4	4.9	-0.1	5.5
5.3	Triad patents per million population	1.2	1.0	6.1	9.6	19.7	9.7	23.9	11.0	-2.0	3.3	--	-30.1	16.5	0.4	-6.7	7.4	-1.4	2.9
5.4	Community trademarks per million population	15.6	13.9	33.5	525.4	14.1	106.6	--	-1.0	11.3	4.1	42.2	90.7	45.6	14.7	54.6	14.0	-1.9	13.9

Annex Table D: European Innovation Scoreboard 2005 – Definitions and interpretation

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
1.1	New S&E graduates per 1000 population aged 20-29	Number of S&E (science and engineering) graduates. S&E graduates are defined as all post-secondary education graduates (ISCED classes 5a and above) in life sciences (ISC42), physical sciences (ISC44), mathematics and statistics (ISC46), computing (ISC48), engineering and engineering trades (ISC52), manufacturing and processing (ISC54) and architecture and building (ISC58).	The reference population is all age classes between 20 and 29 years inclusive.	The indicator is a measure of the supply of new graduates with training in Science & Engineering (S&E). Due to problems of comparability for educational qualifications across countries, this indicator uses broad educational categories. This means that it covers everything from graduates of one-year diploma programmes to PhDs. A broad coverage can also be an advantage, since graduates of one-year programmes are of value to incremental innovation in manufacturing and in the service sector.
1.2	Population with tertiary education per 100 population aged 25-64	Number of persons in age class with some form of post-secondary education (ISCED 5 and 6).	The reference population is all age classes between 25 and 64 years inclusive.	This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields because the adoption of innovations in many areas, in particular in the service sectors, depends on a wide range of skills. Furthermore, it includes the entire working age population, because future economic growth could require drawing on the non-active fraction of the population. International comparisons of educational levels however are difficult due to large discrepancies in educational systems, access, and the level of attainment that is required to receive a tertiary degree. Differences among countries should be interpreted with caution.
1.3	Broadband penetration rate (number of broadband lines per 100 population)	Number of broadband lines. Broadband lines are defined as those with a capacity equal to or higher than 144 Kbit/s.	Total population as defined in the European System of Accounts (ESA 1995).	Realising Europe's full e-potential depends on creating the conditions for electronic commerce and the Internet to flourish, so that the Union can catch up with its competitors by hooking up many more businesses and homes to the Internet via fast connections. The Community and the Member States are to make available in all European countries low cost, high-speed interconnected networks for Internet access and foster the development of state-of-the-art information technology and other telecom networks as well as the content for those networks (Lisbon European Council, 2000). The Barcelona European Council (2002) attached priority to the widespread availability and use of broadband networks throughout the Union by 2005 and the development of Internet protocol IPv6. Further development in this area requires accelerated broadband deployment; in this respect the Brussels European Council (2003) called on Member States to put in place national broadband / high speed Internet strategies by end 2003 and aim for a substantial increase in high speed Internet connections by 2005.

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
1.4	Participation in life-long learning per 100 population aged 25-64)	Number of persons involved in life-long learning. Life-long learning is defined as participation in any type of education or training course during the four weeks prior to the survey. Education includes both courses of relevance to the respondent's employment and general interest courses, such as in languages or arts. It includes initial education, further education, continuing or further training, training within the company, apprenticeship, on-the-job training, seminars, distance learning, and evening classes.	The reference population is all age classes between 25 and 64 years inclusive	A central characteristic of a knowledge economy is continual technical development and innovation. Individuals need to continually learn new ideas and skills or to participate in life-long learning. All types of learning of valuable, since it prepares people for "learning to learn". The ability to learn can then be applied to new tasks with social and economic benefits.
1.5	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	Number of persons aged 20-24 having completed at least upper secondary education, i.e. with an education level ISCED 3-4 minimum.	The reference population is all age classes between 20 and 24 years inclusive	The indicator measures the qualification level of the population aged 20-24 years in terms of formal educational degrees. In so far it provides a measure for the "supply" of human capital of that age group and for the output of education systems in terms of graduates. A study for OECD countries suggests a positive link between education and economic growth. According to this study an additional year of average school attainment is estimated to increase economic growth by around 5% immediately and by further 2.5% in the long run (De la Fuente and Ciccone, "Human capital in a global and knowledge-based economy", Final report for DG Employment and Social Affairs, 2002). Completed upper secondary education is generally considered to be the minimum level required for successful participation in a knowledge-based society. It is increasingly important not just for successful entry into the labour market, but also to allow students access to learning and training opportunities offered by higher education. School attainment is a primary determinant of individual income and labour market status. Persons who have completed at least upper secondary education have access to jobs with higher salaries and better working conditions. They also have a markedly higher employment rate than persons with at most lower secondary education (Employment in Europe 2004).

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
2.1	Public R&D expenditures (% of GDP)	Difference between GERD (Gross domestic expenditure on R&D) and BERD (Business enterprise expenditure on R&D). Both GERD and BERD according to Frascati-manual definitions, in national currency and current prices.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	R&D expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth. Recognising the benefits of R&D for growth and being aware of the rapidly widening gap between Europe's R&D effort and that of the principal partners of the EU in the world, the Barcelona European Council (March 2003) set the EU a target of increasing R&D expenditure to 3 per cent of GDP by 2010, two thirds of which should come from the business enterprise sector.
2.2	Business R&D expenditures (% of GDP)	All R&D expenditures in the business sector (BERD), according to Frascati-manual definitions, in national currency and current prices.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sector (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
2.3	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	R&D expenditures in medium-high and high-tech manufacturing, in national currency and current prices. These include chemicals (NACE24), machinery (NACE29), office equipment (NACE30), electrical equipment (NACE31), telecommunications and related equipment (NACE32), precision instruments (NACE33), automobiles (NACE34) and aerospace and other transport (NACE35).	R&D expenditures in total manufacturing, in national currency and current prices.	This indicator captures whether a country invests in future technologies (medium-high and high-tech manufacturing industries) or rather in historical industries (medium-low and low-tech manufacturing industries). This follows a recent report published by the JRC (R&D expenditure scoreboard), which highlights that the R&D problem observed in Europe is more a business structure problem. In most sectors R&D intensity is as high in the EU as in the rest of the world, however the relative importance of R&D intensive sectors in the total business is relatively low in Europe.
2.4	Share of enterprises receiving public funding for innovation	Number of innovative enterprises that have received public funding. Public funding includes financial support in terms of grants and loans, including a subsidy element, and loan guarantees. Ordinary payments for orders of public customers are not included. (Community Innovation Survey)	Total number of enterprises, thus both innovating and non-innovating enterprises. (Community Innovation Survey)	This indicator measures the degree of government support to innovation. The indicator gives the percentage of all firms (innovators and non-innovators combined) that received any public financial support for innovation from at least one of three levels of government (local, national and the European Union).
2.5	University R&D expenditures financed by business sector	R&D expenditures in the higher education sector financed by business, in national currency and current prices.	Total R&D expenditures in the higher education sector (HERD), in national currency and current prices.	This indicator measures public private co-operation. University R&D financed by the business sector are expected to explicitly serve the more short-term research needs of the business sector.

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
3.1	SMEs innovating in-house (% of SMEs)	Sum of SMEs with in-house innovation activities. Innovative firms are defined as those who introduced new products or processes either 1) in-house or 2) in combination with other firms. This indicator does not include new products or processes developed by other firms. (Community Innovation Survey)	Total number of SMEs. (Community Innovation Survey)	This indicator measures the degree to which SMEs, that have introduced any new or significantly improved products or production processes during the period 1998-2000, have innovated in-house. The indicator is limited to SMEs because almost all large firms innovate and because countries with an industrial structure weighted to larger firms would tend to do better.
3.2	Innovative SMEs co-operating with others (% of SMEs)	Sum of SMEs with innovation co-operation activities. Firms with co-operation activities are those that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years of the survey period. (Community Innovation Survey)	Total number of SMEs. (Community Innovation Survey)	This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate on the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms and between firms and other firms. The indicator is limited to SMEs because almost all large firms are involved in innovation co-operation.
3.3	Innovation expenditures (% of turnover)	Sum of total innovation expenditure for enterprises, in national currency and current prices. Innovation expenditures includes the full range of innovation activities: in-house R&D, extramural R&D, machinery and equipment linked to product and process innovation, spending to acquire patents and licenses, industrial design, training, and the marketing of innovations. (Community Innovation Survey)	Total turnover for all enterprises, in national currency and current prices. (Community Innovation Survey)	This indicator measures total innovation expenditure as percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas. Overall, the indicator measures total expenditures on many activities of relevance to innovation. The indicator partly overlaps with the indicator on business R&D expenditures.
3.4	Early-stage venture capital (% of GDP)	Venture capital investment is defined as private equity raised for investment in companies. Management buyouts, management buyins, and venture purchase of quoted shares are excluded. Early-stage capital includes seed and start-up capital. Seed is defined as financing provided to research, assess and develop an initial concept before a business has reached the start-up phase. Start-up is defined as financing provided for product development and initial marketing, manufacturing, and sales. Companies may be in the process of being set up or may have been in business for a short time, but have not yet sold their product commercially.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	The amount of early-stage venture capital is a proxy for the relative dynamism of new business creation. In particular for enterprises using or developing new (risky) technologies venture capital is often the only available means of financing their (expanding) business. Note: in order to reduce volatility, the indicator is based on a two-year average.

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
3.5	ICT expenditures (% of GDP)	Total expenditures on information and communication technology (ICT), in national currency and current prices. ICT includes office machines, data processing equipment, data communication equipment, and telecommunications equipment, plus related software and telecom services.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	ICT is a fundamental feature of knowledge-based economies and the driver of current and future productivity improvements. An indicator of ICT investment is crucial for capturing innovation in knowledge-based economies, in particular due to the diffusion of new IT equipment, services and software. One disadvantage of this indicator is that it is ultimately obtained from private sources, with a lack of good information on the reliability of the data. Another disadvantage is that part of the expenditures is for final consumption and may have few productivity or innovation benefits.
3.6	SMEs using non-technological change (% of SMEs)	CIS question 12.1 asks firms if, between 1998 and 2000, they implemented 'advanced management techniques', 'new or significantly changed organizational structures', or 'significant changes in the aesthetic appearance or design in at least one product '. A 'yes' response to at least one of these categories would identify a SME using non-technical change. (Community Innovation Survey)	Total number of SMEs. (Community Innovation Survey)	The Community Innovation Survey mainly asks firms about their technical innovation, Many firms, in particular in the services sectors, innovate through other non-technical forms of innovation. Examples of these are innovation through the introduction of advanced and more efficient management techniques or through the introduction of new and more efficient ways of organization. Evidence on non-technical innovation is scarce. This indicator tries to capture the extent that SMEs innovate through non-technical innovation.
4.1	Employment in high-tech services (% of total workforce)	Number of employed persons in the high-tech services sectors. These include post and telecommunications (NACE64), information technology including software development (NACE72) and R&D services (NACE73).	The total workforce includes all manufacturing and service sectors.	The high technology services both provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy. The latter can increase productivity throughout the economy and support the diffusion of a range of innovations, in particular those based on ICT.
4.2	Exports of high technology products as a share of total exports	Value of high-tech exports, in national currency and current prices. High-tech exports includes exports of the following products: aerospace; computers and office machinery; electronics-telecommunications; pharmaceuticals; scientific instruments; electrical machinery; chemistry; non-electrical machinery and armament (cf. OECD STI Working Paper 1997/2 for the SITC Revision 3 codes).	Value of total exports, in national currency and current prices.	The indicator measures the technological competitiveness of the EU i.e. the ability to commercialise the results of research and development (R&D) and innovation in the international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies is vital for the competitiveness of a country in the modern economy. This is because high technology sectors are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment. The Brussels European Council (2003) stressed the role of public-private partnerships in the research area as a key factor in developing new technologies and enabling the European high-tech industry to compete at the global level.

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
4.3	Sales of new-to-market products (% of turnover)	Sum of total turnover of new or significantly improved products for all enterprises. (Community Innovation Survey)	Total turnover for all enterprises, in national currency and current prices. (Community Innovation Survey)	This indicator measures the turnover of new or significantly improved products, which are also new to the market, as a percentage of total turnover. The product must be new to the firm, which in many cases will also include innovations that are world-firsts. The main disadvantage is that there is some ambiguity in what constitutes a 'new to market' innovation. Smaller firms or firms from less developed countries could be more likely to include innovations that have already been introduced onto the market elsewhere.
4.4	Sales of new-to-firm not new-to-market products (% of turnover)	Sum of total turnover of new or significantly improved products to the firm but not to the market for all enterprises. (Community Innovation Survey)	Total turnover for all enterprises, in national currency and current prices. (Community Innovation Survey)	This indicator measures the turnover of new or significantly improved products to the firm as a percentage of total turnover. These products are not new to the market. Sales of new to the firm but not new to the market products are a proxy of the use or implementation of elsewhere already introduced products (or technologies). This indicator is thus a proxy for the degree of diffusion of state-of-the-art technologies.
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	Number of employed persons in the medium-high and high-tech manufacturing sectors. These include chemicals (NACE24), machinery (NACE29), office equipment (NACE30), electrical equipment (NACE31), telecommunications and related equipment (NACE32), precision instruments (NACE33), automobiles (NACE34) and aerospace and other transport (NACE35).	The total workforce includes all manufacturing and service sectors.	The share of employment in medium-high and high technology manufacturing sectors is an indicator of the manufacturing economy that is based on continual innovation through creative, inventive activity. The use of total employment gives a better indicator than using the share of manufacturing employment alone, since the latter will be affected by the hollowing out of manufacturing in some countries.
5.1	EPO patents per million population	Number of patents applied for at the European Patent Office (EPO), by year of filing. The national distribution of the patent applications is assigned according to the address of the inventor.	Total population as defined in the European System of Accounts (ESA 1995).	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents. This indicator measures the number of patent applications at the European Patent Office.
5.2	USPTO patents per million population	Number of patents granted by the US Patent and Trademark Office (USPTO), by year of grant. Patents are allocated to the country of the inventor, using fractional counting in the case of multiple inventor countries.	Total population as defined in the European System of Accounts (ESA 1995).	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents. This indicator measures the number of patents granted by the US Patent and Trademark Office.

#	EIS 2005 indicators	Numerator	Denominator	Interpretation
5.3	Triadic patent families per million population	Number of triad patents. A patent is a triad patent if and only if it is filed at the European Patent Office (EPO), the Japanese Patent Office (JPO) and is granted by the US Patent & Trademark Office (USPTO).	Total population as defined in the European System of Accounts (ESA 1995).	The disadvantage of both the EPO and USPTO patent indicator is that European countries respectively the US have a 'home advantage' as patent rights differ among countries. A patent family is a group of patent filings that claim the priority of a single filing, including the original priority filing itself, and any subsequent filings made throughout the world. Trilateral patent families are a filtered subset of patent families for which there is evidence of patenting activity in all trilateral blocks (USPTO, EPO, JPO). No country will thus have a clear 'home advantage'.
5.4	Number of new community trademarks per million population	Number of new community trademarks. A trademark is a distinctive sign, which identifies certain goods or services as those produced or provided by a specific person or enterprise. The Community trademark offers the advantage of uniform protection in all countries of the European Union on the strength of a single registration procedure with the Office for Harmonization.	Total population as defined in the European System of Accounts (ESA 1995).	The Community trade mark gives its proprietor a uniform right applicable in all Member States of the European Union on the strength of a single procedure which simplifies trade mark policies at European level. It fulfils the three essential functions of a trade mark at European level: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and is a form of communication, a basis for publicity and advertising. The Community trade mark may be used as a manufacturer's mark, a mark for goods of a trading company, or service mark. It may also take the form of a collective trade mark: properly applied, the regulation governing the use of the collective trade mark guarantees the origin, the nature and the quality of goods and services by making them distinguishable, which is beneficial to members of the association or body owning the trade mark.
5.5	Number of new community designs per million population	Number of new community designs. A registered Community design is an exclusive right for the outward appearance of a product or part of it, resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation.	Total population as defined in the European System of Accounts (ESA 1995).	A design is the the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programs. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States.

Annex Table E: European Innovation Scoreboard 2005 – SII scores over a 3 year period

	SII	T-1	T-2	Growth	Rank SII	Rank T-1	Rank T-2
EU25	0.42	0.42	0.42	0.0			
EU15	0.46	0.47	0.47	-0.2			
BE	0.50	0.50	0.50	0.1	9	8	9
CZ	0.26	0.25	0.25	2.2	25	25	25
DK	0.60	0.62	0.61	-0.7	5	5	5
DE	0.58	0.57	0.57	1.0	7	7	7
EE	0.32	0.31	0.34	-2.5	18	18	18
EL	0.21	0.20	0.20	1.6	29	30	29
ES	0.30	0.31	0.30	-0.6	21	19	19
FR	0.46	0.46	0.46	-0.7	12	12	12
IE	0.42	0.42	0.44	-3.1	15	15	14
IT	0.36	0.35	0.35	1.4	17	17	17
CY	0.28	0.28	0.27	1.7	22	22	22
LV	0.20	0.19	0.19	1.9	30	31	31
LT	0.27	0.25	0.26	2.1	24	24	24
LU	0.44	0.42	0.44	-0.3	14	14	13
HU	0.31	0.28	0.28	4.3	20	21	21
MT	0.20	0.21	0.19	1.2	31	29	30
NL	0.48	0.48	0.48	0.7	10	11	11
AT	0.51	0.50	0.49	2.4	8	9	10
PL	0.23	0.23	0.23	0.3	27	27	27
PT	0.28	0.27	0.27	1.9	23	23	23
SI	0.32	0.30	0.30	3.2	19	20	20
SK	0.21	0.21	0.21	0.2	28	28	28
FI	0.68	0.68	0.67	0.9	3	3	3
SE	0.72	0.74	0.74	-1.5	1	1	1
UK	0.48	0.49	0.51	-2.6	11	10	8
BG	0.24	0.25	0.24	-0.7	26	26	26
RO	0.16	0.16	0.16	-0.2	32	32	32
TR	0.06	0.06	0.06	-4.3	33	33	33
IS	0.45	0.44	0.42	4.0	13	13	15
NO	0.40	0.40	0.40	0.3	16	16	16
US	0.60	0.60	0.60	-0.2	6	6	6
JP	0.65	0.64	0.63	2.0	4	4	4
CH	0.71	0.70	0.70	0.5	2	2	2

SII at T-1 and T-2 computed using 2005 methodology

B - COUNTRY BRIEFS

B.1 EU 25 COUNTRIES

B 1.1 AUSTRIA

1. Introduction

Since Austria joined the EU in 1995, it has made significant strides towards reaching EU levels of R&D activity. Today, Austria's R&D intensity is well above the EU average. A change occurred concerning the funding sources: while the relative share of public sources (Federal/Bundesländer) has decreased over time, the business sector has substantially increased its share. However, Austria has with 19.2% the highest share of firms receiving public funding for innovation. Of note is also the sharp increase of financial inflow from abroad which might also be linked to the generous EU structural funds which provide Austria with 3.6 billion € between 1995-2006.

In terms of other innovation indicators, Austria is since 2000 among the countries moving towards the EU-average and not lagging further behind. Even though improving in relative terms, Austria still ranks relatively low compared to the countries with comparable size and economic performance. The Innovation Scoreboard highlighted six areas where Austria was lagging behind. Taken together, the indicators point to a national system of innovation with deficits in its science base, a low propensity of the private sector to invest in R&D and, more generally, an underdeveloped culture of entrepreneurship. These deficits however should take into account the economic structure and technological patterns of specialisation, which is clearly dominated by SMEs in low R&D intensive sectors.

Austria's innovation performance in the recent past has put the country into a cluster of intermediates - countries such as Belgium, the Netherlands and Germany. In terms of innovation modes Austria resembles strongly the Netherlands and Sweden, and in terms of similar profile of strengths and weaknesses, Austria comes closest to the innovation leaders Finland and Sweden. Compared to Finland, Austria performs poor in terms of new S&E graduates (so do other peer countries such as the Netherlands and Germany), where Finland does exceptionally good.

2. Major challenges and policies

The following challenges have been identified in the 2005 Trend Chart analysis.

Below average levels of tertiary education and new S&E graduates

The number of new S&T graduates as well as the level of individuals with tertiary education in the labour market were below the EU-averages reaching a level of 67% and 84% respectively. In terms of relative performance to the EU25, Austria is catching up in tertiary education but is still further behind in terms of S&E graduates. The issue – in particular the lack of S&E graduates – has been addressed by Austrian policy makers. They see the challenge in an even wider context as there is a general lack of women in the R&D workforce, in academia as well as industry. A particular programme to counteract the negative situation was launched in 2002 by the programme fForte, a, bundle of initiatives to boost the women's share in technical and natural sciences at universities and firms. Furthermore, there are dedicated programmes to fund Doctoral programmes. DOC is available for all areas, while DOC-fForte aims at women in S&E fields.

Austria possibly faces a demographic limit on its ability to increase the supply of S&E graduates (as well as other graduates). Its cohort of 15-19 years old individuals is rather small (only 17th out of 25 EU Member States).

Broadband access and ICT investment

While broadband access and overall ICT investment data in 2004 can be considered slightly above EU-average, the growth rates for both are rather poor, letting Austria falling into the category of losing momentum in both categories. There is no evidence of particular innovation policies addressing this issue.

Percentage of university R&D funded by industry

The lack of a cooperation culture within industry as well as between industry and academia is an issue of concern to policy makers. In fact, the demand to cooperate has been included in the latest programmes and initiatives as a standard request. A number of programmes address the issue such as A plus B (Academia plus Business), a programme to support academic spin offs; Research Studios Austria: the studios process R&D of services firms

in the area of e-technologies, smart content and new media. The cooperation with enterprises guarantees applied results.
Furthermore, the Christian Doppler Research Association (CDG) provides through particular research laboratories at universities early and direct access to new scientific and technical knowledge to its affiliated companies.

3. Policy learning

3.1 Governance

Since the year 2000, Austria's innovation system is in a status of change. The trend of separating policy making and policy implementation has changed the governance of the whole system. While the three ministries in charge of innovation policies focus more and more on the strategic intelligence, the administration of programmes is gradually handed over to agencies. A number of agencies were created by merging existing ones, for example the Austria Wirtschaftsservice which brought together three innovation relevant agencies. While the separation of tasks has reached some considerable simplification, the Austrian policies still lack transparency and coordination and still include duplication; the three ministries act independently of each other when designing and implementing new initiatives and leave it up to the customers to find their way to a fitting programme.

Austria is now using evaluations almost systematically for its programmes. However, evaluation is perceived more or less as legitimating the existence of programmes rather than perceiving it as a learning tool to improve the implementation and allocation of resources. Here, the still strong involvement of policy makers in the implementation of initiatives explains the rather defensive use of evaluations. Most outcomes are still not published or discussed in a wider context. A very rich policy learning opportunity is possibly missed with such an attitude.

Possibly an important role for the national innovation policy was the TIP initiative which did not only bring the three ministries together but a number of external experts and thus was an opportunity to discuss innovation issues across the various decision makers and the different fields of responsibilities. The project NIS-Monit, launched in 2003, followed the TIP platform initiative in order to monitor the evolution and results on coherence and coordination both within innovation policy and between innovation policy and other policy fields.

3.2 Recent policy trends

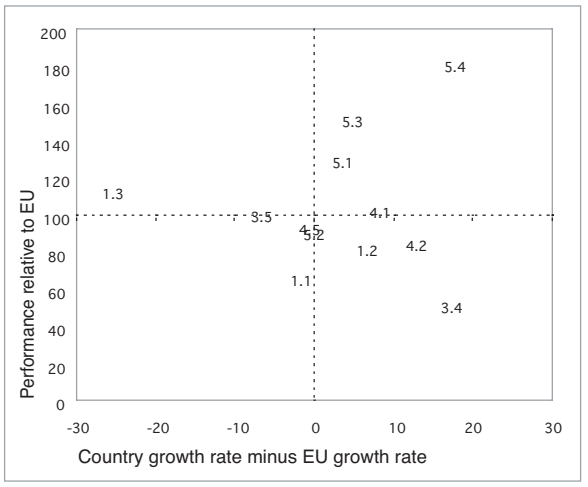
Austria's defined goal is to spend 2.5% of GDP on R&D by 2006 and given the previous growth rates, this goal seems highly realistic. Concerning the target to separate the strategic and operative level of the Austrian innovation system one can observe that progress has been made due to the reorganisations of agencies and their administration of research programmes. However, there remain some unclear competencies of research intermediaries (i.e., the Council for Research and Technology Development) and the abundance of programs of the three ministries persist. Lately, the attention has shifted from the identification of possible 'promotion portfolio gaps' to the reduction of diversity of initiatives which is difficult to monitor.

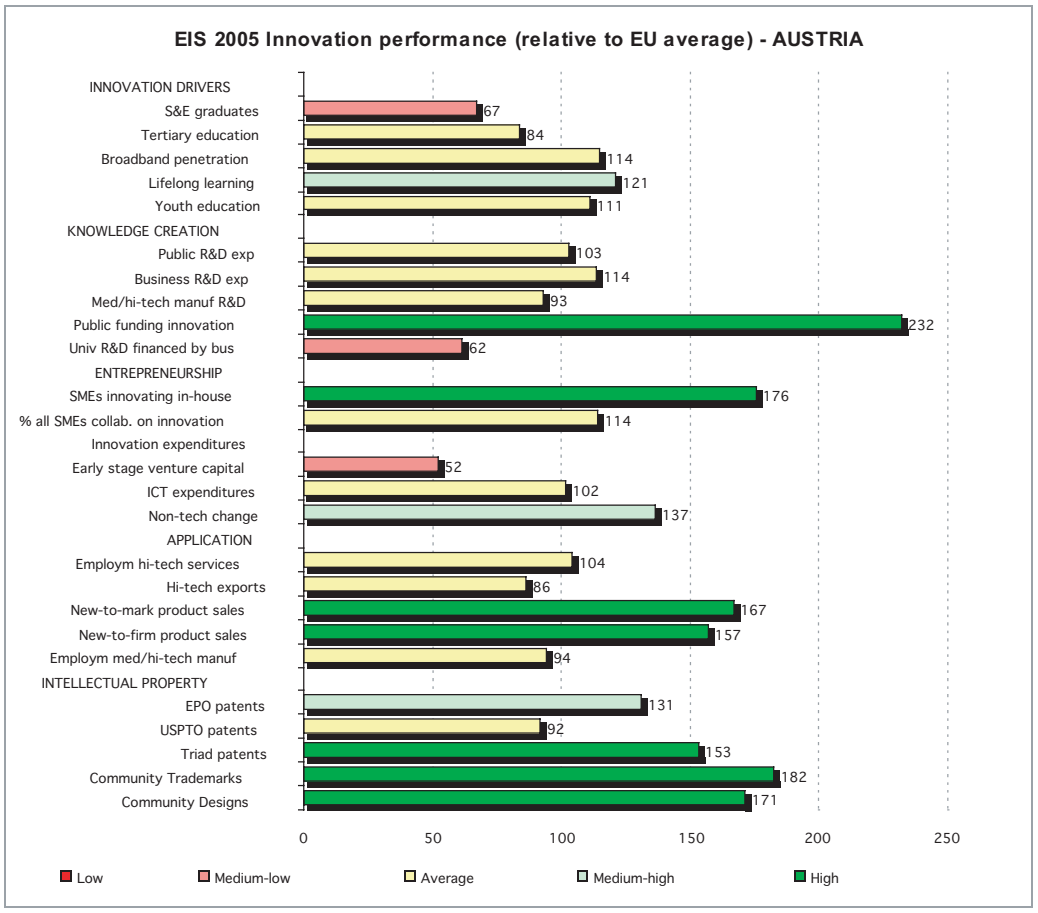
4. Possible orientation for future actions

The age structure of the Austrian population poses already some problems, for example its domestic innovation demand is rather low. A more severe problem might arise for the next generations of S&T graduates and tertiary educated individuals. The domestic supply might not match domestic demand. It might equally hamper a change of the industry structure towards more knowledge-based industries, lower levels of spin-outs etc. According to an Austrian study [mentioned on page ii by h.leo, no further reference], there is no lack of human resources in Austria. While this issue remains a moot point, Austria acknowledges its extremely poor performance in terms of female participation in R&D (which is the lowest in Europe) and rightfully tackles the problem by tailoring dedicated programs such as fForte.

Concerted actions by the three ministries or a clear division of responsibilities could be another line of action in the near future which will bring the needed transparency to the customer – in particular industry.

AUSTRIA - EIS 2005 results





Indicator quality concerns:

Of note, there is a break in series for life long learning (1.4) between 2002 and 2003, which substantially improved Austria's relative performance to other EU countries.

AUSTRIA					(2003)	(2004)	2005	Relative to EU	Trendt	Trend EU
SII	--	--	--	--	0.49	0.50	0.51		2.4	0.0
relative to EU	--	--	--	--	115	117	120			
rank	--	--	--	--	10	9	8			
	1998	1999	2000	2001	2002	2003	2004			
INPUT - Innovation drivers										
S&E graduates	7.9	6.9	7.2	7.3	7.9	8.2	--	67	7	9
relative to EU	--	73	71	66	69	67	--			
Population with tertiary education	8.2	14.0	14.1	14.8	15.7	15.7	18.3	84	11	4
relative to EU	--	--	71	74	77	74	84			
Broadband penetration rate	--	--	--	--	4.7	6.6	8.7	114	24	50
relative to EU	--	--	--	--	--	--	114			
Participation in life-long learning	--	9.1	8.3	8.2	7.5	12.5	12.0	121	--	--
relative to EU	--	--	105	104	94	134	121			
Youth education attainment level	84.4	84.7	84.7	84.1	85.1	83.7	85.3	111	--	0
relative to EU	--	--	--	--	--	109	111			
INPUT - Knowledge creation										
Public R&D expenditures	0.65	--	--	--	0.70	--	--	103	4	2
relative to EU	98	--	--	--	103	--	--			
Business R&D expenditures	1.13	--	--	--	1.42	--	--	114	12	1
relative to EU	97	--	--	--	114	--	--			
Share of med-high/high-tech R&D	--	81.9	80.9	81.7	82.9	--	--	93	1	--
relative to EU	--	92	91	92	93	--	--			
Enterprises receiving public funding			19.2					232	--	--
Business financed university R&D	1.8	--	--	--	4.1	--	--	62	--	1
relative to EU	27	--	--	--	62	--	--			
INPUT - Innovation & entrepreneurship										
SMEs innovating in-house			35.5		44.7			176	--	--
Innovative SMEs co-operating with others			8.8		13.2			114	--	--
Innovation expenditures			--		--			--	--	--
Early-stage venture capital	0.004	0.007	0.018	0.025	0.017	0.013	--	52	-11	-28
relative to EU	--	22	32	41	45	52	--			
ICT expenditures	--	--	6.2	6.3	6.5	6.4	6.4	102	1	7
relative to EU	--	--	95	100	98	100	102			
SMEs using non-technological change			58.0					137	--	--
OUTPUT - Application										
Employment in high-tech services	2.49	2.67	2.79	3.03	3.47	3.32	--	104	8	0
relative to EU	--	--	91	92	107	104	--			
Exports of high technology products	10.1	11.7	14.0	14.6	15.7	15.3	--	86	7	-6
relative to EU	--	59	68	71	86	86	--			
Sales new-to-market products			7.6		7.6			167	--	--
Sales new-to-firm not new-to-market products			22.0		10.6			157	--	--
Med-hi/high-tech manufacturing employment	6.47	6.62	6.77	6.48	6.59	6.21	--	94	-3	-3
relative to EU	--	--	97	93	96	94	--			
OUTPUT - Intellectual property										
New EPO patents	142.3	140.3	158.4	180.3	174.8	--	--	131	9	5
relative to EU	130	119	119	127	131	--	--			
New USPTO patents	49.3	60.4	64.2	72.0	65.4	--	--	92	6	6
relative to EU	81	96	96	100	92	--	--			
New Triad patents	33.5	32.7	34.2	--	--	--	--	153	6	1
relative to EU	146	147	153	--	--	--	--			
New community trademarks	--	--	--	--	89.1	97.4	158.8	182	33	16
relative to EU	--	--	--	--	137	115	182			
New community designs	--	--	--	--	--	101.6	143.6	171	--	--
relative to EU	--	--	--	--	--	149	171			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.2 BELGIUM

1. Introduction

Recent trends in Belgium economic performance are broadly positive, however most national and international forecasts predict that Belgian growth cannot be sustained at high enough rates in the future to avoid the reappearance of public deficits. Most analysts agree that in order to keep public deficits under control while maintaining a high-quality system of social protection in the face of an ageing population, there must be a considerably greater investment in innovation. This is particularly the case as there is a long-term trend to declining productivity growth that is threatening Belgian's future competitiveness. In short, the Belgian authorities must take action to **strengthen the dynamic of growth through innovation and productivity improvements.**

Belgium's overall innovation performance, based on the Summary Innovation Index (SII) for 2005 is positive, ranking 6th overall out of the EU25. However, Belgium seems unable to reap the full benefits of the high levels of R&D and innovation expenditure and activity in the business sector in terms of innovation outputs, and there is also a gap between scientific knowledge production and commercialisation suggesting insufficient collaboration between the non-profit (public and higher education) research activity and the enterprise sector. The country is also falling behind in over half of the EIS indicators for which trend data is available.

2. Major challenges and policies

The following challenges for Belgium have been identified on the basis of the 2005 EIS and the Trend Chart policy analysis.

Weak position in indicators concerning the application of knowledge

Belgium performs well compared to most other EU25 countries on a range of indicators related to the intensity of business R&D expenditure and innovation activity. However, findings on the patterns of innovation activity in Belgium point clearly to structural weaknesses in Belgian enterprise sector in terms. Belgium industry is positioned towards the export of intermediate goods and allied to the low rates of entrepreneurship (including research spin-offs), this results in Belgium performing poorly in terms of employment in high-tech manufacturing and high-tech exports. Moreover, there is a high concentration of both investment (business expenditure, number of R&D active firms) and outputs (patenting concentrated in a few larger companies often foreign owned), allied to significant geographical and sectoral disparities, in innovation activity.

Policy makers in all three regions need to address this 'innovation deficit' in a concerted fashion. However, research tends to suggest that the impact of public policies in favour of business R&D has been to increase the number of firms involved in some form of innovation activity but not to overcome the problem of a concentration of activity in a limited number of firms and localities. All governments have planned or introduced additional measures to widen the range of companies involved in R&D and innovation during 2005 (see recent policy trends below).

Insufficient public investment in R&D

The share of GDP allocated to public R&D expenditure has remained essentially unchanged in Belgium since 1998 (varying between 0.55 and 0.57%) and the relative position of Belgium vis-à-vis the EU25 has declined from 86% to 81% of the EU average. This level of investment is insufficient to sustain longer-term knowledge base particularly given negative trend for business R&D expenditure witnessed recently. Belgium faces a significant challenge of increasing relatively low public R&D expenditures allied to a need to better exploit relatively good scientific outputs (which however are not necessarily aligned enough with the Belgian economies competitive strengths).

The Belgian authorities have recognised these challenges in their various policy declarations with a commitment by all the Belgian authorities to meet the 3% objective (reiterated in the recent Lisbon Action Plan), however a High-Level Expert Group '3% Belgium' concluded in 2005 that Belgium was unlikely to meet this target by 2010. The challenge is therefore recognised but there remains a gap between rhetoric and implementation which so far as only been tackled by a limited number of measures (e.g. reduced social charges for researchers, etc).

Relative decline in Science and engineering graduates and improving but below average participation in life-long learning

The trends concerning these two indicators are a problem in all three regions given need to sustain competitiveness (given the extremely high labour costs in Belgium) through raising further productivity and avoiding skills-matches in the labour force. The position of Belgium in terms of the potential and capacities of the workforce to contribute to innovation is mixed, with good positions in terms of general level of education of the population and labour productivity, contrasting with weak relative showing in terms of

S&E graduates and investment in life-long learning. The need for urgent action to counter declining productivity growth rates (due to a structural shift in employment towards the service sector) are allied to the need to invest more and more effectively in improving science, technology and engineering skills. Indeed, the recent HLG 3% Belgium report underlined that Belgium is faced with a significant disadvantage due to the high relative labour costs and the lower net salaries of skilled scientific personnel in both non-profit organisations and private organisations.

In terms of life-long learning, Belgium has moved in the last year towards catching up to the EU25 average. Certainly, the Governments of the Communities/Regions, notably in Flanders, are paying greater attention to the issue of life-long learning since 2000. While there are a number of measures (grants and taxation incentives) for recruiting and employing scientific personnel in Belgium, a concerted and sustained effort to promote scientific and technological careers is still not assured and the issue has yet to gain really high prominence in the political agenda. The regional governments do sponsor science education initiatives (including science centres and TV shows) as well as open days, science weeks, etc. However, there is a lack of in-depth evaluation of the effects on career orientations.

aspects of innovation policy are therefore the sole competence of the regions. However, various Federal-regional agreements and committees do exist to provide for appropriate coordination, notably on statistics.

The main identified weaknesses or threats facing the innovation governance system in Belgium include:

- *Lack of strategic policy making framework concerning innovation policy (in Brussels and Wallonia)*
- *Poor exploitation of innovation survey results (e.g. CIS) in policy-design (particularly Brussels and Wallonia);*
- *Over-complex and burdensome institutional and governance structures, notably in the bilingual and French-speaking areas (respectively Brussels and Wallonia);*
- *Continued pressure to reduce public expenditure with impact on resources available for strategic policy-making and new measures;*
- *Trend to fragmentation of innovation system with risk of duplication or overlap in functions and lack of critical mass;*
- *Local elections in 2006 are likely to lead to either political immobility or short-term 'high-profile' decisions governed by electoral factors.*

3. Policy learning

3.1 Governance

Belgium is a Federal State composed of communities and regions. In practice, this means that the three regions (Brussels-Capital, Flanders and Wallonia) have competence over almost all policy levers influencing innovation activity in enterprises *(with the exception of fiscal powers and some aspects of intellectual property rights policy which are retained by the Federal State).*

At the political level, it is the Minister with the competence for economy that is responsible for innovation matters in each of the four governments. In none of the four cases is there a specific "innovation policy council", however in Flanders and Wallonia, the science policy councils tend to have a broader remit and be involved in consultations on policies in the innovation field. At the level of execution of policies, two of the regions have chosen to separate policy making and supervision functions from implementation of policies by the creation of agencies (in Brussels and Flanders). In terms of mechanisms for the coordination of innovation policy between the Federal and regional levels, it should be noted that technically there is no hierarchy of power and that most

3.2 Recent policy trends

Following regional parliamentary elections in 2004, the period since September 2004 has been one of a settling in of the new Governments with work being undertaken on medium term (up to 2010) economic policy frameworks. A number of new plans have been or are being drafted by the regional government's that either directly (Flanders) or indirectly (Brussels and Wallonia) concern innovation policy matters. It is to be expected that these plans will begin to be implemented as of September 2005.

At Federal level, in April 2005, the Federal Government decided to create an "Ideas Fund" which will be open to contributions from the private sector. The Government has made an initial amount of 150 MEUR available and it is expected that the regions and communities will make available additional funds via drawing rights (leading to a total fund of 500 MEUR). The objective is to encourage investment in order to encourage innovative enterprises and keep Belgium at the forefront of the knowledge economy. It is not yet clear how the fund will be managed or when it will become operational but it could clearly be a major contribution to increasing the knowledge intensity of the economy.

No new innovation policy measures have been

implemented in Brussels-Capital region since mid-2004, however, the Contract for the Economy and Employment foresees focusing innovation policy on three main innovative sectors in the region.

In Wallonia, a number of possible new measures were foreseen in a Strategic Plan Creation of Activity. An Action Plan for the future of Wallonia was adopted end August 2005 providing a financial framework for the implementation of a range of priority actions including support for start-ups and the launch of a number of new competitiveness poles. Overall funding for research and innovation in the region will increase by some 260 MEUR per year from 2006.

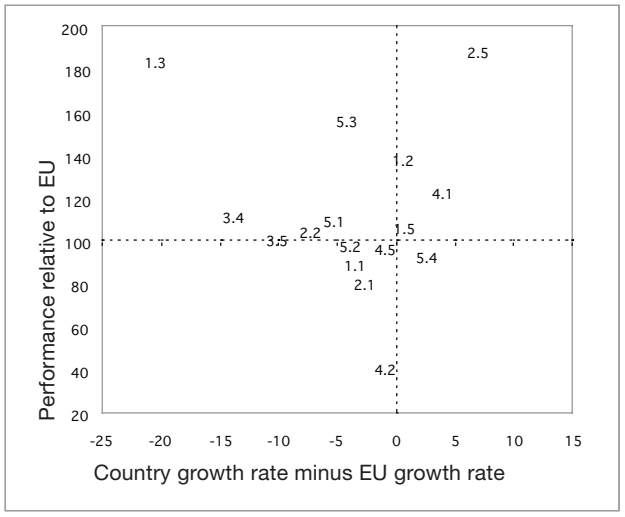
The most important addition to the Flemish policy measures is the establishment of the VINNOF, the Flemish Innovation Fund which will have a budget of 75 MEUR (BE 73). This pre-seed and seed facility will support young innovative companies to transform their ideas into business Another new instrument is the IOF (BE 76, 12 MEUR for 2004/5) which is meant to gear university research more towards industrial applications. The budget of each university is determined by it's track record in valorisation of research (number of patents and of spin off companies). Other, complementary measures are under development (expected to start during the second semester 2005) are the new NRC-Fund, which is aimed at financing support for one-time company expenditures connected with innovation.; the ARKimedes fund (for gearing private (risk) capital towards starting/growing companies and a policy framework for supporting large competence centres in specific technology fields. In the science field the Odysseus programme, aimed at encouraging top researchers to come (back) to Flanders will be established in 2005.

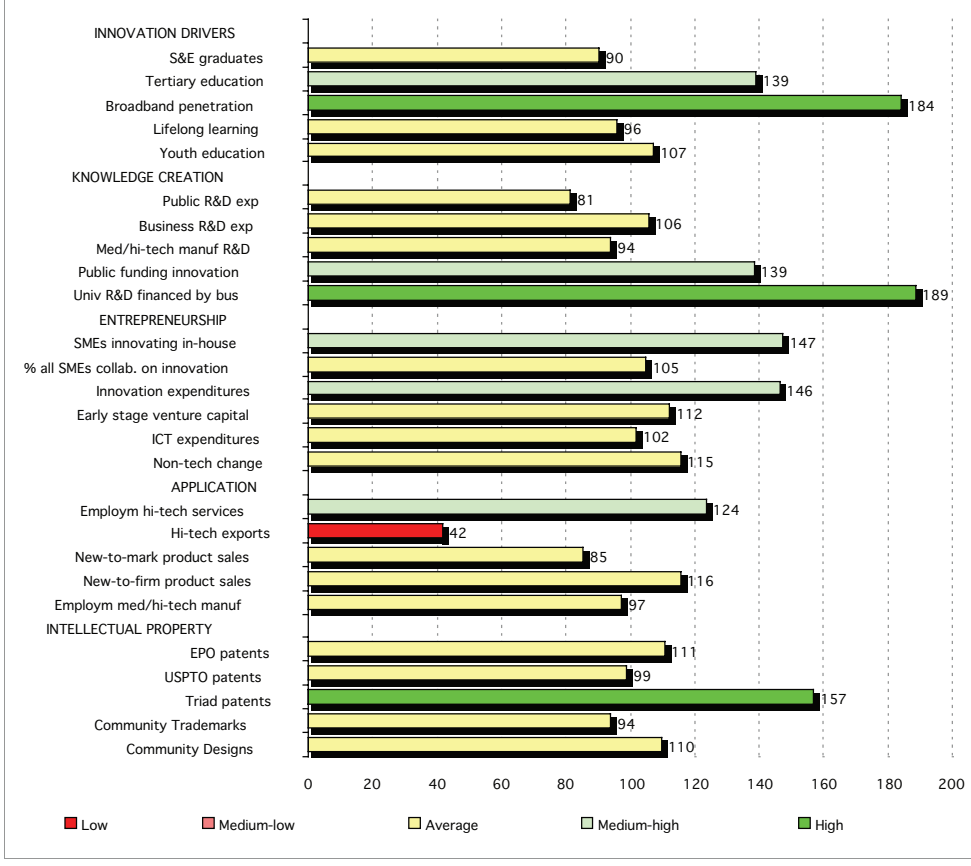
4. Possible orientation for future actions

Reversing the negative trend in business expenditure on R&D could be facilitated by a review of the current fiscal measures aimed at stimulating R&D. Various proposals made since 2000 to improve the impact of such incentives have not been followed up on.

The example of longer-term technology programmes from Finland which have succeed in involving a large number of SMEs in R&D programmes with other actors in the innovation system could be one way of over-coming the problem of a concentration of research activity in a few larger firms.

BELGIUM - EIS 2005 results





Indicator quality concerns:

There is a high level of volatility in the indicator for life-long learning from year to year, due to two breaks in the data series. EPO patent activity fell by 8% between 2001 and 2002, but this is unlikely to be due to a problem with the data because the fall in patenting is international and affects both EPO and USPTO patenting rates. Conversely, new community designs increased by 36.3% between 2003 and 2004, but this reflects large increases across many countries, as firms become familiar with the community design registration process.

	BELGIUM					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.50*	*0.50*	*0.50*		*0.1*	*0.0*
	relative to EU	--	--	--	--	*117*	*118*	*117*			
	rank	--	--	--	--	*9*	*8*	*9*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	--	--	*9.7*	*10.1*	*10.5*	*11.0*	--	*90*	*5*	*9*
	relative to EU	--	--	*95*	*92*	*92*	*90*	--			
1.2	*Population with tertiary education*	*25.3*	*25.7*	*27.1*	*27.6*	*28.1*	*29.0*	*30.4*	*139*	*5*	*4*
	relative to EU	--	--	*135*	*138*	*138*	*136*	*139*			
1.3	*Broadband penetration rate*	--	--	--	--	*6.7*	*10.1*	*14.0*	*184*	*29*	*50*
	relative to EU	--	--	--	--	--	--	*184*			
1.4	*Participation in life-long learning*	*4.4*	**6.9**	*6.8*	*7.3*	*6.5*	*8.5*	**9.5**	*96*	--	--
	relative to EU	--	--	*86*	*92*	*81*	*91*	**96**			
1.5	*Youth education attainment level*	*79.6*	**76.2**	*80.9*	*79.4*	*81.1*	*81.3*	*82.1*	*107*	*1*	*0*
	relative to EU	--	*102*	*106*	*104*	*106*	*106*	*107*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.55*	*0.56*	*0.56*	*0.57*	*0.56*	*0.56*	--	*81*	*0*	*2*
	relative to EU	*83*	*86*	*85*	*85*	*82*	*81*	--			
2.2	*Business R&D expenditures*	*1.35*	*1.40*	*1.48*	*1.60*	*1.40*	*1.33*	--	*106*	*-6*	*1*
	relative to EU	*116*	*116*	*121*	*128*	*112*	*106*	--			
2.3	*Share of med-high/high-tech R&D*	*78.9*	*82.2*	*81.6*	*83.8*	--	--	--	*94*	*2*	--
	relative to EU	*89*	*92*	*92*	*94*	--	--	--			
2.4	*Enterprises receiving public funding*			*11.5*					*139*	--	--
2.5	*Business financed university R&D*	*11.1*	*10.5*	*11.8*	*12.7*	--	--	--	*189*	*8*	*1*
	relative to EU	*174*	*161*	*181*	*189*	--	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*38.3*		--			*147*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*9.6*		--			*105*	--	--
3.3	*Innovation expenditures*			*2.65*		--			*146*	--	--
3.4	*Early-stage venture capital*	*0.039*	*0.077*	*0.099*	*0.073*	*0.041*	*0.028*	--	*112*	*-42*	*-28*
	relative to EU	--	*264*	*174*	*122*	*109*	*112*	--			
3.5	*ICT expenditures*	--	--	*6.7*	*7.0*	*6.7*	*6.4*	*6.4*	*102*	*-3*	*7*
	relative to EU	--	--	*103*	*111*	*102*	*100*	*102*			
3.6	*SMEs using non-technological change*			*49.0*					*115*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.45*	**3.22**	*3.60*	*4.08*	*4.18*	*3.94*	--	*124*	*4*	*0*
	relative to EU	--	--	*117*	*124*	*129*	*124*	--			
4.2	*Exports of high technology products*	*7.1*	**7.9**	*8.7*	*9.0*	*7.5*	*7.4*	--	*42*	*-7*	*-6*
	relative to EU	--	*40*	*42*	*44*	*41*	*42*	--			
4.3	*Sales new-to-market products*			*5.1*		--			*85*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*13.9*		--			*116*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*7.24*	*7.20*	*6.90*	*6.57*	*6.68*	*6.42*	--	*97*	*-3*	*-3*
	relative to EU	--	--	*99*	*94*	*98*	*97*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*140.0*	*145.1*	*157.7*	*160.9*	*148.1*	--	--	*111*	*0*	*5*
	relative to EU	*128*	*123*	*118*	*113*	*111*	--	--			
5.2	*New USPTO patents*	*68.6*	*64.3*	*69.1*	*71.9*	*70.4*	--	--	*99*	*2*	*6*
	relative to EU	*112*	*102*	*104*	*100*	*99*	--	--			
5.3	*New Triad patents*	*38.0*	*35.8*	*35.1*	--	--	--	--	*157*	*-3*	*1*
	relative to EU	*165*	*161*	*157*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*58.1*	*92.5*	*81.6*	*94*	*18*	*16*
	relative to EU	--	--	--	--	*89*	*109*	*94*			
5.5	*New community designs*	--	--	--	--	--	*67.6*	*92.2*	*110*	--	--
	relative to EU	--	--	--	--	--	*99*	*110*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.3 CYPRUS

1. Introduction

Cyprus is an economically rather well-performing service economy but its innovative performance is well below the EU average, ranking 17th out of the 25 EU member states on the SII and 22nd out of 33 countries. Serious weaknesses include human capital indicators, employment in high tech and exports and most intellectual property indicators. Because of the nature of the economy the low share of employment in high tech services is worrying. Despite some serious data limitations it is clear that there are a few areas of strength, since the tertiary education, the percentage of innovative firms that receive public support for innovation and the community trademark applications are above average. Cyprus is also performing particularly well on all innovation and entrepreneurship input indicators but the corresponding bad performance in output indicators suggests productivity weaknesses. While clustering innovation indicators does not suggest any peers, the usual bench¬marks for Cyprus are Malta and the Baltic Republics because of their size and time of accession to the EU. Compared with them Cyprus is doing rather well. The most encouraging conclusion emerges from the highest number of EIS indicators being in the "catching up" category with only S&E graduates and new EPO patents further falling behind.

2. Major challenges and policies

Promotion of R&D and innovation and facilitation of ICT diffusion is among the priorities of the Lisbon agenda in Cyprus. However, the operationalisation of this strategy seems to be still lagging behind.

There are four serious challenges considered important and reversible in the medium term for the Cypriot policy; because of the nature of the economy and the state of overall innovation performance, intellectual property is not treated as a crucial weakness, since it cannot be expected to be seriously affected by policy measures in the near future.

Additional challenges considered by the government in the framework of the Lisbon strategy refer to the creation of a critical mass of researchers in the country, the internationalisation of research and the improvement of the infrastructure.

S&E graduates

This is a very serious drawback of the innovation process, since Cyprus ranks 30th out of 33 countries. Although overall the population has a well above average share of tertiary education graduates, scientists and engineers account only for 30% of the EU average. The business sector appears worried about this weakness and is actively involved in the design of educational priorities.

The problem is recognised by the policy makers and the Ministry of Education and Culture promoted the establishment of new engineering departments in the University of Cyprus, as well as the establishment of a Technical University, which is expected to begin operations. However, given the time necessary for the first graduates to enter the labour market this challenge is bound to remain a bottleneck for the years to come.

Public R&D expenditure

Public R&D expenditure is too low positioning Cyprus in the 28th rank. Besides, funds are widely dispersed, hence unable to create the critical mass, which would contribute to science-based innovation performance in selected areas. However, even if very slowly, the country is catching up with the EU average. The main source of the public sector financing are the government budget, the University of Cyprus budget and the funds distributed by the Research Promotion Foundation (RPF), an autonomous organisation playing the role of a Research Council. Hence, the main instruments supporting public R&D are the budget appropriations for individual ministries, the RPF, the university and other research establishments and the RPF budget. While research is formally included in the priorities of economic policy, there is no evidence of an overall quantitative target and a systematic pursuit of the Barcelona objective. However, there are some recent indications that there will be more focus on specific areas, which should constitute priority (health service research) and this may be an opportunity to direct more funds towards public R&D spending. Efforts towards increasing BERD and making the whole system more effective appear to have priority over a genuine public expenditure increase.

BERD and Venture Capital

Business expenditure constitutes only 0,08% of GDP, positioning in this particular indicator Cyprus 32nd among the 33 countries considered. Being behind all peers and new member states indicates a need for immediate action. This challenge is well understood by the government, which is putting the necessary emphasis in the Lisbon process. But the structure of the economy and the perception of the business sector does not allow for rapid progress. Business units are small and family-run. Industry contribution

to GDP is 21% and the main industrial sectors are food, beverage, textiles, chemicals, metal products and wood processing.

Although Cyprus appears to be catching up, this is due to its very low initial position rather than a considerable and rewarding effort. Despite recent focus of R&D and innovation policy on the business sector, the market is not yet responding. There seems to be a vicious circle, since the business sector does not see an opportunity in the incentives offered and at the same time it fails to provide pressure towards market oriented R&D, hence the limited research activity is mainly focused on basic research.

The government is well aware of this problem and orients many measures either directly towards to support of business R&D or to the exploitation of research results in order to indicate potential high return on research investments. Such measures are: National support for Eureka participation (CY 28), Research for Enterprises Actions (CY 25) and inclusion of enterprises in the support programmes of the Research Promotion Foundation. Indirect promotion through the support of research exploitation constitute the measures CY 27 Young Entrepreneurship, CY 26 Follow-up Scheme for increasing the availability of innovative infrastructures to facilitate knowledge exchange and product/service development by enterprises plus the increase the rate of commercialisation/marketing of the results of innovation activity and CY 23 Support to female entrepreneurship.

Given the marginal size of business R&D it does not come as a surprise that, despite the well developed financial services sector in Cyprus, there is virtually no early stage venture capital on the island.

Innovation promotion in the service sector

The Cypriot economy is service-oriented and 67% of its population is employed in services, mainly leisure tourism and banking. The sector has performed well and contributed to a rapid increase of GDP. However, employment in high-tech services is only 63% of the EU average, positioning the country 25th out of 33. As the service sector is performing well there is no identifiable effort in terms of policy intervention to further stimulate and modernise it. On the contrary, in the context of innovation promotion in the Lisbon Programme the Cypriot government appears to strongly prioritise the manufacturing sector.

3. Policy learning

3.1 Governance

The Cyprus innovation governance system has a relatively limited experience of policy makers and a lack of institutionalised co-ordination mechanisms. However, because of the small size of the country, which is favourable to effective informal interaction and the tradition of effective overall Anglo-Saxon policy making, it exhibits a relatively high degree of effectiveness in all stages of the policy-making cycle. The responsibilities for the implementation of the different parts of innovation policy are distributed to a small number of policy actors, while the relatively simple structures of the governance system allow for the horizontal co-ordination of actors through less formal procedures, partnerships or consultations.

The current major challenge is to adapt to the EU threats and opportunities and to respond to broader challenges, going beyond individual measures into a comprehensive, targeted long term policy. In general, the Cyprus governance system was so far characterised by less formal, though effective policy making and implementation structures, but it is questionable whether or not this model will continue to be effective under the new policy mix.

3.2 Recent policy trends

There were no really new measures adopted in innovation policy in Cyprus in the year 2005. This was due partly to other political priorities, which have absorbed the energy of the government, but also to the fact that there was an early adoption of the necessary changes to cope with competition policy, as well as innovation policy challenges and opportunities in the EU. A broad number of programmes were adopted in the previous years and new organisations were created in the context of the Strategic Development Plan 2004-2006 decided in April 2003.

The year 2005 can be characterised as a phase of consolidation and continuity. New action plans will be launched in order to fulfil the entire set of innovation policy objectives foreseen by the Strategic Development Plan 2004-2006. So far none of the new measures has been launched.

4. Possible orientation for future actions

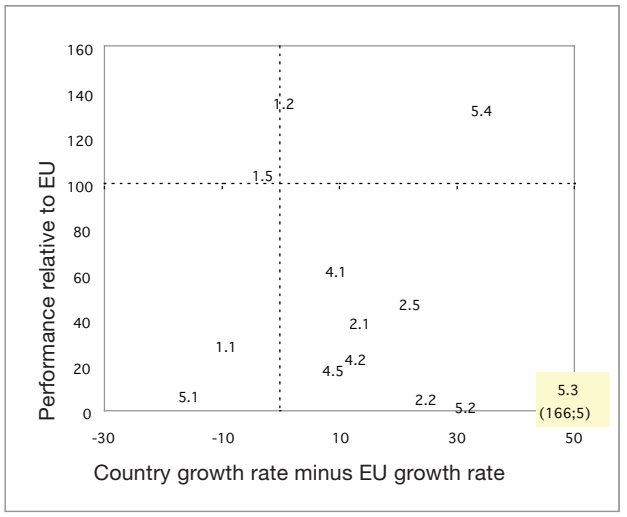
While a number of organisations and measures are put in place and are fairly effectively pursued, the overall size and focus of innovation policy remain unable to create a holistic approach. It is important in the future to:

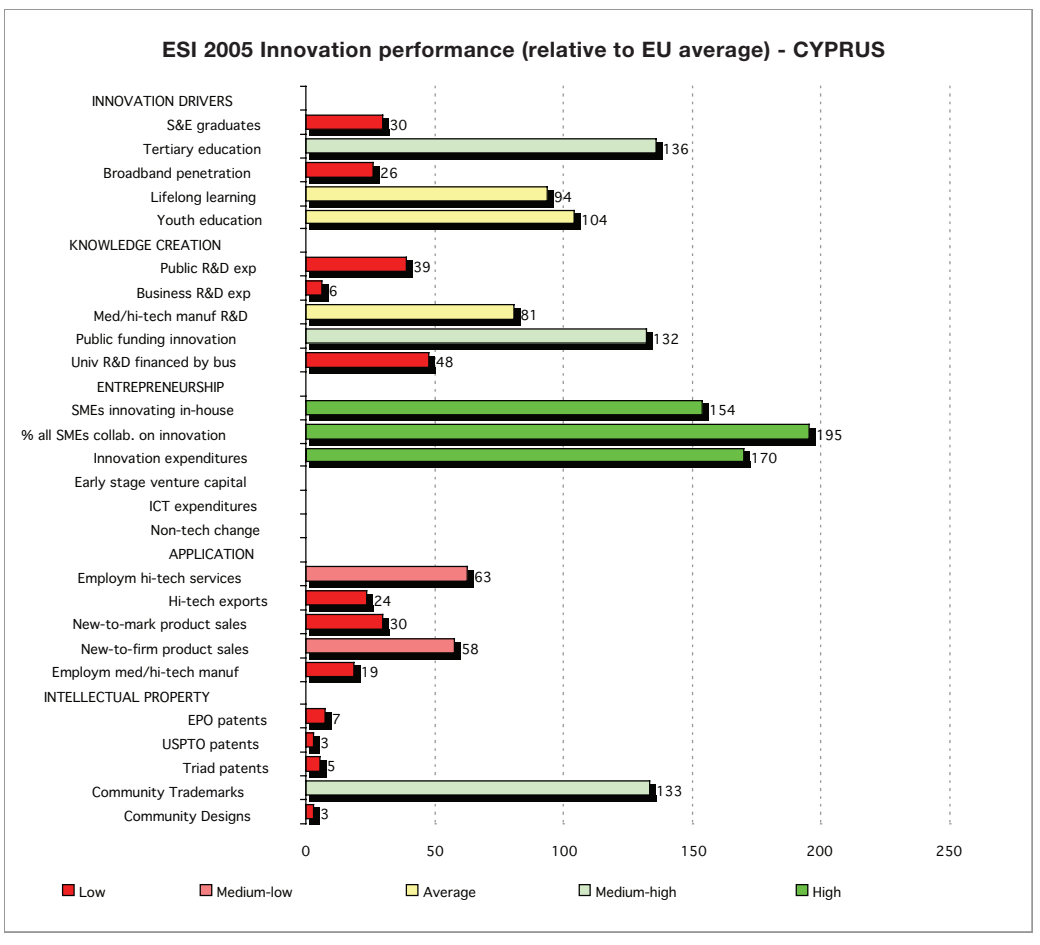
1. Organise a debate about the quantitative targets of GERD, BERD and innovation expenditure and possibly adopt, after the active consultation with stakeholders, a white paper for innovation.

2. Involve the business sector more in innovation policy design.

The Lisbon agenda recognises the relevance of innovation and adopts the necessary guidelines, but it seems that the priorities are too many and of a general nature, possibly not taking sufficiently into consideration the specificities of the national economy, i.e. its small size and the need to pool resources as much as possible, plus the role played by the service sector.

CYPRUS





Indicator quality concerns:

Several of the indicators are highly volatile. There is also a break in the series for the indicator for lifelong learning (1.4) and the youth education attainment level (1.5). The indicator for total innovation expenditures appears to be unrealistically high given the exceptionally low level of investment in business R&D.

	CYPRUS					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.27*	*0.28*	*0.28*		*1.7*	*0.0*
	relative to EU	--	--	--	--	*64*	*66*	*67*			
	rank	--	--	--	--	*22*	*22*	*22*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	--	*3.8*	*3.4*	*3.7*	*3.8*	*3.6*	--	*30*	*0*	*9*
	relative to EU	--	*40*	*33*	*34*	*33*	*30*	--			
1.2	*Population with tertiary education*	--	*23.1*	*25.1*	*26.8*	*29.1*	*29.5*	*29.8*	*136*	*5*	*4*
	relative to EU	--	--	*126*	*134*	*143*	*138*	*136*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*2.0*	*26*	--	*50*
	relative to EU	--	--	--	--	--	--	*26*			
1.4	*Participation in life-long learning*	--	*2.6*	*3.1*	*3.4*	*3.7*	**7.9**	*9.3*	*94*	--	--
	relative to EU	--	--	*39*	*43*	*46*	**85**	*94*			
1.5	*Youth education attainment level*	--	*83.4*	*83.0*	*84.2*	*85.3*	*82.2*	*80.1*	*104*	*-2*	*0*
	relative to EU	--	*111*	*109*	*110*	*112*	*107*	*104*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.20*	*0.19*	*0.20*	*0.21*	*0.25*	*0.27*	--	*39*	*16*	*2*
	relative to EU	*30*	*29*	*30*	*31*	*37*	*39*	--			
2.2	*Business R&D expenditures*	*0.03*	*0.05*	*0.05*	*0.05*	*0.06*	*0.08*	--	*6*	*26*	*1*
	relative to EU	*3*	*4*	*4*	*4*	*5*	*6*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	*65.0*	*60.0*	*71.9*	--	--	*81*	--	--
	relative to EU	--	--	*73*	*67*	*81*	--	--			
2.4	*Enterprises receiving public funding*			*11.0*					*132*	--	--
2.5	*Business financed university R&D*	*2.6*	*2.4*	*1.7*	*1.7*	*3.1*	*2.9*	--	*48*	*23*	*1*
	relative to EU	*41*	*36*	*26*	*25*	*48*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			--		*39.2*			*154*	--	--
3.2	*Innovative SMEs co-operating with others*			*22.7*		*22.6*			*195*	--	--
3.3	*Innovation expenditures*			*1.39*		*2.55*			*170*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	--	--	--	--	--	--	--	*7*
	relative to EU	--	--	--	--	--	--	--			
3.6	*SMEs using non-technological change*			--					--	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	--	*1.47*	*1.67*	*1.83*	*1.90*	*2.00*	--	*63*	*10*	*0*
	relative to EU	--	--	*54*	*56*	*59*	*63*	--			
4.2	*Exports of high technology products*	--	*4.0*	*3.0*	*4.0*	*3.5*	*4.2*	--	*24*	*7*	*-6*
	relative to EU	--	*20*	*15*	*20*	*19*	*24*	--			
4.3	*Sales new-to-market products*			*1.0*		*1.4*			*30*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*3.8*		*3.9*			*58*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	--	*1.08*	*1.16*	*1.03*	*1.11*	*1.24*	--	*19*	*7*	*-3*
	relative to EU	--	--	*17*	*15*	*16*	*19*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*13.3*	*13.2*	*10.1*	*20.0*	*9.9*	--	--	*7*	*-10*	*5*
	relative to EU	*12*	*11*	*8*	*14*	*7*	--	--			
5.2	*New USPTO patents*	*0.8*	--	*1.5*	*1.5*	*2.1*	--	--	*3*	*38*	*6*
	relative to EU	*1*	--	*2*	*2*	*3*	--	--			
5.3	*New Triad patents*	*0.0*	*1.5*	*1.2*	--	--	--	--	*5*	*167*	*1*
	relative to EU	*0*	*7*	*5*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*51.3*	*88.7*	*116.2*	*133*	*50*	*16*
	relative to EU	--	--	--	--	*79*	*105*	*133*			
5.5	*New community designs*	--	--	--	--	--	*31.0*	*2.8*	*3*	--	--
	relative to EU	--	--	--	--	--	*45*	*3*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data.

B 1.4 CZECH REPUBLIC

1. Introduction

The Czech economy has grown quickly over the last 4 years. In 2004 the GDP grew by 4%, which is the highest since 2000. It is, however, still below growth levels recorded by many of other new EU member states e.g. Baltic States and Slovakia or Poland. Czech economic performance has a sound basis – industrial production and labour productivity show a steady increase and trade balance has been developing positively. Foreign direct investment (FDI) in the economy continues to play an important role, notably in medium to higher technology manufacturing or service activities. On the negative side, unemployment is on the rise mounting to 8.3% in 2004, which is still below EU average (9%). This is, however, a phenomenon typical for economies undergoing structural change.

The Czech Republic ranks well below the EU average on the Summary Innovation Index (SII), with a rank of 20th out of 25 EU member states. According to the Summary Innovation Index (SII) of the European Innovation Scoreboard (EIS) 2004 the Czech Republic falls into the category "falling further behind" together with Austria, Estonia and Italy. Its worst performance is on innovation drivers. The Czech Republic shows very low performance in indicators related to patenting, the number of S&E graduates, innovation expenditures, venture capital and new-to-firm products.

The relative strengths of the Czech Republic are in innovation applications and the indicator for innovation demand. The good performance for applications is due to above EU average shares for employment in medium-high and high technology manufacturing and average shares of employment in high-technology services. The country also has a very positive trend in high tech exports. Good results for applications despite poor performance in knowledge drivers and knowledge creation could be linked to FDI inflow and technology transfer.

The trends for both public and business R&D are positive and above the EU average trend. In terms of business R&D the Czech Republic outperforms all other new EU member states with exception of Slovenia. The country's overall trend performance is, however, poor.

2. Major challenges and policies

The overall challenge for the Czech Republic is to raise wealth by investing more and more effectively in its innovation system. In recognition of this challenge the adoption the government adopted the National Innovation Policy for the period 2005-2010. Following challenges have been identified as the most relevant:

Inadequate supply of human resources for innovation

The three 'supply' indicators for human resources belonging to innovation drivers are far below the EU average (S&E graduates – 52% of the EU average, tertiary education – 56%, lifelong learning - 64%). The population with a tertiary education has increased very slowly, but has declined in relation to the EU average. The Czech Republic had less than 60% percent of the average number of researchers in the EU in 2003. The worst situation is in the business enterprise sector (50% of the EU25 average) and in the higher education sector (43%). The low number of researchers and the slow increase in their numbers may be attributed to low salaries of scientific workers at universities and research institutes resulting in a brain drain.

This challenge is to be addressed by the National Innovation Policy (2005-2010) and it is dealt with in the government policy document "Strategy for Human Resources Development" (prepared already in February 2003). A schedule for its implementation was to be submitted to the Government for approval in August 2005. Measures and actions foreseen include e.g. launching special programmes focused on generating the required number of graduates in the R&D relevant disciplines and improving conditions for teaching and research in S&E fields.

Improve the links between business and universities

Low business contributions to HERD can be considered an indicator of limited cooperation between private companies and universities. Weak cooperation between business and science, especially as regards jointly funded projects, is considered a general drawback of Czech innovation system. It should be remembered, however, that it is an inherent problem of all post-socialist countries.

The government addressed this challenge with sev-

eral measures. TANDEM (CZ 16) focuses on cooperation between research institutes and business entities in R&D. It offers assistance to enterprises that carry out projects of basic and industrial research in collaboration with research institutes. As a condition for financing it has to be contractually agreed that the results of the project will be used in connected projects of industrial research and development that will lead to new products, technologies and materials. The demand for support under this programme exceeded the means of the available budget. IMPULS (CZ 17) assists both businesses and research institutions proposing projects of industrial research and development with tangible results capable of bringing financial benefits from an immediate commercialisation. The programme is very popular with enterprises, SMEs in particular. 225 projects were supported, the first results of which will be put into production in 2006.

The latest developments are related to the Operational Programmes (2004-2006) co-financed by the EU Structural Funds. Individual programmes and schemes within the OP Industry and Enterprise provide support especially to SMEs and their links with other actors of innovation system, e.g. KLASTRY (CZ 26) supports projects establishing and developing clusters on both regional and supra-regional level. There were very few project proposals submitted for this measure probably due to somewhat unrealistic requirements (e.g. the minimum number of 15 participating entities). Moreover, the willingness of both companies and research institutions to find the common ground and then invest money in projects that do not bring immediate tangible results seems to be limited. The programme is currently amended, which should improve its user-friendliness and increase the number of applications.

- Low public and business R&D expenditures

Knowledge creation potential remains relatively low. The trend is positive, but the slow increase limits the potential of improving innovation capacities in a short term. This challenge was recognised by the National Innovation Policy (2005-2010) that envisages increase R&D expenditure from the state budget 1% of GDP by 2010.

As regards business R&D expenditure there are direct and indirect measures. The direct measures focus mostly on offering SMEs willing to innovate an access to finance (e.g. START or KREDIT). Schemes introduced in the framework of OP Industry and Enterprise (2004 – 2006) addressing the challenge of increasing public R&D expenditures include: START (CZ 27) – support to start-ups with favourable loans; KREDIT (CZ 31) – support to small enterprises with a short business record, ROZVOJ (Development) (CZ 28) - support to SMEs' competitiveness and INOVACE (CZ 29) - support to increasing technical and utility value of SMEs' products and services.

In addition the Czech Republic adapted its taxation system in 2004; R&D related costs are exempt from taxation and the depreciation period for intangible R&D results will be shortened. The legislation came into force on 1 January 2005. National Innovation Policy document foresees continuation of TAX relief schemes.

3. Policy learning

3.1 Governance

Despite positive developments the Czech innovation system suffers from systemic deficiencies typical for economies in transition. The innovations system is fragmented. Institutional and policy coordination are not yet sufficiently developed. Weakly developed links between science and industry result in e.g. low commercialisation of public R&D activities. Lengthy and complicated administrative procedures related to business aggravate the general business environment. The background strategic document in the field of innovation is the National Innovation Strategy 2005-2010 adopted by the Government in 24 March 2004. According to this document the most important problems of innovation system is financing R&D and innovation, political and legislative framework for innovation and business activities and communication between research and business.

3.2 Recent policy trends

The National Innovation Policy (NIP) for 2005 – 2010 and the Strategy for Economic Growth – which is to be the "umbrella" policy document (to be submitted to the Government in October 2005) – address weaknesses and challenges for the Czech innovation system. Strategic objectives of the NIP are expected to be as follows:

- *Transform research and development into the source of innovation*
- *Establish a working public-private-partnership*
- *Secure human resources for innovation*
- *Make the performance of state administration in research, development and innovation more effective*

Over forty concrete measures have been proposed

to achieve the NIP objectives, including the specification of responsibilities, deadlines and success indicators of their implementation. New principles of the innovation governance in the Czech Republic are to be introduced on the basis of NIP. One of its goals is to make the performance of state administration in research, development and innovation more effective.

Further policy programmes are: National Research and Development Policy of the Czech Republic for the years 2004-2008 was adopted by a Government Resolution in January 2004. The Policy defines priorities for the National Research Programme (NRP II) which is to be launched in 2006. A set of seven Long-term Principal Research Directions was adopted by a Government Resolution on 1 June 2005 – as an amendment to the National Research and Development Policy. Innovation Concept for Industry and Business for 2005-2008 was adopted by the Ministry of Industry and Trade as its strategic document in December 2004. It is based on the National Innovation Strategy adopted by the Government in March 2004.

4. Possible orientation for future actions

Based on analysis of EIS indicators and revealed trends as well as in reference to existing Estonian policy strategic documents the following general policy recommendations could be put forward:

Implement measures to increase supply of human resources for innovation

- *Implement long term policies promoting S&E studies*
- *Implement schemes encouraging recruitment of R&D personnel in industry e.g. partly publicly funded placement schemes*
- *Develop a market oriented training schemes for S&E graduates and R&D public employees*

Raise public R&D funding and continue efforts to raise business R&D expenditures

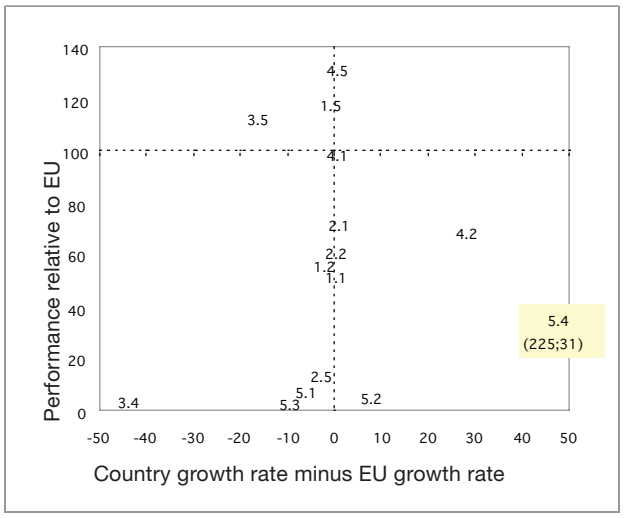
- *Increase growth of public R&D funding*
- *Continue support for SMEs for acquisition of the new technologies (co-funding schemes or loans)*
- *Focus on attracting FDIs in knowledge intensive sectors*
- *Improve framework conditions, e.g. maintain R&D tax relief scheme and evaluate its impact on private investment in R&D*

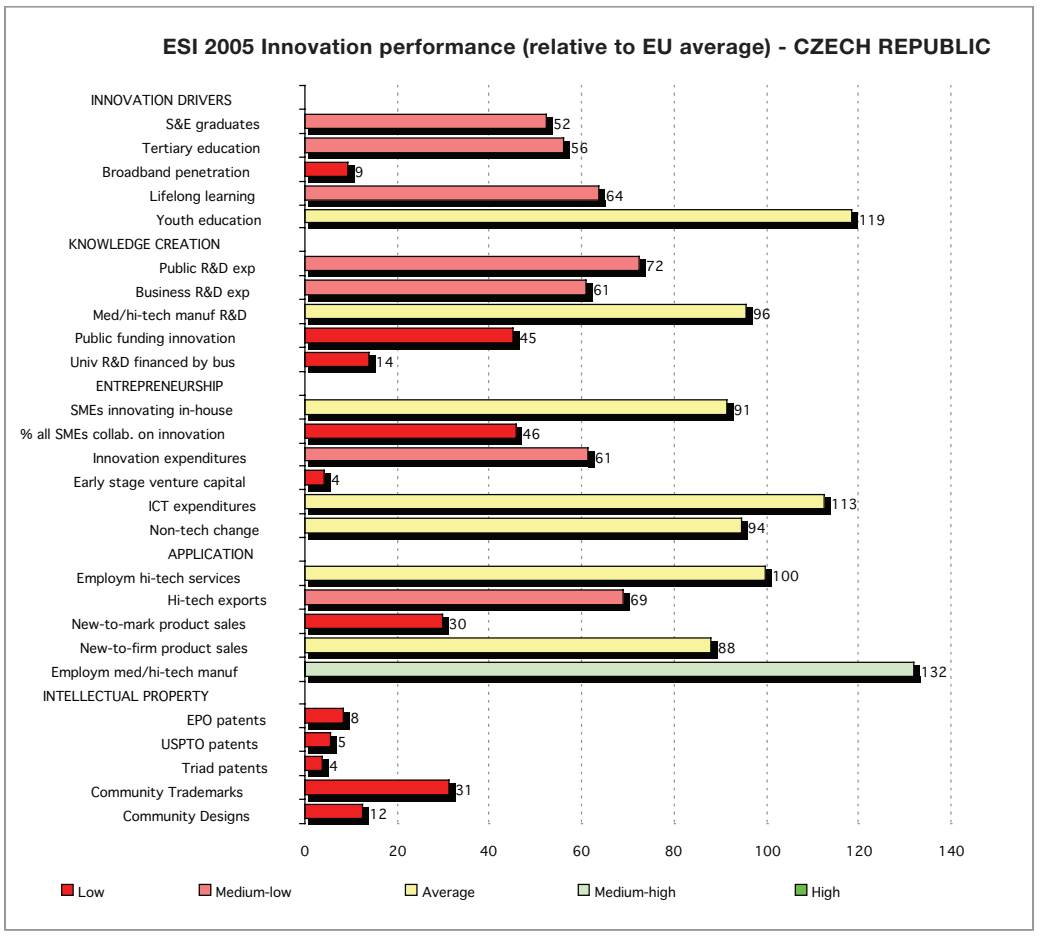
Encourage public-private R&D collaboration

- *Continue and further develop specific measures supporting joint business-science projects such as e.g. TANDEM (CZ 16) and IMPULSE (CZ 17)*
- *Further develop measures supporting development of clusters*
- *Encourage links between knowledge intensive FDI and local innovation systems by e.g. measures supporting cooperation between local SMEs and research institutes with to the investments*

Intelligent use of the EU Structural Funds should be made in developing a funding framework for many of these measures.

CZECH REPUBLIC - EIS 2005 results





Indicator quality concerns:

None known.

	CZECH REPUBLIC					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.25*	*0.25*	*0.26*		*2.2*	*0.0*
	relative to EU	--	--	--	--	*58*	*59*	*61*			
	rank	--	--	--	--	*25*	*25*	*25*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*4.6*	*5.0*	*5.5*	*5.6*	*6.0*	*6.4*	--	*52*	*9*	*9*
	relative to EU	--	*53*	*54*	*51*	*53*	*52*	--			
1.2	*Population with tertiary education*	*10.8*	*11.3*	*11.5*	*11.7*	*11.9*	*12.0*	*12.3*	*56*	*3*	*4*
	relative to EU	--	--	*58*	*58*	*58*	*56*	*56*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*0.7*	*9*	--	*50*
	relative to EU	--	--	--	--	--	--	*9*			
1.4	*Participation in life-long learning*	--	--	--	--	*5.9*	**5.4**	*6.3*	*64*	--	--
	relative to EU	--	--	--	--	*74*	**58**	*64*			
1.5	*Youth education attainment level*	*92.2*	*91.8*	*91.1*	*90.5*	*91.7*	*92.0*	*90.9*	*119*	*0*	*0*
	relative to EU	--	*123*	*119*	*119*	*120*	*120*	*119*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.41*	*0.43*	*0.49*	*0.48*	*0.47*	*0.50*	--	*72*	*4*	*2*
	relative to EU	*62*	*66*	*74*	*72*	*69*	*72*	--			
2.2	*Business R&D expenditures*	*0.75*	*0.73*	*0.74*	*0.74*	*0.75*	*0.77*	--	*61*	*2*	*1*
	relative to EU	*65*	*60*	*61*	*59*	*60*	*61*	--			
2.3	*Share of med-high/high-tech R&D*	*80.0*	*83.1*	*84.0*	*86.5*	*85.4*	--	--	*96*	*2*	--
	relative to EU	*90*	*93*	*94*	*97*	*96*	--	--			
2.4	*Enterprises receiving public funding*			*3.7*					*45*	--	--
2.5	*Business financed university R&D*	*2.1*	*1.3*	*1.1*	*0.7*	*0.9*	*1.0*	--	*14*	*-1*	*1*
	relative to EU	*32*	*19*	*16*	*10*	*14*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*25.2*		*23.3*			*91*	--	--
3.2	*Innovative SMEs co-operating with others*			*6.2*		*5.3*			*46*	--	--
3.3	*Innovation expenditures*			*1.07*		*0.92*			*61*	--	--
3.4	*Early-stage venture capital*	--	*0.005*	*0.014*	*0.018*	*0.006*	*0.001*	--	*4*	*-71*	*-28*
	relative to EU	--	*17*	*24*	*30*	*15*	*4*	--			
3.5	*ICT expenditures*	--	--	*8.8*	*8.3*	--	--	*7.1*	*113*	*-9*	*7*
	relative to EU	--	--	*135*	*132*	--	--	*113*			
3.6	*SMEs using non-technological change*			*40.1*					*94*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.18*	*3.09*	*3.04*	*3.22*	*3.09*	*3.18*	--	*100*	*1*	*0*
	relative to EU	--	--	*99*	*98*	*95*	*100*	--			
4.2	*Exports of high technology products*	--	*7.8*	*7.7*	*9.1*	*12.3*	*12.3*	--	*69*	*22*	*-6*
	relative to EU	--	*40*	*37*	*44*	*68*	*69*	--			
4.3	*Sales new-to-market products*			*7.2*		*1.4*			*30*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*7.3*		*5.9*			*88*	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*8.66*	*8.81*	*8.97*	*9.16*	*8.94*	*8.71*	--	*132*	*-2*	*-3*
	relative to EU	--	--	*128*	*131*	*131*	*132*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*9.7*	*9.8*	*13.5*	*11.4*	*10.9*	--	--	*8*	*-1*	*5*
	relative to EU	*9*	*8*	*10*	*8*	*8*	--	--			
5.2	*New USPTO patents*	*2.4*	*3.0*	*3.5*	*2.4*	*3.9*	--	--	*5*	*14*	*6*
	relative to EU	*4*	*5*	*5*	*3*	*5*	--	--			
5.3	*New Triad patents*	*1.1*	*0.9*	*0.9*	--	--	--	--	*4*	*-8*	*1*
	relative to EU	*5*	*4*	*4*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*2.3*	*8.2*	*27.1*	*31*	*240*	*16*
	relative to EU	--	--	--	--	*4*	*10*	*31*			
5.5	*New community designs*	--	--	--	--	--	*1.8*	*10.5*	*12*	--	--
	relative to EU	--	--	--	--	--	*3*	*12*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.5 DENMARK

1. Introduction

Denmark is one of the most innovative countries within the EU, as shown by the third place performance on the SII out of the 25 EU member states and its 5th place standing out of 33 countries. In the category on intellectual property, Denmark is not only top but forging further ahead, while in the outputs on applications category, it is either catching up or close to average growth. Hence, the innovation productivity appears high. Denmark's trend performance is particularly good for venture capital and for business R&D, while the worst performance is for the broadband penetration rate, due to its already leading position. In terms of EIS indicators weaknesses compared to the EU average are in enterprises receiving public funding (which may only denote a strong innovative culture in enterprises not needing incentives), in business financed university R&D (which again may be interpreted as a lack of specific needs, since clustering operates well otherwise) and in SMEs using non-technological change. Hence, from the EIS the major challenge is interpreted to be the SMEs using non-technological change, for which the Danish indicator suggests only 61% of the EU average. Denmark only ranks 22nd out of the 33 countries studied.

Its peer countries for performance include the two top EU performers, namely Finland and Sweden. However, its good overall rating hides large relative differences in performance, with Denmark performing well above average on the EIS for innovation drivers (3rd out of 25 EU member states), IPR (4th out of 25 EU member states), and applications (4th out of 25 EU member states). Conversely, it is below the expectations of its performance peer group for knowledge creation, where it ranks 10th.

2. Major challenges and policies

The major challenge identified by the EIS is SMEs using non-technological change, while in addition a more detailed and qualitative country analysis suggests resources being thinly spread in a wide range of policies and policy instruments:

SMEs using non-technological change

The Danish economy includes a high number of competitive SMEs operating in niche markets with a success track record in the global economy. Data from the CIS suggests that while these companies are well connected with each other, with high innovation expenditures and in-house innovation, they lag behind in non-technological change. There are no specific measures addressing this issue, which should be of serious concern to the Danish government.

Lack of concentration of resource in specific policies

Even though the general picture is positive, there is still room for improvement at the macro-level as well as at the micro-level. Danish regulations are perceived to hamper competitiveness, some actors see the tax system as skewing the economic incentive structures, and the labour market could be strengthened more. If addressed efficiently, these factors could potentially improve the foundation for innovation and create a more dynamic system. Overall R&D investment in Denmark is still modest compared to the Barcelona objective (and the best performers). However, in spite of these weaknesses, Denmark by and large remains the leading country in terms of macrostructures.

3. Policy learning

3.1 Governance

Overall innovation governance is exemplary. Danish research and innovation policy has traditionally been a policy area where consensus has been sought. It is customary that reforms and more far-reaching bills are circulated among a broad array of stakeholders who are invited to comment on the reform/bill. Based on this consultation the reform bill will follow a fixed procedure before it eventually becomes 'legislation'. In the last couple of years the 'benchmarking model' has increasingly been used as a tool to identify strengths and weaknesses in many policy areas.

The Danish innovation governance system is currently in the early implementation phases of a major reform and restructuring process. The Danish macro structures are strong, but there are major challenges ahead: to successfully implement the many reforms and, in that process, to create a well-functioning, coherent and coordinated national innovation system. The recent reforms targeted the university-sector, the public research institutions, the technology service system, the advisory and funding structures and the regional system, just to mention the most important ones. At the same time new strategies and action plans were been formulated regarding national and regional growth, collaboration between the public and private sector, knowledge development, strategic research etc. In addition to this, a new set of very ambitious innovation related objectives were

launched very recently in accordance with the so-called Government Foundation outlining the objectives of the present Government.

In general, the Danish innovation system is characterised as a strong and rather well functioning system with a number of competitive strengths and few serious weaknesses, related to the need to adopt a more systematic evaluation and benchmarking culture. A major restructuring leading to a higher responsibility of the regional and local governments is part of this change. Regional innovation councils will already begin their work in 2005, and official growth forums for each region will continue this work as of 2007.

3.2 Recent policy trends

Danish innovation policy is changing rapidly at the moment. As a policy field innovation is steadily gaining importance in the public and political debate. As a consequence the most important Danish innovation policy objectives are very recent and the majority of them are still formulated at a fairly general level. Consequently, a meaningful general assessment of whether progress towards the main policy objectives and targets has been achieved cannot be made at this point.

One factor is, however, strongly debated at present: the question of whether Denmark is making any real progress towards the Barcelona objective. It is in particular questioned whether the public share of investment in research and development is sufficient and whether the investment rate is optimal. It is argued by a number of key stakeholders that a steady progress towards the objective is necessary for a successful absorption of the funds. It takes time to develop world class research environments, and if the investments are dramatically raised in the last year of the period to meet the target, there is a great risk that the funds will be used inefficiently. However, the Ministry claims that there are no reasons to doubt that the target will be met in time, even though a clear action-plan has yet to be presented.

There are two new measures in favour of innovation, although no funds have so far been directly allocated to either of the initiatives. The first is the Innovation Accelerating Research Platforms proposed by the Strategic Research Council (DSCR) and the second is the setting up of the so-called Globalisation Council, which will assist the Government in formulating and implementing an ambitious strategy of how to develop Denmark into a world class nation in a number of key innovation related aspects.

4. Possible orientation for future actions

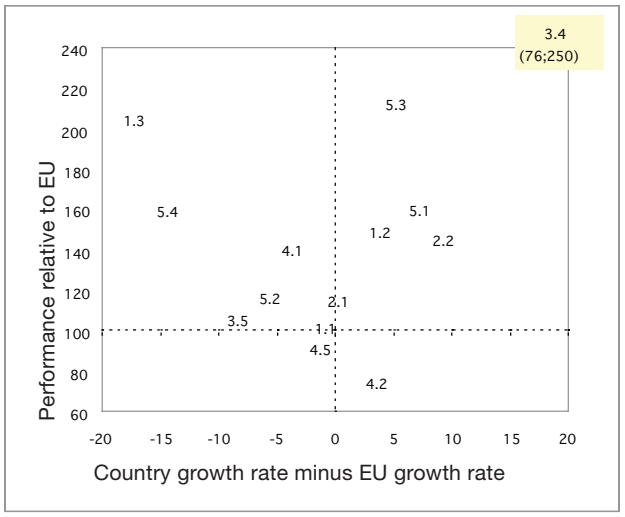
In general, a number of important attempts were taken recently to improve the overall functioning of the innovation system. One of the general challenges was to create a more coherent and coordinated national innovation system, and the policy response to this key-challenge has received a very high political priority. More or less all elements of the National Danish innovation system has been reformed and restructured during the last couple of years.

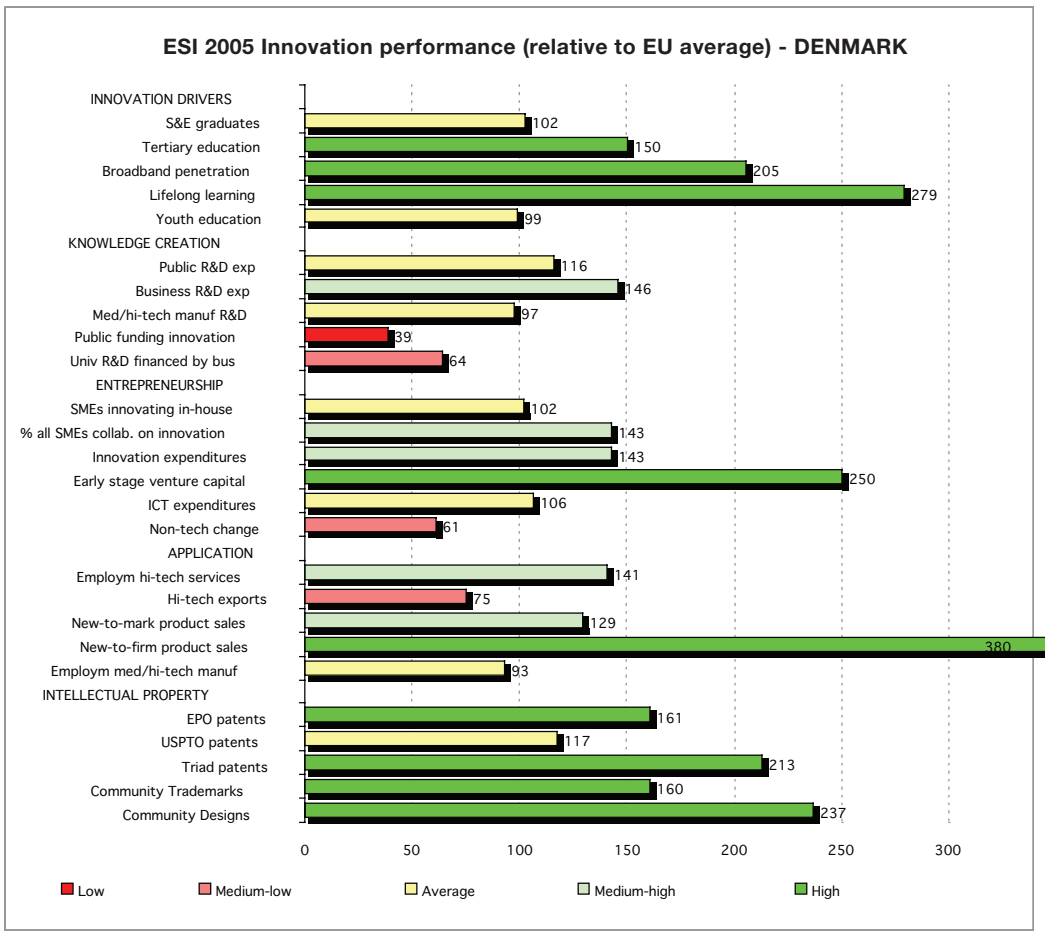
The country is pursuing world-class research and innovation policies and this per se constitutes a vast challenge. As yet, all indications suggest that it is pursuing an effective policy based on good governance.

Beside quantitative targets, the main challenges for a longer term horizon, and in order to cope with increasing global pressures, are identified by the country's Lisbon strategy as follows:

- *To ensure increased private investment in research and development and better interaction with public research.*
- *To double the number of PhDs.*
- *To improve the primary and lower-secondary school system including strengthening evaluation and quality development processes.*
- *To increase the number of students who complete a secondary education programme and, at a later stage, tertiary education programme.*
- *To ensure continued improvements in the framework conditions for innovation and entrepreneurs.*

DENMARK - EIS 2005 results





Indicator quality concerns:

None known.

	DENMARK					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.61*	*0.62*	*0.60*		*-0.7*	*0.0*
	relative to EU	--	--	--	--	*144*	*145*	*142*			
	rank	--	--	--	--	*5*	*5*	*5*			
		1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*8.1*	*8.2*	*11.7*	*12.2*	*11.7*	*12.5*	--	*102*	*8*	*9*
	relative to EU	--	*87*	*115*	*111*	*103*	*102*	--			
1.2	*Population with tertiary education*	*25.4*	*26.6*	*26.2*	*28.4*	*29.6*	*31.9*	*32.9*	*150*	*8*	*4*
	relative to EU	--	--	*131*	*141*	*145*	*150*	*150*			
1.3	*Broadband penetration rate*	--	--	--	--	*7.4*	*10.4*	*15.6*	*205*	*32*	*50*
	relative to EU	--	--	--	--	--	--	*205*			
1.4	*Participation in life-long learning*	*19.8*	*19.8*	*20.8*	*17.8*	*18.4*	**25.7**	*27.6*	*279*	--	--
	relative to EU	--	--	*263*	*225*	*230*	**276**	*279*			
1.5	*Youth education attainment level*	*76.3*	*73.2*	*69.8*	*78.5*	*79.6*	**74.4**	*76.1*	*99*	--	*0*
	relative to EU	--	--	--	--	--	*97*	*99*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.73*	*0.77*	*0.76*	*0.75*	*0.79*	*0.80*	--	*116*	*3*	*2*
	relative to EU	*111*	*118*	*115*	*112*	*116*	*116*	--			
2.2	*Business R&D expenditures*	*1.33*	*1.33*	*1.51*	*1.65*	*1.76*	*1.84*	--	*146*	*11*	*1*
	relative to EU	*115*	*110*	*124*	*132*	*141*	*146*	--			
2.3	*Share of med-high/high-tech R&D*	*84.5*	*86.7*	--	--	--	--	--	*97*	--	--
	relative to EU	*95*	*97*	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			*3.2*					*39*	--	--
2.5	*Business financed university R&D*	--	*2.1*	*2.0*	*3.0*	*4.2*	*2.7*	--	*64*	--	*1*
	relative to EU	--	*32*	*31*	*45*	*64*	--	--			
	INPUT - Innovation & entrepreneurship										
3.1	*SMEs innovating in-house*			*16.1*		*25.9*			*102*	--	--
3.2	*Innovative SMEs co-operating with others*			*15.7*		*16.6*			*143*	--	--
3.3	*Innovation expenditures*			*0.54*		*2.15*			*143*	--	--
3.4	*Early-stage venture capital*	*0.005*	*0.014*	*0.020*	*0.053*	*0.080*	*0.063*	--	*250*	*48*	*-28*
	relative to EU	--	*47*	*35*	*88*	*216*	*250*	--			
3.5	*ICT expenditures*	--	--	*7.0*	*6.8*	*6.8*	*6.7*	*6.7*	*106*	*-1*	*7*
	relative to EU	--	--	*108*	*108*	*103*	*105*	*106*			
3.6	*SMEs using non-technological change*			*26.0*					*61*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*4.15*	*4.51*	*5.04*	*4.93*	*4.73*	*4.50*	--	*141*	*-3*	*0*
	relative to EU	--	--	*164*	*150*	*146*	*141*	--			
4.2	*Exports of high technology products*	*12.5*	*13.9*	*14.4*	*14.0*	*15.0*	*13.4*	--	*75*	*-3*	*-6*
	relative to EU	--	*71*	*70*	*68*	*82*	*75*	--			
4.3	*Sales new-to-market products*			*8.9*		*5.9*			*129*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*18.0*		*25.6*			*380*	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*6.83*	*6.39*	*6.44*	*6.99*	*6.31*	*6.12*	--	*93*	*-4*	*-3*
	relative to EU	--	--	*92*	*100*	*92*	*93*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*139.7*	*168.5*	*199.3*	*225.7*	*214.8*	--	--	*161*	*13*	*5*
	relative to EU	*128*	*142*	*149*	*159*	*161*	--	--			
5.2	*New USPTO patents*	*75.0*	*91.7*	*81.7*	*91.3*	*83.8*	--	--	*117*	*1*	*6*
	relative to EU	*123*	*146*	*123*	*127*	*117*	--	--			
5.3	*New Triad patents*	*42.8*	*47.0*	*47.6*	--	--	--	--	*213*	*7*	*1*
	relative to EU	*187*	*211*	*213*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*135.7*	*166.7*	*139.9*	*160*	*2*	*16*
	relative to EU	--	--	--	--	*208*	*196*	*160*			
5.5	*New community designs*	--	--	--	--	--	*228.1*	*199.1*	*237*	--	--
	relative to EU	--	--	--	--	--	*334*	*237*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.6 ESTONIA

1. Introduction

Estonia is one of the most competitive countries among new EU Member States often being considered a showcase of successful emerging economies («Baltic tiger»). After a minor decline caused by the Russian and Asian crises in 1999, the Estonian economy has grown continuously at a rate of 5-7% annually.

In terms of innovation performance Estonia does relatively well, especially in comparison to other new EU Member States. The country ranks 13th in the EU25 in the 2005 European Innovation Scoreboard (EIS). Along with Slovenia it is one of the best performers among new Member States. Estonia has very good composite results on innovation & entrepreneurship and innovation drivers, the latter due to high levels of tertiary education (31,4% compared to 21,9% EU average). Despite the relatively high score in the summary innovation index (SII), EIS 2005 results for Estonia are rather worrying. Estonian innovation potential has been curbed by several weaknesses, which in part are hangover from the economic situation and policies of the 1990s. These are e.g. low business R&D expenditures, small number of S&E graduates and low innovation demand. The old weaknesses have not been overcome and compared to the other countries Estonia starts losing out. EIS 2005 shows that country experiences persisting problems related to poor performance in knowledge creation, applications and IPR. The cluster analyses performed on EIS indicators positioned Estonia among the countries lagging behind such as Greece, Latvia, Poland and Portugal.

This overall negative trend was recognized also in other international analyses. In 2004 Estonia was 28th out of 60 countries ranked in the World Competitiveness Yearbook – higher than France or Spain. That was, however, six positions lower than in similar ranking in 2003. According to this study Estonia has lost some of its competitive advantage.

2. Major challenges

The EIS results suggest that Estonia needs to invest more in developing more advanced (creative) innovative capabilities. The following critical challenges have been identified on the basis of 2005 Trend Chart analysis.

Insufficient levels of investment in R&D (both public and private)

Both private and public investments in R&D are below EU average. While total R&D expenditure has grown by approximately 3.7% a year during the 1999-2003 period, reaching 0.83% of GDP in 2003, Estonia still lags far behind the EU25 average (1.93%). The strategy paper «Knowledge Based Estonia» envisaged increase in R&D expenditures to 1.5% of GDP by 2006. Given the trend so far this goal seems rather unrealistic.

Especially business R&D is very low. Although BERD trend is positive and expenditures increased from 0.11% in 1998 to 0.28% in 2003, it is still well below the EU average (1.26%), but also considerably lower than in e.g. Slovenia (0.90%). Public expenditures have also increased from 0.47% in 1998 to 0.53% in 2003, but are still only 80% of the EU average. Insufficient level of R&D investments is one of the reasons behind poor performance of Estonia in knowledge creation. BERD is largely concentrated in few sectors and insufficient to lead to restructuring of activity towards higher value added. Furthermore, a high share of the existing BERD is funded from abroad (notably in trade and financial services sector). This situation reflects Estonian economic structure, where small and medium-sized enterprises in 'low technology' sectors prevail and where hi-tech business sector capable of undertaking R&D activity is restricted to a small number of sub-sectors (such as bio-medical sector around Tartu University). The trend analysis of EIS and national statistics show that low growth rate in business R&D can reduce catching-up capacity of the whole economy.

Government recognised this challenge and launched policy measures addressing R&D expenditure issue. Programmes such as the Competence Centre Program (EE 20) and Estonian Enterprise funded financing schemes for innovative enterprises (EE 21). The latter offers e.g. R&D grants and loans. Also the future Estonian Development Fund (envisaged to be operational in 2006) may be supportive to further growth in business R&D and innovation expenditures. EDF is a state venture capital fund inspired by SITRA in Finland. Its creation was long debated and repeatedly delayed

Low supply of S&E graduates and poor performance in life long learning

In 2001, graduates of natural and exact sciences and engineering sciences in Estonia accounted for 18% of all the graduates at higher education level. The corresponding EU average was 24%, and even 28% in Finland. The indicators on the supply of new S&E

graduates and life-long learning are both well below EU average (72% and 68% respectively). Fortunately, however, trend performance in these two weakest areas for innovation drivers is above the EU average. The government has not developed a clearly defined policy to address these problems.

Limited co-operation in innovation system

Low business contributions to HERD can be considered an indicator of limited cooperation between private companies and Universities. Weak cooperation between business and science, especially as regards jointly funded projects, is considered a general drawback of Estonian NIS. It should be remembered, however, that it is an inherent problem of all post-socialist countries. The government has addressed this problem with several measures, most notably the Competence Centres (EE_20) and SPINNO (EE_17) programmes. The aim of the Competence Centres Programme launched in 2004 is to foster cooperation of enterprise and research sector. SPINNO programme focuses on building up and strengthening capacity at universities for supporting entrepreneurship and ability to manage spin-off processes. The programme supports activities, which contribute to the increase of entrepreneurship in universities and the development of a systemic higher education environment, which should promote entrepreneurial activities.

3. Governance and policy development

3.1 Governance

Governance of Estonian National Innovation System (NIS) has developed considerably since year 2000, but still suffers from significant shortages. The NIS is characterised by a high degree of institutional fragmentation. Different ministries have different visions of future developments of innovation strategy and policy.

Education and science policies fall under the responsibility of the Ministry of Education and Research, while the Ministry of Economic Affairs and Communication is responsible for innovation and technology policy. The Research and Development Council (RDC) is the main strategic advisory body. The main national agency implementing innovation policy is the Enterprise Estonia Foundation (EAS). There is no well defined policy coordination mechanism developed to assist the debate between these institutions and help achieve consensus. RDC attempted to initiate better coordination and act as a mediator between the ministries, but has not been able to perform this role effectively due to e.g. government instability (i.e. repeated changes of ministers).

Apart from institutional fragmentation, the innovation system suffers from relatively low innovation awareness among entrepreneurs and policy makers, and a low intensity of cooperation between the research and industry sectors.

3.2 Recent policy trends

Estonian RTDI policy evolved rapidly in the early years of the current century from a position where this field of policy was given low priority to one where the objective of a 'Knowledge-Based Estonia' was adhered to, at least on paper, by the broader political and economic establishment. The basis of Estonian R&D and innovation policy is the Estonian research and development strategy for 2002-2006, entitled 'Knowledge-based Estonia' and adopted by the Parliament in 2001. This document, the National Development Plan for the Implementation of EU Structural Funds SPD 2004-2006 and strategy paper for implementing the EU Lisbon strategy ('Estonian Success 2014') all form the basis of R&D and innovation policy measures. The innovation support measures/ schemes have been developed almost exclusively in the Ministry of Economic Affairs and Communications (Division of Technology and Innovation).

Since 2000 innovation policy implementation has been centred on the support of high-tech start-ups (university spin-offs) and R&D capable businesses. In 2004 the fostering of long-term cooperation between enterprise and research sector became active with launching of the Competence Centres Programme (EE_20). This year the focus has expanded to the wider range of enterprises and infrastructure development

Several new programs were launched at the beginning of 2005. The Innoawareness program and the pilot of an Innovation Audit programme are both focused on increasing innovation awareness among a wider range of enterprises rather than only high tech companies. The other focus of innovation policy is infrastructure development. The R&D infrastructure development program (EE_25) was launched in 2005 with the first projects selected for funding in autumn 2005. There are also additional funds for the development of the physical environment of scientific centre of excellence.

4. Possible orientation for future actions

Based on analysis of EIS indicators and revealed trends as well as in reference to existing Estonian policy strategic documents the following general policy recommendations could be put forward:

Increase public and private investments in R&D

- *Broaden the funding possibilities towards support for a wider range of innovation activities including design, integration of new technologies and processes in less technologically advanced enterprises, recruitment of innovation specialists, etc.*
- *Develop framework conditions conducive to higher private investment in R&D (e.g. tax reform)*

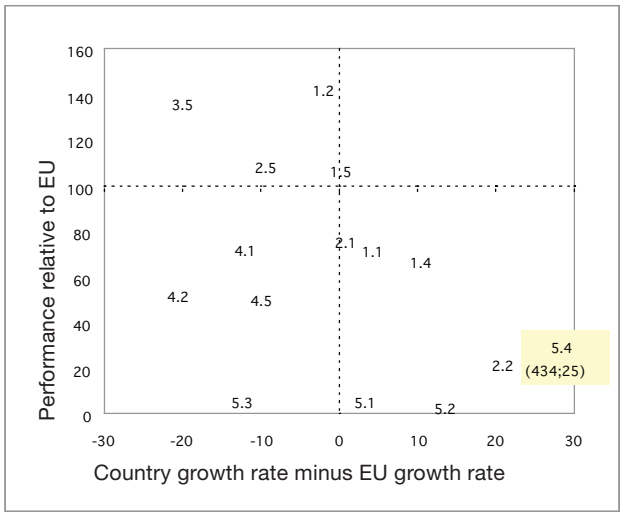
Improve supply of S&E graduates

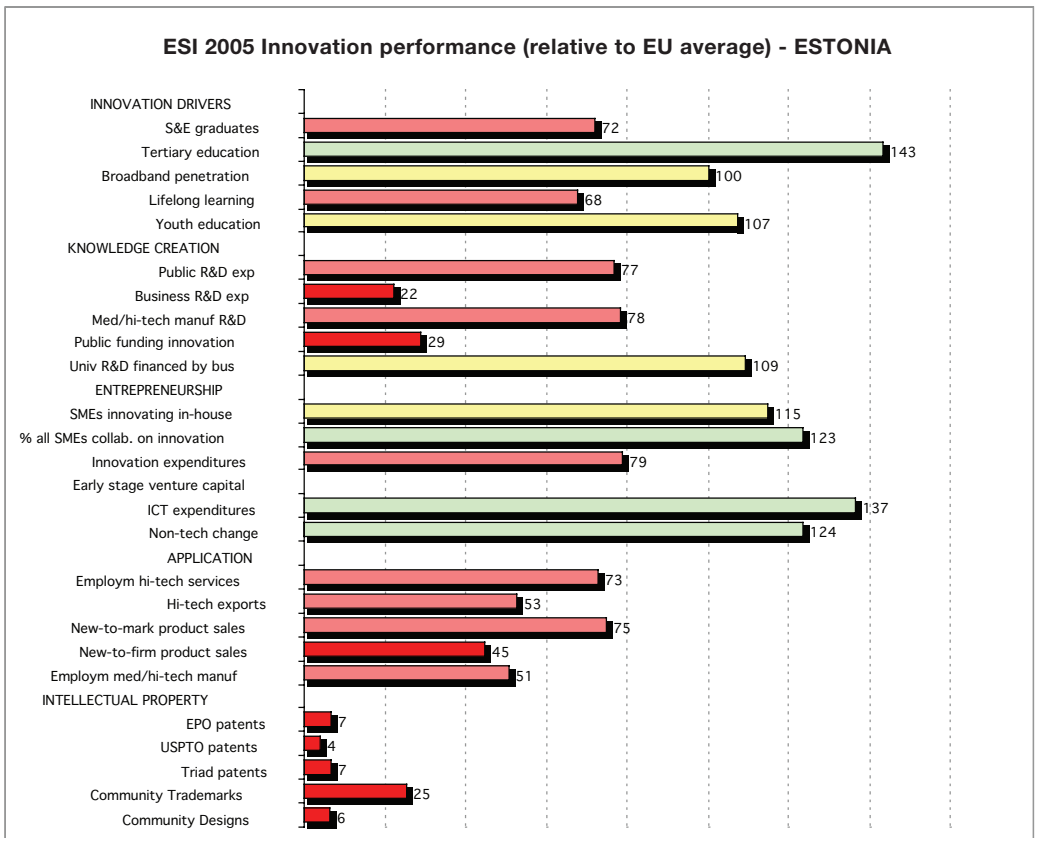
- *Implement long term policies aimed at promoting S&E studies*
- *Support adaptation of university curricula to market realities*
- *Encourage increased mobility of researchers and engineers including returning researchers or immigration to halt brain drain, as well as schemes to encourage recruitment of R&D personnel in industry;*

Further improve cooperation between universities and private sector

- *Build on experience of existing Competence Centre programme to Develop and sustain networks between science and industry*
- *Launch proof of concept type funding to boost commercialisation of research carried out in academic or public research organisations*

ESTONIA - EIS 2005 results





Indicator quality concerns:

Exports of high technology products for 2000 were 148% higher than in 1999, then fell by 32% in 2001 and continued to fall, ending in 2003 at a level below that of 1999. The results for 2000 therefore appear as an anomaly. It is not known if this is due to an error in the data or to unique conditions, such as the rapid expansion of a small number of firms followed by contraction. The latter is possible because of the small size of the Estonian economy.

	ESTONIA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	0.34	0.31	0.32		-2.5	0.0
	relative to EU	--	--	--	--	79	74	75			
	rank	--	--	--	--	18	18	18			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	S&E graduates	3.3	6.3	7.0	7.3	6.6	8.8	--	72	13	9
	relative to EU	--	67	69	66	58	72	--			
1.2	Population with tertiary education	30.2	29.6	28.9	30.2	30.5	30.6	31.4	143	3	4
	relative to EU	--	--	145	150	149	144	143			
1.3	Broadband penetration rate	--	--	--	--	--	--	7.6	100	--	50
	relative to EU	--	--	--	--	--	--	100			
1.4	Participation in life-long learning	6.3	6.5	6.0	5.2	5.2	6.2	6.7	68	11	--
	relative to EU	--	--	76	66	65	67	68			
1.5	Youth education attainment level	83.1	83.0	83.6	79.5	80.4	81.4	82.3	107	1	0
	relative to EU	--	111	109	104	105	106	107			
	INPUT - Knowledge creation										
2.1	Public R&D expenditures	0.47	0.53	0.48	0.48	0.52	0.53	--	77	3	2
	relative to EU	71	82	73	72	76	77	--			
2.2	Business R&D expenditures	0.11	0.17	0.14	0.25	0.23	0.28	--	22	22	1
	relative to EU	9	14	11	20	18	22	--			
2.3	Share of med-high/high-tech R&D	--	--	66.7	68.5	69.8	--	--	78	--	--
	relative to EU	--	--	75	77	78	--	--			
2.4	Enterprises receiving public funding			2.4					29	--	--
2.5	Business financed university R&D	7.5	9.8	7.4	5.1	7.2	6.3	--	109	-8	1
	relative to EU	118	150	113	76	109	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	SMEs innovating in-house			29.8		--			115	--	--
3.2	Innovative SMEs co-operating with oth-ers			11.3		--			123	--	--
3.3	Innovation expenditures			1.43		--			79	--	--
3.4	Early-stage venture capital	--	--	--	--	--	--	--	--	--	-28
	relative to EU	--	--	--	--	--	--	--			
3.5	ICT expenditures	--	--	13.1	9.5	--	--	8.6	137	-13	7
	relative to EU	--	--	202	151	--	--	137			
3.6	SMEs using non-technological change			52.5					124	--	--
	OUTPUT - Application										
4.1	Employment in high-tech services	2.90	2.63	2.87	3.42	2.87	2.32	--	73	-12	0
	relative to EU	--	--	93	104	89	73	--			
4.2	Exports of high technology products	--	10.1	25.1	17.1	9.8	9.4	--	53	-27	-6
	relative to EU	--	51	122	83	54	53	--			
4.3	Sales new-to-market products			4.5		--			75	--	--
4.4	Sales new-to-firm not new-to-market products			5.4		--			45	--	--
4.5	Med-hi/high-tech manufacturing em-ployment	3.61	3.94	4.25	4.88	3.41	3.35	--	51	-12	-3
	relative to EU	--	--	61	70	50	51	--			
	OUTPUT - Intellectual property										
5.1	New EPO patents	5.0	5.8	11.7	12.4	8.9	--	--	7	9	5
	relative to EU	5	5	9	9	7	--	--			
5.2	New USPTO patents	--	0.7	3.0	1.1	2.7	--	--	4	20	6
	relative to EU	--	1	5	2	4	--	--			
5.3	New Triad patents	2.1	1.5	1.5	--	--	--	--	7	-11	1
	relative to EU	9	7	7	--	--	--	--			
5.4	New community trademarks	--	--	--	--	0.7	13.2	22.2	25	450	16
	relative to EU	--	--	--	--	1	16	25			
5.5	New community designs	--	--	--	--	--	--	5.2	6	--	--
	relative to EU	--	--	--	--	--	--	6			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.7 FINLAND

1. Introduction

In international comparisons Finland has continuously ranked as one of the leading countries in innovation, as measured in terms of growth, competitiveness and technological sophistication and infrastructure. It ranks second out of the 25 EU countries and third out of 33 countries studied by the EIS, after Switzerland and Sweden. It ranks among the top three countries for each of the six composite indices with the exception of applications and is in 1st place for innovation demand and innovation governance. Consequently, Finland has no readily identifiable weaknesses, with below average results for all EIS indicators. The trend results are below the EU average for many indicators, but this is due to Finland's good performance in the past and the effort of other countries to catch up. In that sense the real challenge for Finland is to maintain its leading position as others are adopting more proactive innovation policies than in the past, often learning from the Finnish experience and adopt longer term strategies that will enable the country to further forge ahead.

Its lowest ranking compared to the 33 countries studied, is in SMEs innovating in-house, whereas it is below the EU average and is further falling behind in new Community trademarks. However, the challenges identified in the European Innovation Scoreboard do not necessarily match the national interpretations: from the national point of view the real challenges for innovation policy should focus on the maintenance momentum of attractiveness to investments. Finland's pattern of strengths and weaknesses is most similar to those of the Netherlands, Belgium and France.

2. Major challenges and policies

There are three major challenges for Finland:

Firm innovation

Although the Finnish economy as a whole is very innovative, this is due partly to few very competitive bigger firms, with Nokia excelling among them. The number of SMEs innovating in-house is 93% of the EU average and the country ranks 15th out of 33. Besides, the indicator deteriorated substantially between the years 2000 and 2002. However, improving the innovative capabilities and potential of Finnish firms is among the top priorities of the government, which has already launched a few support schemes in this direction:

Start-up Loan for Technology Companies: This is a scheme providing capital funding (in the form of equity) with low interest rate for starting and growing technology intensive SMEs for their development and commercialising work. R&D capital loans are primarily aimed at (i) strengthening the risk-taking capacity of small and starting enterprises in their R&D activities and (ii) projects that will develop a product, process or service. Capital loans for R&D strengthen the company's balance sheet. Capital loans for R&D are granted without collaterals (FI14).

Tekes' Start-up capital funding for technology companies is a special case for this particular type of firma only (FI 22).

Infrastructure projects are also partly created with the aim of changing the pattern of SMEs behaviour. All the following schemes offer support under the condition that it will be exploited for the renewal of the business sector: YRKE (national development project for business incubators), the parks, which are situated all over Finland, offer development services to new innovative enterprises and intend to gradually introduce new homogeneous models throughout the country, which will produce innovation-oriented enterprises (FI 26). Similarly the Centre of Expertise Programme's aim is to enhance regional competitive¬ness and to increase the number of high-tech products, companies and jobs (FI 5).

New Community trademarks (falling behind)

In this particular indicator Finland ranks 13th, which is one of the lowest ranks it conquers. There are no measures to face this challenge, which is not considered of high priority by the government.

Maintain momentum of attractiveness to investments

This is one of the encompassing objectives of the Finnish government in the context of the Lisbon strategy. Research, education and innovation policy are used to make the country attractive to high tech indigenous and inward investment. In addition, a broad number of measures for the improvement of the conditions and support of local entrepreneurship are adopted, while the tax treatment of foreign investments has been revised on 15 August 2005 so that the same rules now apply to foreign venture capital investments in a Finnish capital fund and in a target company.

High level competence in research, the promotion of innovation skills and creativity and the promotion of entrepreneurships are areas on which focuses the

Reform Programme with specific guidelines for further emphasis. In this context the Government set up a project that was charged with drafting a national action plan for better regulation by the end of April 2006. The aim is to create a programme that will incorporate the commonly accepted principles and policy lines so that the legislative process can give maximum support to competitiveness and the creation of favourable business conditions.

3. Policy learning

3.1 Governance

Finland has become internationally known as an exemplary case for forward-looking innovation policy making. Innovation policy objectives have been considered within the context of the national innovation system (NIS) approach since the early 1990s. Evaluations, benchmarking activities and other means of policy intelligence are used extensively by the policy makers in order to identify national strengths, weaknesses, opportunities and threats. International organisations have been highly valued by national innovation policy makers. During the last decade the situation has changed. Instead of being a follower, Finland is seen as a model country of successful innovation policy making. The Science and Technology Policy Council of Finland in co-operation with the key innovation policy agencies, Tekes and the Academy of Finland, have close ties and co-ordinate their activities continuously. There are also more indirect ways of co-ordinating innovation policy activities between the administrative fields and the national and regional levels. The fact that many key policy makers participate in various working groups that deal with innovation policy issues ensures the flow of information between the different players. This, in turn, facilitates the matching of activities in different organisations. A recent Government Resolution on the development of the public research structure (7 April 2005) set frames for the innovation governance system in the future. The background for drafting the resolution was provided by four recently published evaluations. The Government Resolution also includes an action plan for strengthening science, technology and innovation policy decision making and steering. The Science and Technology Policy Council will be developed as the principal expert body in all major questions of science, technology and innovation policy. Simultaneously, the role of the science, technology and innovation policy will be strengthened in the Ministry of Education and the Ministry of Trade and Industry with a view to enhancing co-operation.

The above mentioned efforts are designed to meet the current government challenges, which are:

- *RTDI policy making within small, established circle of stakeholders, which 'outsiders' find hard to enter ('mono-cultural approach' preferring one well-established truth and vision at a time).*
- *Focus (still) reflects traditional duality between science and technology policy domains.*
- *The current system tends to neglect the dialogue between the established science, technology and innovation policy makers and stakeholders on the one hand and politicians on the other.*

3.2 Recent policy trends

The current strategic visions for science, technology and innovation at the national level can be found in the sixth triennial review (2003) of the Science and Technology Policy Council of Finland. Special attention is paid to the rapidly internationalising innovation environment and the ensuing pressures for structural and operational change in Finland. The country scores well in the Lisbon Review 2004 turning out to be the most competitive country among the EU15. In light of recent publications, Finnish innovation policy actors are acutely aware of the need to continuously develop a competitive business environment and adapt national policies to emerging global challenges and opportunities. However, the nation cannot rely too much on past successes but must be ready for continuous renewal in the face of global changes. A flow of new reports commissioned/produced by major policy and political actors, as well as key innovation policy agencies, are directly addressing the emergent challenges and trying to redefine Finland's strategy in the midst of economic globalisation. The key ideas of the innovation policy are also rather closely entangled with the information society development. Striving towards a knowledge-based economy has a visible position in the policy making, as can be seen in the programme of Prime Minister.

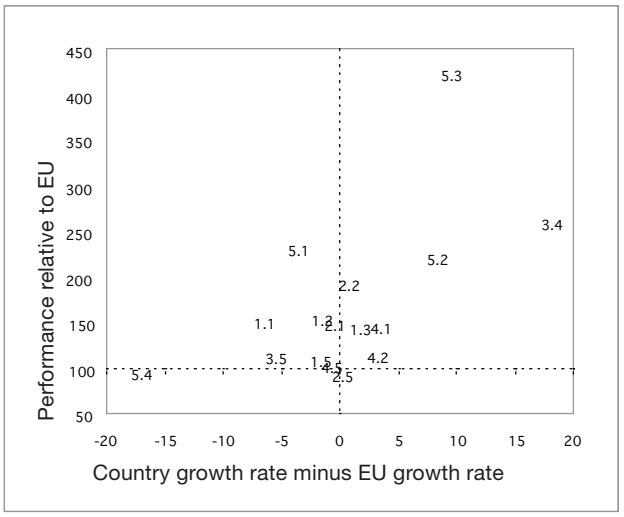
The following measures are new or re-launched in the current period: Technology Strategy Design (FI 24) has been part of Tekes' service portfolio for a long time. Venture Cup Finland (FI 25), launched in 2000, is a three-stage business plan competition for aspiring growth companies. YRKE - a national development project for business incubators (FI 26) is a collaborative effort between Sitra, the Ministry of Trade and Industry, the TE-Centres and Tekes, aiming to strengthen the resources and competences of Finland's science parks and technology centres. The Innovation Programme (FI 27) was launched by Sitra in autumn 2004. The programme aims at making Finland a pioneer in innovation. The programme brings together major actors to analyse challenges, set goals and implement the required actions. Seed Financing - Financing Programme for Early Stage

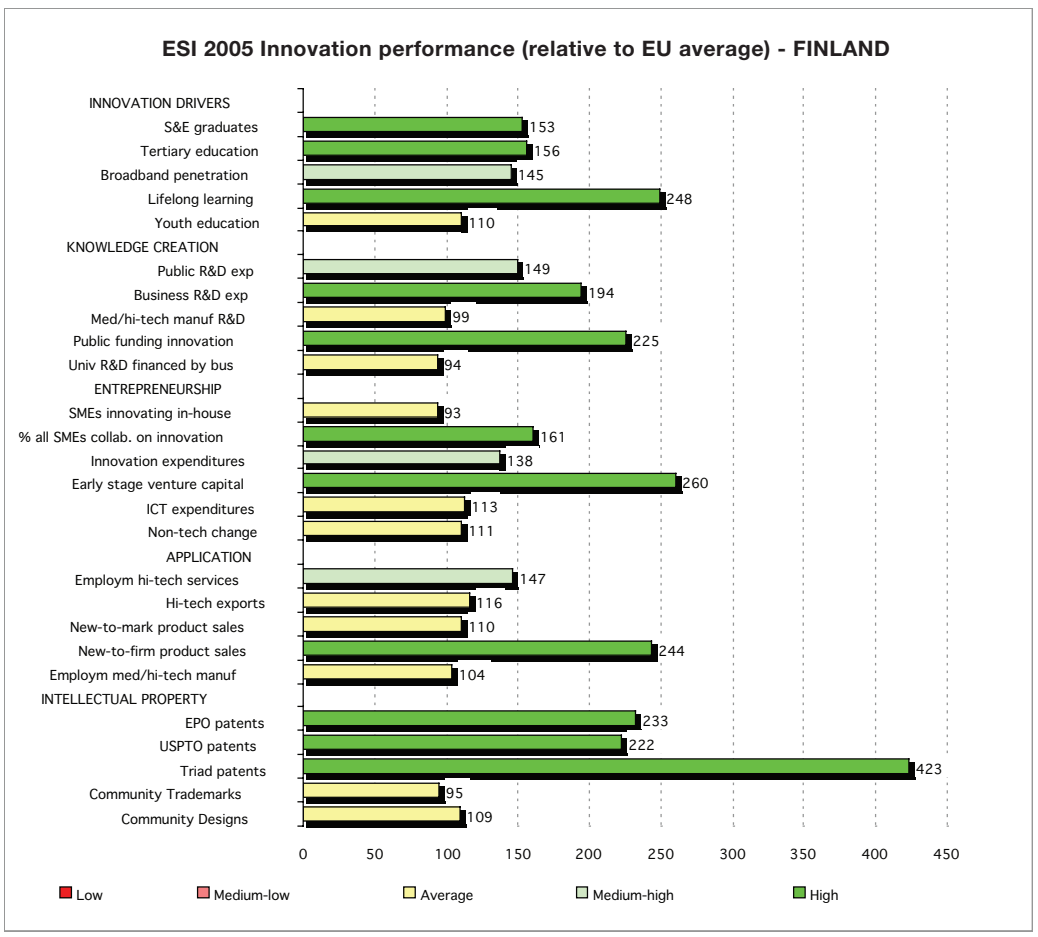
Companies (FI 28) was launched by the Finnish Industry Investment Ltd in early 2004. The target is to encourage equity investments in early stage (seed, start-up and early growth) companies in Finland. The Academy of Finland has for a long time run Research Programmes (FI 29) that are composed of a number of closely related projects working in the same field of research. The Millennium Technology Prize (FI 30) is awarded by the Millennium Prize Foundation, an independent fund established by Finnish industry and the State of Finland in partnership. The INNO-SUOMI - INNOFINLAND project (FI 31) is to promote creativity, skill, entrepreneurial spirit and co-operation in Finland in a practical and creative way in order to nationally improve opportunities for wellbeing.

4. Possible orientation for future actions

The challenge for the future of Finland is not so much to improve specific areas but to maintain its leading position and further forge ahead. Its main competitors lie less in the EU and more in the top performers of the global market. Hence, it is important that the government is considering this challenge and the common denominator for all the recent proposals is the emphasis on high-level expertise and competence, together with a well-working innovation system as the basis for national competitiveness. The need to shift the emphasis from a narrowly defined science and technology policy to a broad-based innovation policy comes through from the proposals - although without forgetting the focal role of top-level research for competitiveness. Accordingly, development of high technology and its broad application in different sectors has a crucial position in the visions of the future. Similarly, strengthening the education and innovation systems is seen as a central element in this context.

FINLAND - EIS 2005 results





Indicator quality concerns:

None known.

	FINLAND					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.67*	*0.68*	*0.68*		*0.9*	*0.0*
	relative to EU	--	--	--	--	*158*	*160*	*161*			
	rank	--	--	--	--	*3*	*3*	*3*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*15.9*	*17.8*	*16.0*	*17.2*	*17.4*	--	--	*153*	*2*	*9*
	relative to EU	--	*189*	*157*	*156*	*153*	--	--			
1.2	*Population with tertiary education*	*28.9*	*31.3*	*32.3*	*32.3*	*32.4*	*33.2*	*34.2*	*156*	*3*	*4*
	relative to EU	--	--	*162*	*161*	*159*	*156*	*156*			
1.3	*Broadband penetration rate*	--	--	--	--	*3.0*	*6.6*	*11.0*	*145*	*51*	*50*
	relative to EU	--	--	--	--	--	--	*145*			
1.4	*Participation in life-long learning*	*16.1*	*17.6*	**19.6**	*19.3*	*18.9*	**25.3**	*24.6*	*248*	--	--
	relative to EU	--	--	*248*	*244*	*236*	**272**	*248*			
1.5	*Youth education attainment level*	*85.2*	*86.8*	**87.8**	*86.5*	*86.2*	*85.2*	*84.6*	*110*	*-1*	*0*
	relative to EU	--	*116*	**115**	*114*	*113*	*111*	*110*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.94*	*1.02*	*0.98*	*0.97*	*1.03*	*1.03*	--	*149*	*2*	*2*
	relative to EU	*142*	*157*	*148*	*145*	*151*	*149*	--			
2.2	*Business R&D expenditures*	*1.94*	*2.19*	*2.40*	*2.41*	*2.40*	*2.45*	--	*194*	*2*	*1*
	relative to EU	*167*	*181*	*197*	*193*	*192*	*194*	--			
2.3	*Share of med-high/high-tech R&D*	*83.8*	*86.0*	*86.5*	*86.3*	*88.1*	--	--	*99*	*2*	--
	relative to EU	*94*	*96*	*97*	*97*	*99*	--	--			
2.4	*Enterprises receiving public funding*			*18.7*					*225*	--	--
2.5	*Business financed university R&D*	*4.5*	*4.7*	*5.6*	*6.7*	*6.2*	*5.8*	--	*94*	*1*	*1*
	relative to EU	*71*	*72*	*85*	*100*	*94*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*37.6*		*23.8*			*93*	--	--
3.2	*Innovative SMEs co-operating with others*			*20.0*		*18.6*			*161*	--	--
3.3	*Innovation expenditures*			*2.50*		--			*138*	--	--
3.4	*Early-stage venture capital*	*0.031*	*0.055*	*0.081*	*0.104*	*0.088*	*0.065*	--	*260*	*-10*	*-28*
	relative to EU	--	*190*	*142*	*173*	*236*	*260*	--			
3.5	*ICT expenditures*	--	--	*6.9*	*6.6*	*7.1*	*7.0*	*7.1*	*113*	*2*	*7*
	relative to EU	--	--	*106*	*105*	*108*	*109*	*113*			
3.6	*SMEs using non-technological change*			*47.0*					*111*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*4.60*	*4.26*	*4.39*	*4.40*	*4.73*	*4.68*	--	*147*	*4*	*0*
	relative to EU	--	--	*143*	*134*	*146*	*147*	--			
4.2	*Exports of high technology products*	*19.4*	*20.7*	*23.5*	*21.1*	*20.9*	*20.6*	--	*116*	*-3*	*-6*
	relative to EU	--	*105*	*114*	*103*	*115*	*116*	--			
4.3	*Sales new-to-market products*			*14.5*		*5.1*			*110*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*17.5*		*16.4*			*244*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*7.21*	*7.23*	*7.23*	*7.44*	*7.38*	*6.85*	--	*104*	*-3*	*-3*
	relative to EU	--	--	*103*	*107*	*108*	*104*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*260.2*	*294.2*	*343.7*	*377.4*	*310.9*	--	--	*233*	*2*	*5*
	relative to EU	*238*	*249*	*257*	*266*	*233*	--	--			
5.2	*New USPTO patents*	*116.4*	*126.5*	*119.5*	*143.4*	*158.6*	--	--	*222*	*15*	*6*
	relative to EU	*191*	*201*	*179*	*200*	*222*	--	--			
5.3	*New Triad patents*	*82.6*	*81.1*	*94.5*	--	--	--	--	*423*	*11*	*1*
	relative to EU	*360*	*364*	*423*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*84.4*	*81.5*	*82.7*	*95*	*-1*	*16*
	relative to EU	--	--	--	--	*129*	*96*	*95*			
5.5	*New community designs*	--	--	--	--	--	*56.9*	*91.7*	*109*	--	--
	relative to EU	--	--	--	--	--	*83*	*109*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.8 FRANCE

1. Introduction

France is an intermediate performing country, ranking 9th out of the 25 EU member states on the summary innovation index. Based on performance, its peer countries include Austria, Belgium, the Netherlands, the UK, Germany and Italy. Its relative strengths are in knowledge creation, innovation drivers, and applications. Its greatest weakness is in innovation & entrepreneurship, where it ranks 11th out of 23 countries. Its good performance on innovation drivers is due to a far above average supply of new S&E graduates. Otherwise, its performance on innovation driver indicators is slightly above the EU average or below, as with life-long learning. On knowledge creation France performs at or above the EU average, with the exception of the percentage of university R&D financed by business, which is only 44% of the EU average. Its weakness in innovation & entrepreneurship is primarily due to a low percentage of firms that introduced non-technological change, plus slightly below average investment in ICT and an average share of SMEs that cooperate on innovation.

Although France is an average performer on IPR, it has an exceptional strength in triad patents, which contrasts to near average performance in EPO and USPTO patenting. One possibility is that French firms actually better manage their patent portfolios than firms in other countries, by patenting economically valuable inventions (which tend to show up in triadic patents) and not patenting minor inventions of little value.

2. Major challenges and policies

France is a big country with a solid R&D system. However, important challenges remain in order to transform its structures into a sustainable national innovation system that will allow long term competitiveness in the global context. The immediate challenges appear to be:

Increase business R&D expenditures (through improved public-private partnerships

Business R&D expenditures in France are only 106% compared to the EU average, well below those of Germany and demonstrating a slightly reducing tendency in 2003. The very low score on the business-financed university R&D, namely 44% of the EU average positioning France on the 26th place of the countries considered, suggests that the business sector invests in isolation from the academic environment and one way to increase BERD is through public-private partnerships.

The French government has very early on introduced incentives for directly increasing business R&D expenditure. The Corporate Tax Credit for Research Expenses (FR 5) is a key measure to support R&D investments within companies. It operates as a horizontal measure, non-discriminatory across sectors of activity, and aimed at supporting corporate R&D investments by means of tax incentives. A new tax measure aimed at encouraging companies to increase their R & D spending is expected to show first results in 2006.

A variety of additional measures support business R&D via incentives for venture capital or new technology firm creation. In addition, because the propensity to cooperate was low, the French government introduced important measures in this direction. Since 2000, innovation policy-making has benefited from the thrust initiated by the 1999 Innovation Act. The Act has indeed generated enthusiasm and a wide cultural change by increasing and facilitating the interaction between the academic and the business sector. Such measures include the Competitiveness Clusters (FR 63), Support for the creation of thematic research networks, Research and Technological Innovation Networks (RRITs, FR17). Technological Development Networks (FR22), the Entrepreneurship Houses established within universities and Higher Education Institutions (HEI) to open up universities to the business world (FR 60) and Technology Platforms (PFT) to support and institutionalise the 3rd mission of public education and training institutions, i.e. the promotion of innovation and technology transfer (FR33).

In addition, the government has facilitated access of innovative SMEs to public procurements in the field of defence, thus stimulate R&D through market creation rather than support measures (FR 61). Improved co-operation between public research and enterprises by creating technology transfer offices (SAIC) started in pilot form and are expected to generalise in the year 2006. The simplification of administrative formalities is another important target, which has already started.

The French Reform Programme foresees important administrative simplifications and new ways to institutionalise university-industry linkages. Overall, this challenge was already addressed in the past and intervention is now further reinforced. The French government sees this challenge as a more complex issue linking the quality of public research with the incentives for the increase of business expenditure.

Only in tandem they will create attractive poles of excellence in new technologies making the French territory attractive to new investments.

- Foster non-technological innovations

SMEs using non-technological change in France account for 54% of the EU average positing the country number 23rd among all those considered. Similarly, in new community trademarks the French indicator is only 84% of the EU average putting the country on the 15th position.

Measures in favour of competitiveness and entrepreneurship can address this challenge and in this spirit it is important to increase SMEs innovation capabilities. The French government addresses the issue with a variety of measures for the support of SMEs. There is an increased political will to involve SMEs in the development of innovation more closely; ANVAR's aim became the integration of SMEs in innovation and technical progress. The regional delegations have often provided SMEs with more than just funding, but have also given general support for the success of the innovation project.

An initiative regarded as a very positive measure for SME research and innovation is the Young Innovative Company status (JEI), provided for in the 2004 Finance Law, with the objective of this status to help young innovative companies overcome their first years of existence by granting them tax credits to offset R&D investment. The access to public procurement (FR 61) mentioned above, the support for PhD recruitments (FR 14) and technology diffusion (FR 4) are among those supporting the modernisation of SMEs.

However, these measures appear insufficient to turn the tide and significantly affect the non-technological innovation performance of the French business sector. Apparently, more incentives are needed for the modernisation of the average French SME. In this context, the broader challenge identified by the Lisbon Reform Plan to foster the entrepreneurial spirit, as part of the broader educational reform, appears relevant.

- Life-long learning

France is 15th in terms of life-long learning with 79% of the EU average in 2004. However, one should note that there is a significant change in terms of order of magnitude from 2002 to 2003; before that the indicator was only around 35% of the EU average and it has doubled in relative shares in the last two years.

Legal provisions from 2002 to 2004 shifting responsibility to the regions and offering new incentives for professional training were introduced. However, life-long learning, does not appear either on the political agenda or as a priority in reports or in think tanks reflections.

3. Policy learning

3.1 Governance

The French innovation governance system is characterised by a high level of transparency and readability of strategic planning, as well as efforts for a maximum stakeholder involvement. However, at a more operational level, follow-up is still one of the challenges to the system, since there is a lack of use of indicators guiding R&D policy. In addition, the multitude of actors in innovation policy at the national and regional levels is one of the most prominent problems, especially for SMEs. A reorganisation of all involved actors, for which there has been growing support over the past year, is likely to consolidate the institutional landscape. The creation of the Industrial Innovation Agency and of competitiveness clusters in this year are an indication into this direction.

The modernisation of policy tools is slow, since there is limited diffusion of the project and evaluation culture. Institutional targets that were met include the introduction of infrastructural changes with the establishment of a more 'innovation-friendly' administrative environment.

Hence, immediate challenges for the improvement of the innovation governance are:

- *Need for an effective follow-up of innovation policy measures, with dedicated bodies for the management of research and innovation programmes*
- *Systematic policy learning from international benchmarking and international exchanges*
- *Dispersion of actors supporting innovation, multiplicity of innovation agencies both on the national level (OSEA, AII) and on the regional level.*

3.2 Recent policy trends

The reorganisation of the system was marked in the recent period by the creation of the National Agency for Research and the OSEO.

The Agency's exact status and working methods are still unclear as the various statutes setting out its role will form part of the forthcoming Research Bill. In the meantime, a temporary structure has been established to distribute the Agency's €350 million budget for 2005. The ANR will have a particular focus on

basic research and research carried out in collaboration with industry. In 2005, the ANR will take over the management and funding of a number of existing directed funding programmes previously run by the Research Ministry, including RRITs.

The creation of OSEO is a result of the merger of ANVAR (the National Innovation Agency), the BDPME (Bank for Development of SMEs), the Agency for SMEs and the SOFARIS scheme. In January 2004, ANVAR took over the management of the Fund for Enterprises Competitiveness and of the Programme ATOUT. This is in line with one of the strategic orientations defined in the 2003 Innovation Plan to make OSEO the main public operator in the field of innovation, in charge of managing and implementing the measures established by the government to promote innovation – especially towards SMEs.

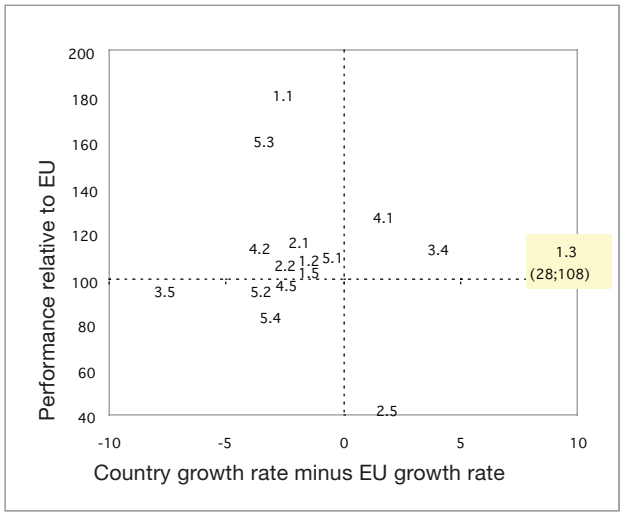
More administrative forms are under way: The creation of the General Directorate for Enterprises (DGE) in the Ministry in charge of Industry, following the merger of the two divisions in charge of innovation-related matters. The Industrial Innovation Agency and competitiveness clusters are two other initiatives to be implemented before summer 2005. To complete ANR and OSEO actions, another Agency will be created, the Industrial Innovation Agency (AII to manage and coordinate medium term public programmes for industrial innovation, called "Programmes mobilisateurs pour l'innovation industrielle" (PMII). Finally, the main new development of innovation policy in 2005 will concern Competitiveness clusters defined territorially by the co-existence of a strongly specialised industrial basis and research and education potential.

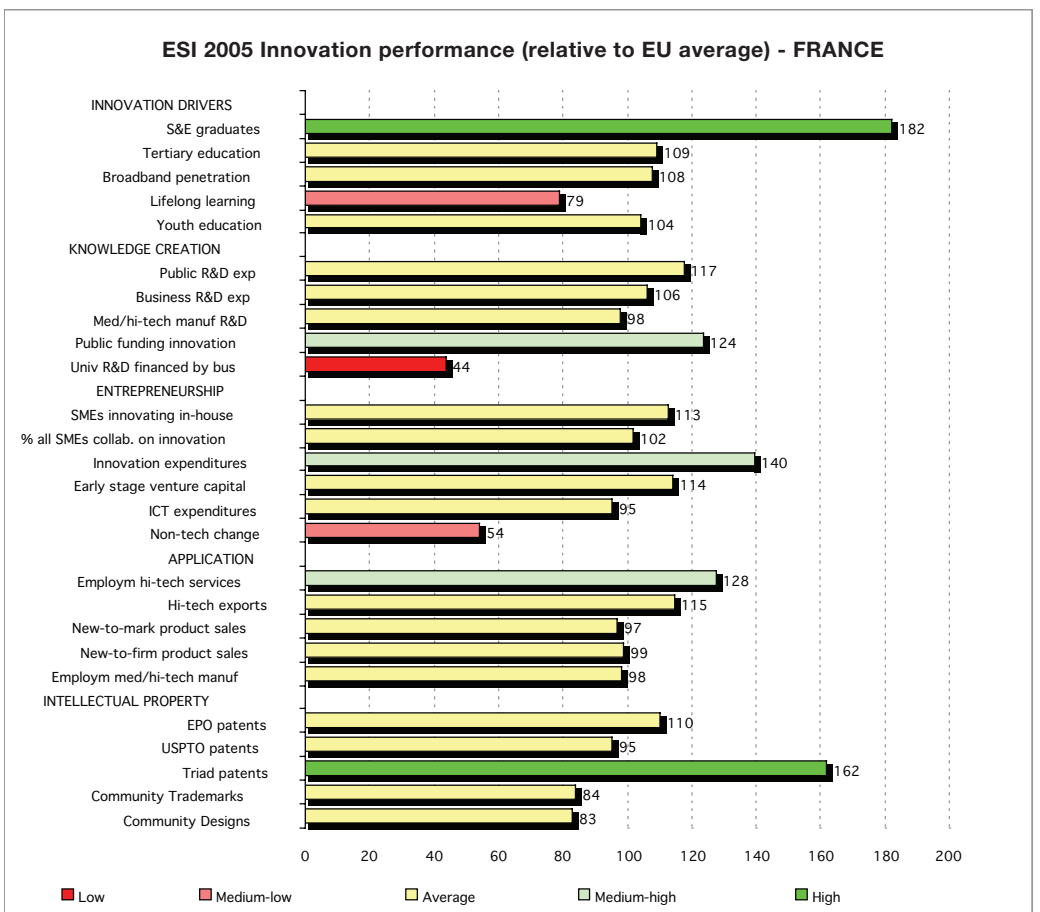
4. Possible orientation for future actions

The French economy, although one of the strongest in the Union, suffered from serious challenges over the last years, often losing ground in new technologies. Innovation policy started early on but appeared less effective than expected. Design and concepts were stronger than implementation. However, recent reforms and the adoption of the Reform Plan demonstrate a clear determination to improve considerably in the near future. It is important to complete the new governance structure and assure their effective operations.

Quantitative targets and the incentives offered are ambitious and can be expected to be fruitful. However, two issues seem to request more attention: emphasis on life-long learning and the systematic introduction of modern policy tools, such as benchmarking, evaluation and a project-based innovation policy culture.

FRANCE - EIS 2005 results





Indicator quality concerns:

None known.

	FRANCE					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.46*	*0.46*	*0.46*		*-0.7*	*0.0*
	relative to EU	--	--	--	--	*109*	*108*	*108*			
	rank	--	--	--	--	*12*	*12*	*12*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*18.5*	*19.0*	*19.6*	*20.2*	--	*22.2*	--	*182*	*6*	*9*
	relative to EU	--	*202*	*192*	*184*	--	*182*	--			
1.2	*Population with tertiary education*	*20.1*	*20.9*	*21.6*	*22.6*	*23.5*	*23.2*	*23.9*	*109*	*3*	*4*
	relative to EU	--	--	*108*	*112*	*115*	*109*	*109*			
1.3	*Broadband penetration rate*	--	--	--	--	*1.2*	*4.0*	*8.2*	*108*	*78*	*50*
	relative to EU	--	--	--	--	--	--	*108*			
1.4	*Participation in life-long learning*	*2.7*	*2.6*	*2.8*	*2.7*	*2.7*	**7.4**	*7.8*	*79*	--	--
	relative to EU	--	--	*35*	*34*	*34*	**80**	*79*			
1.5	*Youth education attainment level*	*78.9*	*80.0*	*81.6*	*81.8*	*81.7*	*80.9*	*79.8*	*104*	*-1*	*0*
	relative to EU	--	*107*	*107*	*107*	*107*	*106*	*104*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.82*	*0.79*	*0.81*	*0.81*	*0.82*	*0.81*	--	*117*	*0*	*2*
	relative to EU	*124*	*122*	*123*	*121*	*121*	*117*	--			
2.2	*Business R&D expenditures*	*1.35*	*1.37*	*1.34*	*1.39*	*1.41*	*1.34*	--	*106*	*-1*	*1*
	relative to EU	*116*	*113*	*110*	*111*	*113*	*106*	--			
2.3	*Share of med-high/high-tech R&D*	*86.3*	*87.9*	*86.2*	*86.2*	*87.2*	--	--	*98*	*0*	--
	relative to EU	*97*	*99*	*97*	*97*	*98*	--	--			
2.4	*Enterprises receiving public funding*			*10.3*					*124*	--	--
2.5	*Business financed university R&D*	*3.4*	*3.4*	*2.7*	*3.1*	*2.9*	--	--	*44*	*3*	*1*
	relative to EU	*53*	*52*	*41*	*46*	*44*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*29.2*		--			*113*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*9.3*		--			*102*	--	--
3.3	*Innovation expenditures*			*2.53*		--			*140*	--	--
3.4	*Early-stage venture capital*	*0.014*	*0.029*	*0.060*	*0.060*	*0.035*	*0.029*	--	*114*	*-24*	*-28*
	relative to EU	--	*100*	*105*	*99*	*95*	*114*	--			
3.5	*ICT expenditures*	--	--	*5.9*	*6.1*	*6.2*	*5.9*	*6.0*	*95*	*-1*	*7*
	relative to EU	--	--	*91*	*97*	*94*	*92*	*95*			
3.6	*SMEs using non-technological change*			*23.0*					*54*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.58*	*3.83*	*3.86*	*4.07*	*4.06*	*4.07*	--	*128*	*2*	*0*
	relative to EU	--	--	*125*	*124*	*125*	*128*	--			
4.2	*Exports of high technology products*	*22.8*	*24.0*	*25.5*	*25.6*	*21.9*	*20.4*	--	*115*	*-10*	*-6*
	relative to EU	--	*122*	*124*	*125*	*120*	*115*	--			
4.3	*Sales new-to-market products*			*5.8*		--			*97*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*11.9*		--			*99*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*6.97*	*7.23*	*7.23*	*7.16*	*6.82*	*6.50*	--	*98*	*-5*	*-3*
	relative to EU	--	--	*103*	*103*	*100*	*98*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*125.7*	*131.0*	*144.4*	*150.2*	*147.2*	--	--	*110*	*5*	*5*
	relative to EU	*115*	*111*	*108*	*106*	*110*	--	--			
5.2	*New USPTO patents*	*63.3*	*65.4*	*65.4*	*68.9*	*68.1*	--	--	*95*	*3*	*6*
	relative to EU	*104*	*104*	*98*	*96*	*95*	--	--			
5.3	*New Triad patents*	*39.0*	*35.5*	*36.1*	--	--	--	--	*162*	*-2*	*1*
	relative to EU	*170*	*159*	*162*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*57.6*	*69.3*	*73.1*	*84*	*13*	*16*
	relative to EU	--	--	--	--	*88*	*82*	*84*			
5.5	*New community designs*	--	--	--	--	--	*47.3*	*69.8*	*83*	--	--
	relative to EU	--	--	--	--	--	*69*	*83*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.9 GERMANY

1. Introduction

The innovation performance of Germany is still among the highest in Europe, as revealed by European Innovation Scoreboard (EIS) indicators. Germany shows a medium-high or high performance for 12 EIS indicators, while a medium-low performance is reported for only 2 indicators. But more than many other EU countries, the performance of Germany on the EIS is sensitive to the choice of indicators. A duality of a top performing export sector and stagnation in domestic demand determines the current economic position. The strength of the former is demonstrated by Germany's absolute performance on Triad patents, which is exceptional, at over three times the EU average.

For 2005, the ranking of Germany has increased to the fourth place out of 25 EU member states and it is in the 7th place out of 33 countries. Germany's strengths are in knowledge creation, innovation & entrepreneurship, applications, and IPR. Surprisingly, these strengths, particularly in both classes of innovation outcomes, are built upon below average performance in innovation drivers and poor performance in innovation demand and governance. These suggest possible problems for Germany in the future, with a negative trend in both S&E graduates and the youth education attainment level. These are both indicators where Germany is already performing below the EU average, and they constitute clear challenges for future competitiveness. Most German trends are at or below the EU average, because of the high initial position of the country combined with difficulties to forge ahead.

2. Major challenges and policies

As pointed out the human capital elements are crucial for the future of the German competitiveness. In addition, early stage venture capital is very important for the restructuring of the productive sector. The National Reform Programme views the creation of NTBFs as a more general, long-term challenge, which will guarantee sustainable development and competitiveness. Human capital and financial support are a means to this end.

S&E graduates

Despite its reputation and strength in machine manufacturing, Germany has only a level of 69% compared to the EU average in the particular indicator, hence, ranking 19th among the countries studied. The issue is of concern in Germany, as proven both by the new edition of the annual Report on Germany's technological performance and the current innovation policy debate. The former mentions as on if the main areas of concern "Lack in supply in S&E graduates in the years to come". The latter centres around six main themes, one of which is "tackling a potential shortage in high qualified personnel, especially S&E graduates". A major focus point for theses debates are the working groups of the Partners for Innovation initiative of the federal government.

A number of measures were launched in order to overcome this shortage in the short as well as in the long term. As a short term measure, opening the German labour market to foreign experts was the most important initiative (DE 45). With regard to the long-term measures, structural reforms of the education system are intended to increase both the number of university students in S&E and the number of students successfully finishing their studies. For the former, reforms in secondary education attempt to raise the quality of education and the number of students equipped with a general qualification for university entry. This includes, among others, the promotion of all-day schools and incentives for girls to attend science-oriented classes or school forms (in response to a low rate of female students in S&E). For the latter, reforms in tertiary education within the Bologna process is the main activity. This includes the introduction of Bachelor and Master certificates and the modularisation of studies in order to shorten study times.

A new programme to promote excellence and top-level academic research at universities is still waiting to start.

Life-long learning and youth education

This is the worse performance of Germany with 75% of the EU average and the 16th position in life-long learning; the corresponding indicators are 95% and the 25th position in youth education. Increasing the participation of employees in further education and continuing training is a major goal of education policy. In 2001, the BMBF published an Action Programme "Life-long Learning for ALL". The main activity is a programme called Learning Regions that supports the establishment of regional networks of institutions active in the area of further education and continuing training (see DE 53). This should contribute to an improvement of the infrastructure for life-long learning. In 2004, the BLK issued a joint initiative of the Federal and the Länder governments on life-long learning in Germany. A report on how to finance life-long learning, commissioned by the BMBF, was published in 2004, too. The development of software

for network-based education systems is one activity of many (LERNET) which is part of the ICT thematic research programme (see DE 69). Further activities concern the promotion of further education at higher education institutions, support to individuals that attempt to study for master craftsman (Meister-Bafög) and activities to insure quality of continuing training supply.

Early stage venture capital (significantly falling behind)

Historically the German economy developed with the support of the banking system and it was not until the '80s that the Stock Exchange started playing a more active role. Venture capital increased with substantial support from the Federal and Regional governments but has been significantly falling behind after the Dot.com crisis. Hence, Germany is now position on the 14th place but with a systematic deterioration over the last years compared both to the EU average and itself.

In response to that, the Federal government relaunched its VC programmes and introduced a new public VC fund that addresses these shortcomings. In April 2005, the new High-tech Start-up Fund (DE 76) was launched, offering seed and start-up VC funding to founders of technology-based start-ups. In Autumn 2004, a new umbrella fund was launched that aims to provide additional capital for private VC companies for investment in seed and start-up stages of young technology enterprises (DE 12). Moreover, the existing VC programmes (BTU, BTU Early Stage, KfW VC programme, tbg programme were redesigned (DE 12).

BAND, the Business Angels Network of Germany, which aims at promoting a culture of private support for new firm founders is also a means to address the problem in its cultural dimension (DE 50).

3. Policy learning

3.1 Governance

The German governance system is well structured and adapts rapidly incorporating modern techniques and applying benchmarking and transnational learning. The US and Japan are often the reference points.

Objectives in innovation policy are defined in a parliamentary process by members of parliament, by political parties, by government officials (Ministers, Secretaries of State) or by other stakeholders. Of particular interest is in this context the initiative 'Partners for Innovation', involving expert knowledge from public administration (especially federal ministries) and other experts invited to expert panels etc. Mechanisms for debate and intervention are sufficient: representatives of industry associations, unions, professional associations, non-governmental organisations, science organisations, private associations etc. articulate their views on innovation performance and the need for policy intervention through conferences, press statements, reports, petitions to the Parliament, individual talks to policy makers etc. The public administration, i.e. the federal ministries as well as other federal authorities, commission a large number of studies on innovation policy issues such as international comparisons of technological performance in certain areas and fields of innovation policy, including benchmark activities and the identification of best practice. Thematic workshops are organised, that bring together stakeholders from all areas serve as an important tool for exchanging views and producing a common picture of challenges for innovation policy and appropriate measures to tackle these challenges.

On an international level, the OECD, in particular the Science, Technology, Industry (STI) Directorate, as well as the European Commission, serve as a major stimulator for identifying potential needs for policy intervention, adopting approaches and measures from other countries, and exchanging experiences in the delivery and effectiveness of innovation policy activities.

Despite the good organization there are some important challenges remaining, which may hamper the effort to forge ahead:

- *The federal system complicates and lengthens policy decisions, because of the split in competencies between federal and Länder level, especially concerning research, education and science (plus federal system increasingly blocks reforms and may hinder effective policy making if ruling parties on the Länder level are different from the ruling parties on the federal level).*
- *There is a relatively complex system of administration of innovation policy measures due to a high number of administrating agencies and programmes including the multiple responsibility in some innovation policy areas at BMBF and BMWA.*
- *Stakeholder involvement often contributes to the preservation of existing measures and may hinder more radical reforms and the introduction of new measures.*

3.2 Recent policy trends

Innovation policy in Germany has well articulated operational objectives linked to the Barcelona target, SME and high-tech development and regional balances between the old and new Bundeslaender. Clusters and university-industry co-operation are the means for that.

In order to boost innovation in Germany, the Federal Government follows three main policy lines:
(a) Improving framework conditions for innovation
(b) Improving the education and science system
(c) Promoting innovation activities in firms through financial aid.

The year 2004 was the 'year of innovation', indicating the crucial importance of this area for federal policy. That year, the government initiated the new innovation initiative, to stimulate new innovative projects in enterprises, research institutions and society. Strengthening innovation complements the ongoing structural reforms on labour markets and in social security systems. Since, there was no major change in the basic orientation and strategy of innovation policy in Germany. At the level of individual measures, some new initiatives have been implemented. Most of them concern measures to improve financing for technology-based start-ups, especially concerning access to venture capital (VC). The Federal Government has implemented a tripartite structure in this area. Beside the VC, explained above, the sub-programme EXIST Seed (which provides grant aid to universities in order to fund students, graduates and young researchers who want to start a new business, esp. for developing a business plan) has been extended nation wide. The ERP Innovation programme (DE 10), a loan programme for R&D and innovation financing in SMEs, is redesigned in order to better address current market failures in loan financing of innovation. The relaunched programme offers more attractive conditions.

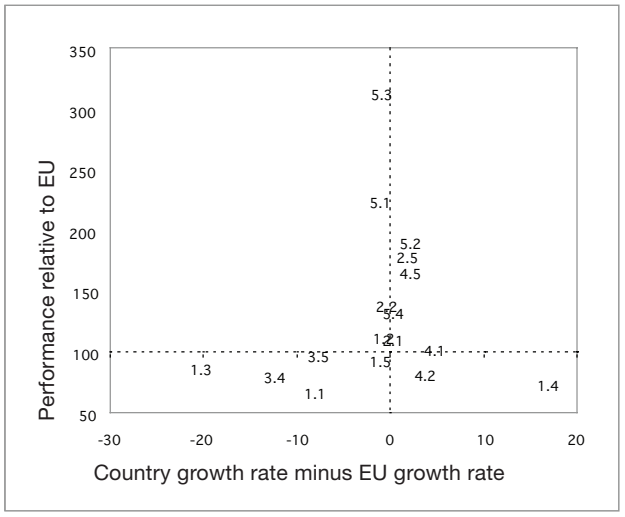
4. Possible orientation for future actions

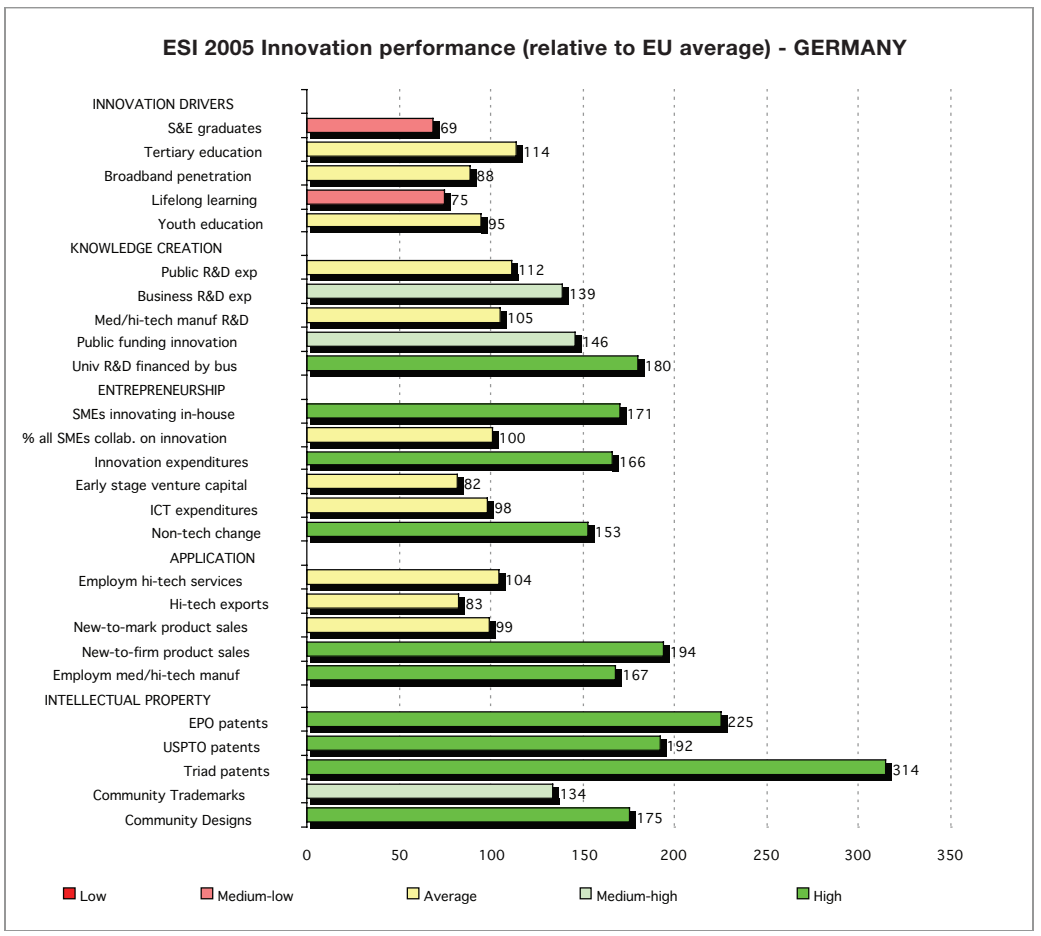
The strong export performance rests on a high innovation orientation of German enterprises, resulting in considerable increases in productivity (+1.3% in 2004 in real terms) and a high competitiveness due to high-quality products. This part of the economy leads in innovation and high-tech.

However, Germany sometimes appears captive of its own success with major lock ins. The intensive report that started recently needs to go beyond the existing success and renew the productive fabric. Most stakeholders see the main challenges for sustaining Germany's strong position in innovation in the following areas:

- *Improving framework conditions for financing R&D and innovation activities, e.g. through an increased supply of venture capital for financing high-tech start-ups and better financial support for R&D and innovation in SMEs.*
- *Improving the qualifications of the work force through a better basic education at primary and secondary level, a modernisation of vocational training (which occupies a prominent role in the German education system), increasing the number of students (especially in science and technology) and a reform of university education in terms of shortening the length of degree courses and incorporating innovation related topics in the curricula (such as entrepreneurship and innovation management).*
- *Reducing bureaucratic obstacles to innovation activities in all areas*
- *Continuing reforms in the public research sector in order to strengthen technology transfer and industry-science links (such as regular evaluations, a professional commercialisation infrastructure, financial support to joint research activities).*

GERMANY - EIS 2005 results





Indicator quality concerns:

None known.

	GERMANY					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.57*	*0.57*	*0.58*		*1.0*	*0.0*
	relative to EU	--	--	--	--	*133*	*135*	*136*			
	rank	--	--	--	--	*7*	*7*	*7*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*8.8*	*8.6*	*8.2*	*8.0*	*8.1*	*8.4*	--	*69*	*1*	*9*
	relative to EU	--	*91*	*80*	*73*	*71*	*69*	--			
1.2	*Population with tertiary education*	--	*23.0*	*23.8*	*23.5*	*22.3*	*24.0*	*24.9*	*114*	*4*	*4*
	relative to EU	--	--	*119*	*117*	*109*	*113*	*114*			
1.3	*Broadband penetration rate*	--	--	--	--	*3.2*	*4.8*	*6.7*	*88*	*29*	*50*
	relative to EU	--	--	--	--	--	--	*88*			
1.4	*Participation in life-long learning*	*5.3*	*5.5*	*5.2*	*5.2*	*5.8*	*6.0*	*7.4*	*75*	*17*	--
	relative to EU	--	--	*66*	*66*	*73*	**65**	*75*			
1.5	*Youth education attainment level*	--	*74.6*	*74.7*	*73.6*	*73.3*	*72.5*	*72.8*	*95*	*-1*	*0*
	relative to EU	--	*100*	*98*	*97*	*96*	*95*	*95*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.74*	*0.73*	*0.72*	*0.74*	*0.77*	*0.77*	*0.74*	*112*	*3*	*2*
	relative to EU	*112*	*112*	*109*	*110*	*113*	*112*	--			
2.2	*Business R&D expenditures*	*1.57*	*1.67*	*1.73*	*1.72*	*1.72*	*1.75*	*1.68*	*139*	*1*	*1*
	relative to EU	*135*	*138*	*142*	*138*	*138*	*139*	--			
2.3	*Share of med-high/high-tech R&D*	*92.8*	*92.1*	*92.7*	*92.3*	*93.5*	--	--	*105*	*1*	--
	relative to EU	*104*	*103*	*104*	*104*	*105*	--	--			
2.4	*Enterprises receiving public funding*			*12.1*					*146*	--	--
2.5	*Business financed university R&D*	*10.5*	*11.3*	*11.6*	*12.2*	*11.8*	*12.5*	--	*180*	*3*	*1*
	relative to EU	*165*	*173*	*178*	*182*	*180*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*46.2*		*43.4*			*171*	--	--
3.2	*Innovative SMEs co-operating with others*			*9.2*		--			*100*	--	--
3.3	*Innovation expenditures*			*2.72*		*2.50*			*166*	--	--
3.4	*Early-stage venture capital*	*0.018*	*0.038*	*0.066*	*0.069*	*0.042*	*0.021*	--	*82*	*-40*	*-28*
	relative to EU	--	*129*	*117*	*114*	*112*	*82*	--			
3.5	*ICT expenditures*	--	--	*6.4*	*6.3*	*6.1*	*6.0*	*6.2*	*98*	*-1*	*7*
	relative to EU	--	--	*98*	*100*	*92*	*94*	*98*			
3.6	*SMEs using non-technological change*			*65.0*					*153*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*2.61*	*2.81*	*3.03*	*3.20*	*3.33*	*3.32*	--	*104*	*5*	*0*
	relative to EU	--	--	*98*	*97*	*103*	*104*	--			
4.2	*Exports of high technology products*	*13.1*	*14.2*	*16.1*	*15.8*	*15.1*	*14.7*	--	*83*	*-2*	*-6*
	relative to EU	--	*72*	*78*	*77*	*83*	*83*	--			
4.3	*Sales new-to-market products*			*6.2*		*4.5*			*99*	--	--
4.4	*Sales new-to-firm not new-to-market prod-ucts*			*23.3*		--			*194*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*11.04*	*10.87*	*11.18*	*11.21*	*11.36*	*11.04*	--	*167*	*0*	*-3*
	relative to EU	--	--	*160*	*161*	*166*	*167*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*247.6*	*273.5*	*305.1*	*320.4*	*301.0*	--	--	*225*	*5*	*5*
	relative to EU	*227*	*231*	*228*	*226*	*225*	--	--			
5.2	*New USPTO patents*	*111.0*	*114.2*	*124.9*	*137.0*	*137.2*	--	--	*192*	*8*	*6*
	relative to EU	*182*	*181*	*187*	*191*	*192*	--	--			
5.3	*New Triad patents*	*73.0*	*71.5*	*70.3*	--	--	--	--	*314*	*1*	*1*
	relative to EU	*318*	*321*	*314*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*86.4*	*113.6*	*116.6*	*134*	*16*	*16*
	relative to EU	--	--	--	--	*132*	*134*	*134*			
5.5	*New community designs*	--	--	--	--	--	*120.3*	*147.1*	*175*	--	--
	relative to EU	--	--	--	--	--	*176*	*175*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.10 GREECE

1. Introduction

Greece is one of the cohesion countries and has as such benefited from generous CSF support in the last twenty years. In this context, in particular during the last decade, progress was marked in institutional change; regional development funding has increasingly flown into innovation. However, despite these efforts the country remains in a comparatively very weak position: it ranks 23rd out of the 25 EU member states and 29th compared with the 33 European countries studied. It performs relatively better in the innovation and entrepreneurship, innovation drivers and innovation creation categories but it is very weak in the composite indexes for applications and intellectual property. Educational attainment, which is close to the European average, and in particular youth education, which is higher than the EU average, offer an optimistic message for the future.

Greece is clearly forging ahead only in the youth educational attainment indicator and is also catching up in high tech products and services, where it started very low. Similarly it improves in EPO patents and in trade marks, however in both cases remaining at the fringe of EU activities. Hence, Greece's current capabilities show that it is unlikely to develop creative innovative capabilities in the near future, but it can improve its performance through innovation diffusion.

The innovation performance of the country in the recent past has put it into a cluster of peers, all lagging behind, notably Estonia, Latvia, Poland and Portugal. In fact, the best comparison is with Portugal because of the very similar size and the similar structure of intervention in the last decade, based on the structural funds. In both countries small steps switch over to deterioration and then progress again. Success is hence fragmented and short-lived and neither of them has succeeded in transforming into a knowledge-based economy.

2. Major challenges and policies

In its Reform Programme the Greek Government recognises the need to address the innovation gap, however with moderate emphasis since macroeconomic conditions and the labour market appear to be the current priority. The following three challenges are the most relevant ones identified by the EIS, since the very weak performance in applications and intellectual property is unlikely to be tackled before the infrastructure is in place for developing innovation in the first place:

- Business expenditure on R&D (BERD) and SMEs innovating in-house

Based on all recent econometric evidence the empirical literature on innovation gives a very prominent role to BERD, which is also one of the Barcelona targets. Although innovation without R&D is possible and may be very effective, a figure as low as 16% of the European average, which persists at that level since EIS statistics started to be collected, reflects a real problem. BERD is not only a way for business to launch new products and processes but also a way to improve their absorptive capacities and hence facilitate an effective innovation diffusion process. It is directly linked to the low share of SMEs innovating in-house. A very low BERD is characteristic for the least competitive countries and all the peers of Greece occupy the lowest ranks among the EU member states.

The challenge is identified by the Greek policy makers, who persistently put BERD increase as a target in their agendas. A variety of programmes support this target:

- *one of the first measures introduced by the Greek technology policy was a grant scheme for in-house company R&D grants; the programme is launched almost yearly with some modifications recently trying to improve efficiency (EL 8),*
- *cluster and sectoral priority measures emphasise the role of enterprises and use the role of the business sector as an important criterion for the ex ante evaluation (EL55),*
- *support for spin offs in general and start ups to various groups like women and youth entrepreneurship were launched under the third CSF (EL39).*

At the same time a document, of early 2004 set a clear objective, put into quantitative terms: Greece should attain 1,5% of GERD/GDP with 40% stemming from industry in 2010, starting with 0,65% and 30% respectively in 2001. The effort to involve the business sector in innovation governance through the invitation of key stakeholders in existing and new fora also represents an effort to meet the challenge. However, be it because the policy mix is inappropriate, be it because the overall economic climate and the business routines are unfavourable, no visible change can be observed as yet. This remains a key challenge for the Greek innovation policy. A more innovative set of policy measures and better governance (including co-ordination with macro-economic policy) may be the right answer to the problem.

- Broadband access and ICT investment

Greece ranks last of all countries studied (there is

no data available for Romania and Bulgaria) in the broadband penetration rate, which is only 3% of the EU average and comparably only to Turkey; the Slovak Republic and Poland which are ahead of Greece have double the penetration rate compared to the EU average. This catastrophic indicator is probably related to the still dominant position of the former telecommunications monopoly and the fees, which are higher by orders of magnitude compared to the advanced member states.

Policy makers have to some extent addressed the challenge of low internet and PC penetration through an encompassing Operational Programme for the Information Society. However, despite reaching 81% of the EU average, Greece is falling behind instead of catching up and is comparable only to Turkey, Bulgaria and Romania in this performance. This complies with the global sub-indexes ranking where Greece ranks 38th in technology with worst performance in ICT.

Policies address the problems mainly through grants and efforts to adopt standards, create a market and promote information and dissemination. The Ministry of Transport and Communications cooperates with the independent regulatory authority for telecommunications in the setting of the rules for the dissemination of ICT technologies, while it has a central role in exploiting the satellite potential, introducing new services. The Operational Programme for the Information Society supports the introduction of ICT into the public education system, the civil services, the telecommunications and the business sector. The 13 regional operational programmes allocate part of their resources to a spectrum of activities including e-marketing innovative products through common Internet sites. However, again like in the case of BERD the grant-centred philosophy proves insufficient to help the country forge ahead and the gap is maintained, sometime even widened.

Life-Long Learning

The Greek performance is also very weak in life-long learning (LLL), the only weak indicator in the set of education and training variables. Greece ranks 28th compared to 30 countries for which the indicator is available. It is also identified as a major weakness in the national SWOT analysis. A significant jump in 2004 was insufficient to put the country higher than 39% of the EU average and in 2005 it started falling behind again.

LLL is a significant problem in a country, where diffusion is important and the formal level of educational attainment is almost the only strength of the country: whatever is gained in formal education is lost over the years because of the lack of continuous education, which renders the first investments rapidly obsolete. New approaches of training, such as the life-long learning, have a very recent past in the country and competences are shared between many ministries and agencies. While funding has been earmarked for LLL, both from the public budget and as a levy to companies, demand and quality seem to be very low to attract the attention of the business sector and make a difference. An integrated reorganisation, involving the two competent ministries is necessary.

3. Policy learning

3.1 Governance

Innovation governance in Greece is split between the Ministry of Development, hosting General Secretariat for Research and Technology (GSRT) who has been the main operator in innovation policy since the early 1980ies, the Ministry of the Economy and Finance, using innovation incentives as a tool for investment boosting and the Ministry of Education. The universities are the main contributors for research orientation and priorities and for the supply of fresh knowledge to the market place.

The main challenge remains an effective and evidence-based co-ordination among the key actors. Policy tools are only marginally used and co-ordination has a bottom up direction than the opposite. There is an additional element, which impacts the policy making process: among the various components of the innovation system, research is disproportionably over-represented in the stakeholders' fora. A debate is open from time to time as to the need for co-ordination though an interministerial committee and it seems probable that such a committee will be established by the government elected in 2004. Such a committee was created a few decades ago under the chairmanship of the Prime Minister and met twice in four years, before it was abolished, for lack of political interest at that time. The main co-ordination activity is developed during the preparation and assessment phases of the operational programmes of the Common Support Framework. The MEF, in his role of correspondent of the Structural Funds in Greece, as well as the Commission's General Directorates managing the Structural Funds (Regional Development, Social Affairs) take care of the prioritisation and avoid duplications in the drafting operational programmes proposed by the competent ministries and regional authorities.

3.2 Recent policy trends

strong continuity in the RTDI support measures, most of them being re-launched on a yearly basis. The rate of commitment of OPC's funds to projects is continuing to increase. Following the mid term review of the Programme, the competent authorities rearranged resources to faster advancing activities. An interesting amount has been transferred to RTD and innovation actions, which have to be detailed and transformed into funding schemes in the coming months. The development of "poles of innovation" is one of the new concepts to be introduced in the OPC and complement the S&T parks and incubators.

This year a particular emphasis is put on education, considered by all governments as crucial for development, but always reformed partially and with slow rates. Evaluation of teaching staff at primary and secondary levels and openness of the public university are becoming major issues in the education policy debate. Closer co-operation between universities and research centres is also sought.

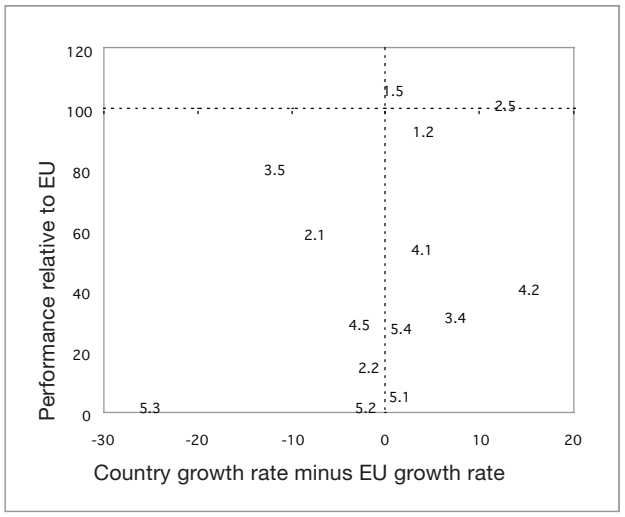
At the same time, the Government proposed and the Parliament approved revised legal frameworks on direct incentives to private investment and on fiscal measures, in which the incentives are pushed to the highest levels allowed by the EU general regulations, in particular the regional state aids, and by the public budgetary restrictions.

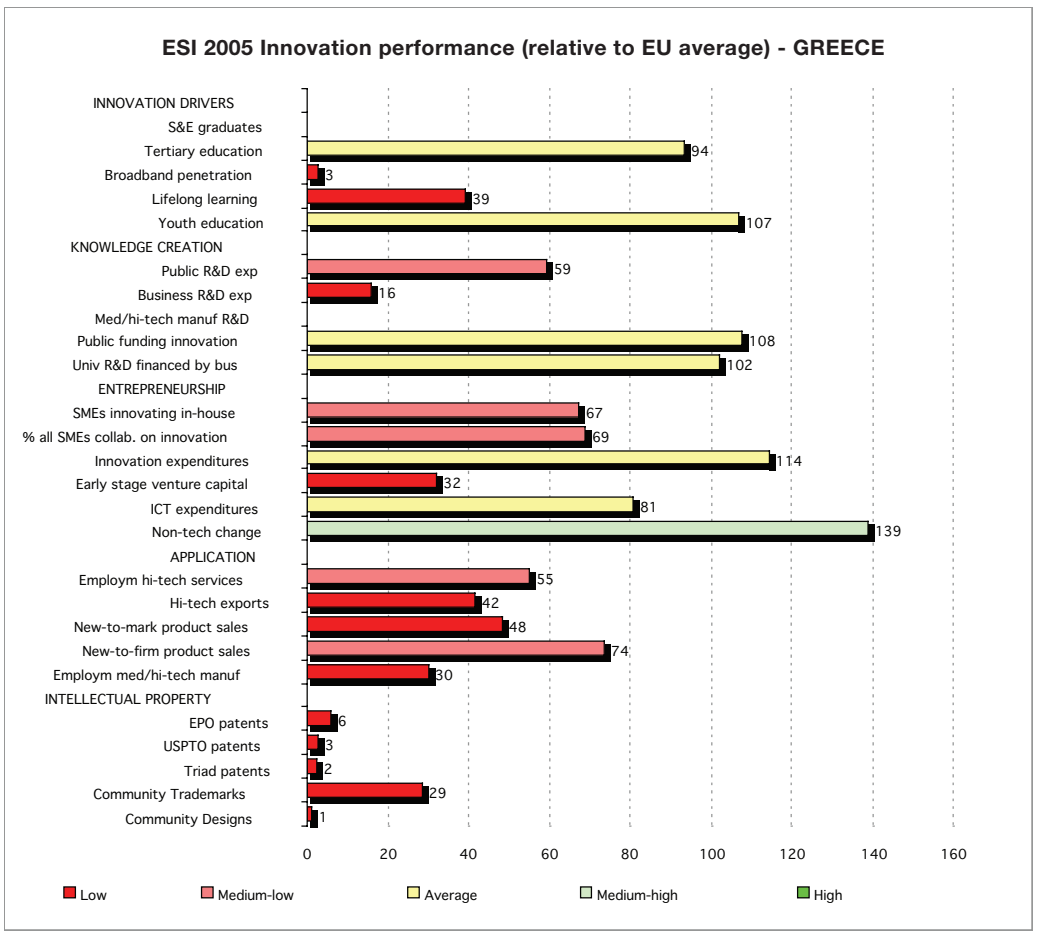
4. Possible orientation for future actions

There is a strong need for the country to improve the effectiveness of its innovation policy. Inputs have increased rapidly in the late '90s but have deteriorated compared to the EU average ever since. Outputs remain in most cases at rudimentary levels.

However, since innovation expenditure and non-technical SME innovation are high, an innovation diffusion model is slowly getting off the ground. There is an urgent need to move from diffusion to innovation creation as soon as possible and set qualitative targets. Improvements in governance and policy tools are urgent.

GREECE - EIS 2005 results





Indicator quality concerns:

None known.

	GREECE					(2003)	(2004)	2005	Relative to EU	Trend	Trend EU
	SII	--	--	--	--	0.20	0.20	0.21		1.6	0.0
	relative to EU	--	--	--	--	47	48	48			
	rank	--	--	--	--	29	30	29			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	S&E graduates	--	--	--	--	--	--	--	--	--	9
	relative to EU	--	--	--	--	--	--	--			
1.2	Population with tertiary education	16.8	16.7	17.0	17.3	18.0	18.5	20.5	94	8	4
	relative to EU	--	--	85	86	88	87	94			
1.3	Broadband penetration rate	--	--	--	--	0.0	0.0	0.2	3	--	50
	relative to EU	--	--	--	--	--	--	3			
1.4	Participation in life-long learning	1.0	1.2	1.1	1.4	1.2	**3.9**	3.9	39	--	--
	relative to EU	--	--	14	18	15	**42**	39			
1.5	Youth education attainment level	76.4	78.6	79.3	80.0	80.7	81.7	81.9	107	1	0
	relative to EU	--	105	104	105	105	107	107			
	INPUT - Knowledge creation										
2.1	Public R&D expenditures	--	0.48	--	0.43	--	0.41	--	59	-5	2
	relative to EU	--	74	--	64	--	59	--			
2.2	Business R&D expenditures	--	0.19	--	0.21	--	0.20	--	16	0	1
	relative to EU	--	16	--	17	--	16	--			
2.3	Share of med-high/high-tech R&D	--	--	--	--	--	--	--	--	--	--
	relative to EU	--	--	--	--	--	--	--			
2.4	Enterprises receiving public funding			8.9					108	--	--
2.5	Business financed university R&D	--	5.0	--	6.9	--	--	--	102	14	1
	relative to EU	--	76	--	102	--	--	--			
	INPUT - Innovation & entrepreneurship										
3.1	SMEs innovating in-house			17.5		--			67	--	--
3.2	Innovative SMEs co-operating with others			6.3		--			69	--	--
3.3	Innovation expenditures			2.08		--			114	--	--
3.4	Early-stage venture capital	0.005	0.011	0.012	0.016	0.017	0.008	--	32	-21	-28
	relative to EU	--	36	21	26	45	32	--			
3.5	ICT expenditures	--	--	5.7	5.5	5.6	5.3	5.1	81	-5	7
	relative to EU	--	--	88	87	85	83	81			
3.6	SMEs using non-technological change			59.0					139	--	--
	OUTPUT - Application										
4.1	Employment in high-tech services	1.49	1.53	1.62	1.70	1.76	1.75	--	55	4	0
	relative to EU	--	--	53	52	54	55	--			
4.2	Exports of high technology products	4.8	5.5	7.5	5.6	6.7	7.4	--	42	9	-6
	relative to EU	--	28	36	27	37	42	--			
4.3	Sales new-to-market products			2.9		--			48	--	--
4.4	Sales new-to-firm not new-to-market products			8.9		--			74	--	--
4.5	Med-hi/high-tech manufacturing employment	2.41	2.21	2.22	2.22	2.20	1.99	--	30	-5	-3
	relative to EU	--	--	32	32	32	30	--			
	OUTPUT - Intellectual property										
5.1	New EPO patents	7.1	8.1	6.1	8.3	8.1	--	--	6	7	5
	relative to EU	6	7	5	6	6	--	--			
5.2	New USPTO patents	1.6	2.0	1.7	2.5	1.9	--	--	3	4	6
	relative to EU	3	3	3	3	3	--	--			
5.3	New Triad patents	0.9	0.4	0.6	--	--	--	--	2	-24	1
	relative to EU	4	2	2	--	--	--	--			
5.4	New community trademarks	--	--	--	--	18.0	23.1	24.9	29	18	16
	relative to EU	--	--	--	--	28	27	29			
5.5	New community designs	--	--	--	--	--	1.4	1.1	1	--	--
	relative to EU	--	--	--	--	--	2	1			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.11 HUNGARY

1. Introduction

Since 1997 Hungary has been recording impressive annual economic growth rates of around 4%. After a slowdown in 2003, the Gross Domestic Product (GDP) continued to grow vigorously in 2004, resulting again in an annual growth rate of 4%. Narrowing the real convergence with the other EU Member States is considered as one of the most remarkable achievements of Hungary. In comparison with the EU25 average, the GDP per capita increased from 52% in 1998 to 61.7% in 2004. Nonetheless, for a large number of indicators measuring innovation performance Hungary is considerably lagging behind the EU25 average. Hungary ranks 15th out of the EU25 on its overall innovation performance, based on the summary innovation index (SII), and is in 20th place out of 33 countries. In particular, Hungary has extremely low levels of S&E graduates, broadband penetration rate, lifelong learning, business R&D expenditures and innovation expenditures. Similarly to the other new EU Members States its patenting activity is also very low. Moreover, it performs near the EU average on indicators such as public R&D expenditures, share of medium-high and high-tech R&D and share of enterprises receiving public funding for innovation. In addition, Hungary performs above average on employment in medium-high and high-tech manufacturing and high-tech exports, both linked to foreign investments. As far as trends are concerned, the worst trend performance is for venture capital and ICT investment.

2. Major challenges and policies

As in other new Member States, Hungary is more successful in innovation diffusion than in creative innovation, possibly due to the activities of foreign firms in bringing new technology and business practices to Hungary. One of the main challenges is to increase the number of S&E graduates, especially in the knowledge-based industrial areas. Moreover, it is also crucial to continue support increasing low levels of innovation and business R&D expenditures. At the same time, it is very important to release a potential for innovation diffusion.

Supply of new S&E

On of the key challenges is to close the gap in terms of human resources for innovation and R&D. In particular, there is a necessity to increase the number of new S&E graduates which is currently estimated at 39% of the EU-25 average. Furthermore, the ratio of S&E graduates among population aged between 20 and 29 is only 4.8% which puts Hungary on the 21st position out of the EU-25 Member States. In this context, it is very appropriate to give some historical perspective. In 2003, the number of S&E graduates fell by 30% in comparison with 1988 which is quite significant, given the sharp increase of the number of students in that period. The overall number of R&D personnel during the same period decreased by 48 percent from 45,069 in 1988 to 23,311 in 2003. The policy response to this challenge remains to a great extent limited to general measures promoting the development of human resources for the needs of modern economy i.e. HU 82 Promoting life-long learning and adaptability, HU_83 Developing the infrastructure of education and training, HU 85 Employment of PhD, MSc or MBA students, and HU 89 Innovative Education Support Systems. On the one hand, it is clear that increasing R&D spending requires investment in the human resources needed to conduct this R&D. On the other, S&E jobs should be created by concerted public and private efforts, with businesses playing a leading role.

Increase the low levels of innovation and business R&D expenditures

The intensity of business R&D expenditures increased from 0.26% in 1998 to 0.36% in 2003. In comparison with other EU Member States, the performance of Hungary is visibly much less positive. In 2003, the total business R&D spending represented only 29% of EU-25 average which places Hungary on the 16th position out 25 Member States. Furthermore, Hungary is ranked on the 24th position in terms of innovation expenditures out of EU-25 Member States and account on for 20% of EU-25 average. Overcoming the lack of finance as a major barrier to innovation has been the subject of a number of policy measures. Tax incentives have been introduced to stimulate firms spending more on R&D (HU 84). Another step forward was the creation of the "Research and Technology Innovation Fund" (HU 86) aimed at creating a stable and reliable financial ground for research, technological development and innovation activities.

Strengthen the potential for innovation diffusion

The potential for innovation diffusion is weakened by low lifelong learning, broadband penetration rate and declining ICT expenditures. The results for lifelong learning increased sharply in 2003, followed by a decrease during the following year. In 2004, it was estimated that on average 4.6 persons participated in lifelong learning per 100 population aged 25-64 years which represented only 46 percent of EU-25 average. In the same year, the broadband penetra-

tion rate (measured as number of broadband lines per 100 population) was just 2.2% and 29% of EU-25 average. Although the ICT expenditures still are above EU-25 average, the worrying aspect is the declining trend. The ICT expenditures have fallen by 35% from the level of 9.6% of GDP in 2000 to 7.1% of GDP in 2004. With regards to the policy responses, there is range of measures addressing this rather complex challenge. More specifically, lifelong learning is supported mainly through the measure HU 82 "Promoting life-long learning and adaptability". As far as ICT issues are concerned, there was a two-day international conference organised in Budapest on 20-21 October 2005, with the view to discuss some of the main challenges of the i2010 initiative of the European Commission.

3. Policy learning

3.1 Governance

There are several ministries and government agencies that play a key role in setting broad policy directions, as well as high-level councils which act as intermediaries between government and the rest of innovation stakeholders. Of these the Education and Science Committee and Economic Committee of the Parliament are the highest-level political consultative bodies in the field of RTDI policy in Hungary while Ministry of Education plays a key role in the formation and implementation of science and education policies. Although an apparently appropriate mechanism has been put in place in the form of two high-level bodies (Science and Technology Policy Council, Research and Technological Innovation Council), in practice policy co-ordination is fragmented and, at best, takes places bilaterally.

3.2 Recent policy trends

The year 2005 can be viewed as the period of further changes and strengthening of innovation support system. In particular, some of the former weaknesses of the national innovation governance system have been addressed by new legislations since September 2004. Most notably, the importance of devising and implementing a coherent RTDI strategy has been recognised in HU 95 "Law on Research and Technological Innovation", which aims to enhance business spending on R&D and technological innovation. Due to the same Law, one important tool of policy intelligence, namely evaluation of measures has become mandatory since 2005. As for policy debates, a series of discussions were initiated by the National Development Office in January 2005 to analyse the underlying trends and factors of RTDI processes when preparing the 2007-2013 round of the Structural Fund programming cycle.

4. Possible orientation for future actions

The complex nature of the current challenges requires conscious and focussed efforts to concert the policies of various government departments. More specifically, the efforts to increase the low levels of innovation and business R&D expenditures must go hand in hand with an overall commitment to invest in human resources able to conduct and implement RTDI projects. Yet it is to be remembered that innovation is to a large extent about spreading innovation through society. In the case of Hungary, the potential for innovation diffusion is currently being weakened by low lifelong learning, broadband penetration rate and declining ICT expenditures among others.

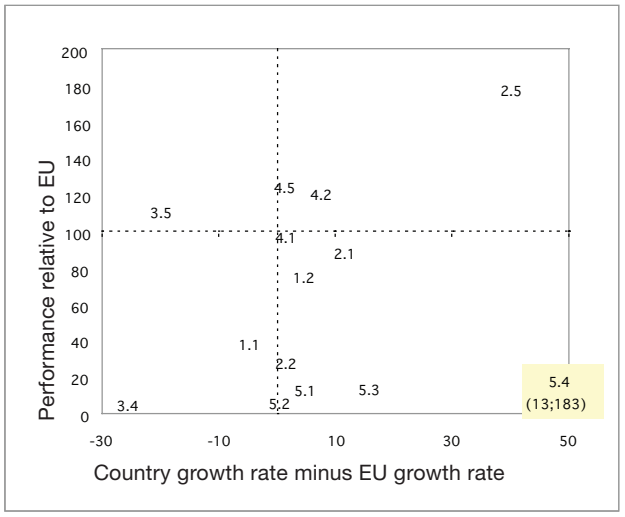
Taking into account the above-mentioned drawbacks, it is very important in the future to:

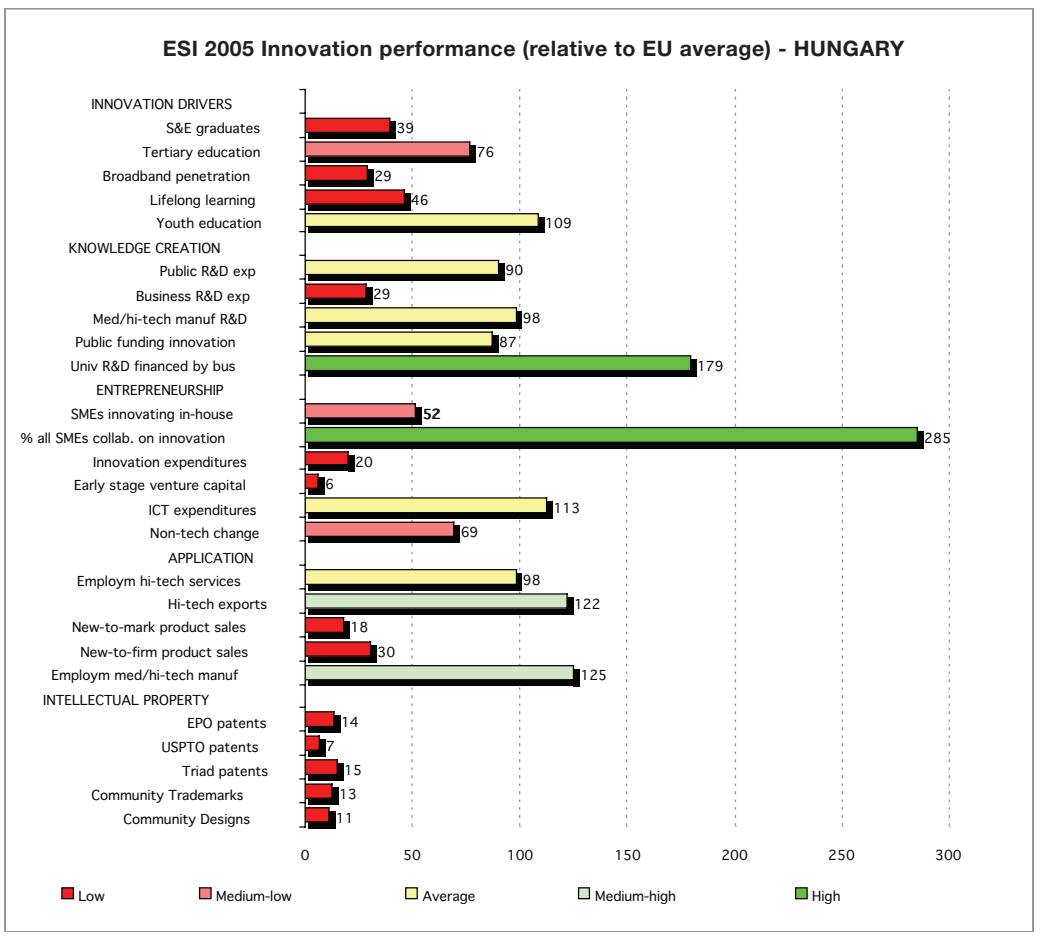
1. Encourage the recruitment of S&E graduates by firms and raise awareness among children of the usefulness of studying science subjects. Such instruments can have great value-added i.e. contribute to strengthening companies' innovation potential through the integration of highly skilled human resources and guarantee the supply of S&E in the long-term perspective. Nonetheless, this challenge requires concerted public and private efforts, with businesses playing a leading role.

2. Continue the efforts in increasing the low levels of innovation and business R&D expenditures. Given the strong presence of foreign-owned firms in Hungary, it is necessary to encourage the foreign to continue expanding their existing R&D units and establishing the new ones. At the same time, it is very important to go beyond research and technological innovation.

3. Strengthen the potential for innovation diffusion by promoting initiatives aiming at increasing the participation of population in lifelong learning, ICT expenditures and broadband penetration rates. With regards to ICT, it is necessary to encourage domestic companies to invest in ICT and investigate the potential for increased investment in ICT R&D infrastructure with the involvement of foreign R&D labs.

HUNGARY - EIS 2005 results





Indicator quality concerns:

There are sudden changes in the values of three indicators that could either be due to small samples producing volatile results, or a break in the data series. The results for life-long learning increased sharply in 2003, followed by a decrease, The youth attainment level declined by more than expected between 2003 and 2004, and there was a 168% increase between 2002 and 2003 in the percentage of university R&D financed by the business sector that might have been to a change in policy or to a change in definition.

	HUNGARY					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.28*	*0.28*	*0.31*		*4.3*	*0.0*
	relative to EU	--	--	--	--	*66*	*67*	*72*			
	rank	--	--	--	--	*21*	*21*	*20*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*5.0*	*5.1*	*4.5*	*3.7*	*4.8*	*4.8*	--	*39*	*4*	*9*
	relative to EU	--	*54*	*44*	*34*	*42*	*39*	--			
1.2	*Population with tertiary education*	*13.1*	*14.4*	*14.1*	*14.0*	*14.2*	*15.4*	*16.7*	*76*	*9*	*4*
	relative to EU	--	--	*71*	*70*	*70*	*72*	*76*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*2.2*	*29*	--	*50*
	relative to EU	--	--	--	--	--	--	*29*			
1.4	*Participation in life-long learning*	*3.3*	*2.9*	*3.1*	*3.0*	*3.2*	**6.0**	*4.6*	*46*	--	--
	relative to EU	--	--	*39*	*38*	*40*	**65**	*46*			
1.5	*Youth education attainment level*	*81.5*	*85.2*	*83.6*	*84.4*	*85.8*	**85.0**	*83.4*	*109*	--	*0*
	relative to EU	--	--	--	--	--	*111*	*109*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.42*	*0.41*	*0.45*	*0.57*	*0.66*	*0.62*	--	*90*	*14*	*2*
	relative to EU	*64*	*63*	*68*	*85*	*97*	*90*	--			
2.2	*Business R&D expenditures*	*0.26*	*0.28*	*0.35*	*0.38*	*0.36*	*0.36*	--	*29*	*3*	*1*
	relative to EU	*22*	*23*	*29*	*30*	*29*	*29*	--			
2.3	*Share of med-high/high-tech R&D*	--	*83.2*	*90.7*	*90.3*	*87.8*	--	--	*98*	*0*	--
	relative to EU	--	*93*	*102*	*101*	*98*	--	--			
2.4	*Enterprises receiving public funding*			*7.3*					*87*	--	--
2.5	*Business financed university R&D*	*5.4*	*6.1*	*5.5*	*4.4*	*11.8*	*10.6*	--	*179*	*42*	*1*
	relative to EU	*85*	*93*	*84*	*65*	*179*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*17.0*		*13.2*			*52*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*11.1*		*32.9*			*285*	--	--
3.3	*Innovation expenditures*			*1.40*		*0.30*			*20*	--	--
3.4	*Early-stage venture capital*	--	*0.002*	*0.004*	*0.015*	*0.015*	*0.002*	--	*6*	*-53*	*-28*
	relative to EU	--	*7*	*6*	*25*	*41*	*6*	--			
3.5	*ICT expenditures*	--	--	*9.6*	*8.9*	--	--	*7.1*	*113*	*-12*	*7*
	relative to EU	--	--	*148*	*141*	--	--	*113*			
3.6	*SMEs using non-technological change*			*29.3*					*69*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*2.70*	*2.75*	*3.09*	*3.24*	*3.05*	*3.14*	--	*98*	*2*	*0*
	relative to EU	--	--	*100*	*98*	*94*	*98*	--			
4.2	*Exports of high technology products*	--	*19.4*	*23.1*	*20.4*	*20.3*	*21.7*	--	*122*	*2*	*-6*
	relative to EU	--	*98*	*112*	*100*	*112*	*122*	--			
4.3	*Sales new-to-market products*			*1.4*		*0.8*			*18*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*4.9*		*2.0*			*30*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*8.51*	*8.39*	*8.07*	*8.80*	*8.47*	*8.27*	--	*125*	*-1*	*-3*
	relative to EU	--	--	*115*	*126*	*124*	*125*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*13.3*	*13.4*	*18.3*	*20.9*	*18.3*	--	--	*14*	*10*	*5*
	relative to EU	*12*	*11*	*14*	*15*	*14*	--	--			
5.2	*New USPTO patents*	*5.0*	*4.1*	*3.8*	*5.8*	*4.9*	--	--	*7*	*7*	*6*
	relative to EU	*8*	*6*	*6*	*8*	*7*	--	--			
5.3	*New Triad patents*	*1.8*	*2.9*	*3.3*	--	--	--	--	*15*	*17*	*1*
	relative to EU	*8*	*13*	*15*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*1.3*	*5.0*	*11.4*	*13*	*198*	*16*
	relative to EU	--	--	--	--	*2*	*6*	*13*			
5.5	*New community designs*	--	--	--	--	--	*0.7*	*9.3*	*11*	--	--
	relative to EU	--	--	--	--	--	*1*	*11*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.12 IRELAND

1. Introduction

Ireland's overall innovation performance, based on the SII, results in an 11th place rank out of 25 EU member states and 15th out of 33 countries. Ireland mixes above average and below average performance in many of the indicator groups and, as many indicators are missing, there is a problem with the overall picture. Ireland's best performance is for applications, where it ranks first out of 25 countries. Its good performance is due to high tech export shares that are 68% above the EU average and are related to the spectacular success of the country to attract inward investment. Ireland performs well on the innovation drivers, ranking in 8th place.

However, the country also need to meet several challenges, partly due to a long period status of a less favoured region in the previous decades, which hampered the accumulation of infrastructure and the creation of a vibrant indigenous production sector. Hence, broadband penetration rate is only 22% of the EU average, R&D and innovation expenditure is low, there are problems in university-industry co-operation and performance on IPR is generally near half the EU average. Trend performance is split almost evenly between below average and above average trends.

2. Major challenges and policies

The following challenges appear to be the most relevant ones:

- Low broadband penetration

Broadband penetration in Ireland is only 22% of the EU average putting the country on the 25th place out of 31 countries for which data is available. This is considered one of the major weaknesses of the innovation governance.

The Government has recognised the problem and devised a programme of accelerated investment. It has also put in place several initiatives to assist the private sector to address the existing gaps in communications infrastructure and services throughout Ireland, in both urban and rural areas. As pointed out in the Reform Programme between 2004 and 2007, €140 million of Exchequer funding (€35 million per annum) is being invested to provide high-speed, open access broadband infrastructure in all cities and towns with a population greater than 1,500. Already 19 Metropolitan Area Networks (MANs) have now been completed in the first phase, with a further 7 under construction. In the second phase, 35 towns were approved for broadband networks in December 2004 and 47 were announced in January 2005. The programme is on schedule to complete high-speed broadband networks and envisages also rural communities, empowering them to deliver their own infrastructure.

- Insufficient participation in life-long learning

Participation in life-long learning is the only indicator in the case of human resources, where Ireland does not perform well. It is in the 17th place with 73% of the EU average. The Enterprise Strategy Group report emphasizes this problem and an Inter-Departmental Committee is overseeing progress on the recommendations of the Task Force on life-long learning. A government commitment is expressed.

Significant progress has already been recorded, particularly in relation to the national framework of qualifications, the white paper on adult education plus curricular and structural issues relating to education and training provision. Priorities include:

- *addressing skill needs and widening access to life-long learning in the context of an integrated approach to education and training but also*
- *tackling disadvantage in terms of literacy and numeracy, early school leaving and providing second chance education and training for those with low skills.*

Financial support, guidance, counselling childcare services and increased flexibility of provision are the means to achieve the target.

- Business investment in R&D and innovation and early stage VC

Overall the business sector offers a less dynamic innovative performance than one would expect from such a rapidly growing economy: BERD is only 61% of the EU average and innovation expenditure 13% of the EU average, positioning Ireland in the 17th and 28th places respectively. In early stage Venture Capital the country lags only slightly behind the EU average, hence positioned on the 13th place, but it is systematically falling behind after the year 2000.

Efforts to face the problem are undertaken since more than a decade. At the moment an R&D Action Plan envisages the increase in R&D investment, capacity and output and tries to encourage greater innovation and entrepreneurship across the enterprise sector. Explicit targets in the Reform Plan are that business investment in R&D should increase from 0.9% GNP in 2001 to 1.7% GNP and the number of enterprises performing significant R&D (>€2m) will

triple to reach 250.
A very broad number of measures are adopted since over a decade aiming at strengthening business innovation:

- *Additional R&D tax credits-2004: The Irish Council for Science, Technology and Innovation recommended in a recent policy statement the introduction of tax credits for research and development (IE 33).*
- *Research Technology & Innovation (RTI) Competitive Grants Scheme (IE 26).*
- *Research & Development (R&D) Capability Initiative (IE 25).*

Under the National Development Plan 2000-2006, a new Seed and Venture Capital Fund Scheme was set up for SMEs in Ireland. Particular emphasis has been given to the development of geographical locations outside Dublin, early stage projects and sectors, which are particularly difficult to finance. This scheme is currently being reviewed. In addition the Business Expansion Scheme (BES) and Seed Capital Relief constitute two interconnected measures that allow companies to raise funds from individuals who can then offset their investment against their tax liabilities (IE 21).

- Low-levels of university-industry co-operation

University-industry co-operation, as measured by business financed university R&D, is only 57% and Ireland ranks 24th among the 33 countries compared. A variety of measures are adopted to create stronger links, of which the most important are:

The most recent policy philosophy, as reflected in the National Reform Programme, is that the co-operation will be best served through the production of excellent research results. Recent investments strengthen the base of research excellence in frontier research. The next challenge is to build research and technology competencies in strategic areas of more direct medium term relevance to Ireland's enterprise base. Industry needs to have a strong role in driving research agendas with research institutions, building on existing enterprise strengths through technology development.

Specific measures promoting cooperation are adopted and are expected to cultivate co-operation:

- *Innovation Partnership Initiative to support the undertaking of collaborative applied research with direct industrial and commercial application, between industry and Third Level colleges (IE 34).*
- *FUSION-Knowledge transfer across the island of Ireland, which develops partnerships and projects between Companies - Third Level Institutes or research centres. Partnerships are driven by a company need. (IE 31).*
- *Advanced Technologies Research Programme 2001 with the objective of the programme is to generate technologies, products or processes that can provide the basis of new start-up companies in Ireland or can improve the competitiveness of industry in Ireland (IE 27).*

3. Policy learning

3.1 Governance

Ireland has a long tradition in the design and implementation of R&D policy and has created a number of agencies supporting innovation. In the last 12 months important steps forward were taken through the appointment of the first Chief Science Advisor to the Government, the establishment of the Cabinet Subcommittee on Science, Technology and Innovation (STI); and an Interdepartmental Committee on STI. This provides a degree of focus and a level of co-ordination that did not exist until now. This means that now the top level of governance is adequately provided for. If in the future it is given the priority it deserves it will be very effective.

Implementing agencies continue their work and are powerful. However, many of the private and public intermediaries are only at the development stage and more effort is required to improve these parts of the Irish NIS.

In terms of instruments the national policy is well advanced: New evaluations of the National Development Plan – its productive, human resource and infrastructure plans as well as its regional plans (two NUTS II regions) - were recently announced. Other major policy decisions are usually supported by background studies. Stakeholders are involved in all stages of the process and experiences learned from other countries are taken into consideration.

The system, as it functions now is very recent and it is important to help it gain momentum and eliminate inter-institutional barriers, objectives and difficulties which can reduce the effectiveness of policy implementation, despite the presence of a number of co-ordinating committees. The changes made this last year are in response, partly, to this co-ordination need.

3.2 Recent policy trends

Ireland is well known for a systematic policy approach. In this period policy emphasis has been on two reports: "Building Ireland's Knowledge Economy" which proposed R&D targets related to the Lisbon agreement and made recommendations to the Inter-Departmental Committee for Science, Technology and Innovation for their achievement; and the Enterprise Strategy Group's (ESG) report which recom¬mended a new medium term enterprise strategy for encouraging and generating growth and employment in the economy. In response to SRG, Enterprise Ireland published a new strategy with a greater emphasis on growing large indigenous businesses; internationalising these businesses; increasing the number of companies with significant R&D expenditure; and more emphasis on regional innovation and improved productivity. Both reports have been accepted generally and the Minster for Enterprise Trade and Employment has endorsed their findings and generally supported the original report recommendations.

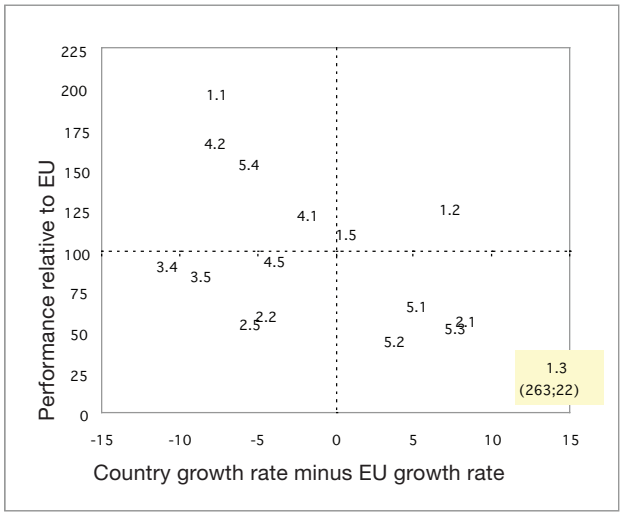
Policy debates on the quality Third Level research infrastructure and how to improve the technology absorptive capacity of indigenous SMEs are also on. The measures adopted in the past continued and an increased commitment to training people in work (€83 million) was announced.

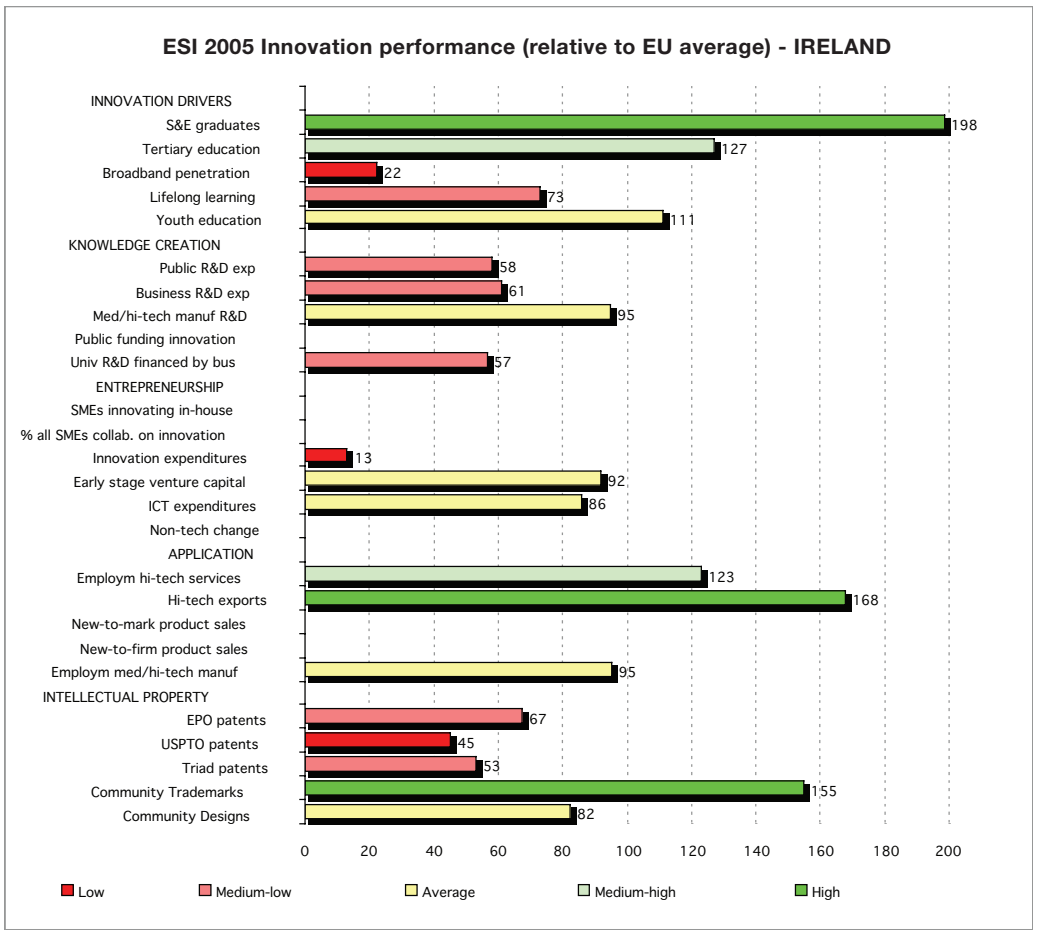
4. Possible orientation for future actions

There is general social partnership agreement that innovation is a critical element in national development policy. The common vision for the future is centred on the concept of creating a "highly innovative, knowledge based economy that is internationally competitive".

Hence, one may argue that the ingredients for change are put in place in Ireland, but still a long way is needed to operate them efficiently. Whereas the lags in infrastructure seem to be well dealt with, the market response in terms of new business creation, BERD and early stage Venture Capital needs more emphasis until the market (in particular of the indigenous sector) responds and the Barcelona target is achieved. A final relevant point is the divide between the rich South East and the rest of the country (BMW), which is very clearly reflected in innovation performance, and needs to be closed.

IRELAND - EIS 2005 results





Indicator quality concerns:

A large number of indicators are missing for Ireland (all CIS indicators except innovation expenditures which seems to be too low), plus the results for the share of medium-high tech R&D out of all manufacturing R&D are out of date.

	IRELAND					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.44*	*0.42*	*0.42*		*-3.1*	*0.0*
	relative to EU	--	--	--	--	*104*	*99*	*98*			
	rank	--	--	--	--	*14*	*15*	*15*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*22.9*	--	*24.2*	*22.9*	*20.5*	*24.2*	--	*198*	*1*	*9*
	relative to EU	--	--	*237*	*208*	*180*	*198*	--			
1.2	*Population with tertiary education*	--	*18.5*	*18.5*	*23.6*	*24.8*	*26.3*	*27.8*	*127*	*12*	*4*
	relative to EU	--	--	*93*	*117*	*122*	*123*	*127*			
1.3	*Broadband penetration rate*	--	--	--	--	*0.0*	*0.2*	*1.7*	*22*	*312*	*50*
	relative to EU	--	--	--	--	--	--	*22*			
1.4	*Participation in life-long learning*	--	--	--	--	*7.6*	**9.7**	*7.2*	*73*	--	--
	relative to EU	--	--	--	--	*95*	**104**	*73*			
1.5	*Youth education attainment level*	--	*82.0*	*82.4*	*84.6*	*83.9*	*85.3*	*85.3*	*111*	*1*	*0*
	relative to EU	--	*110*	*108*	*111*	*110*	*111*	*111*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.35*	*0.32*	**0.32**	*0.34*	*0.34*	*0.40*	*0.43*	*58*	*11*	*2*
	relative to EU	*53*	*49*	**48**	*51*	*50*	*58*	--			
2.2	*Business R&D expenditures*	*0.90*	*0.86*	*0.81*	*0.78*	*0.76*	*0.77*	*0.77*	*61*	*-3*	*1*
	relative to EU	*78*	*71*	*66*	*62*	*61*	*61*	--			
2.3	*Share of med-high/high-tech R&D*	*82.8*	*84.6*	--	--	--	--	--	*95*	--	--
	relative to EU	*93*	*95*	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			--					--	--	--
2.5	*Business financed university R&D*	*6.6*	*5.9*	*5.3*	*4.4*	*3.7*	*4.8*	--	*57*	*-4*	*1*
	relative to EU	*103*	*90*	*82*	*65*	*57*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			--		--			--	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			--		--			--	--	--
3.3	*Innovation expenditures*			*0.24*		--			*13*	--	--
3.4	*Early-stage venture capital*	*0.015*	*0.036*	*0.077*	*0.071*	*0.027*	*0.023*	--	*92*	*-39*	*-28*
	relative to EU	--	*124*	*136*	*118*	*73*	*92*	--			
3.5	*ICT expenditures*	--	--	*5.7*	*5.1*	*5.9*	*5.3*	*5.4*	*86*	*-2*	*7*
	relative to EU	--	--	*88*	*81*	*89*	*83*	*86*			
3.6	*SMEs using non-technological change*			--					--	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.78*	*4.00*	*4.03*	*4.11*	*4.28*	*3.92*	--	*123*	*-2*	*0*
	relative to EU	--	--	*131*	*125*	*132*	*123*	--			
4.2	*Exports of high technology products*	*37.7*	*39.4*	*40.5*	*40.8*	*35.3*	*29.9*	--	*168*	*-14*	*-6*
	relative to EU	--	*200*	*197*	*199*	*194*	*168*	--			
4.3	*Sales new-to-market products*			--		--			--	--	--
4.4	*Sales new-to-firm not new-to-market products*			--		--			--	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*7.52*	*7.31*	*6.96*	*7.29*	*6.85*	*6.28*	--	*95*	*-7*	*-3*
	relative to EU	--	--	*100*	*105*	*100*	*95*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*55.2*	*69.9*	*95.4*	*92.9*	*89.9*	--	--	*67*	*11*	*5*
	relative to EU	*51*	*59*	*71*	*65*	*67*	--	--			
5.2	*New USPTO patents*	*20.4*	*26.0*	*34.1*	*36.9*	*32.4*	--	--	*45*	*10*	*6*
	relative to EU	*33*	*41*	*51*	*51*	*45*	--	--			
5.3	*New Triad patents*	*12.3*	*14.8*	*11.9*	--	--	--	--	*53*	*9*	*1*
	relative to EU	*54*	*67*	*53*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*111.0*	*113.9*	*134.9*	*155*	*10*	*16*
	relative to EU	--	--	--	--	*170*	*134*	*155*			
5.5	*New community designs*	--	--	--	--	--	*43.5*	*69.1*	*82*	--	--
	relative to EU	--	--	--	--	--	*64*	*82*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.13 ITALY

1. Introduction

Italy is one of the poorest performing countries out of the original EU-15, but its relative position has improved with the addition of the 10 new member states, ranking in 12th position on the summary innovation index out of the 25 EU member states and in 17th place out of 33 countries. Its peer group for performance includes the intermediate group of countries, although Italy ranks last in this group. It is particularly weak in innovation drivers (ranking 21st out of 25 countries) and in innovation & entrepreneurship (20th). Poor performance on innovation drivers is due to low performance on tertiary education and life-long learning. There is also a poor supply of new S&E graduates. The causes of Italy's below average performance on innovation & entrepreneurship is due to very low levels of innovation co-operation among SMEs (23% of the EU average), a collapse in venture capital supply (20% of the EU average), and slightly below average levels of investment in ICT.

The weak innovation performance of Italy is contrasted to its economic scope as a member of the G7 and to its very prominent ranking in medium-high tech R&D and new to market products. Limited innovation capabilities may lie behind the gradual erosion of Italian competitiveness. The traditional dynamism and flexibility of the Italian economy has faltered in recent years, partly because of the unfavourable developments in the international economy, but also because structural reforms have not yet gone far enough to turn the tide.

2. Major challenges and policies

The Italian innovation policy has a lot of challenges to face, but human capital and business development are the highest priorities, combined with the need to improve innovation governance.

S&E graduates and population with tertiary education

Italian S&E graduates account for 65% of the European average only, positioning the country on the 24th place of all countries considered. Even worse the share of population with tertiary education is only 53% of the EU average and Italy ranks 30th.

A broad reform of the education and training system was adopted in 2003 and its completion and effective implementation is part of the Reform Programme guidelines. The project EDA 2010 guarantees adult education (20-29 years) and a broad number of new courses for life-long learning are introduced.

These initiatives are expected to remedy the current weaknesses and change the performance of the labour force in the medium term.

Business R&D

Business R&D expenditures account for 44% of the European average and Italy is in the 20th position. Several support schemes were introduced in the past, such as:

- *Support for the promotion and the development of new innovative enterprises (IT 41).*
- *Decree for the implementation of the Fund for Research Support (decree 27 July 1999, n. 297) based on which the Ministry (MURTS) intervenes to support of the industrial research activities. The intervention can even support not predominant pre-competitive development activities. These activities are eligible only if necessary for the validation of the industrial research activities results (IT 36).*
- *The reorganisation of the regulation and the simplification of the procedures: the Fund for Research Support through which the Ministry of Scientific Research (MURST) has reorganised and rationalised the support to scientific and technology research of industrial interest (IT 11).*
- *Measures aimed at sustaining innovation: the measure, which is managed by the regional governments, provides for automatic tax incentives to industrial companies throughout the country, with the goal of favouring research and pre-competitive development activities (IT 7).*

The Reform Programme of 2005 foresees a further reorganisation of the research system with emphasis on the business sector, in the hope that public funds and a conducive environment will stimulate business R&D. Strengthening the technological level of the Italian productive system to maintain competitiveness, focusing on ten strategic industrial research programmes involving also the participation of universities and research centres is one of the three priority axes of the National Research Plan (2005-2007).

Early stage venture capital

Early stage venture capital is one of the major challenges for the Italian policy: with 20% of the European average the country ranks 26th. Worse than that, Italy is falling further behind in the particular indicator. Increasing market-led funding opportunities is crucial for the development of the business sector. A high-tech Fund for SMEs, which is a fund for the public participation in risk capital of enterprises operating in high technology sectors (information technology,

electronics, nanotechnologies and micro technologies, electro medical instruments, high technology mechanics for industrial automation), has been foreseen by the II Action Plan for ICT launched in 2005. The participation may address already established or to be established funds or may be implemented through a direct support to venture capital activities. The beneficiaries of the measure are start-ups in high technology sectors, venture capitalists, and institutional investors in Southern Italy (IT 55).
The Reform Programme emphasises the role of venture capital for entrepreneurship.

- National innovation policy could be more coherent and coordinated to increase efficiency of allocating resources

A large number of challenges for the innovation governance system are identified:

- *Lack of effective co-ordination between policy makers and risk of overlapping*
- *Public operators not inclined to adopt a strategic management approach to R&D*
- *No long-term view on policy making*
- *Cultural barriers to public-private co-operation*
- *Limited evaluation culture and "far from perfect" research/innovation impact evaluation system*
- *Lack of evaluation to sustain the policy making process*
- *Stakeholders consultation but limited impact on policy making*
- *Barriers to the effective implementation of innovation policies (lack of funds, delays, bureaucracy)*

There is a need to address them together and modernise the system in order to improve its potential.

3. Policy learning

3.1 Governance

At national level, the ministries involved in innovation policy are: the Ministry of Economy and Finance, the Ministry of Education, University and Research (MIUR), the Ministry of Productive Activities (MAP), the Minister for Innovation and Technology (MIT) and, to a lesser extent, other ministries such as the Ministry of Environment and the Ministry of Health. At regional level, the 20 Italian regions are increasing their administrative autonomy in terms of industrial and innovation policy formulation on a local scale due to the implementation of the devolution process in Italy. At regional level, new powers have been given to the regions in the field of scientific research and technological innovation policy formulation since 2001. Regions are gaining autonomy in setting their own innovation goals and have started to put forward regional innovation plans that take into account their local distinctiveness and peculiarities.

The major challenges refer to a more thorough and effective co-ordination within the public administration and the adoption of modern management tools, such as evaluation and benchmarking. A recent positive sign on innovation governance is the increasing consultation with stakeholders, although their effective contribution in policy making is still somehow limited. Similarly, indications of increasing adoption of an evaluation culture appear.

3.2 Recent policy trends

Italy has set a framework of measures to implement its R&D and innovation policy objectives. At national level, policy directions are set out in the National Research Plan (2005-2007) that foresees 3 main strategic lines of action:

- *reinforcement of the scientific base of the country, looking for excellence, merit, internationalisation, economic growth and valorisation of the human capital;*
- *strengthening the technological level of the Italian productive system to maintain competitiveness, focusing on ten strategic industrial research programmes involving also the participation of universities and research centres;*
- *supporting active participation in EU programmes and in international agreements.*

Since 2000, the Lisbon target of raising R&D expenditure to 3% of GDP has been the main target of R&D policy in Italy. However, overall progress made towards this target so far is very limited and its final achievement in 2010 is quite controversial.

The Lisbon target is therefore not realistic, considering the public expenditure constraints set by the Stability Pact. The formulation of the Italian policy objectives and targets has substantially improved during recent years; however, the targeted objectives regarding reinforcement of the basic research per se are quite general and are not broken down in sub-segments of specific, measurable and quantitative indicators. The Italian government plan appears like a sum of somewhat positive but un-coordinated measures. Although the government has clearly defined objectives, when policies are implemented, the overall policy framework lacks coherence. Various measures are introduced at different times by different responsible government institutions: the result is

that the overall policy package is not always consistent and objectives are not carefully considered in their long-term effects.

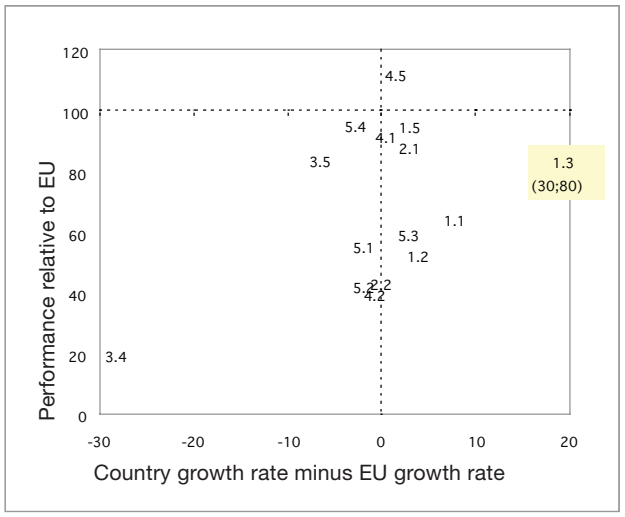
Regarding new policy measures, the most recent actions undertaken by the Italian government are the creation of public-private joint-labs in strategic sectors to sustain new high-tech industries, focus of public intervention on 10 strategic programmes foreseen in the National Research Plan; the establishment of 11 Technology Districts; systematic support to internationalisation; support the development of Information and Communication Technologies (ICT) and foster the adoption of ICT by enterprises (specially by SMEs); incentive schemes that target sectors or activities identified as priority investment areas and that foster linkages between SMEs and research institutions (Innovation Technology Fund, Integrated Package Aid)

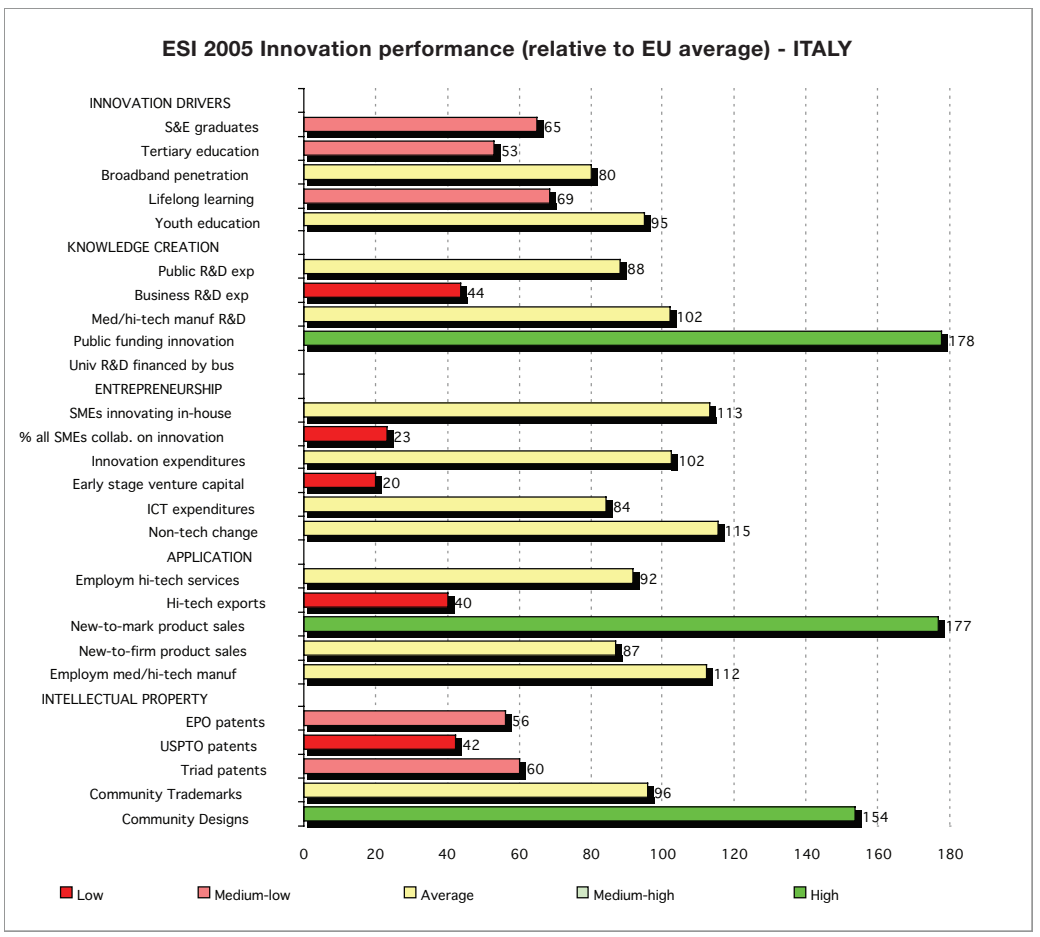
4. Possible orientation for future actions

The key priority for innovation policy is to hold a strong strategic vision, both at national and regional level, and a clear perspective to ensure long-term planning and long-standing impact results. It is necessary to re-organise the whole incentive system, assigning priorities, providing an effective segmentation of measures, ensuring synergies among the different actors involved and favouring a systemic virtuous circle.

Links between MIUR and MAP, the ministries most involved in the R&D measures implementation, must be strengthened and managed as an effective one-stop-shop and single entry door for innovation policies and actions in Italy. A more selective and rewarding model should be implemented in the incentive schemes application to allow high-quality projects financing and to guarantee financial support to the most competitive and innovative investment programmes.

ITALY - EIS 2005 results





Indicator quality concerns:

None known.

	ITALY					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	0.35	0.35	0.36		1.4	0.0
	relative to EU	--	--	--	--	82	83	85			
	rank	--	--	--	--	17	17	17			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	S&E graduates	5.1	5.5	5.7	6.1	7.4	--	--	65	17	9
	relative to EU	--	59	56	55	65	--	--			
1.2	Population with tertiary education	8.8	9.5	9.7	9.8	10.2	10.7	11.6	53	8	4
	relative to EU	--	--	48	49	50	50	53			
1.3	Broadband penetration rate	--	--	--	--	1.0	2.8	6.1	80	79	50
	relative to EU	--	--	--	--	--	--	80			
1.4	Participation in life-long learning	4.8	5.5	5.5	5.1	4.6	4.7	6.8	69	--	--
	relative to EU	--	--	70	65	58	51	69			
1.5	Youth education attainment level	65.3	66.3	68.8	67.0	69.1	69.9	72.9	95	3	0
	relative to EU	--	89	90	88	90	91	95			
	INPUT - Knowledge creation										
2.1	Public R&D expenditures	0.55	0.53	0.54	0.55	0.60	--	--	88	5	2
	relative to EU	83	82	82	82	88	--	--			
2.2	Business R&D expenditures	0.52	0.51	0.53	0.56	0.56	0.55	--	44	2	1
	relative to EU	45	42	43	45	45	44	--			
2.3	Share of med-high/high-tech R&D	92.2	93.0	90.3	91.1	--	--	--	102	-1	--
	relative to EU	104	104	101	102	--	--	--			
2.4	Enterprises receiving public funding			14.8					178	--	--
2.5	Business financed university R&D	--	--	--	--	--	--	--	--	--	1
	relative to EU	--	--	--	--	--	--	--			
	INPUT - Innovation & entrepreneurship										
3.1	SMEs innovating in-house			31.0		28.8			113	--	--
3.2	Innovative SMEs co-operating with others			3.0		2.7			23	--	--
3.3	Innovation expenditures			1.95		1.54			102	--	--
3.4	Early-stage venture capital	0.011	0.014	0.030	0.035	0.015	0.005	--	20	-56	-28
	relative to EU	--	47	52	58	39	20	--			
3.5	ICT expenditures	--	--	5.1	5.2	5.4	5.3	5.3	84	1	7
	relative to EU	--	--	78	83	82	83	84			
3.6	SMEs using non-technological change			49.0					115	--	--
	OUTPUT - Application										
4.1	Employment in high-tech services	2.56	2.71	2.92	3.05	3.02	2.93	--	92	1	0
	relative to EU	--	--	95	93	93	92	--			
4.2	Exports of high technology products	7.4	7.5	8.5	8.5	8.2	7.1	--	40	-7	-6
	relative to EU	--	38	41	41	45	40	--			
4.3	Sales new-to-market products			9.5		8.1			177	--	--
4.4	Sales new-to-firm not new-to-market products			16.1		5.8			87	--	--
4.5	Med-hi/high-tech manufacturing employment	7.62	7.62	7.62	7.42	7.37	7.42	--	112	-1	-3
	relative to EU	--	--	109	106	108	112	--			
	OUTPUT - Intellectual property										
5.1	New EPO patents	64.4	68.1	76.8	80.6	74.7	--	--	56	4	5
	relative to EU	59	58	57	57	56	--	--			
5.2	New USPTO patents	27.8	26.1	29.5	29.9	30.3	--	--	42	4	6
	relative to EU	46	41	44	42	42	--	--			
5.3	New Triad patents	12.6	13.0	13.5	--	--	--	--	60	4	1
	relative to EU	55	58	60	--	--	--	--			
5.4	New community trademarks	--	--	--	--	65.3	84.9	83.6	96	13	16
	relative to EU	--	--	--	--	100	100	96			
5.5	New community designs	--	--	--	--	--	100.8	129.2	154	--	--
	relative to EU	--	--	--	--	--	148	154			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.14 LATVIA

1. Introduction

Latvia is a fast-growing economy, but at the same time it is among the least performing ones in the EU. In recent years, it has had one of the highest economic growth rates in the EU. In the period from 2001 to 2003 the average gross domestic product (GDP) growth in Latvia was 7.3% a year. In 2004, GDP growth reached 8.5%, however, the GDP per capita is only 43.7% of the EU-25 average. At the same time, its innovative performance is considerably below the EU average. Latvia ranks 24th out of 25 EU Member States on its overall innovation performance, and is in 30th place out of 33 countries. Most of the trend indicators are above the EU average, with the exceptions of public R&D, USPTO patents and ICT expenditures.

The major weaknesses of the innovation governance system include weak coordination mechanisms, insufficient interaction between the stakeholders and major policies and inappropriate financial innovation support schemes. Its major relative weakness in terms of innovation performance is low level of applications for patents, insufficient R&D expenditures, very low broadband penetration rate and the low rate of high-tech exports. Latvia is performing rather well on entrepreneurship indicators including tertiary education, lifelong learning and youth education but the corresponding low level of innovation among Latvian enterprises and limited R&D expenditures result in weak cooperation between science and industry. Based on overall innovation performance, its peer countries include Estonia, Greece, Poland and Portugal but Latvia is ranked last.

2. Major challenges and policies

One of the main challenges currently faced by Latvia it to promote stronger business involvement in the innovative development of the country and ensure a sizeable increase in business and public R&D expenditures. Additional challenges relate to increasing the number of S&E graduates and strengthening the cooperation between the key stakeholders in the innovation system.

R&D expenditures

This is a very serious drawback of the innovation process, since Latvia ranks on public and business R&D expenditures 23rd out of 25 EU Member States, and is in the 30th position out of 33 countries. Public R&D expenditures account for 0.25% of GDP, whereas business R&D expenditures are estimated at 0.14% of GDP. The problem is recognised by policy makers and the new Law on Research Activity (passed on 14 April 2005) includes a provision for regular increases in R&D funding. More specifically, upon submission of the annual law on the state budget, the Cabinet of Ministers envisages an annual increase in the funding for research activities of no less than 0.15% of the gross domestic product until State funding for research activity reaches at least 1% of GDP. This provision will be effective as of 2006. An additional response to the financial challenge for R&D funding has been made by the allocation of extra funding for the promotion of science competitiveness in the state budget for 2005. It aims to advance applied research and innovation, thus increasing public R&D funding by 0.07% of GDP in 2005. In addition, a number of measures are designed to address the problem of the low level of business R&D expenditures include support to market-oriented research (LV 67), the national programme aimed to encourage risk-taking in the start-up of innovative businesses through the provision of risk capital (LV 68), and the state support programme aimed at the promotion of new product developments and their commercialisation by companies (LV 70).

Human resources

There are currently about 4000 researchers in the scientific community of Latvia which is not sufficient to maintain the critical mass of the R&D base. The number of researchers decreased substantially after 1990 and only recovers slowly. The average age of academic staff increased due to a lack of young researchers, especially in the fields of natural sciences and engineering. This will constitute a serious problem in the future since increasing investment in research will raise the demand for researchers. A key issue is, therefore, how to increase the number of young people entering science, engineering and technology careers. Several measures have been launched in recent years to address this challenge with initiatives at the level of secondary education, graduate studies and doctoral programmes. These include amendments to the regulations on taxable income. The amendments allow tuition fees covered by the employer and the repayable amount of student loans to be deducted from the taxable income. There has also been an increase in the budget allocations from the Ministry of Education and Science for study places in natural sciences and engineering. In addition, two national programmes aiming to mitigate this problem have recently been approved. The initiative «Advancement of the quality of teaching in the subjects of natural sciences, mathematics and technologies in secondary education» (LV 78) is designed to promote interest in the respective field

among schoolchildren, while the programme «Support to the implementation of doctoral programmes and postdoctoral research» (LV 77) is a national programme aimed at the promotion of research work and at fostering the mobility of doctoral students and young scientists in the field of natural sciences and engineering.

Weak cooperation between the key stakeholders in the innovation system

The coordination of innovation policy in Latvia started with the approval of the National Programme for Innovation in 2003. This year was also marked by the formation of the Steering Council of the National Programme for Innovation and the Innovation Division at the Ministry of Economics. Nevertheless, the drawback of the system is a lack of common coordinating mechanism for the implementation of innovation policy. Instead, the system based on two ministries including the Ministry of Economics and the Ministry of Education and Science has still remained in place. A positive initiative was the establishment of the Steering Council of the National Programme for Innovation as well as the National Economy Council, both involving representatives of various stakeholder groups (ministries, agencies, business associations, etc.). The emerging conclusion is that there is still a room for additional initiatives promoting more intensive and constructive cooperation and dialogue between the major actors responsible for the innovation policy.

3. Policy learning

3.1 Governance

The innovation governance system had to be developed almost from scratch after the collapse of the centrally planned economy. On 1 April 2003, the Cabinet of Ministers approved the National Programme for Innovation (2003-2006), which defined the national system of innovation. Although there is a lack of effective cooperation between the key stakeholders in the innovation system, a positive initiative was taken in 2003 establishing the Steering Council of the National Programme for Innovation. The negative aspect of the governance system is a lack of systematic evaluations of innovation policy measures.

3.2 Recent policy trends

The implementation of innovation policy in 2004-2005 has been marked by the launch of a range of new innovation support measures including support for training, retraining and continuing education of employees (LV 76), support for the implementation of doctoral programmes and postdoctoral research (LV 77), promotion of exact sciences in secondary education (LV 78) and support to research in priority fields (LV 79). Moreover, the Parliament passed a new law in April 2005 which provides for a gradual annual budget increase of 0.15% of GDP for state funding of R&D activities until the total public expenditure reaches 1% of GDP. In addition, the National Programme for Innovation (2006-2010) is being currently elaborated.

The year 2005 can be characterised as both continuity and learning phase. On the one hand, Latvia has launched a range of new instruments. On the other, it has been gaining experience in the management and implementation of the Structural Fund instruments. The year 2006 will surely show more intensified work relating to the preparation of the Structural Fund programming 2007-2013.

4. Possible orientation for future actions

While there is a quite a broad range of innovation supporting organisations, many studies highlighted the comparatively underdeveloped linkages between various stakeholders and lack of high quality innovation related services. At the same time, the cooperation between science and industry needs to be strengthened, however, all the support should not be limited to the promotion of high-tech sector.

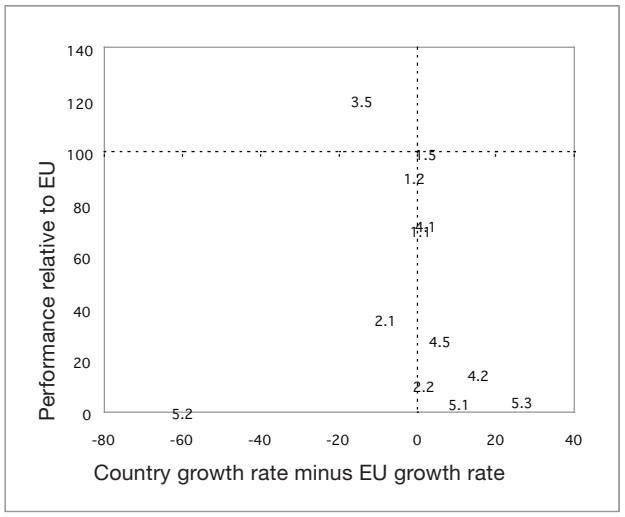
Taking into account the above-mentioned drawback, it is very important in the future to:

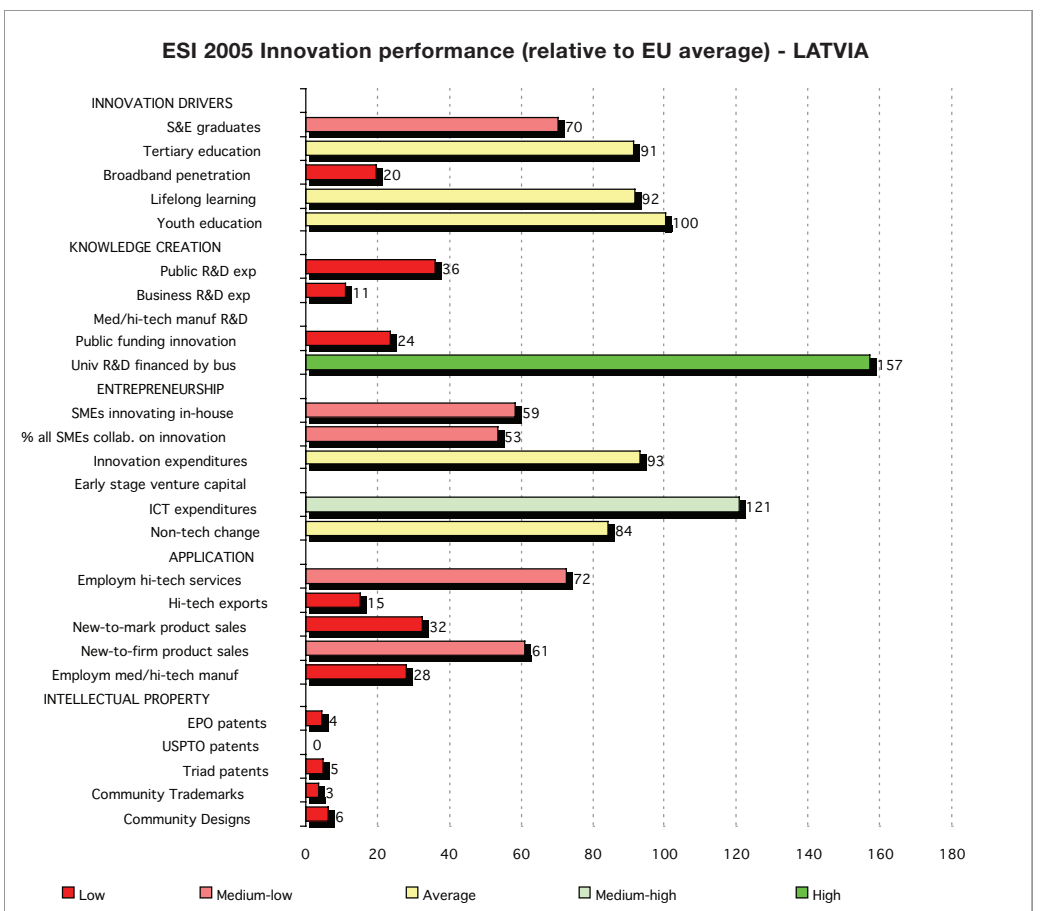
1. Improve the capacities of innovation supporting organisations as well as developing stronger linkages and co-operation between them.

2. Develop more sophisticated projects that might have in the future significant structural effects with the involvement of science and business sector.

3. Increase innovativeness of more traditional companies since given their importance in the economy and employment, it is equally important as granting support to a limited number of high-tech companies.

LATVIA - EIS 2005 results





Indicator quality concerns:

The sudden decline in the share of university R&D funded by business between 2000 and 2001 could be due to a change in policy or a change in data series. No other data quality problems are visible.

	LATVIA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.19*	*0.19*	*0.20*		*1.9*	*0.0*
	relative to EU	--	--	--	--	*46*	*46*	*47*			
	rank	--	--	--	--	*31*	*31*	*30*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*6.1*	*6.4*	*7.4*	*7.6*	*8.1*	*8.6*	--	*70*	*10*	*9*
	relative to EU	--	*68*	*73*	*69*	*71*	*70*	--			
1.2	*Population with tertiary education*	*17.2*	*17.8*	*18.2*	*18.2*	*19.3*	*18.1*	*20.0*	*91*	*4*	*4*
	relative to EU	--	--	*91*	*90*	*95*	*85*	*91*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*1.5*	*20*	--	*50*
	relative to EU	--	--	--	--	--	--	*20*			
1.4	*Participation in life-long learning*	--	--	--	--	*8.2*	*8.1*	*9.1*	*92*	--	--
	relative to EU	--	--	--	--	*103*	**87**	*92*			
1.5	*Youth education attainment level*	*78.5*	**74.6**	*76.8*	*70.3*	**73.2**	*74.0*	*76.9*	*100*	*2*	*0*
	relative to EU	--	*100*	*101*	*92*	**96**	*97*	*100*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.32*	*0.31*	*0.27*	*0.26*	*0.25*	*0.25*	--	*36*	*-6*	*2*
	relative to EU	*48*	*48*	*41*	*39*	*37*	*36*	--			
2.2	*Business R&D expenditures*	*0.09*	*0.06*	*0.18*	*0.15*	*0.17*	*0.14*	--	*11*	*4*	*1*
	relative to EU	*8*	*5*	*15*	*12*	*14*	*11*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	--	--	--	--	--	--	--	--
	relative to EU	--	--	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			*2.0*					*24*	--	--
2.5	*Business financed university R&D*	*27.0*	*23.4*	*27.1*	*10.0*	*10.3*	*23.9*	--	*157*	--	*1*
	relative to EU	*423*	*357*	*414*	*149*	*157*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*15.2*		*14.9*			*59*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*8.3*		*6.2*			*53*	--	--
3.3	*Innovation expenditures*			*2.26*		*1.40*			*93*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	*9.6*	*7.8*	--	--	*7.6*	*121*	*-7*	*7*
	relative to EU	--	--	*148*	*124*	--	--	*121*			
3.6	*SMEs using non-technological change*			*35.7*					*84*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*1.84*	*2.20*	*2.28*	**2.19**	*2.26*	*2.31*	--	*72*	*3*	*0*
	relative to EU	--	--	--	*67*	*70*	*72*	--			
4.2	*Exports of high technology products*	--	*2.3*	*2.2*	*2.2*	*2.3*	*2.7*	--	*15*	*10*	*-6*
	relative to EU	--	*12*	*11*	*11*	*13*	*15*	--			
4.3	*Sales new-to-market products*			*2.3*		*1.5*			*32*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*4.1*		*4.1*			*61*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*0.76*	*0.92*	*0.64*	**1.72**	*1.97*	*1.85*	--	*28*	*4*	*-3*
	relative to EU	--	--	--	*25*	*29*	*28*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*4.5*	*4.9*	*3.8*	*7.6*	*6.0*	--	--	*4*	*16*	*5*
	relative to EU	*4*	*4*	*3*	*5*	*4*	--	--			
5.2	*New USPTO patents*	*0.8*	*1.7*	*1.1*	*0.5*	*0.3*	--	--	*0*	*-53*	*6*
	relative to EU	*1*	*3*	*2*	*1*	*0*	--	--			
5.3	*New Triad patents*	*1.0*	*0.3*	*1.1*	--	--	--	--	*5*	*28*	*1*
	relative to EU	*5*	*1*	*5*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*0.0*	*0.9*	*3.0*	*3*	--	*16*
	relative to EU	--	--	--	--	*0*	*1*	*3*			
5.5	*New community designs*	--	--	--	--	--	--	*5.2*	*6*	--	--
	relative to EU	--	--	--	--	--	--	*6*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.15 LITHUANIA

1. Introduction

Lithuania has recorded an impressive economic performance during the last few years. Gross Domestic Product (GDP) grew by over 6% during the period 2001-2002 and by 9.7% in 2003. However, after this peek real GDP growth fell to 6.7% in 2004, and 5.7% in the first quarter of 2005. Although growth is expected to remain high for the next few years, there is a negative tendency in the long-term development of GDP growth. As many other countries from the region, Lithuania seeks to promote high and medium high-tech industries. In comparison with other countries, Lithuanian innovation performance ranks 19th out of 25 EU Member States and in 24th place out of 33 countries. It performs very well on all education indicators except for life-long learning and indicators collected in the framework of the Community Innovation Survey including SMEs innovating in-house (% of SMEs), innovative SME cooperating with others (% of SMEs), and innovation expenditures (% of turnover). Nevertheless, Lithuanian innovation potential suffers from extremely low levels of R&D expenditures. Moreover, there is a real imbalance in R&D activity with public expenditures on R&D almost four times higher than business expenditures, the latter have been growing but from close to zero activity in 1998. Other trend results are generally favourable, except for ICT investment and employment in high-tech services.

2. Major challenges and policies

The major challenges in front of Lithuania include developing modern skills for innovation and introducing a patenting culture, creating effective links between the R&D sector and firms, as well as increasing the level of R&D investment in both public and private sector.

Improving modern skills for innovation

One of the major strengths of Lithuania is the relatively high share of science and engineering (S&E) graduates and a large share of the population with a tertiary education which are respectively estimated at 16.3% and 25.2%. However, there remain concerns about skills shortages in certain fields. In this context, the challenge is actually two-fold. First, it is necessary continue improving modern skills levels of modern human resources. Second, the newly developed skills should be as relevant as possible to the industry needs. As regards the policy responses, the Ministry of Education and Science launched in September 2004 a scheme "Improvement of the quality of human resources for R&D and innovation" within the framework of the Single Programming Document 2004 -2006. The main aim of this measure was to improve the quality of highly skilled human resources in the priority areas of science and technology (biotechnology, mechatronics, laser, optical technologies and others).

Creating effective links between the R&D sector and firms

Countries aiming to become the knowledge-based economies need to foster co-operation between companies and research organisations. For the time being, the cooperation and interaction between companies and research institutes or universities in Lithuania is not systematic. More specifically, there is insufficient allocation of resources for competitive projects with the involvement of enterprises. Until recently, the measures which were designed in this policy area were limited to the investments in infrastructure, notably technology parks and innovation centres. Those instruments have been supplemented with two new measures which aim to support joint research projects of companies and R&D institutions. One measure, The Programme for High Technology Development is supported through the national budget and the other through the Structural Funds 2004-2006.

Investing in modern equipment for research organisations and promoting joint-research projects makes only sense if there is sufficient mobility of researchers to the private sector. It should be remembered that such projects might have in fact much stronger structural effects than investment in infrastructure-oriented projects. Although Lithuania is a leading country (from the group of the new Member States together with Slovenia) in the development of clusters, its networks have been formed in low-tech industries. In the future perspective, it will be interesting to see to what extent Lithuania will manage to develop effective cooperation between companies, research and development organisations and the political system through its cluster initiatives.

R&D expenditures and outputs (patents)

Increasing the level of investment in public and private R&D sector is another challenge which is common to all the new Member States. Although business R&D expenditures have been growing rapidly from close to zero in 1998, they were still only 11% of the EU average in 2002. Public R&D expenditures have increased from a low of 0.46% in 2000 to 0.60% in 2004. The actual problem is that public R&D spending still is approximately four times higher than business investment in R&D. In addition, what is consid-

ered as a serious drawback in Lithuania is the fact that most of public R&D expenditures are transferred to public or academic R&D institutions, whereas only a small fraction is allocated to competitive projects. As far as the policy responses are concerned, there is a national agreement to increase the level of public funding for R&D by 0.1% of GDP per year and to reach a level of 1% by 2010.

While it is a prerequisite for Lithuania to invest more both in financial terms and in terms of human capital, it is also very important to devote more reflection about how to generate greater impact in terms of outputs of this R&D and commercialisation. For the time being, Lithuania suffers from the extremely low levels of patents. According to the most recent data from the European Innovation Scoreboard (2005), Lithuania has only 2.6 EPO patents per million population. The worrying aspect is that although a strategy aimed at improving intellectual property rights has been drafted, it has not been implemented to date.

3. Policy learning

3.1 Governance

The general policy directions are set by the Lithuanian Seimas (Parliament). In particular, the Ministry of the Economy is in charge of the development and implementation of innovation policy. Knowledge generation and R&D activities are regulated by the Ministry of Education and Science. Since 2001, the innovation policy framework has undergone significant changes. In spring 2005, the Science and Technology Commission was reorganised and became the Science, Technology and Innovation Commission. Its main objective is to join the efforts of the scientific and business communities and accelerate the transition to a knowledge intensive economy. Lithuania continues to search for the best policy design and delivery mechanism mix. Although several important improvements were made in recent years, the long-term problem of a lack of linkages between all policy levels persists.

3.2 Recent policy trends

The implementation of innovation policy was marked in Lithuania by the launch of a range of new innovation support measures including development of business and innovation support infrastructure, development of R&D and innovation in business, and development of human resources. The year 2005 can be characterised for Lithuania as continuity and first experience with considerable support through the Structural Funds which allowed Lithuania to double amount of funding available for innovation. Moreover, the most important innovation policy event was the creation of the Lithuanian Innovation Award with the aim to promote innovation and technology development in Lithuanian enterprises.

4. Possible orientation for future actions

The major challenges in front of Lithuania include development of modern human resources relevant to the needs of industry, establishment of effective cooperation between industry and business sector and recovery from extremely low shares of public and R&D expenditures.

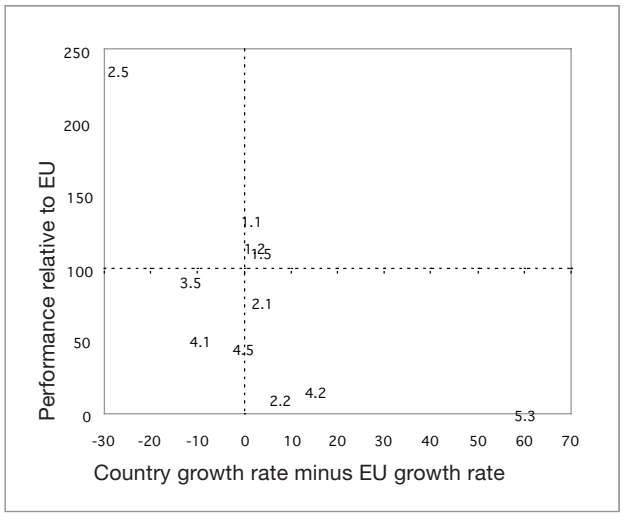
Taking into account the above-mentioned drawbacks, it is very important in the future to:

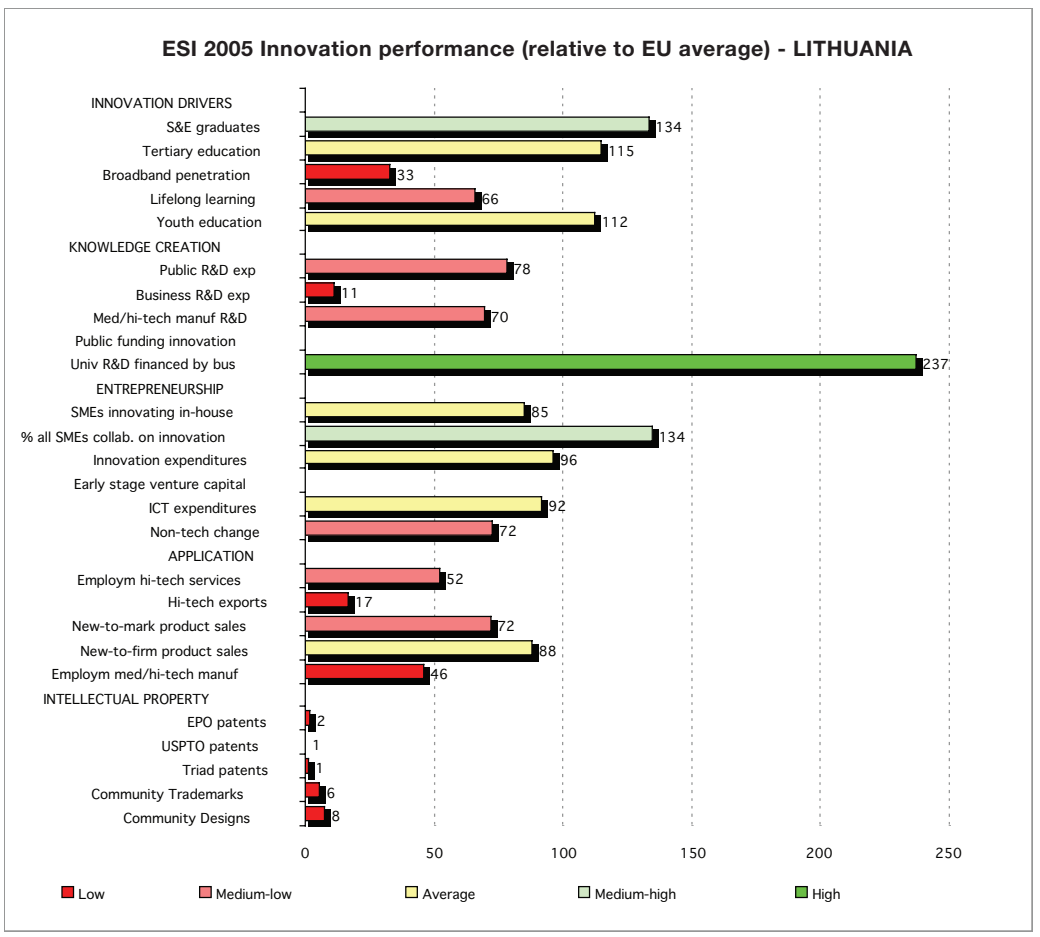
1. Continue investing in human resources with the view to develop the curricula relevant to the industry needs as well as envisage initiatives promoting patenting culture and allowing to cover the costs for the acquisition of intellectual property rights.

2. Introduce a new generation of initiatives which will strengthen the cooperation between the science and business sector. There is a necessity to move away from infrastructure-oriented projects. One noteworthy example which has been pursued by Estonia is the creation of competence centres. Another policy option for Lithuania is to create innovative clusters.

3. While trying to develop high-tech industries, it is equally important to support the development of innovative projects across all types of industries.

LITHUANIA - EIS 2005 results





Indicator quality concerns:

As with other new member states, the IPR data for patents are volatile as they are based on very few patents. For this reason, the positive trend for triadic patents (5.3) is unreliable.

	LITHUANIA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.26*	*0.25*	*0.27*		*2.1*	*0.0*
	relative to EU	--	--	--	--	*61*	*59*	*63*			
	rank	--	--	--	--	*24*	*24*	*24*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*9.3*	*11.7*	*13.5*	*14.8*	*14.6*	*16.3*	--	*134*	*11*	*9*
	relative to EU	--	*124*	*132*	*135*	*128*	*134*	--			
1.2	*Population with tertiary education*	*41.4*	*42.1*	*42.3*	**22.2**	*21.9*	*23.2*	*25.2*	*115*	*7*	*4*
	relative to EU	--	--	*212*	**110**	*107*	*109*	*115*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*2.5*	*33*	--	*50*
	relative to EU	--	--	--	--	--	--	*33*			
1.4	*Participation in life-long learning*	--	*3.9*	*2.8*	*3.6*	*3.3*	*4.5*	**6.5**	*66*	--	--
	relative to EU	--	--	*35*	*46*	*41*	**48**	**66**			
1.5	*Youth education attainment level*	*83.2*	*81.3*	*77.9*	*81.2*	**79.3**	*82.1*	*86.1*	*112*	*4*	*0*
	relative to EU	--	*109*	*102*	*107*	**104**	*107*	*112*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.54*	*0.49*	*0.46*	*0.48*	*0.56*	*0.54*	--	*78*	*6*	*2*
	relative to EU	*82*	*75*	*70*	*72*	*82*	*78*	--			
2.2	*Business R&D expenditures*	*0.01*	*0.02*	*0.13*	*0.20*	*0.11*	*0.14*	--	*11*	*10*	*1*
	relative to EU	*1*	*2*	*11*	*16*	*9*	*11*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	--	*77.0*	*62.1*	--	--	*70*	--	--
	relative to EU	--	--	--	*86*	*70*	--	--			
2.4	*Enterprises receiving public funding*			--					--	--	--
2.5	*Business financed university R&D*	--	--	*14.0*	*12.4*	*15.6*	*7.4*	--	*237*	*-25*	*1*
	relative to EU	--	--	*213*	*184*	*237*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*22.1*		--			*85*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*12.3*		--			*134*	--	--
3.3	*Innovation expenditures*			*1.74*		--			*96*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	*6.3*	*6.3*	--	--	*5.8*	*92*	*-4*	*7*
	relative to EU	--	--	*97*	*100*	--	--	*92*			
3.6	*SMEs using non-technological change*			*30.7*					*72*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*2.47*	*2.10*	*2.23*	**2.01**	*1.69*	*1.66*	--	*52*	*-9*	*0*
	relative to EU	--	--	--	*61*	*52*	*52*	--			
4.2	*Exports of high technology products*	--	*2.0*	*2.6*	*2.9*	*2.4*	*3.0*	--	*17*	*10*	*-6*
	relative to EU	--	*10*	*13*	*14*	*13*	*17*	--			
4.3	*Sales new-to-market products*			*4.3*		--			*72*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*10.6*		--			*88*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*3.77*	*3.75*	*3.13*	**3.18**	*2.64*	*3.03*	--	*46*	*-2*	*-3*
	relative to EU	--	--	--	*46*	*39*	*46*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*1.1*	*0.6*	*1.4*	**2.6**	*2.6*	--	--	*2*	--	*5*
	relative to EU	*1*	*0*	*1*	**2**	*2*	--	--			
5.2	*New USPTO patents*	*0.6*	*0.4*	--	**0.9**	*0.5*	--	--	*1*	--	*6*
	relative to EU	*1*	*1*	--	**1**	*1*	--	--			
5.3	*New Triad patents*	*0.2*	*0.1*	*0.3*	--	--	--	--	*1*	*62*	*1*
	relative to EU	*1*	*1*	*1*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*0.0*	*2.3*	*4.9*	*6*	--	*16*
	relative to EU	--	--	--	--	*0*	*3*	*6*			
5.5	*New community designs*	--	--	--	--	--	--	*6.4*	*8*	--	--
	relative to EU	--	--	--	--	--	--	*8*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.16 LUXEMBOURG

1. Introduction

Despite its good general economic performance, Luxembourg performs less well in innovation. The relevance of the service sector is the best explanation for this divergence. The EIS indicators in 2004 highlighted many areas related to innovation where Luxembourg is below the EU25 average. Nevertheless, in some areas, the indices show that the country is making up for lost time. The country ranks 14th out of the 33 countries and 10th out of the 25 EU countries (some of the results need to be treated cautiously because of missing data for knowledge creation and innovation and entrepreneurship). Luxembourg's best performance is in IPR, which could be linked to above average performance in business R&D. Its performance in applications ranges from very poor for new-to-market product sales and for employment in medium-high and high tech manufacturing, to far above the EU average for high tech exports. The latter is difficult to understand, given low employment in the relevant sector.

2. Major challenges and policies

The following challenges appear to be the most relevant ones for the economy of Luxembourg:

S&E graduates

The country has only 18% of the EU average in S&E graduates, positioning it in the 32nd among the 33 countries studied. This is a particularly poor performance reminding of developing rather than developed countries. The lack of a national university until very recently may be the cause of the problem, and despite the creation of the S&E faculty it will take time until the share improves considerably.
Overall, the government recognises education as a priority in the "Education and Training Programme 2010" and emphasises it in the Reform Programme. However, science and engineering is not explicitly mentioned in the priority list.

Public R&D Expenditures

Public research expenditure as a share of GDP is only 29% of the EU average. With this share Luxembourg ranks 31st among the countries studied. In its Lisbon strategy triggered Reform Programme the government indicates that it intends to increase public funds for research and promote the university and national research centres' capabilities.

Until now the national policy has supported R&D mainly through the National Fund for Research (Fonds National de la Recherche), created by the law of 31rst May 1999 to assists public research centres (PRCs) and other public bodies in their research activities, in accordance with the objectives of the national R&D policy (LU 6). A variety of other public funds are used mainly to stimulate clusters, such as the «cluster» programme of the Ministry of Economic Affairs devised in November 2001. Its main aim is to form industrial partnerships involving the sharing of complementary technological expertise potentially leading to co-operation projects in the field of R&D and the development of new economic activities. 3 clusters have been set up (New materials, Information and Communication Technologies, Aeronautics and aerospace technologies).

More public funds are directed towards the stimulation of private R&D, such as the research and development incentive scheme of the Ministry of Small and Medium- sized Businesses, Tourism and Housing (LU 15) and the R&D incentive scheme of the Ministry of Economy (Régime d'encouragement à la R&D du Ministère de l'Economie) (LU 1).

Innovation expenditures

Innovation expenditure is only 68% of the EU average and Luxembourg takes the 20th position. The improvement of the situation is a priority and specific schemes are already used by the government to meet this challenge, namely

- *Innovation loan: To co finance expenses directly related to R&D projects involving the launch of a new product or service or the development of new production or marketing processes. As a rule, innovation loans cover 25% of the total eligible costs of an R&D project (LU 16).*
- *Luxinnovation GIE - National Agency for Innovation and Research for the promotion of innovation and research: created in 1984 Luxinnovation is the first stop shop for innovation and research in Luxembourg. It provides to companies, research centres, entrepreneurs and researchers information on national and European innovation financing, technology transfer and business start-up and assists them in their innovation project. Luxinnovation also devises and manages numerous pilot projects (LU 5).*

However, since the measures are sufficiently old there is apparently a need for a reinforcement of this policy.

3. Policy learning

3.1 Governance

Thanks to its small size, Luxembourg policy makers have always been aware and informed about the innovation situation within the country. The involvement of stakeholders, businesses in particular, is a tradition in Luxembourg. The major governance problem in the past is that the design of innovation policy in Luxembourg was not based on the use of indicators and benchmarks because of a lack of available data. Indicators will, however, be presented to the government in the first innovation report now. Moreover, it demonstrates a change in the design of policy as it implies a reporting exercise preceding the definition of new measures. Luxembourg has not yet defined a national plan with general innovation objectives. In terms of trans-national learning and benchmarking Luxembourg has always been widely inspired by foreign initiatives.

Although policy is rather effective, because of the high income, high general level of the administration and the small size of the country, some important challenges remain in order further improve governance:

- *The creation of an action plan fixing orientations*
- *A more systematic evaluation of the measures*
- *Improvement of human resources within the ministries in charge of innovation policy*

3.2 Recent policy trends

Luxembourg has no formal innovation policy document setting broad objectives. The innovation policy is not a stand-alone policy. The overall objective of the government is to maintain and increase Luxembourg's competitiveness. Innovation is one of the means to reach this objective.

The current national objectives in innovation policy are related to the challenges identified above:

- *to raise investments in R&D to 3% of GDP*
- *to strengthen innovation in SMEs*
- *to foster entrepreneurship*
- *to increase the number of graduates in Sciences and Engineering.*

As for innovation measures, the period from July 2004 to March 2005 was predominantly marked by continued innovation measures rather than by the implementation of new ones or by real changes of orientations. Nevertheless, the new government which came into office in July 2004 draw up a new programme and will take new measures in the following months to achieve the priorities defined in its programme. The most important new policy instruments refer to the modernisation of the Instruments of the SNCI for the eligibility of investments in intangible assets (intellectual property rights, patents) and Law of 15 June 2004 creating a framework for private equity and venture capital companies. The law creates a flexible legal framework both from a corporate and a tax perspective (LU 19). Finally the creation of a new host structure for innovation companies (LU 17) is dedicated to skilled craft business or industrial companies investing in new production techniques or services.

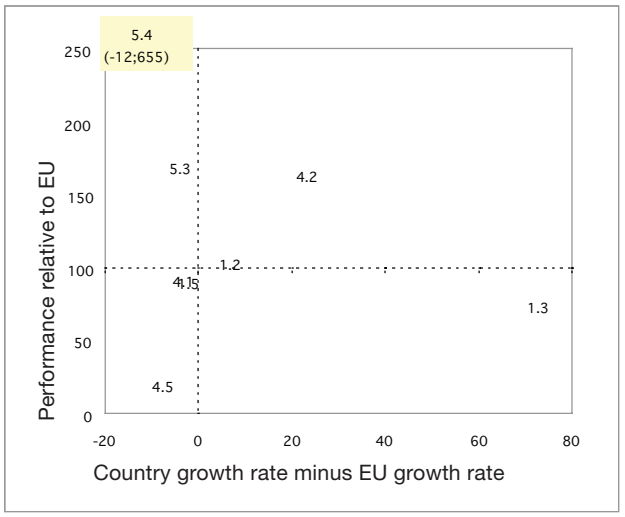
It is expected that, as a response to the newly launched National Plan for Innovation and Full Employment, there will be a further reinforcement of policies.

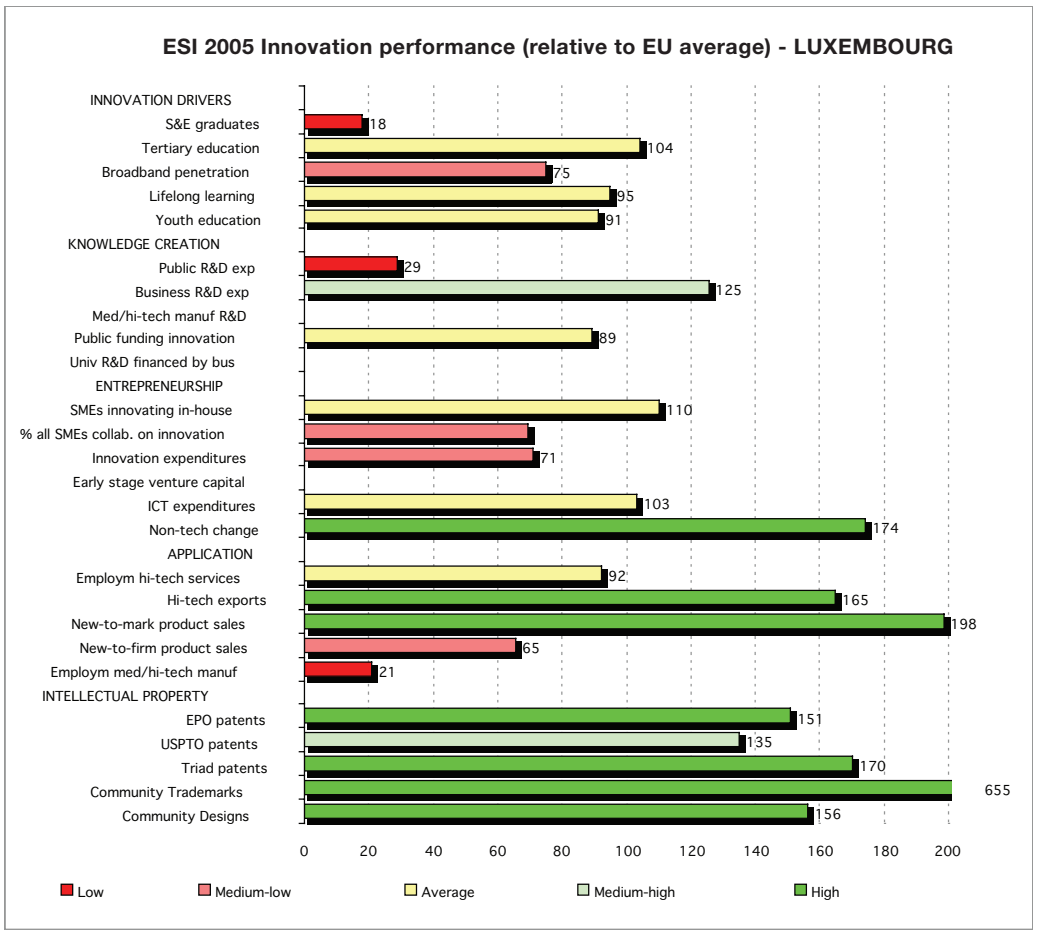
4. Possible orientation for future actions

Luxembourg is a very prosperous country relying mainly on a very competitive service sector. This has led to a neglect of innovation policy, since the service sector and the private sector were expected to take care of their future success. In addition the small size of the country deprives it from the possibility of economies of scale in research activities.

However, this situation seems for the first time reversed since the adoption of the first national innovation programme. Increased resources are earmarked and a consensus policy created. Channelling innovation efforts into carefully selected areas (because of the small size of the country only very few areas can be supported) and raising rapidly the share of public research expenditure and innovation expenditure is important.

LUXEMBOURG - EIS 2005 results





Indicator quality concerns:

There are several concerns with the data from Luxembourg that are partly due to several unique features, such as a poorly developed tertiary education system, and the fact that it serves as the head office for many EU firms. The former probably explains poor performance on S&E graduates while the latter could explain the excellent performance on all IPR indicators, which conflicts with the low share of employment in medium high and high tech manufacturing. Head office firms could receive the patent assignment for inventions developed outside Luxembourg. The high level of high tech exports could also be due to Luxembourg serving as an entrepot location for high-value airfreight.

	LUXEMBOURG					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.44*	*0.42*	*0.44*		*-0.3*	*0.0*
	relative to EU	--	--	--	--	*104*	*100*	*104*			
	rank	--	--	--	--	*13*	*14*	*14*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*1.4*	--	*1.8*	--	--	--	--	*18*	--	*9*
	relative to EU	--	--	*18*	--	--	--	--			
1.2	*Population with tertiary education*	--	*18.2*	*18.5*	*18.1*	*18.8*	*14.9*	*22.8*	*104*	*11*	*4*
	relative to EU	--	--	*92*	*90*	*92*	*70*	*104*			
1.3	*Broadband penetration rate*	--	--	--	--	*0.0*	*2.3*	*5.7*	*75*	*123*	*50*
	relative to EU	--	--	--	--	--	--	*75*			
1.4	*Participation in life-long learning*	*5.1*	*5.3*	*4.8*	*5.3*	*7.7*	**6.3**	*9.4*	*95*	--	--
	relative to EU	--	--	*61*	*67*	*96*	**68**	*95*			
1.5	*Youth education attainment level*	--	*71.2*	*77.5*	*68.0*	*69.8*	*69.8*	--	*91*	*-2*	*0*
	relative to EU	--	*95*	*101*	*89*	*91*	*91*	--			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	--	--	*0.13*	--	--	*0.20*	--	*29*	*24*	*2*
	relative to EU	--	--	*20*	--	--	*29*	--			
2.2	*Business R&D expenditures*	--	--	*1.58*	--	--	*1.58*	--	*125*	*0*	*1*
	relative to EU	--	--	*130*	--	--	*125*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	--	--	--	--	--	--	--	--
	relative to EU	--	--	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			*7.4*					*89*	--	--
2.5	*Business financed university R&D*	--	--	--	--	--	--	--	--	--	*1*
	relative to EU	--	--	--	--	--	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*39.2*		*28.0*			*110*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			--		*8.1*			*70*	--	--
3.3	*Innovation expenditures*			*1.29*		--			*71*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	*7.3*	*7.4*	*6.8*	--	--	*103*	--	*7*
	relative to EU	--	--	*112*	*117*	*103*	--	--			
3.6	*SMEs using non-technological change*			*74.0*					*174*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*2.51*	*3.59*	*2.66*	*3.06*	*2.24*	*2.94*	--	*92*	*-3*	*0*
	relative to EU	--	--	*86*	*93*	*69*	*92*	--			
4.2	*Exports of high technology products*	--	*15.1*	*20.6*	*27.9*	*24.6*	*29.3*	--	*165*	*18*	*-6*
	relative to EU	--	*77*	*100*	*136*	*135*	*165*	--			
4.3	*Sales new-to-market products*			*2.1*		*9.1*			*198*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*7.4*		*4.4*			*65*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*1.62*	*1.80*	*2.03*	*1.19*	*1.22*	*1.36*	--	*21*	*-10*	*-3*
	relative to EU	--	--	*29*	*17*	*18*	*21*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*143.5*	*200.5*	*198.7*	**216.6**	*201.3*	--	--	*151*	--	*5*
	relative to EU	*131*	*169*	*149*	**153**	*151*	--	--			
5.2	*New USPTO patents*	*45.5*	*44.5*	*90.4*	**77.0**	*96.3*	--	--	*135*	--	*6*
	relative to EU	*74*	*71*	*136*	**107**	*135*	--	--			
5.3	*New Triad patents*	*44.7*	*44.4*	*38.0*	--	--	--	--	*170*	*-2*	*1*
	relative to EU	*195*	*200*	*170*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*527.7*	*580.5*	*571.2*	*655*	*4*	*16*
	relative to EU	--	--	--	--	*809*	*684*	*655*			
5.5	*New community designs*	--	--	--	--	--	*134.5*	*131.1*	*156*	--	--
	relative to EU	--	--	--	--	--	*197*	*156*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.17 MALTA

1. Introduction

Malta ranks last on the summary innovation index for the 25 EU countries and in 31st place out of 33 countries. Its best performance is in innovation and entrepreneurship and in applications. The latter is largely due to high-tech exports, which is an anomaly due to one firm within a very small economy. Business R&D is close to non-existent and public R&D is only 28% of the EU average. The good performance for innovation and entrepreneurship is from high total innovation expenditures, most likely capital investment.

Because of its size and economic structure the country lags behind in a number of the EIS indicators. There is almost no intellectual property output, with most indicators ranging close to or below 10% of the EU average.

2. Major challenges and policies

The following challenges appear to be the most relevant ones:

S&E graduates and population with tertiary education

The key innovation challenge relates to developing human resources in science and technology at all levels from technician level to PhD. Malta, with 25% of the EU average ranks only 31st among 32 countries for which data is available. According to the EIS 2004, there are indications that Malta is catching up in terms of increasing the number of S&E graduates. Specific HR incentives have been introduced in National Budget 2005 to encourage private sector employment of S&E graduates. The recent Review of State Higher Education Funding is expected to lead to new measures in this respect.

The "Chalmers Report" noted in its key findings that "Malta has made significant progress over recent years in stepping up participation rates in Post Secondary and Tertiary (PS+T) education... However, continuing investment is required if we are to aspire to OECD standards and the Lisbon criteria". The balance of resources between undergraduate and postgraduate studies needs to be revised to attract and encourage high quality graduates to continue to PhD studies.

Life-long learning

Malta invests only moderately in life-long learning with a share of 51% compared to the EU average. This ranks it 24th. In the national objectives for innovation improvement of the general framework conditions the government mentions life-long learning as a priority. However, there is limited evidence of concrete intervention for improvement. Current policy measures to improve human resources in S&E need to be stepped up through the introduction of incentives for students at undergraduate, post graduate to doctoral level. Life-long learning opportunities, including e-learning initiatives need to be given special incentives and supports to improve the share of population with tertiary degree, and in particular to promote STI popularisation.

BERD and SMEs innovating in-house or in collaboration (with emphasis on the business end)

The indicators of the effort of the private sector are at a disappointing level: BERD is only 6% of the EU average, positioning Malta at the last position together with Cyprus. SMEs innovating in-house are at 11% of the European average and the country is in the 29th position, whereas collaboration among SMEs raises the average only to 17% of the respective EU average, while Malta remains in the 29th rank. National policies have as a target to improve this situation and most of the public funds spent envisage a leverage role for the private sector. In particular the government has introduced the Income Tax Act (Chapter 123 of the Laws of Malta), which allows for the deduction of expenditure on scientific research up to 150% of the actual amount of expenditure incurred. Further the national innovation policy includes a scheme on collaborative research, which aims at knowledge creation and creating value all along the research and innovation chain. The scheme is to be primarily SME-driven with a view to supporting high quality collaborative applied research (MT 6).

Co-ordination for innovation policy between the various ministries

There is a strong need to improve inter-ministerial co-operation and co-ordination in order to improve innovation governance. The current discussion and the emphasis given on the Lisbon-triggered Reform Plan suggest that this debate has started and there is ample evidence of change, as indicated hereafter.

3. Policy learning

3.1 Governance

Innovation policy virtually started in Malta in view of the EU accession and has not had the necessary time horizon to bear fruit. The SWOT analysis highlights a range of challenges in the national innovation governance system largely related to context (RTDI culture

and existing practices), lack of co-ordination and poor investments in resources and measures. Efforts are in hand to improve the level of co-ordination in policy making through a revised national framework for research and innovation. The elections in the first quarter of 2004 had a considerable impact on policy making structures. The re-allocation of ministerial portfolios resulted in an increased level of economic policy co-ordination with other ministries, particularly where effective handling of specific issues calls for close inter-ministerial collaboration, including the national economic strategy and international economic relations. The 2004 elections also led to the emergence of a dynamic Ministry for Investment, Industry and Information Technology. Among the new innovation governance structures planned in 2005 are:

- *a new Research and Innovation governance structure is to be proposed in 2005 based on a review of the national framework to be carried out early in 2005,*
- *the setting up of a National Commission for Higher Education based on proposals by the Minister of Education to determine a policy for tertiary education and to co-ordinate institutions.*

In addition, in 2004, Malta Enterprise in collaboration with a consortium of European partners developed a Regional Innovation Strategy project proposal entitled MARIS, a consensus-building exercise involving co-operation between the private sector and the key RTDI players to develop an innovation strategy.

Malta is still missing formal policy making and evaluation practices in research and innovation, however efforts are undertaken to introduce more systematic approaches to RTDI policy making cycle. While there is no policy review system in place, the utility and frequency of such reviews has become more apparent with a number of them taking place since 2002. The mechanisms for tapping strategic information on innovation policy developments in other countries have developed over time on an ad hoc basis and vary depending on the institution.

Important challenges remain linked to:

- *Lack of RTDI culture - minimal investments and lack of critical mass*
- *Culture of state dependence as a result of excessive dominance of the economy by the government*
- *No tradition of rational approaches to policy and no structured national dialogue on innovation.*

3.2 Recent policy trends

In general, there is evidence of important progress in 2004-2005 on the prioritisation and targeting of national policy responses to innovation challenges. A key breakthrough is the fact that these topics have been given a high priority on the national policy agenda. The government is to review the national framework for research and innovation in order to exploit potential to the full of those willing and able to contribute and has to decide which entity is to take lead responsibility for the research and innovation sector. In the National Budget 2005, the government introduced a number of new incentives to stimulate innovation in the private sector - these measures have not yet been put into effect but the legal drafting is at an advanced stage.

New policy measures outlined in the National Budget 2005 include:

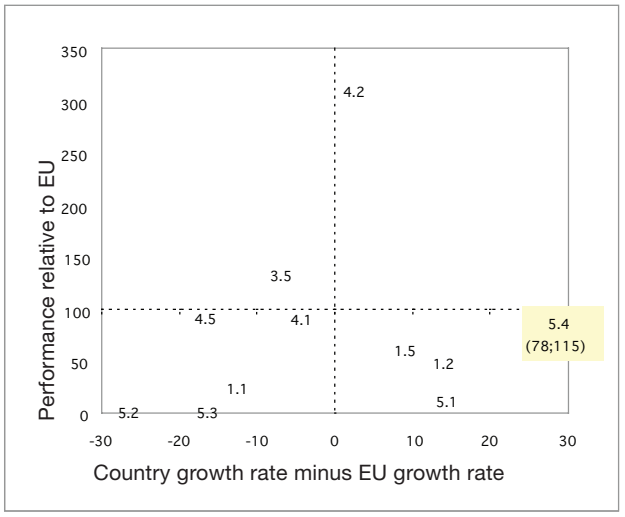
- *The research expenditure tax deduction was increased from 150% to 200% of relevant costs with R&D expenditure including purchase of property for research activity, salaries and scholarships for employees on postgraduate studies. Fiscal incentives have also been introduced for companies investing in IT to improve e-commerce and e-business systems and their productivity and sales networks. An amount of €2,250,000 is allocated over a three-year period to set up a Venture Capital Fund with tax credit for providers of venture capital and partial exemption on capital (gains) tax relative to such investment (MT2)*
- *Support for capacity building, collaborative research and scientific research (MT1and MT6)*
- *Following an agreement with the European Investment Fund for guarantee facilities, Malta Enterprise has become an intermediary for EIF. Through the agreement, EIF will be providing a counter-guarantee facility to Malta Enterprise and the Malta Enterprise Loan Guarantee Scheme will support SMEs through three specific loan guarantee schemes*
- *Financial Services: new law on trusts and trustees to be followed by a law on securitisation, which generates innovation through the strengthening of the securities market. In 2005, government will submit the Bill to Parliament in consultation with the sector.*

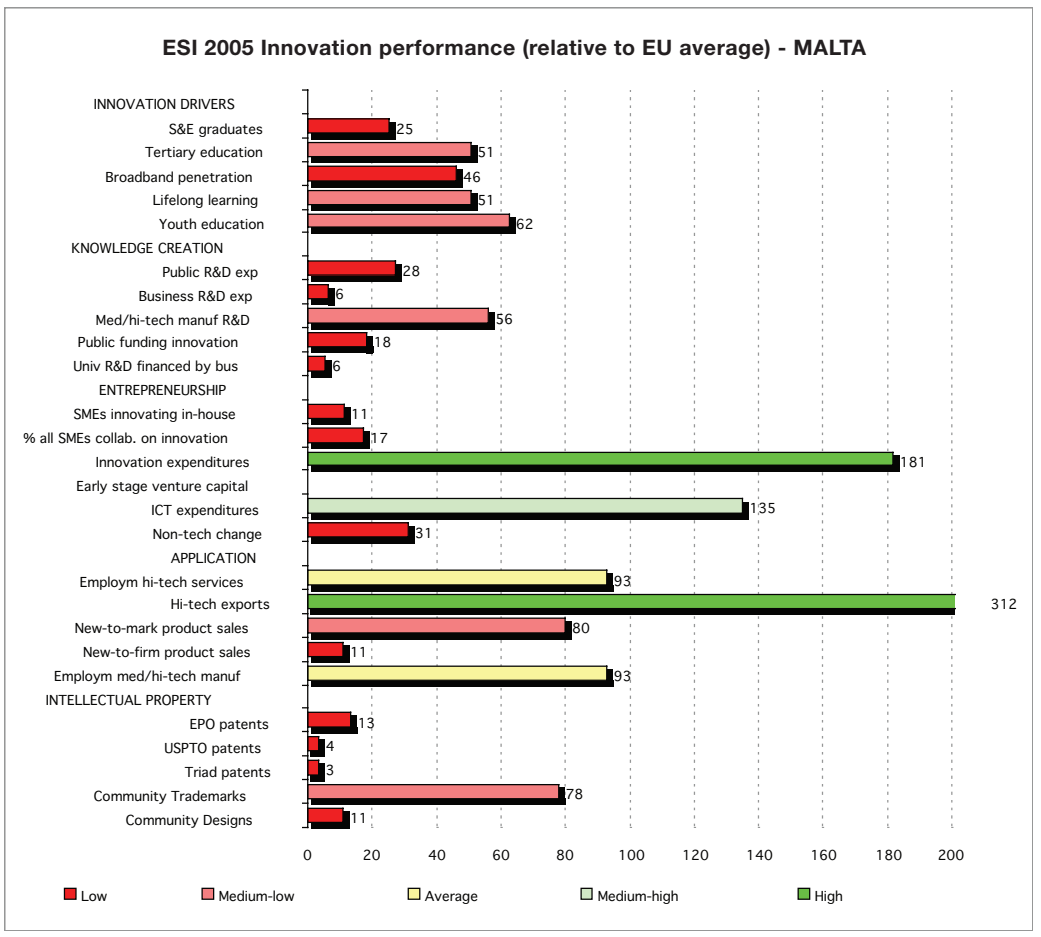
4. Possible orientation for future actions

Malta made a late start but is rapidly adapting to international good practices in terms of innovation governance and in introducing some basic measures promoting innovation. The continuing investments in the Information Society open up new windows of opportunity for Malta to serve as a test-bed for new technologies, e.g. in the area of security. Malta is well-positioned to play a critical catalytic role in the opening up of Libya and EU efforts to extend the European Research Area to the Mediterranean. There are already indications of business and research efforts to develop and capitalise on existing links with North African countries to this end.

In line with this, a process of reflection and review is underway to improve the national innovation system as a whole. It is envisaged that an important innovation policy learning curve is being set in motion. Progress is recorded on a number of fronts but the very low levels of business commitment will be prohibitive for a long term success.

MALTA - EIS 2005 results





Indicator quality concerns:

With the exception of high tech exports, which are based on the activities of very few firms, there are no problems with the available indicators.

	MALTA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.19*	*0.21*	*0.20*		*1.2*	*0.0*
	relative to EU	--	--	--	--	*46*	*49*	*47*			
	rank	--	--	--	--	*30*	*29*	*31*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	--	*3.9*	*3.4*	*2.7*	*3.1*	*3.1*	*3.6*	*25*	*-4*	*9*
	relative to EU	--	*41*	*33*	*25*	*27*	*25*	--			
1.2	*Population with tertiary education*	--	--	*5.4*	*9.6*	*8.7*	*9.2*	*11.1*	*51*	*19*	*4*
	relative to EU	--	--	*27*	*48*	*43*	*43*	*51*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*3.5*	*46*	--	*50*
	relative to EU	--	--	--	--	--	--	*46*			
1.4	*Participation in life-long learning*	--	--	*4.5*	*4.6*	*4.4*	*4.2*	**5.0**	*51*	--	--
	relative to EU	--	--	*57*	*58*	*55*	*45*	**51**			
1.5	*Youth education attainment level*	--	--	*40.9*	*40.1*	*39.0*	*43.0*	*47.9*	*62*	*9*	*0*
	relative to EU	--	--	*54*	*53*	*51*	*56*	*62*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	--	--	--	--	*0.21*	*0.19*	--	*28*	--	*2*
	relative to EU	--	--	--	--	*31*	*28*	--			
2.2	*Business R&D expenditures*	--	--	--	--	*0.07*	*0.08*	--	*6*	--	*1*
	relative to EU	--	--	--	--	*6*	*6*	--			
2.3	*Share of med-high/high-tech R&D*	--	*45.5*	*75.0*	*83.3*	*50.0*	--	--	*56*	--	--
	relative to EU	--	*51*	*84*	*93*	*56*	--	--			
2.4	*Enterprises receiving public funding*			*1.5*					*18*	--	--
2.5	*Business financed university R&D*	--	--	--	--	*0.4*	*0.2*	--	*6*	--	*1*
	relative to EU	--	--	--	--	*6*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*2.9*		--			*11*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*1.6*		--			*17*	--	--
3.3	*Innovation expenditures*			*3.29*		--			*181*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	--	--	*8.4*	*8.7*	*8.5*	*135*	*0*	*7*
	relative to EU	--	--	--	--	*128*	*136*	*135*			
3.6	*SMEs using non-technological change*			*13.4*					*31*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	--	--	*3.26*	*3.17*	*3.05*	*2.96*	--	*93*	*-4*	*0*
	relative to EU	--	--	*106*	*96*	*94*	*93*	--			
4.2	*Exports of high technology products*	--	*55.7*	*64.4*	*58.1*	*56.5*	*55.5*	*63.3*	*312*	*-3*	*-6*
	relative to EU	--	*283*	*313*	*283*	*310*	*312*	--			
4.3	*Sales new-to-market products*			*4.8*		--			*80*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*1.3*		--			*11*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	--	--	*9.93*	*8.79*	*8.16*	*6.14*	--	*93*	*-19*	*-3*
	relative to EU	--	--	*142*	*126*	*119*	*93*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*7.9*	*10.6*	*18.4*	*12.8*	*17.7*	--	--	*13*	*20*	*5*
	relative to EU	*7*	*9*	*14*	*9*	*13*	--	--			
5.2	*New USPTO patents*	*2.7*	--	*5.3*	*5.1*	*2.5*	--	--	*4*	*-20*	*6*
	relative to EU	*4*	--	*8*	*7*	*4*	--	--			
5.3	*New Triad patents*	*0.0*	*2.4*	*0.8*	--	--	--	--	*3*	*-15*	*1*
	relative to EU	*0*	*11*	*3*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*12.7*	*55.6*	*67.7*	*78*	*131*	*16*
	relative to EU	--	--	--	--	*20*	*65*	*78*			
5.5	*New community designs*	--	--	--	--	--	*7.6*	--	*11*	--	--
	relative to EU	--	--	--	--	--	*11*	--			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.18 THE NETHERLANDS

1. Introduction

The performance of the Netherlands is strong in terms of GDP per capita. It is amongst the highest in the EU. However, the GDP growth has been relatively low in the last years. Also the international competitiveness of the Netherlands has decreased as indicated in, for example, international ranking of the Institute for Management Development (IMD), in which the Netherlands dropped from 4th in 2002 to 13th in 2005 (15th in 2004).

The Netherlands is an above average performer on the European Innovation Scoreboard (EIS), ranking 8th on the summary innovation index out of the EU 25 countries and 11th out of 33 countries. The EIS 2004 suggests that the Netherlands has the potential to achieve more growth through innovation than it currently does. Despite of an overall strong innovation system with a number of good indicators well above EU25 average (e.g. high quality of output of scientific research; high level of patenting, high share of financing of public research by industry and high use of ICT and access to its applications), the trends in a number of factors are negative. The Netherlands is "loosing momentum" in its innovation performance. First, the total expenditures on R&D are stagnating. In particular business expenditure on R&D lags behind compared to main competitors. Business R&D expenditures are only at 80% of the EU average and have declined from a high of 1.14% in 1999 to 1.01% in 2003, most likely due to the collapse of the dot-com bubble and the off-shoring of R&D by major Dutch firms.

Second, there is a looming shortage of skilled S&E personnel. Third, interaction between the actors of the NIS is limited and exploitation of research results is inadequate. Fourth, innovative entrepreneurial activity is limited, e.g. the Netherlands performs poorly in terms of new-to-firm sales share (37% of the EU average). Finally, there are problems with regard to the financing of (early stages of) innovation.

2. Major challenges and policies

The following challenges have been identified as the most relevant:

Limited potential for improving relatively low BERD

Structural weaknesses in economic structure limit potential for improving below average business expenditure on R&D. Limited BERD is considered one of the most serious challenges is to improve innovative potential. There is some sign of a turn around, with business R&D increasing from 0.98% of GDP in 2002 to 1.01% in 2003. Any improvements in business R&D will probably require a long-term strategy to nurture the capacities of smaller firms, since several of the large Dutch multinationals are pursuing a strategy of developing R&D centres outside the Netherlands.

The Dutch government addresses this problem by means of different instruments directed towards stimulating expenditure on R&D/innovation by companies. A substantial part of the total budget allocated for this purpose is directed through a fiscal scheme on innovation and research called the WBSO (NL 5). This instrument supports companies performing research and development by allowing deduction of part of the related wage costs of R&D personnel from their income tax bills and the social security payments. Among new initiatives are e.g. Innovation Subsidy for Collaborative Projects (NL 45) subsidises technological collaboration aimed at the research and development (R&D) of innovative and sustainable products, processes or services. There are also measures supporting innovation capacities of SMEs as e.g. Innovation Vouchers (NL 47). The main objective of the vouchers scheme is to enable SMEs to buy knowledge from knowledge institutes with innovation vouchers and thus to stimulate interaction and exchange between the knowledge suppliers and SMEs.

Declining availability of early-stage venture capital

According to the findings in the report, the declining availability of early-stage venture capital is worrying. Companies have problems with financing the high-risk process from 'proof of principle' (i.e. the result of scientific research) to 'proven concept' (i.e. the basis for commercialisation). The problem has been recognised by the government. Two recent measures address this issue.

The TechnoPartner initiative (NL 43) is to support creation high-tech start-ups. In March 2005 the final part of the TechnoPartner programme was launched: the seed facility for high-tech start-ups. This facility aims to promote and mobilise the Dutch venture capital market to the benefit of high-tech start-ups by making available a loan to closed-end venture capital funds. The loan reduces the risks for these funds. The Valorisation Grants measure (NL 49) enables University researchers to apply for a grant to create a spin-off from a public knowledge institute. In March 2005 a second round of the Valorisation

Grants project was started as a joint pilot scheme of the Technology Foundation STW, the national research council NWO and the Dutch Organisation for Applied Scientific Research TNO. The first round in 2004 was successful.

Relatively low number of S&E graduates

The numbers of S&E graduates remain well below EU25 average (60%). There is an impending substantial shortage of scientists, technologists and R&D workers (specific groups of knowledge workers). The proportion of graduates in science and technical studies in the Netherlands is substantially lower than the average in the OECD and EU. In some areas there is a shortage, which will worsen in the coming years.

To address this issue, the government published a white paper on this issue in December 2003 entitled "Delta Plan Science and Technology". It focuses primarily on how to educate more young people in science and engineering. The target is to raise the number of young people entering scientific and engineering courses by 15% by 2007. One of the measures that the government deployed recently is called "Casimir Experiments" (NL_48). The initiative aims at promoting public-private mobility of researchers. It can be seen as the Dutch equivalent of the European Marie Curie scheme. This new scheme was recommended by the Innovation Platform as a means to improve the availability and quality of knowledge workers.

3. Policy learning

3.1 Governance

The Dutch innovation governance system is a complex system with multiple agencies and advisory bodies. Important coordinative role in innovation policy-making belongs to the Committee on Science, Technology and Information Policy (CWTI) at the level of the ministries and the Council for Science, Technology and Information Policy (RWTI). The Innovation Platform also has a coordinative role. The coordination between the Ministry of Economic Affairs and the ministry of Education, Culture and Science has improved over the last years, especially at the level of target setting and prioritisation. With regard to strategic policymaking, innovation policy is underpinned by studies and analyses, advice from advisory bodies and policy consultants, evaluations and stakeholder involvement. There is a system of policy review in place. The so-called VBTB-project ("From Policy budgets to Policy accountability") aims to establish a clear link between policy objectives, activities and the allocation of resources. This new style highlights the importance of setting measurable targets and the use of performance indicators and systematic monitoring and evaluation.

In sum the major strengths of the Dutch governance systems include e.g. broad stakeholder involvement; a shift towards creating networks of existing organisations instead of launching new ones; a willingness to undertake policy experiments; and various cases of good practice in interdepartmental co-ordination. Weaknesses include: high transaction costs of stakeholder involvement; a small number of key stakeholders with large influence in various committees; a tendency towards a "committee culture" in which publication of strategic documents receives more attention than actual implementation; interdepartmental collaboration which is still in its infancy; and complexity of innovation governance system.

3.2 Recent policy trends

Recent developments in innovation policy include an emphasis on choosing "excellence" and the creation of focus and mass in the research and innovation system. In regional innovation policy this emphasis on key areas is exemplified winners", i.e. regions with a capacity to develop into internationally competitive innovation "hot spots". In industry policy this new emphasis in exemplified by the special attention for key innovation areas, to be selected through a bottom up process.

In addition to the Innovation Platform's (IP) report on "Proposals for a key areas approach" (October 2004), the IP also published a report on "Proposals for renewal of vocation education" (September 2004) and a report with recommendations for "Vitalising the knowledge economy" (November 2004). In the latter report, the IP made ten recommendations clustered around three main themes (increasing private investment in R&D; organisational and institutional renewal; and improving linkages in the research infrastructure).

Another relevant event for innovation policy was the so-called "Easter Agreement" (April 2005). An additional €250 million were allocated to education and €500 million from the FES (Economic Structure Enhancing Fund, with natural gas revenues) were allocated for investments in knowledge, innovation and education. The additional expenditure will be used for e.g. primary vocational education, top-research (on nanotechnology, biotechnology and innovative ICT-applications), specific innovation-oriented vocational education (€40 million), large-scale research infrastructure (€40 million) and the key areas, which have been selected by the Innovation Platform (€70 million).

4. Possible orientation for future actions

Based on analysis of EIS indicators and revealed trends as well as in reference to existing Dutch policy strategic documents the following general policy recommendations could be put forward:

Implement measures to increase supply of human resources for innovation

- *Implement long term policies tacking innovation personnel supply*
- *Implement measures and initiatives aiming at attracting S&E students, graduates and researchers from abroad (e.g. research grants, etc)*

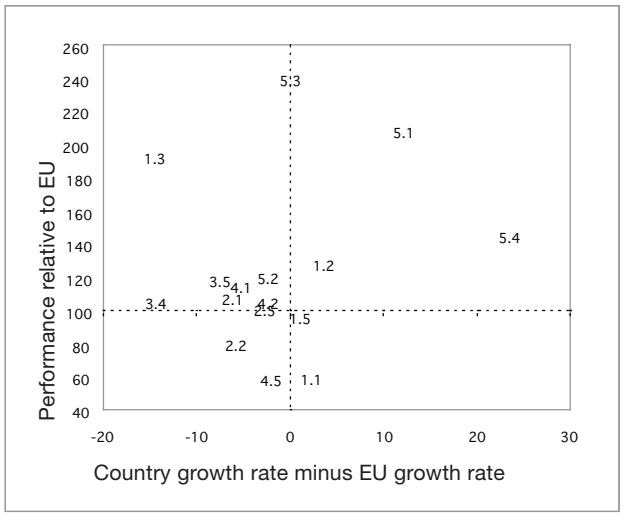
Continue efforts to raise business R&D expenditures

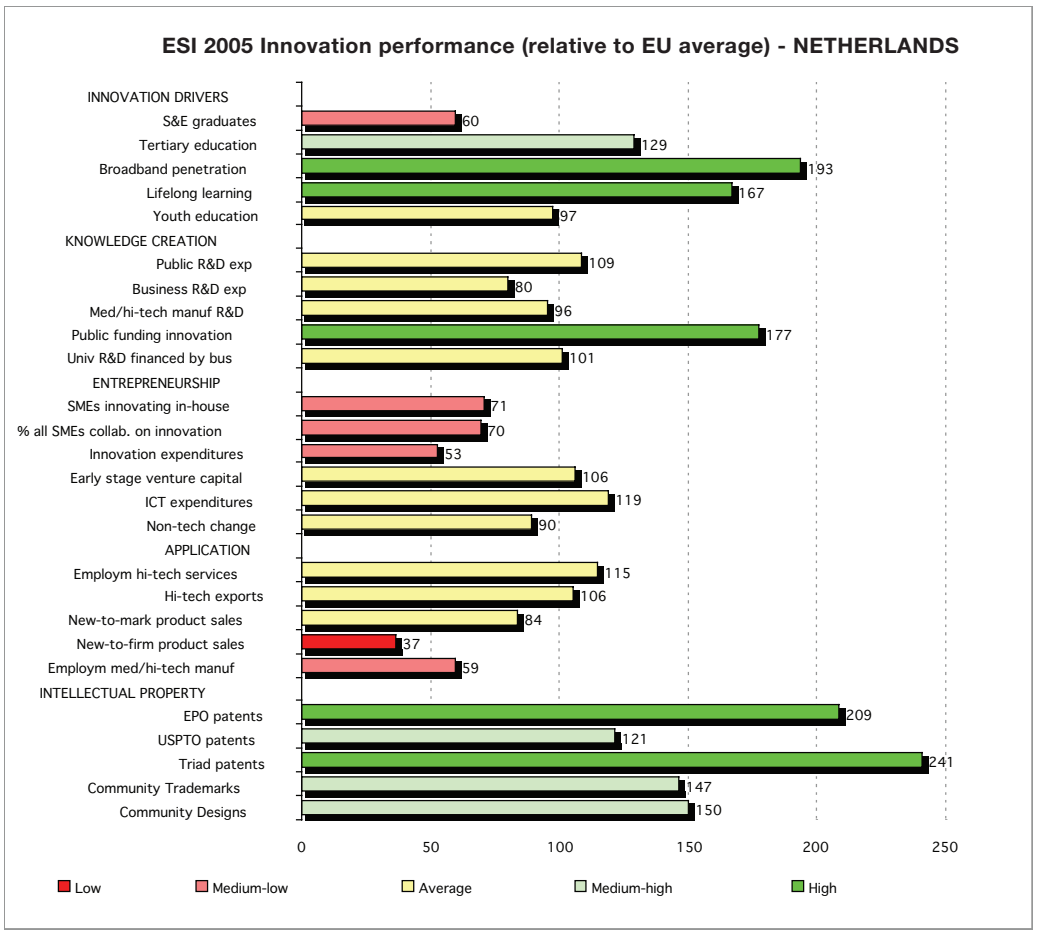
- *Long term strategy to increase business R&D expenditure in SMEs*
- *Public R&D funding for joint public-private innovation initiatives*
- *Implement measures encouraging R&D cooperation between SMEs and large knowledge intensive companies*

Support creation of innovative start-ups and spin-offs

- *Continue testing and mainstreaming measures offering support to the knowledge-intensive start-ups and spin-offs e.g. access to finance and logistical assistance*

NETHERLANDS - EIS 2005 results





Indicator quality concerns:

The good results for patenting might not reflect inventive activity within the Netherlands as more than one-third of all EPO patent applications are made by one multinational with many research centres outside of the Netherlands. The patents from these foreign research units are frequently assigned to the Dutch head office.

	NETHERLANDS					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.48*	*0.48*	*0.48*		*0.7*	*0.0*
	relative to EU	--	--	--	--	*112*	*113*	*114*			
	rank	--	--	--	--	*11*	*11*	*10*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*6.0*	*5.8*	*5.8*	*6.1*	*6.6*	*7.3*	--	*60*	*11*	*9*
	relative to EU	--	*62*	*57*	*55*	*58*	*60*	--			
1.2	*Population with tertiary education*	*21.9*	*22.6*	*24.0*	*24.1*	*25.0*	*27.5*	--	*129*	*8*	*4*
	relative to EU	--	--	*120*	*120*	*123*	*129*	--			
1.3	*Broadband penetration rate*	--	--	--	--	*6.3*	*9.8*	*14.7*	*193*	*35*	*50*
	relative to EU	--	--	--	--	--	--	*193*			
1.4	*Participation in life-long learning*	*12.9*	*13.6*	*15.6*	*16.3*	*16.4*	*16.5*	*16.5*	*167*	--	--
	relative to EU	--	--	*197*	*206*	*205*	**177**	*167*			
1.5	*Youth education attainment level*	*72.9*	*72.3*	*71.7*	*72.1*	*73.3*	*74.5*	*74.5*	*97*	*1*	*0*
	relative to EU	--	*97*	*94*	*95*	*96*	*97*	*97*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.89*	*0.88*	*0.79*	*0.76*	*0.74*	*0.75*	--	*109*	*-4*	*2*
	relative to EU	*135*	*135*	*120*	*113*	*109*	*109*	--			
2.2	*Business R&D expenditures*	*1.05*	*1.14*	*1.11*	*1.05*	*0.98*	*1.01*	--	*80*	*-4*	*1*
	relative to EU	*91*	*94*	*91*	*84*	*78*	*80*	--			
2.3	*Share of med-high/high-tech R&D*	*85.2*	*83.9*	*85.2*	--	--	--	--	*96*	--	--
	relative to EU	*96*	*94*	*96*	--	--	--	--			
2.4	*Enterprises receiving public funding*			*14.7*					*177*	--	--
2.5	*Business financed university R&D*	*5.0*	*5.1*	**7.0**	*7.1*	*6.7*	*6.8*	--	*101*	*-2*	*1*
	relative to EU	*78*	*78*	**107**	*105*	*101*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*34.2*		*18.0*			*71*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*9.6*		*8.0*			*70*	--	--
3.3	*Innovation expenditures*			*1.56*		*0.79*			*53*	--	--
3.4	*Early-stage venture capital*	*0.047*	*0.074*	*0.096*	*0.068*	*0.044*	*0.027*	--	*106*	*-42*	*-28*
	relative to EU	--	*253*	*170*	*113*	*119*	*106*	--			
3.5	*ICT expenditures*	--	--	*7.6*	*7.2*	*7.8*	*7.4*	*7.5*	*119*	*0*	*7*
	relative to EU	--	--	*117*	*114*	*118*	*116*	*119*			
3.6	*SMEs using non-technological change*			*38.0*					*90*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.33*	*3.59*	**4.13**	*4.16*	*3.72*	--	--	*115*	*-5*	*0*
	relative to EU	--	--	*134*	*126*	*115*	--	--			
4.2	*Exports of high technology products*	*19.7*	*21.9*	*22.8*	*22.3*	*18.7*	*18.8*	--	*106*	*-8*	*-6*
	relative to EU	--	*111*	*111*	*109*	*103*	*106*	--			
4.3	*Sales new-to-market products*			*3.1*		*3.8*			*84*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*12.8*		*2.5*			*37*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*4.86*	*4.66*	**4.45**	*4.29*	*4.06*	--	--	*59*	*-4*	*-3*
	relative to EU	--	--	*64*	*62*	*59*	--	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*178.3*	*197.3*	*228.8*	*255.4*	*278.9*	--	--	*209*	*18*	*5*
	relative to EU	*163*	*167*	*171*	*180*	*209*	--	--			
5.2	*New USPTO patents*	*80.1*	*80.3*	*80.0*	*83.1*	*86.6*	--	--	*121*	*4*	*6*
	relative to EU	*131*	*127*	*120*	*116*	*121*	--	--			
5.3	*New Triad patents*	*52.8*	*52.7*	*53.8*	--	--	--	--	*241*	*1*	*1*
	relative to EU	*230*	*237*	*241*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*65.7*	*135.7*	*127.8*	*147*	*39*	*16*
	relative to EU	--	--	--	--	*101*	*160*	*147*			
5.5	*New community designs*	--	--	--	--	--	*97.5*	*125.9*	*150*	--	--
	relative to EU	--	--	--	--	--	*143*	*150*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.19 POLAND

1. Introduction

Poland ranks 27th out of 33 countries on the SII and 21st out of the 25 EU member states. Poland exceeds the EU average for four indicators: the youth education attainment level, total innovation expenditures, ICT expenditures and new-to-firm product sales. All are indicators for future success on adopting new technology. By category, Poland's best performance is for innovation and entrepreneurship and for innovation drivers. The supply of new S&E graduates has been growing consistently since 1998 and the trend is above the EU average. The share of the population with a tertiary education is currently 71% of the EU average but the trend is also favourable. Conditions for knowledge creation, in contrast, are worsening, particularly due to a decline in business R&D, from 0.28% of GDP in 1998 to 0.16% in 2003, although this marks a recovery from a low of 0.13% in 2002. This is feature shared by most new member states.

However, very important challenges remain, since funding is limited and SME innovation is low. The National Reform Programme identifies barriers to entrepreneurship as the most important challenge for increasing competitiveness and has already adopted part of the necessary regulatory reforms. Important steps remain however. In addition, the government has as an objective to increase the expenditure on R&D significantly and to create such institutional mechanisms which would encourage enterprises to spend more on research and innovation, and assist the transfer of technologies to companies. As a parallel measure, regulatory actions will be undertaken with the view to increase the supply of applicable solution from science.

2. Major challenges and policies

The national innovation system of Poland needs to be systematically built up in a medium term horizon. Specific challenges at the moment refer to:

Finance (loans)

As analysed in the Reform Programme the existing system of funds is too weak and incomplete. Absent are venture capital funds investing in small projects. Apart from the Polish Agency for Enterprise Development and the National Economy Bank, already performing the tasks in that area, a National Capital Fund is being developed, which is 'a fund of venture capital funds'. The notification of regulations on granting state aid as regards the operation of the system of funds is expected to speed up future policies.

As yet four instruments were the most widely used:

Technological loans for realisation of innovative investments with the main aim to assist enterprises in increasing their competitive position and effectiveness on the market. Companies will be able to obtain loans for realisation of innovative investments in technology. Technology credits can be of a maximum value of €2 M.

Support to product and technological competitiveness of enterprises, which is aimed at the improvement of enterprises' competitiveness through assistance to initial investments leading to major changes in production, product or production processes, and greater internationalisation of enterprises through promotion It is being implemented through support for enterprises making new investments and support in the field of internationalisation of entrepreneurs' activity.

Improvement of accessibility of external financing of enterprises' investments, which is aimed at facilitating entrepreneurs' access to external sources of investment financing. It is implemented through sub-measures: contribution of capital to micro-loan funds, contribution of capital to guarantee funds and support to seed capital funds.

Financing for growth (Sectoral Programme for SMEs Development and Innovation Fund for Counselling): under this measure, entrepreneurs can receive consulting services in the following areas: emission and introduction of shares/bonds, obtaining financing from venture capital funds, finding strategic investor and other relating services to financing (e.g. bank credits, loans, etc.) (PL 19).

Industry – science co-operation

Inustry and science co-operation has a limited history and as demonstrated by both the "enterprise receiving public funding" and the "innovative SMEs co-operating with others" EIS indicators, the country lags seriously behind the EU average, with 9% and 71% respectively. Strengthening co-operation between the R&D sphere and the economy (PL 27) is a broad measure providing i.a. for the support of joint research projects in co-operation between the science and business sector. The targeted research projects are partly financed by the government to the maximum level of 50%-70% of applied sciences and development projects costs.

The National Reform Plan envisages the development of the innovation market and of the institutional environment facilitating, the co-operation between R&D area and the economy and identifies the need for supporting public-private financing for the develop-

ment of a private market of R&D services; it also envisages supporting the development of science-and-technology parks, clusters and investment parks in an effort to stimulate co-operation. However, there are no specific efforts to promote co-operation.

Clustering

Despite the increased attention clustering has received in most European countries in Poland, it is only broadly mentioned as a future strategy and so far no specific measures or strategies are yet developed. Several analyses on the suitable instruments has been made and there is cluster mapping process is in progress It may be an important aspect for the regional innovation strategies that are expected to be formed as a response to the Reform Programme.

3. Policy learning

3.1 Governance

The lack of systematic co-ordination between three ministries dealing with innovation matters continues to be one of the main challenges for the effective design and implementation of policy in Poland. There has been insufficient political support for a high-level Innovation Council, which would be a co-ordinating mechanism. Additional challenges constitute the need to speed up the reform pace in the R&D sector and the limited influence of intermediary organisation. In addition, the main threats for the NIS include a possible persistence of the present structure to achieve policy co-ordination and insufficient co-operation between the national and the regional levels.

The establishment of co-ordination mechanism between ministries, the co-ordination at various levels of governance and the inclusion of the main stakeholders in a consultation process remain the most serious challenges. As a first step, the Polish government decided in 2005 to prepare a Strategy for increasing the innovativeness of the economy (2007-2013) which could provide solutions to enhance co-ordination of the innovation policy.

As far as the governance tools are concerned, it is important that the national authorities conceive a plan and make more systematic utilisation of benchmarking and evaluation practices.

3.2 Recent policy trends

One of the major changes in this period was the adoption of the new Act on Science Financing. The new Act introduced important modifications into the system of science financing, as the Committee of Scientific Research (KBN) was abolished and transformed into the Science Council. As a result, the role of the Minister of Science and Information Technology increased significantly.

The preparation of the Structural Funds programming period 2007-2013 activated a large number of stakeholders and raised a great deal of interest among them, as this will be the main instrument for the implementation of the Lisbon objectives. As regards the use of different types of instruments, Poland plans to establish a wide range of policy instruments that affect R&D and innovation - from direct measures to indirect measures such as tax allowances.

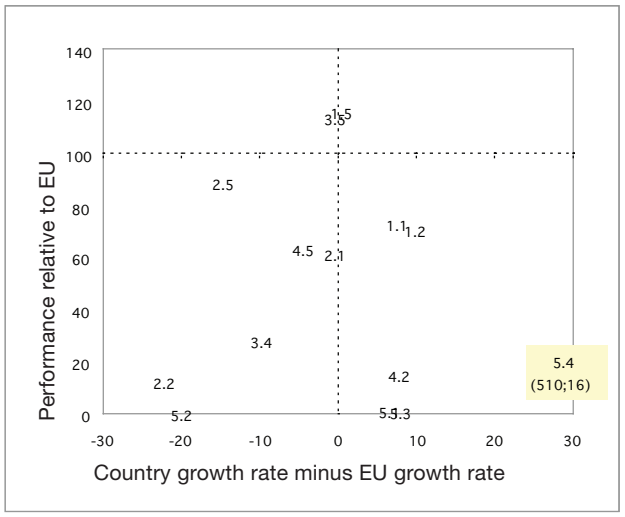
4. Possible orientation for future actions

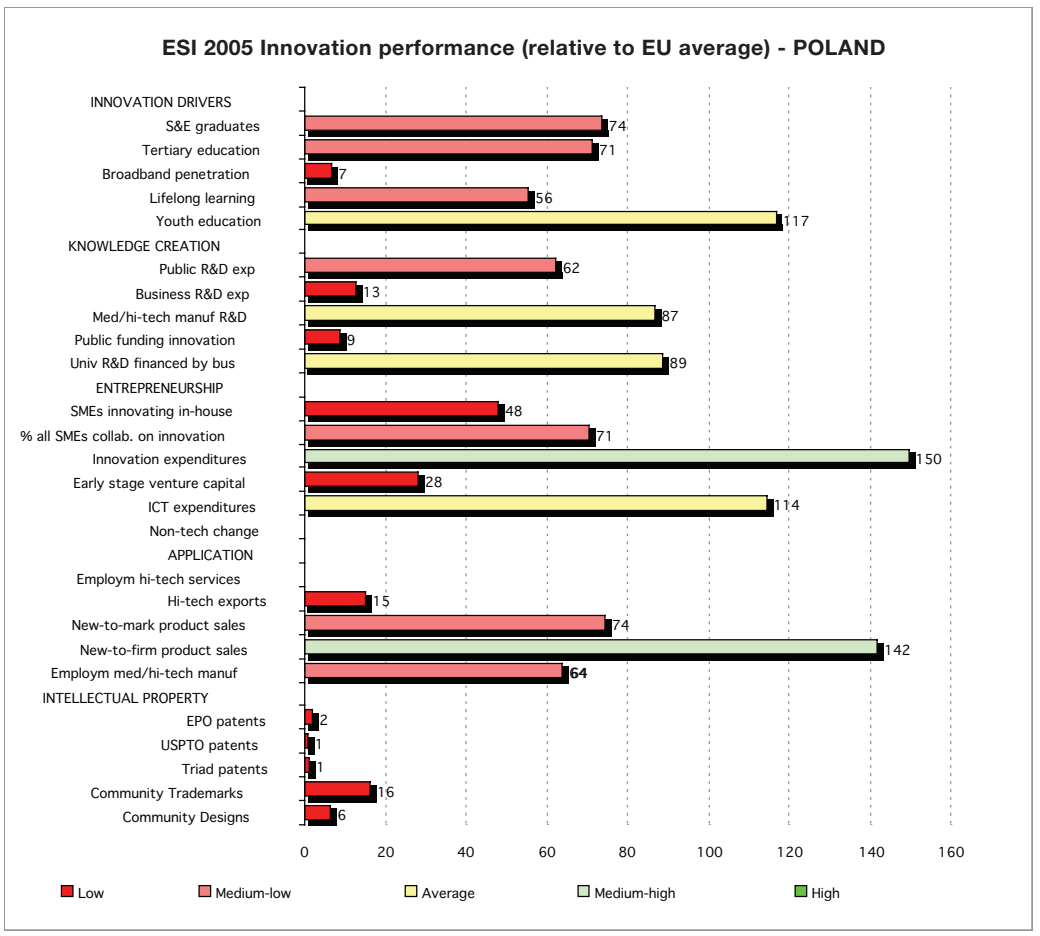
The Polish innovation policy demonstrates its first signs of intensification and modernisation. It has set some ambitious targets, along the lines of the Lisbon and Barcelona targets, in the framework of the National Development Plan 2004-2006, which seem impossible to meet. In addition, the restructuring of the State Research Institutes (JBR) is slower than anticipated. The overall progress of reform of the R&D sector is also rather slow due to long administrative procedures.

A more thorough review of the governance system, with hard political decisions and the exploitation of the Regional Innovation Strategies that have already started may prove valuable tools in this direction. The adoption of an evaluation and benchmarking culture are also relevant for improving policy effectiveness.

Most measures in favour of innovation are new (mainly financed via the EU Structural Funds) and visible progress in improving the innovation performance cannot be expected in the immediate future. What seems to be urgent is the adoption of measures supporting cluster activities and university-industry co-operation rather than putting all the emphasis on funding and the research infrastructure. In terms of national strategy, the challenge is to overcome the fragmentation of the direct support schemes, effectively implement a system of tax incentives for R&D and innovation and ensure that support measures complement each other.

POLAND - EIS 2005 results





Indicator quality concerns:

None known, although the shares of new-to-firm but not-new-to-market products and the share of innovation expenditures seem to be too high.

	POLAND					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.23*	*0.23*	*0.23*		*0.3*	*0.0*
	relative to EU	--	--	--	--	*54*	*53*	*54*			
	rank	--	--	--	--	*27*	*27*	*27*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*4.9*	*5.7*	*6.6*	*7.6*	*8.3*	*9.0*	--	*74*	*16*	*9*
	relative to EU	--	*61*	*65*	*69*	*73*	*74*	--			
1.2	*Population with tertiary education*	*10.7*	*11.3*	*11.4*	*11.8*	*12.5*	*14.1*	*15.6*	*71*	*14*	*4*
	relative to EU	--	--	*57*	*59*	*61*	*66*	*71*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*0.5*	*7*	--	*50*
	relative to EU	--	--	--	--	--	--	*7*			
1.4	*Participation in life-long learning*	--	--	--	*4.8*	*4.3*	*5.0*	**5.5**	*56*	--	--
	relative to EU	--	--	--	*61*	*54*	**54**	**56**			
1.5	*Youth education attainment level*	*84.5*	*81.6*	*87.8*	*88.6*	*88.1*	*88.8*	*89.5*	*117*	*1*	*0*
	relative to EU	--	*109*	*115*	*116*	*115*	*116*	*117*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.40*	*0.41*	*0.42*	*0.41*	*0.46*	*0.43*	--	*62*	*2*	*2*
	relative to EU	*61*	*63*	*64*	*61*	*68*	*62*	--			
2.2	*Business R&D expenditures*	*0.28*	*0.29*	*0.24*	*0.23*	*0.13*	*0.16*	--	*13*	*-21*	*1*
	relative to EU	*24*	*24*	*20*	*18*	*10*	*13*	--			
2.3	*Share of med-high/high-tech R&D*	*80.4*	*82.3*	*79.0*	*77.4*	--	--	--	*87*	*-2*	--
	relative to EU	*90*	*92*	*89*	*87*	--	--	--			
2.4	*Enterprises receiving public funding*			*0.7*					*9*	--	--
2.5	*Business financed university R&D*	*9.7*	*9.8*	*7.9*	*6.3*	*5.8*	*6.0*	--	*89*	*-13*	*1*
	relative to EU	*152*	*150*	*120*	*94*	*89*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*12.5*		--			*48*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*4.5*		*8.2*			*71*	--	--
3.3	*Innovation expenditures*			*1.84*		*2.25*			*150*	--	--
3.4	*Early-stage venture capital*	--	*0.020*	*0.017*	*0.018*	*0.009*	*0.007*	--	*28*	*-38*	*-28*
	relative to EU	--	*67*	*30*	*29*	*23*	*28*	--			
3.5	*ICT expenditures*	--	--	*6.7*	*5.9*	--	--	*7.2*	*114*	*7*	*7*
	relative to EU	--	--	*103*	*94*	--	--	*114*			
3.6	*SMEs using non-technological change*			--					--	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	--	--	--	--	--	--	--	--	--	*0*
	relative to EU	--	--	--	--	--	--	--			
4.2	*Exports of high technology products*	--	*2.3*	*2.8*	*2.7*	*2.4*	*2.7*	--	*15*	*2*	*-6*
	relative to EU	--	*12*	*14*	*13*	*13*	*15*	--			
4.3	*Sales new-to-market products*			--		*3.4*			*74*	--	--
4.4	*Sales new-to-firm not new-to-market products*			--		*9.6*			*142*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*5.22*	*5.07*	*4.73*	*4.56*	*4.35*	--	--	*64*	*-7*	*-3*
	relative to EU	--	--	*68*	*65*	*64*	--	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*2.0*	*1.5*	*3.1*	*3.2*	*2.7*	--	--	*2*	*12*	*5*
	relative to EU	*2*	*1*	*2*	*2*	*2*	--	--			
5.2	*New USPTO patents*	*0.6*	*0.7*	*0.5*	*0.6*	*0.4*	--	--	*1*	*-14*	*6*
	relative to EU	*1*	*1*	*1*	*1*	*1*	--	--			
5.3	*New Triad patents*	*0.2*	*0.2*	*0.3*	--	--	--	--	*1*	*10*	*1*
	relative to EU	*1*	*1*	*1*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*0.4*	*4.7*	*14.3*	*16*	*525*	*16*
	relative to EU	--	--	--	--	*1*	*5*	*16*			
5.5	*New community designs*	--	--	--	--	--	*0.8*	*5.2*	*6*	--	--
	relative to EU	--	--	--	--	--	*1*	*6*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.20 PORTUGAL

1. Introduction

Portugal's overall innovation performance, based on the SII, is below the average for both the EU-25 and EU-15, ranking in 23rd place out of 33 countries and in 18th place out of 25 EU member states. Based on its innovation performance, its peer countries include Estonia, Greece, Latvia and Poland. Portugal's performance is generally below average on all categories with the exception of innovation & entrepreneurship, where it ranks 7th out of 23 countries, due to above average results for five of the six indicators in this category. Portugal's worst performance is in innovation drivers, due to well-below average performance on the four education indicators, although the trends for all of them are consistently positive.

With three exceptions, Portugal's trend performance is above the EU average and positions it clearly in a "catching up" trend. Of greatest concern is the decline in public R&D expenditures. In contrast to a fall in venture capital in almost all EU countries, the supply of venture capital in Portugal increased in absolute terms between the late 1990s and 2003.

The Portuguese government considers innovation as one of the constituent elements of its Reform Programme In this context the guidelines derive from three major challenges: increase the number of researchers, give a new impulse to innovation, supporting market success of innovative products and services, raising technological based foreign investment as means of technology dissemination and promote an effective use of ICTs and an inclusive information society.

2. Major challenges and policies

Judged by the EIS indicators and the governance system, three major challenges need to be addressed:

- Population with tertiary education, and life-long learning

Portugal is performing weakly in the human capital indicators. In particular in the case of "population with tertiary education" and in "life-long learning" urgent action is needed. In the former it demonstrates only 57% of the EU average, which leads it to the 28th position, while in the latter it scores 48% of the EU average ranking 25th.

In the tertiary sector, the overall trend demonstrates a gradual, even if slow, catching up tendency. In policy terms in the tertiary level most efforts were concentrated in the implementation of Bologna orientations.

Life-long learning is more of a persistent problem. In spite of the efforts undertaken so far, including the definition of a national strategy, the Social Concertation Council Agreement on Employment, Labour Market, Education and Training (signed in 2001) and the creation of a General Directorate on Vocational Training, the situation with regard to life-long learning did not improve. On the contrary, Portugal's performance slipped from 41% of the EU-15 average in 1999, to 38% in 2003. To make up for the persistent weakness, enhancing the level of skills of the Portuguese population, including the encouragement of life-long learning is one of the four priority axes of the new Technology Plan of the country and it is included in the Guidelines (17-24) of the Reform Programme responding to the Lisbon strategy.

- BERD and the creation of innovative capabilities in firms

BERD is Portugal is only 21% of the EU average and the country ranks 24th among the countries studied. After a catching up tendency in the late '90s, it is now slightly falling behind again. However, one should stress that generous support measures were offered in the past to mobilise the private sector:

IDEIA Applied Research and Development in Companies aimed at supporting cooperative R&D projects involving companies and S&T organisations.

The Credit Enhancement Securitization Fund (FGTC), operating in the context of the so-called Financial Innovation Actions of POE (PT 24 and PT 25), is a fund for providing guarantees in connection with operations concerning the transaction of securitised credits on SMEs debt (PT 32).

The Company Modernisation Incentive System (SIME) supports modern and competitive company strategies, and stimulates strategic competitiveness factors, namely in the areas of internationalisation, innovation, quality, environment, energy and upgrading of human resources skills (PT 16).

The Small Company Initiatives System (SIPIE) is aimed at promoting small company initiatives, supporting investments aimed at launching or developing micro or small enterprises, by strengthening its technological capabilities and modernising their productive, marketing and organisational structures (PT 15).

Evaluations considered that the approach followed was too much led by demand, providing insufficient attention to innovation and intangible factors. There-

fore, it was not effective enough in promoting a gradual upgrading of companies in-house technological capabilities. This criticism is particularly relevant for SIME, since it was not able to mobilise companies towards more innovative behaviours and projects. It would be expected, however, that the more recently launched NITEC (PT 36) and SIME Inovação (PT 40) may be more effective in inducing companies to espouse more innovative approaches and to increase their commitment to R&D activities. Evidence so far, however, is not very positive.

- Innovation governance (in particular the lack of flexibility and the need to reduce bureaucratic and "audit type" controls)

The Portuguese innovation governance system has been characterised by a 'divide' between science policy, on the one hand, and industrial and enterprise policies on the other. Such a 'divide' has been translated into separate operational programmes for each area indicated above. In addition, there is a weak co-ordination and an insufficient perception of the systemic nature of innovation. These three elements together call for urgent action to assure the reorganisation of innovation policy with modern tools, the active involvement of stakeholders and most importantly effective and responsible co-ordination.

3. Policy learning

3.1 Governance

In recent years, there is an increased awareness of the relevance of innovation, the experience of public organisations in designing operational programmes and the international knowledge and relationships of a host of policy makers. But the improvement of the system faces serious threats, associated with the difficulties in promoting a 'vision' of the future and mobilising the actors around that 'vision', as well as an insufficient consistency and a political zigzagging. Budgetary constraints and the power of vested interest act as additional barriers to change.

A new opportunity for a 'fresh start' and a systemic approach to innovation governance may emerge now: synergies are expected from the new political commitment to technology and innovation (expressed in the Technological Plan), the new round for EU funds for 2007-2013 and the re-launch of the Lisbon Strategy. The former is reflected in the launch of a new programme (POCI 2010 and POS_C), as a result of the mid term review of the Third CSF OPs. These new programmes will provide the main frame for science and information society policies up to the end of 2006. Besides, an increasing emphasis on modern governance tools can be perceived.

But as yet important governance challenges remain because of the absence of a formal innovation policy with a systemic focus, the lack of innovation policy co-ordination, following a long historical tradition, inconsistencies between enterprise and science policies, under-resources key organisations, insufficient involvement and pressure from key stakeholders for strengthening innovation and last but not least low governance capabilities at regional level, due to administrative centralisation. Despite progress a lot more pre-emptive policy making and persistence are needed.

3.2 Recent policy trends

The changes resulting from the mid term review have resulted in the launch of three new measures, all in the context of POS_C, addressing information and communication technologies (ICT):

- *Centres of Excellence (PT 49), on the development of competence centres and clustering in the ICT field;*
- *OTICs (PT 50), on the creation of technology and knowledge transfer offices in Universities and Polytechnic Institutes; and*
- *the NEOTEC Initiative (PT 51), on the promotion of NTBF creation.*

Another measure, in the context of PRIME to support the involvement of SMEs in the digital economy, is about to be launched.

There is also the Technological Plan, which will provide the framework for new innovation measures in the near future. The first measure to be launched is INOV_JOVEM (PT 53), a brand new programme, which was used as an electoral 'flag' by the new Prime Minister. It is aimed at placing 1000 young graduates in SMEs in management, engineering, science and technology positions and in other key areas for innovation and company development. This is expected to contribute to better in-house capabilities for SMEs and, therefore, to more innovative performance and competitiveness.

4. Possible orientation for future actions

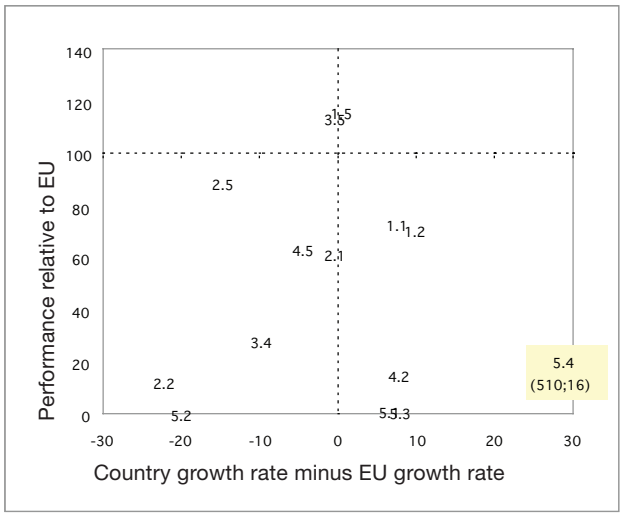
Portugal's innovation objectives have been expressed in many documents during the last five years. Although there is a convergence about the need to foster innovation, its translation into specific objectives has changed too often.

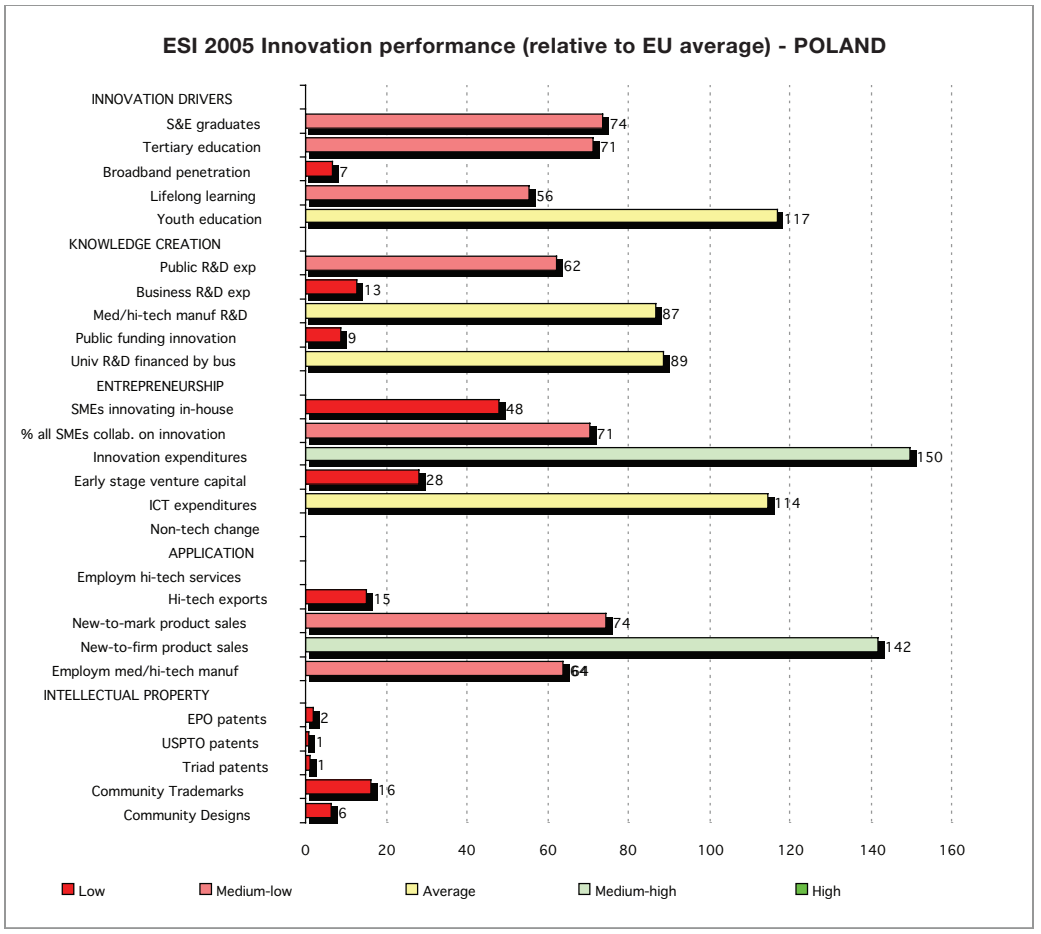
An overall assessment of the progress undertaken since the launch of the Lisbon Strategy indicates that Portugal is catching up. This is evident, for instance, in the share of science and engineering graduates or in patenting. The general picture, however, is bleak. Improvement has been limited, and in some areas Portugal has lost ground.

The main innovation challenges identified in the past, from the lack of co-ordination to human resources and BERD weaknesses, were not addressed in spite of a few initiatives in that regard. It is interesting to note that POE/PRIME and POCTI evaluation exercises, although mentioning some achievements, recognised that performance falls short expectations. In particular in the case of POE/PRIME, the main conclusion in the innovation field was that the impact and performance of the Programme were generally lower than its potential 'promises'.

In recent years the main challenges were identified, and several measures were launched to respond to them. It must be recognised that the impact of some measures was positive and has contributed to the identified catching up effect. Some of them contribute to the medium or long-term sustainability and competitiveness. However, an overall perspective of policy actions suggests that there are too many disparate measures and policy co-ordination and consistency have still ample room for improvement.

PORTUGAL - EIS 2005 results





Indicator quality concerns:

The indicators for the share of sales from innovative products (4.3 and 4.4) are probably measuring innovation diffusion rather than creative innovation (as in Finland) or product differentiation and engineering improvements (as in Italy). This is expected at this stage in Portugal's economic development. Innovation expenditures (3.3) are comparatively high in Portugal compared to very low levels of business R&D and below average rates of capital investment. CIS Light results for Portugal have not been used as the Portuguese results also include enterprises with 5-9 employees. The relative to EU data are thus based on CIS 3 data.

	PORTUGAL					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.27*	*0.27*	*0.28*		*1.9*	*0.0*
	relative to EU	--	--	--	--	*63*	*64*	*66*			
	rank	--	--	--	--	*23*	*23*	*23*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*5.2*	*6.1*	*6.3*	*6.6*	*7.4*	*8.2*	--	*67*	*14*	*9*
	relative to EU	--	*65*	*62*	*60*	*65*	*67*	--			
1.2	*Population with tertiary education*	*8.3*	*8.7*	*8.8*	*9.2*	*9.4*	*11.0*	*12.5*	*57*	*17*	*4*
	relative to EU	--	--	*44*	*46*	*46*	*51*	*57*			
1.3	*Broadband penetration rate*	--	--	--	--	*1.5*	*3.6*	*6.4*	*84*	*58*	*50*
	relative to EU	--	--	--	--	--	--	*84*			
1.4	*Participation in life-long learning*	*3.1*	*3.4*	*3.4*	*3.4*	*2.9*	*3.7*	**4.8**	*48*	--	--
	relative to EU	--	--	*43*	*43*	*36*	**40**	**48**			
1.5	*Youth education attainment level*	*39.3*	*40.1*	*42.8*	*43.5*	*44.2*	*47.7*	*49.0*	*64*	*6*	*0*
	relative to EU	--	*54*	*56*	*57*	*58*	*62*	*64*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	--	*0.56*	--	*0.58*	*0.54*	*0.52*	--	*75*	*-4*	*2*
	relative to EU	--	*86*	--	*87*	*79*	*75*	--			
2.2	*Business R&D expenditures*	--	*0.16*	--	*0.27*	*0.26*	*0.26*	--	*21*	*10*	*1*
	relative to EU	--	*13*	--	*22*	*21*	*21*	--			
2.3	*Share of med-high/high-tech R&D*	--	*72.8*	*80.4*	*68.2*	--	--	--	*76*	--	--
	relative to EU	--	*82*	*90*	*76*	--	--	--			
2.4	*Enterprises receiving public funding*			*13.7*					*165*	--	--
2.5	*Business financed university R&D*	*1.5*	*1.2*	*1.0*	*0.8*	*1.2*	*1.5*	--	*18*	*23*	*1*
	relative to EU	*23*	*19*	*15*	*12*	*18*	--	--			
	INPUT - Innovation & entrepre-										
3.1	*SMEs innovating in-house*			*36.2*		*25.0*			*139*	--	--
3.2	*Innovative SMEs co-operating with others*			*7.0*		*14.2*			*76*	--	--
3.3	*Innovation expenditures*			*2.62*		*0.78*			*144*	--	--
3.4	*Early-stage venture capital*	*0.013*	*0.011*	*0.018*	*0.020*	*0.011*	*0.026*	--	*102*	*26*	*-28*
	relative to EU	--	*36*	*31*	*33*	*28*	*102*	--			
3.5	*ICT expenditures*	--	--	*6.6*	*6.7*	*7.2*	*7.1*	*7.1*	*113*	*2*	*7*
	relative to EU	--	--	*102*	*106*	*109*	*111*	*113*			
3.6	*SMEs using non-technological change*			*51.0*					*120*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*1.38*	*1.21*	*1.18*	*1.43*	*1.47*	*1.45*	--	*45*	*7*	*0*
	relative to EU	--	--	*38*	*43*	*45*	*45*	--			
4.2	*Exports of high technology products*	*4.0*	*4.3*	*5.5*	*6.8*	*6.2*	*7.4*	--	*42*	*16*	*-6*
	relative to EU	--	*22*	*27*	*33*	*34*	*42*	--			
4.3	*Sales new-to-market products*			*10.8*		*1.7*			*180*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*15.1*		*1.1*			*125*	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*3.56*	*3.57*	*3.61*	*3.55*	*3.28*	*3.17*	--	*48*	*-6*	*-3*
	relative to EU	--	--	*52*	*51*	*48*	*48*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*2.4*	*4.7*	*4.0*	*6.5*	*4.3*	--	--	*3*	*8*	*5*
	relative to EU	*2*	*4*	*3*	*5*	*3*	--	--			
5.2	*New USPTO patents*	*0.9*	*0.7*	*1.2*	*1.2*	*1.3*	--	--	*2*	*19*	*6*
	relative to EU	*1*	*1*	*2*	*2*	*2*	--	--			
5.3	*New Triad patents*	*0.8*	*0.5*	*0.8*	--	--	--	--	*4*	*20*	*1*
	relative to EU	*3*	*2*	*4*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*36.7*	*49.8*	*47.8*	*55*	*14*	*16*
	relative to EU	--	--	--	--	*56*	*59*	*55*			
5.5	*New community designs*	--	--	--	--	--	*16.1*	*26.3*	*31*	--	--
	relative to EU	--	--	--	--	--	*24*	*31*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.21 SLOVENIA

1. Introduction

Slovenia has been relatively successful from an economic point of view with a GDP per capita measured in PPS which reached around 80% of the EU25 level in 2004. In spite of relatively high rate of growth of GDP, 4.6 % in 2004 which is the highest rate in the last five years, critics point to slow restructuring of manufacturing in direction of higher technology intensity. In the EIS 2005, Slovenia ranks 14th out of the 25 EU Member States and 19th out of 33 countries. Slovenia is the second-best performer among the 10 new member states, after Estonia, partly because its performance is relatively well-balanced, with no major discrepancies on the different innovation categories, with the exception of IPR. This partly explains why Slovenia's pattern of strengths and weaknesses is similar to that of two more innovative countries (Belgium and France), providing opportunities for policy learning. With improvements in several crucial areas and a good foundation in drivers and knowledge creation, Slovenia should be capable of rapid improvements in the future.

Slovenia's best performance is for innovation drivers and on knowledge creation. The former is due to extensive retraining through life-long learning and above average results for youth education. Broadband penetration rates, while only 50% of the EU average, are also much higher than in many new member states. Both current and trend performance on IPR are above the average for the new member states and are less variable than in several of its peer countries. In terms of knowledge creation, although business sector R&D investment stood at only 71% of the EU25 level, BERD accounted for more than 60% of total R&D expenditure. On the other hand, public R&D investments have declined slightly, but remain only 9% below the EU average. The relatively good performance in terms of BERD, for a new member state, means that Slovenia has a higher percentage of firms that are creative innovators (strategic and intermittent innovators) than firms that primarily innovate via diffusion (modifiers and adopters).

2. Major challenges and policies

There are three main challenges for building a more highly performing national innovation system based on creative innovation. These are:

Availability of sufficient S&E graduates weakens otherwise good performance on innovation drivers

The supply of S&E students fell between 2002 and 2003 (71% of the EU average), although it is still slightly above the levels of the previous years. The supply needs to increase substantially. The share of the population with a tertiary education has been increasing steadily and at a rate above the EU average. This challenge can only be met by long-term comprehensive measures to attract student to this field. The main current measure is SI1 Young (junior) Researchers Programme which provides financial help for junior researchers who work in research team at universities, non-university research organisation or in industry with the aim to complete an MSc or PhD. Around 1200 junior researchers are supported annually, with approximately 200-250 completing the programme every year. However, awareness of the programme in the business sector remains limited and more could be done to boost the number of young people entering technical sciences and engineering of relevance to the business sector.

Positive trends in business investment in innovation need to be reinforced by increasing public support for innovation

Despite a positive trend, rates of business R&D expenditure remain well below the EU25 average and this is reflected in low rates of reported sales in new-to-market or new-to-firm products. The rate of SMEs innovating in house is only roughly 60% of the EU25 average and there is no evidence of a significant upward trend. Public support for innovation in enterprises stands at about half the EU25 level although various measures have been set up in to promote innovation and R&D in business sector. The main measures include: subsidised credit to SMEs (SI 19), Technology Networks (SI 16) and the Innovation infrastructure (SI 18), Investment in Industrial R&D units (SI 5), research for SMEs and research in SMEs (SI 2). However, due to the revision of the budget for 2005 by the new government, no firm allocation of funds to innovation policy programmes has been made.

Potential for diffusion of technology and raising productivity in business weakened by lower levels of broadband penetration and declining rates of investment in ICT

Slovenia displays some weaknesses in the area of innovation diffusion explained possibly by bottlenecks like below average, and declining, levels of ICT investment and notably below average levels of total innovation expenditures (61% of EU average). An example where adequate policy responses are missing is the negative trend in ICT investment. Indeed, the new government could even be considered to have downgraded this as a priority by closing the Minis-

try of Information Society and dividing its closed its tasks among three other ministries. This happened not only in spite of the negative trend in ICT investment, but also contrary to several business-led initiatives claiming that Slovenia needed a more decisive strategy in the area of ICT promotion.

3. Policy learning

3.1 Governance

Slovenia still seems to be looking for the best institutional set up in the area of R&D, innovation and technology development. The institutional framework of innovation policy has gone through several changes since independence, reflecting in part the search for the most efficient division of tasks between different ministries and in part the influence of the science and business communities. Each of the past two elections brought forward new ideas on how to best organize the government to be more supportive to science, technology and innovation.

After the 2004 elections, the Ministry for Science and technology was re-established. The new Ministry for Higher education, Science and Technology 'recuperated' from the Ministry of Economy most of the staff in the department for technology development and innovation as well as the activities this department was conducting. The Agency for Scientific Research has begun its operation, while the Technology Agency was formally established, but is not fully operational yet due to the procedural issues caused by the reorganisation of the government.

Slovenia has a complex innovation support system, with several bridging institutions to help promotion of innovation in business sector. This institutional set up is currently underexploited, partly due to the problems of irregular financial support and partly due to insufficient adjustment of the system to the local needs and capabilities. Moreover, a January 2004 Law on support environment to entrepreneurship, focused on the establishment of a regulatory and financial framework for innovation-related institutions (technology parks, technology centres, incubators, etc.) has not been implemented in practice due to the lack of progress on implementing regulations.

3.2 Recent policy trends

The draft Strategy for Development 2006-2013 stresses the importance of innovation and R&D for the economic and social development of the country. Subscribing to the Lisbon and Barcelona objectives, including the 3% R&D expenditure target, the strategy calls for a systematic reorientation of public funding from predominantly basic research to more targeted research, co-funded by the business sector. The first priority is closely linked to innovation policy: "effective creation, transfer and application of knowledge for economic development and employment". An Action Plan for 2005 – 2006 has been laid down for this priority. From the point of view of innovation policy, the most interesting aspect is the target of the "formation of a national innovation system and the implementation of the Slovenian regional innovation strategy (SLORITS)", which involves creating better linkages between the universities, research institutes, support institutions, government and the business sector. The target deadline is autumn 2006.

Following the recent institutional re-organisation, responsibility for a part of the three existing programmes supporting innovation and technology was moved to the Ministry of Higher Education, Science and Technology. Most of the support of the Ministry should go in the future to the so called "technology programmes". Another novelty is the proposed selectivity, where no more than 50-70 projects should receive annual support to assure that the available funds are not spread out too thinly. However, the implementation of these new measures is postponed to 2006 as the budget cuts and the delays in the policy planning prevented their development in 2005.

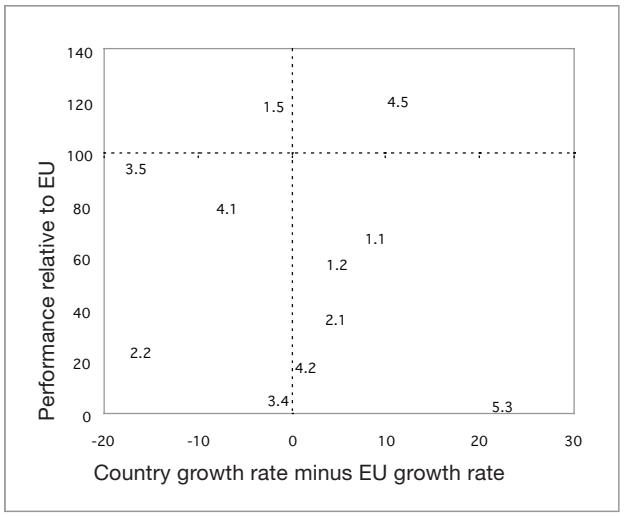
4. Possible orientation for future actions

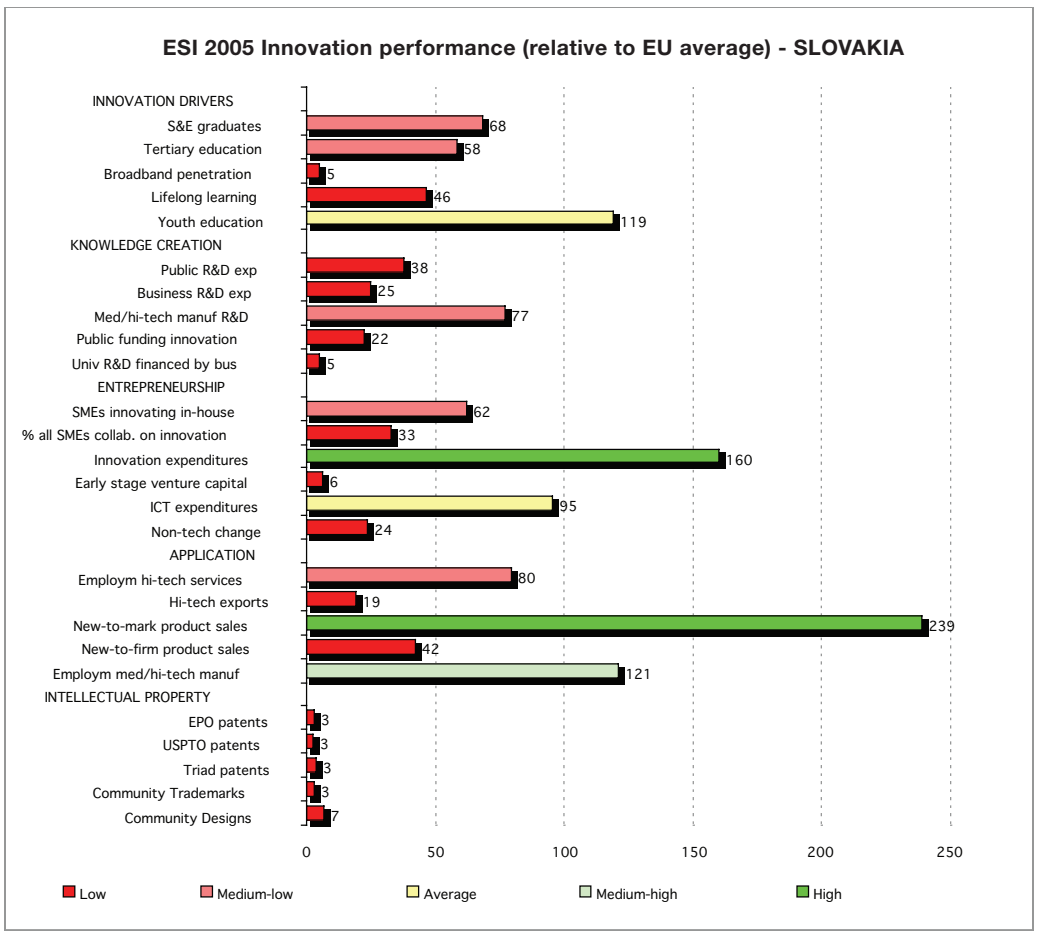
Even if Slovenia is in a good position in relative terms amongst the new Member States, there is a need to design and implement a more coherent and stable approach to innovation policy. If not addressed, this could seriously jeopardise the ability of Slovenia to benefit on the present opportunities for a more knowledge-intensive model of development. The weaknesses of Slovenian innovation policy in the last five years are exemplified in the setting of targets, design of measure and new institutions which are either not followed up on, are not (or under) funded, implemented with a significant delay or which change with each new government. A shift to a more mature policy and institutional environment with a longer-term vision would be a significant improvement.

Moreover, the deficiencies of the Slovenian innovation policy as pointed out by various international or national reports and analyses seem to remain rather stable in spite of the additional measures introduced by the government. Persistent criticism of the lack of cooperation between business sector and public R&D led to the development of several measures aimed at the promotion of such cooperation (SI 2; SI 3, SI 6, SI 11, and more recently SI 13 and SI 16). In spite of these measures, the general perception re-

mains that cooperation is insufficient, partly because several measures have been underfinanced and thus failed to make a real impact, and partly because the increased level of cooperation was only one of the objectives addressed by the measure. The abandon of the successful cluster programme is for instance a decision difficult to understand given positive evaluations.

SLOVENIA - EIS 2005 results





Indicator quality concerns:

None known.

	SLOVENIA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.30*	*0.30*	*0.32*		*3.2*	*0.0*
	relative to EU	--	--	--	--	*70*	*71*	*75*			
	rank	--	--	--	--	*20*	*20*	*19*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*8.0*	*8.4*	*8.9*	*8.2*	*9.5*	*8.7*	--	*71*	*1*	*9*
	relative to EU	--	*89*	*87*	*75*	*83*	*71*	--			
1.2	*Population with tertiary education*	*14.4*	*15.6*	*15.9*	*14.4*	*15.2*	*17.8*	*19.0*	*87*	*12*	*4*
	relative to EU	--	--	*79*	*72*	*75*	*83*	*87*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*3.8*	*50*	--	*50*
	relative to EU	--	--	--	--	--	--	*50*			
1.4	*Participation in life-long learning*	--	--	--	*7.6*	*9.1*	**15.1**	*17.9*	*181*	--	--
	relative to EU	--	--	--	*96*	*114*	**162**	*181*			
1.5	*Youth education attainment level*	*86.8*	*85.8*	*87.0*	*85.9*	*90.0*	*90.7*	*89.7*	*117*	*1*	*0*
	relative to EU	--	*115*	*114*	*113*	*118*	*118*	*117*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.67*	*0.64*	*0.63*	*0.66*	*0.62*	*0.63*	--	*91*	*-1*	*2*
	relative to EU	*102*	*98*	*95*	*99*	*91*	*91*	--			
2.2	*Business R&D expenditures*	*0.72*	*0.78*	*0.81*	*0.90*	*0.91*	*0.90*	--	*71*	*4*	*1*
	relative to EU	*62*	*64*	*66*	*72*	*73*	*71*	--			
2.3	*Share of med-high/high-tech R&D*	--	*81.6*	*81.6*	*84.4*	*85.0*	--	--	*95*	*2*	--
	relative to EU	--	*91*	*92*	*95*	*95*	--	--			
2.4	*Enterprises receiving public funding*			*4.1*					*50*	--	--
2.5	*Business financed university R&D*	*11.3*	*9.2*	*7.6*	*6.7*	*9.0*	*9.6*	--	*137*	*11*	*1*
	relative to EU	*177*	*140*	*116*	*100*	*137*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*16.3*		*14.9*			*59*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*7.6*		*8.8*			*76*	--	--
3.3	*Innovation expenditures*			*1.28*		*0.92*			*61*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	*7.3*	*5.4*	--	--	*5.2*	*83*	*-10*	*7*
	relative to EU	--	--	*112*	*86*	--	--	*83*			
3.6	*SMEs using non-technological change*			*50.8*					*120*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*2.04*	*2.18*	*2.52*	*2.71*	*2.34*	*2.67*	--	*84*	*4*	*0*
	relative to EU	--	--	*82*	*82*	*72*	*84*	--			
4.2	*Exports of high technology products*	--	*3.7*	*4.4*	*4.8*	*4.9*	*5.8*	--	*33*	*16*	*-6*
	relative to EU	--	*19*	*21*	*23*	*27*	*33*	--			
4.3	*Sales new-to-market products*			*5.3*		*3.5*			*76*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*4.9*		*3.4*			*50*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	*8.57*	*8.38*	*8.69*	*8.74*	*9.22*	*8.94*	--	*135*	*2*	*-3*
	relative to EU	--	--	*124*	*125*	*135*	*135*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*17.1*	*25.7*	*25.1*	*43.7*	*32.8*	--	--	*25*	*20*	*5*
	relative to EU	*16*	*22*	*19*	*31*	*25*	--	--			
5.2	*New USPTO patents*	*9.5*	*5.5*	*8.9*	*11.4*	*8.4*	--	--	*12*	*3*	*6*
	relative to EU	*16*	*9*	*13*	*16*	*12*	--	--			
5.3	*New Triad patents*	*5.8*	*2.4*	*4.0*	--	--	--	--	*18*	*10*	*1*
	relative to EU	*25*	*11*	*18*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*9.0*	*20.6*	*38.6*	*44*	*107*	*16*
	relative to EU	--	--	--	--	*14*	*24*	*44*			
5.5	*New community designs*	--	--	--	--	--	*5.5*	*24.6*	*29*	--	--
	relative to EU	--	--	--	--	--	*8*	*29*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.22 SLOVAKIA

1. Introduction

Slovakia is one of the New Member States since 2004 with a GDP per capita of 53.5% (2004). The Slovak economy has enjoyed economic boom since 2001 which can be explained by the strong commitment by the Slovak Government to social and economic reforms and a great influx of the foreign direct investment (FDI) during 2003 and 2004. The reforms were aimed at structural changes in economic and social system of the country and macroeconomic stabilisation and creation of favourable conditions for adoption of Euro by 2009. On the other hand, the contribution of the Slovak R&D and innovation system to economic growth has been fairly limited. This situation will not improve in the future if changes are not made to the system. Slovakia's accession to the EU resulted in a significant increase in innovation spending by the Slovak government and new innovation policy measures have been introduced. The Structural Funds provided between 35-75% of the funding and is several times higher than the support allocated to previous measures.

Slovakia ranks in 22nd place on the EIS summary innovation index for the EU countries. Within EU, it ranks next to last on knowledge creation and last for innovation and entrepreneurship. Slovakia's best performance is for domestic innovation. It performs slightly better on innovation drivers, due to an above average performance on youth education, and substantially better for applications. Further, it has above average performance on new-to-market sales of innovative products and employment in medium-high and high tech manufacturing. The positive trends include an increase in employment in medium-high and high tech manufacturing which is due to FDI in the automotive sector, the supply of S&E graduates, tertiary education, and a recovery in public expenditures on R&D, although in absolute terms public R&D is still very low at 0.24% of GDP.

In addition to very low scores on IPR indicators, Slovakia has exceptionally low share of university R&D financed by business, and venture capital. ICT expenditure has also fallen. Compared to its peers Slovakia does substantially better on the percentage of SMEs that collaborate on innovation. Neither Hungary nor the Czech Republic have good performance on tertiary education and lifelong learning, with the Czech Republic performing only slightly better than Slovakia on lifelong learning.

2. Major challenges and policies

The long term challenge is to develop more advanced capabilities within Slovakia and turn the continuing decline in business R&D. In 2005 the Slovak Government changed its strategic priorities and passed the Competitiveness Strategy (The Lisbon Strategy for Slovakia). For the first time in history of the Slovak Republic creation of knowledge-based economy was declared a major development target. The 2005 State budget allocated higher support to R&D sector and the government decided to reform the public R&D sector, as to increase its efficiency. Over the short and medium term, the main challenge for Slovakia is to develop its capabilities to innovate via diffusion. Following four main challenges have been identified as the most relevant for Slovakia's R&D and innovation system to be tackled so that it can contribute to economic growth in the future.

- Innovation via diffusion (in-house innovative capabilities)

BERD has been falling from 0.52% of GDP in 1998 to 0.31% in 2003 and at 80%, Slovakia has a very high share of firms that do not innovate. Of those that do, only 3% are strategic innovators based on R&D. Slightly over half of the innovative firms innovate through diffusion (technology adopters and modifiers). This only confirms the weak position of Sovak firms and strong role of MNCs in Slovak economy. New innovation policy measures have been introduced in Slovakia since September 2004 include:

- *SK 07 'Support to Innovative SMEs Scheme' (SISME) aims to increase availability of financial sources for innovative companies.*
- *SK 09 'Assistance to SMEs Scheme' (ASMES) aims to support existing and develop new production capacities (businesses) and assist job creation (including managerial posts) via investments in new technologies and systems.*
- *SK 10 'Business Incubators, Technology Parks and R&D Centres Scheme' (BITPRDC) aims at business incubators for start-ups and personal businesses, technology parks for various industries, R&D centres for applied research and feasibility studies.*

- Dual economy – in-put perfomance

Slovakia has been pursuing a policy of encouraging foreign investment that has not led to any detectable benefits so far in innovation capabilities within Slovakia, with most benefits through innovation diffusion. The challenge for Slovakia is how to turn the high level of FDI into R&D (not mentioned in the European Trend Chart of Innovation). Foreign-owned companies provided for significant part of total output and high-tech manufacturing exports. The MNCs, how-

ever, performed most of sophisticated activities (including R&D) in their headquarters. This challenge can only be met by a new comprehensive strategy. An example of successful policies in this area can be found in the neighbouring country Hungary where several MNCs have established research departments in the country.

- Improvements in tertiary education and life-long learning

To be able to develop its capabilities to innovate via diffusion, one area Slovakia needs to improve is in tertiary education and life-long learning, although there has been an increase in the supply of new S&E graduates. Structural reforms undertaken by the Slovak Government also include the education system reform aimed to improve quality of education and make the system more flexible and better adapted to modern economic needs. One measure was taken in 2005 when the Universities enjoyed increased support from the State Budget.

The National Development Plan includes a sectoral operational programme for Human Resources, the The Sectoral Operational Programme Human Resources (SOPHR). The objectives are expressed in "the National Program of Training and Education (Millennium)" for the coming 15 to 20 years and "the Concept of Lifelong Learning in the Slovak Republic". Measure 3.1 'Adaptation of vocational training and education to the needs of the knowledge-based society' is focused on purposefully linking the system of professional training and education, including tertiary education, with the needs of the labour market and Measure 3.2 'Development, improvement, and more extensive provision of further education with the aim of improving the qualification and adaptability of people in employment' is aimed at life-long learning.

3. Policy learning

3.1 Governance

Slovakia performs second to last on innovation governance. By 2005 Slovakia had no National Innovation Plan and/or central body for innovation policy design, implementation and management. Most innovation policies overlapped with the S&T policies, which were designed and implemented by the Ministry of Education. This Ministry, however, lacked financial and human resources for managing industry research, and was not able to elaborate policies for commercialisation of the R&D. Weak support to applied research was reflected in extremely low commercial outputs of the R&D results. The Ministry of Economy and NADSME, on the other hand, were able to design and implement a number of particular industry-oriented innovation policy measures. These bodies, however, have not considered development of innovations priority. Instead of a coherent innovation policy framework, a bundle of ad hoc innovation policy measures were created (strongly backed by the EU finance). Modest support to innovation activities compared to very generous assistance to major foreign low- and medium-tech investors. This trend in the R&D spending did not allow for creation of a knowledge-based economy and problem could hardly be solved via partial improvements in selected R&D sectors. Substantial increases in R&D spending and structural changes in allocation of public resources (towards applied research and new technologies) were the basic preconditions for establishing a knowledge-based economy

3.2 Recent policy trends

On 16th February 2005 the Slovak government passed the 'Strategy of Competitiveness Development in Slovakia up to 2010 (The Lisbon Strategy for Slovakia), which marked a change in its strategic priorities. For the first time in history of the Slovak Republic creation of knowledge-based economy was declared a major development target. The 2005 State budget allocated higher support to R&D sector and the government decided to reform the public R&D sector, as to increase its efficiency. Till 2005 selected innovation policy topics were handled by the Slovak Government Council for Science and Technology (SGCST). The current structure of the Council and its responsibilities seem outdated and should be subject to thorough revisions during 2005. Since 2005 the Council's activities will concentrate solely on science and technology policies. Innovation issues should be handled exclusively by the Ministry of Economy. New principles of the SGCST and new model of financing public R&D sector are laid down in the Law on Organisation of State Support to Research and Development. Slovak Parliament passed this Law on 21st March 2005.

Policy responses to identified challenges in fields of R&D and innovations were formulated by the Slovak Government in the '2004 and 2005 Positions of Slovakia to the Lisbon Process'. The '2004 'Position' was the first official document to recognise failure of the public R&D policies and set some specific targets in R&D development (e.g. increasing state support for R&D and life-long learning, promoting Centre of Excellence Networks, preparing Forecast of Development and Implementation of Science and Technology in Slovakia up to 2015; etc.). The 2005 'Position' was based on the National Lisbon Strategy for Slovakia and clearly in favour of qualitative objectives. The 2005 'Position' stated that solely quantita-

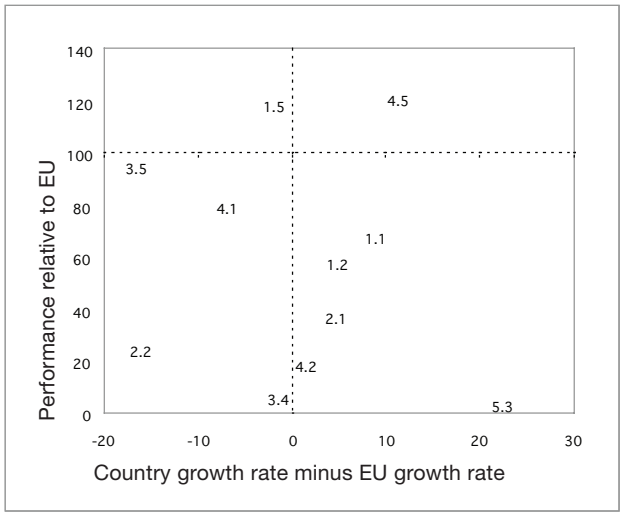
tive targets in R&D spending were not enough for fostering R&D and innovation activities and called for some qualitative objectives. These should, above all, include structural reforms of the R&D sectors aimed at increasing efficiency of R&D and innovation policy measures.

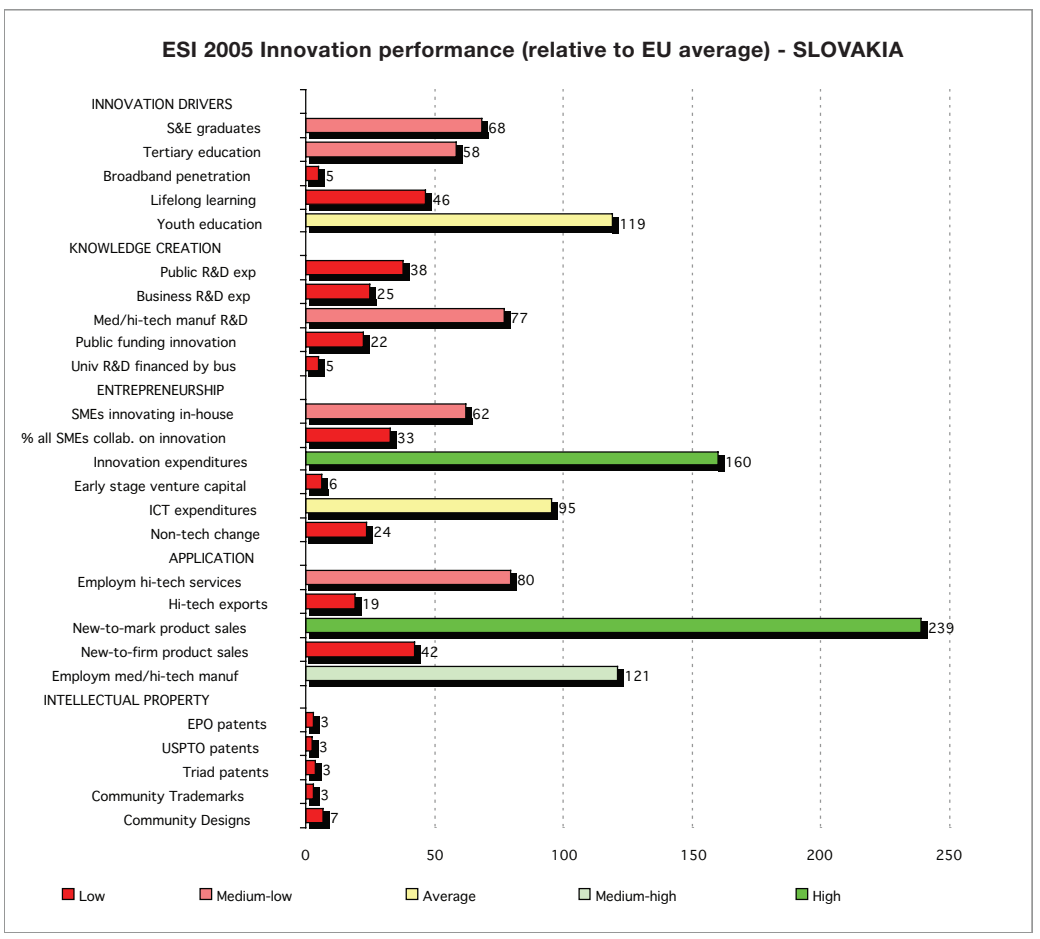
4. Possible orientation for future actions

Slovakia needs to elaborate an effective action plan for the Competitiveness Strategy Besides innovation expenditure in equipment and machinery, the country also needs to investment into R&D activities, and establish a framework conducive to commercialisation of the R&D results.

In the short term Slovakia should focus on diffusion and help to upgrade SMEs, like access to new technology and the ability to use it, upgrading skills, taking part in business clusters. Medium term, Slovakia should use the structural funds to upgrade public research sector in partnership with the industry, like establishing knowledge centres, access to seed-funding at university level. In the long-term, it is important that Slovakia improves the infrastructure to make it attractive for companies, especially MNCs, to invest and pursue R&D in the country. This includes establishing a link between the industry and science, like joint research centres and finding where it has competitive advantage and incorporate in the design of innovation policies. This should include specialisation of universities in cooperation with industry.

SLOVAKIA - EIS 2005 results





Indicator quality concerns:

The decline in the youth education attainment indicator between 2003 and 2004 is greater than expected for this indicator. The share of business funding of university R&D is also effectively zero. This is only likely to happen with a change in definitions or policy.

	SLOVAKIA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.21*	*0.21*	*0.21*		*0.2*	*0.0*
	relative to EU	--	--	--	--	*50*	*50*	*50*			
	rank	--	--	--	--	*28*	*28*	*28*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*4.3*	*5.1*	*5.3*	*7.5*	*7.8*	*8.3*	--	*68*	*18*	*9*
	relative to EU	--	*54*	*52*	*68*	*68*	*68*	--			
1.2	*Population with tertiary education*	*10.2*	*10.0*	*10.3*	*10.9*	*10.9*	*11.8*	*12.8*	*58*	*9*	*4*
	relative to EU	--	--	*52*	*54*	*53*	*55*	*58*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*0.4*	*5*	--	*50*
	relative to EU	--	--	--	--	--	--	*5*			
1.4	*Participation in life-long learning*	--	--	--	--	*9.0*	**4.8**	*4.6*	*46*	--	--
	relative to EU	--	--	--	--	*113*	**52**	*46*			
1.5	*Youth education attainment level*	*93.4*	*93.3*	*94.5*	*94.4*	*94.0*	*94.1*	*91.3*	*119*	*-2*	*0*
	relative to EU	--	*125*	*124*	*124*	*123*	*123*	*119*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.27*	*0.25*	*0.22*	*0.21*	*0.21*	*0.26*	*0.24*	*38*	*7*	*2*
	relative to EU	*41*	*38*	*33*	*31*	*31*	*38*	--			
2.2	*Business R&D expenditures*	*0.52*	*0.41*	*0.43*	*0.43*	*0.37*	*0.31*	*0.23*	*25*	*-14*	*1*
	relative to EU	*45*	*34*	*35*	*34*	*30*	*25*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	*80.5*	*76.3*	*68.6*	--	--	*77*	--	--
	relative to EU	--	--	*90*	*86*	*77*	--	--			
2.4	*Enterprises receiving public funding*			*1.8*					*22*	--	--
2.5	*Business financed university R&D*	*0.5*	*0.9*	*0.4*	*0.3*	*0.0*	*0.0*	--	*5*	--	*1*
	relative to EU	*8*	*14*	*5*	*5*	*0*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*13.1*		*15.7*			*62*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*3.3*		*3.8*			*33*	--	--
3.3	*Innovation expenditures*			*2.53*		*2.40*			*160*	--	--
3.4	*Early-stage venture capital*	--	*0.003*	*0.001*	*0.006*	*0.008*	*0.002*	--	*6*	*-29*	*-28*
	relative to EU	--	*9*	*1*	*10*	*20*	*6*	--			
3.5	*ICT expenditures*	--	--	*7.3*	*7.3*	--	--	*6.0*	*95*	*-9*	*7*
	relative to EU	--	--	*112*	*116*	--	--	*95*			
3.6	*SMEs using non-technological change*			*10.1*					*24*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	--	*2.74*	*2.97*	*3.02*	*2.83*	*2.54*	--	*80*	*-7*	*0*
	relative to EU	--	--	*96*	*92*	*87*	*80*	--			
4.2	*Exports of high technology products*	--	*4.0*	*3.5*	*3.7*	*2.9*	*3.4*	--	*19*	*-5*	*-6*
	relative to EU	--	*20*	*17*	*18*	*16*	*19*	--			
4.3	*Sales new-to-market products*			*6.2*		*10.9*			*239*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*5.9*		*2.8*			*42*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	--	*6.61*	*6.87*	*6.75*	*8.20*	*8.00*	--	*121*	*9*	*-3*
	relative to EU	--	--	*98*	*97*	*120*	*121*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*5.9*	*4.3*	*6.8*	*7.1*	**4.3**	--	--	*3*	--	*5*
	relative to EU	*5*	*4*	*5*	*5*	**3**	--	--			
5.2	*New USPTO patents*	*0.7*	*1.6*	*1.4*	*0.6*	**1.9**	--	--	*3*	--	*6*
	relative to EU	*1*	*3*	*2*	*1*	**3**	--	--			
5.3	*New Triad patents*	*0.5*	*0.6*	*0.8*	--	--	--	--	*3*	*24*	*1*
	relative to EU	*2*	*3*	*3*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*0.0*	*0.9*	*3.0*	*3*	--	*16*
	relative to EU	--	--	--	--	*0*	*1*	*3*			
5.5	*New community designs*	--	--	--	--	--	*2.4*	*5.9*	*7*	--	--
	relative to EU	--	--	--	--	--	*4*	*7*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.23 SPAIN

1. Introduction

Spain ranks 16th on the summary innovation index for the EU 25 member states and 21st out of the 33 countries. The country has a relatively well-balanced performance on each innovation category, with the exception of much weaker performance in innovation & entrepreneurship, where it ranks 22nd out of 23 countries. This poor showing is due to a low share of SMEs involved in innovation co-operation, below average rates of total expenditures on innovation, and low supplies of venture capital. An improvement in performance on innovation drivers will require a large increase in life-long learning, but the trend is favourable. Spain's relatively good performance on knowledge creation, where it ranks 14th out of 25 member states, is due to the activities of the public sector (an above average percentage of firms receive government support for innovation). The business sector lags behind, as shown by business R&D expenditures that are 45% of the EU average and low rates of patenting that are below 20% of the EU average. The majority of trends are at or above the EU average positioning the country in the "catching up" category.

In a broader scope the Reform Programme of the country identifies the combination of an important lack of critical mass in the Science and Technology System in both public and private perspectives in combination with the scarcity of resources, as the major challenge to be addressed in order to reverse the situation and help the country pass from a "catching up" to a "forging ahead" position. In this context the development of the Information Society is crucial.

2. Major challenges and policies

The following challenges appear to be the most relevant ones. However, one should keep in mind that given the autonomy of the Communities in Spain, it is likely that at the regional level there are substantial differences both in terms of indicators and policies to address the particular challenges. The remarks in this section refer to the average of the national level.

Life-long learning

Spain invests only 52% of the European average in life-long learning and this brings it to the 23rd position of the 30 countries for which data is available. This is the weakest among human capital indicators for Spain, which is well positioned in overall third level graduates, including S&E. The national government has recognised the problem and explicitly states in its Reform Programme "that the drive in life-course training must be increased, in particular in matters related to the Information Society, to bring Spain closer to the figures of fellow countries". Beyond that the government proposes a reform of the training model for life-long apprentiship (Guideline 23) and gives the regions a more prominent role than in the past in that respect.

As yet one specific measure has been introduced, namely FORINTEL - Telecommunication Training Programme (FORINTEL - Programa de formacion en telecomunicaciones), which explicitly aims at promoting new measures for guaranteeing the long-life learning (ES 35).

Innovation expenditure

Spain ranks 19th among all countries studied in the area of innovation expenditure with 69% of the EU average. Low propensity of SMEs to innovate, low shares of venture capital and very low BERD explain that. This is one of the challenges that the country has tried to address early on with generous grant and loan schemes at the national level, such as:

- *Fiscal incentives for R&D&I activities a series of measures introduced in year 2000, which modify the conditions of the tax headings and the sums that can be deducted from Corporation Tax Law, with the aim of stimulating the undertaking of R&D&I activities by the productive sectors (ES 18).*
- *Instituto de Crédito Oficial (ICO): offers financial facilities for investments aimed at increasing and improving enterprises' technological and innovative components for SMEs as well as for technological innovation facilities for all enterprises (ES 4).*
- *CDTI financial support: promotes innovation and technological development carried out by Spanish companies. Its financial support is aimed at financing R&D projects, the participation in international research programmes and the international transfer of technology. The financing is channelled through interest-free loans (ES 1).*

However, these measures remain insufficient to make a significant change of R&D and Innovation expenditure.

High tech manufacturing and services

Employment in high-tech services and export in high-tech products are both limited presenting 74% and 33% of the EU average respectively, positioned in both cases on the 22nd place of the countries compared. The Reform Plan of Spain envisages "to Internationalise High-Technology Content Sectors to enhance the technological content of Spanish exports,

comprising five target sectors: telecommunications and information technology, renewable energies and energy efficiency, the environment and waste management, infrastructures and industrial innovation. The plan, endowed with 100 million euros for 2005-2007, comprises a promotion phase, a communication and information phase and a formation phase". Fund of Funds is also envisaged, which will invest in private venture capital funds which, in turn, will invest in technology companies in the infant and start-up phases. This fund aims to complement existing programmes to create, through public initiative, 110 new companies in 2008, and 130 in 2010.

In the past, a variety of measures addressed technological upgrade directly, aiming at specific sectors or indirectly through venture capital support: Aids for the Promotion of the Technical Research for Singular Scientific and Technological Projects with Strategic Nature (ES 49), the Public Venture Capital to NTBFs by ENISA participation (ES 39), Support measure to venture capital for New Technology-based firms (ES 32), NEOTEC: Support to creation and development of NTBFs (ES 29), the PISTA-Programme to promote and identify new services in advanced Telecommunications (ES 36), ROFARMA II-Promotion the scientific Research, the technological development and the innovation in pharmaceutical and veterinary industry (ES 33).

- New government has separated research and innovation policies into two ministries: Science & Education and Industry & Trade

The government change resulted in the closure of the Ministry of Science and Technology created in 2000 by the previous government and the creation of two new ministries which took over the responsibilities: the Ministry of Education and Science (MEC) (formerly known as Ministry of Education and Culture) and the Ministry of Industry, Tourism and Trade. Under the previous government, the MCYT grouped most competences in Science, Technology and Innovation. Now, these activities have been split up between the two new ministries. The competences related to Information and Communication Technologies (previously under the MCYT) are now managed by the Ministry of Industry, Tourism and Trade, via the State Secretariat for Telecommunications and the Information Society. The Ministry of Economy and Finance is responsible for Spanish Fiscal Policy and has overall competence in terms of the public budgetary development.

Achieving a good co-ordination for innovation policy despite the split responsibilities, constitutes a major challenge for the future and it is important to organise a good flow of information and an efficient decision making system, involving stakeholders and using intelligent and modern tools.

3. Policy learning

3.1 Governance

Government innovation policy in Spain is the outcome of a complex interaction of several stakeholders using open consultation procedures. There is no evidence of a regular or consistent system for organised "intelligence gathering" to survey foreign innovation policies, but information is collected on an ad hoc basis to respond to particular necessities. However, transnational learning is recognised by policy makers as an important matter. Budgetary limitations and language barriers are the main constraints for transnational policy learning in Spain. Overall policy benchmarking and transnational learning activities can improve significantly.

All 17 regional governments in Spain have a competence for their own innovation policy and each one has designed a regional strategy for innovation. However, the implementation of these strategies is a different matter. Different regional agents have denounced the lack of a common strategic framework of the central administration and the Autonomous Communities. This is the major problem for the success of the National Science and Technology System.

The Confederation of Employers and Industries of the Madrid Region (CEIM) have agreed to run an international project to develop a benchmarking policy as of June 2005. The main objective of the project is to develop a methodology to assess the impact of innovation policies carried out in the participating regions, especially with regard to analysing their effect on SMEs. This analysis will provide a resource for benchmarking in the participating regions and identify successful actions that can be 'exported' to improve innovation policy design in other participating regions.

The most relevant challenges remain:

- *Insufficient co-ordination of actions promoted by the different authorities.*
- *University and Research Centre R&D are not sufficiently geared towards companies.*
- *Excessive bureaucracy in the application process for public funds for the development of technological projects*

3.2 Recent policy trends

In February 2005 the Spanish Government published a Plan to strengthen the Spanish Economy by establishing new measure to reach the Lisbon objectives. Urgent measures were adopted for its implementation. In March 2005, the Government published the framework for action and management within the National R&D Plan in areas where research is applied.

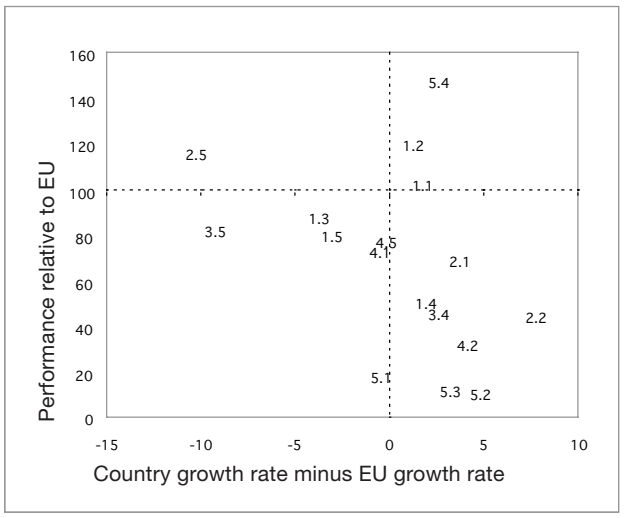
The main objective of the regulatory reforms is to stimulate private investment in technological innovation and to support the start-up of NTBFs. The Royal Decree 4/2004, article 35 established the "R&D Activities Evaluation and Qualification Office" of the Industry Ministry as the National Entity to evaluate R&D projects.

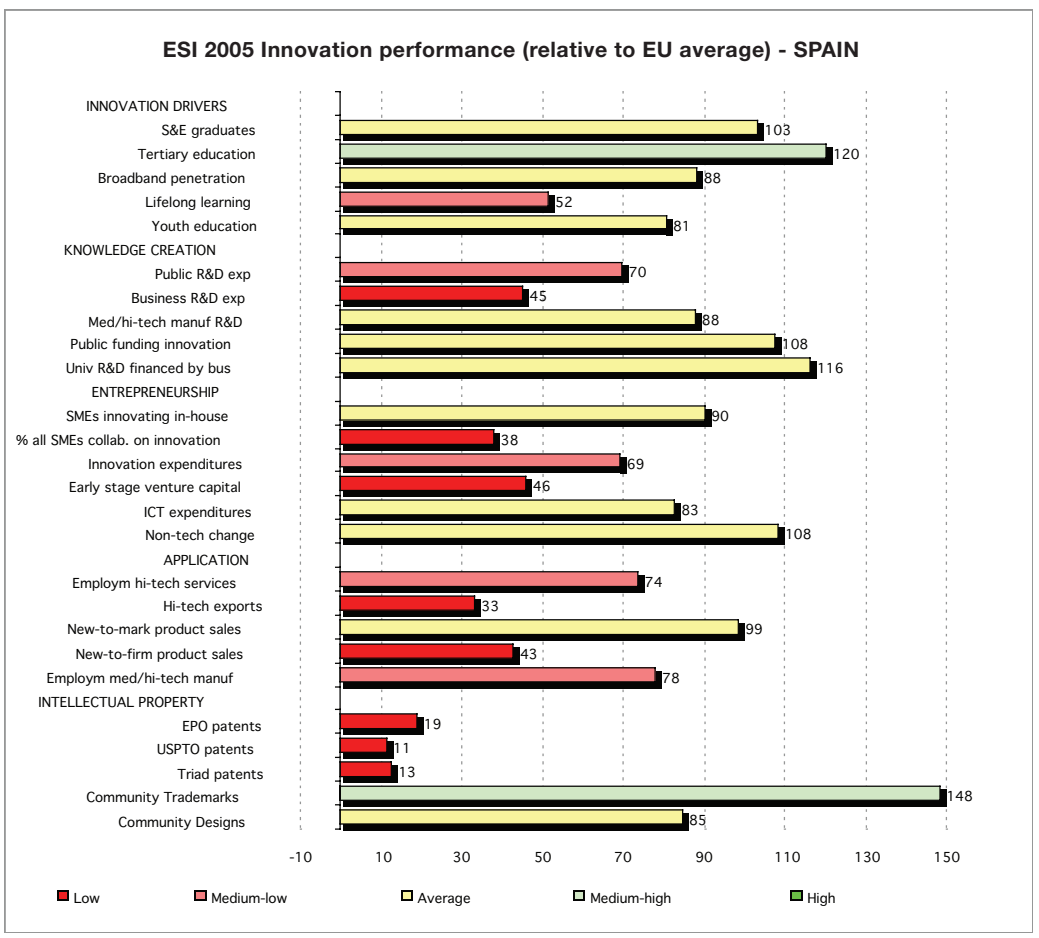
4. Possible orientation for future actions

Spain is catching up but very important items need further emphasis and support. The government has adopted an ambitious Reform Programme with sufficiently detailed elements. The INGENIO 2010 program fixes objectives for GERD, BERD and the Information Society and envisages to use the following tools: more resources for R&D and innovation, incremental resources focused on new actions responding to the main challenges of the Spanish Science and Technology System, a regulatory reforms in favour of R&D and innovation activities and a new system to monitor and evaluate R&D and innovation policy.

Provided these challenges will be addressed as planned with a target to achieve a critical mass, the national innovation system will rapidly improve. Governance issues need to be systematically addressed, since there are important challenges identified and the current changes have not been assimilated yet. Finally, since the pattern of strengths and weaknesses in Spain are very similar to that of France, Spain could possibly learn from French policies.

SPAIN - EIS 2005 results





Indicator quality concerns:

The youth educational attainment indicator has been falling steadily since 66.1% in 2000 to 62.5% in 2004. This is unusual and not supported by the steady increase in the share of the population with a tertiary education. One option is that improving employment conditions has led to an increase in early school leavers.

	SPAIN					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.30*	*0.31*	*0.30*		*-0.6*	*0.0*
	relative to EU	--	--	--	--	*72*	*73*	*71*			
	rank	--	--	--	--	*19*	*19*	*21*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*8.0*	*9.6*	*9.9*	*11.3*	*12.0*	*12.6*	--	*103*	*11*	*9*
	relative to EU	--	*102*	*97*	*103*	*105*	*103*	--			
1.2	*Population with tertiary education*	*20.1*	*21.2*	*22.7*	*23.7*	*24.5*	*25.2*	*26.4*	*120*	*6*	*4*
	relative to EU	--	--	*113*	*118*	*120*	*118*	*120*			
1.3	*Broadband penetration rate*	--	--	--	--	*2.0*	*4.3*	*6.7*	*88*	*46*	*50*
	relative to EU	--	--	--	--	--	--	*88*			
1.4	*Participation in life-long learning*	*4.2*	*5.0*	*5.0*	*4.8*	*4.9*	*5.8*	*5.1*	*52*	*2*	--
	relative to EU	--	--	*63*	*61*	*61*	**62**	*52*			
1.5	*Youth education attainment level*	*64.6*	*65.2*	*66.2*	*65.3*	*64.5*	*62.7*	*61.8*	*81*	*-3*	*0*
	relative to EU	--	*87*	*87*	*86*	*84*	*82*	*81*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.42*	*0.42*	*0.42*	*0.44*	*0.45*	*0.48*	--	*70*	*6*	*2*
	relative to EU	*64*	*65*	*64*	*66*	*66*	*70*	--			
2.2	*Business R&D expenditures*	*0.47*	*0.46*	*0.49*	*0.48*	*0.54*	*0.57*	--	*45*	*9*	*1*
	relative to EU	*41*	*38*	*40*	*38*	*43*	*45*	--			
2.3	*Share of med-high/high-tech R&D*	*76.5*	*79.1*	*77.2*	*78.3*	--	--	--	*88*	*0*	--
	relative to EU	*86*	*89*	*87*	*88*	--	--	--			
2.4	*Enterprises receiving public funding*			*8.9*					*108*	--	--
2.5	*Business financed university R&D*	*7.0*	*7.7*	*6.9*	*8.7*	*7.6*	*6.4*	--	*116*	*-9*	*1*
	relative to EU	*109*	*118*	*106*	*130*	*116*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*24.3*		*22.9*			*90*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*2.7*		*4.4*			*38*	--	--
3.3	*Innovation expenditures*			*1.24*		*1.04*			*69*	--	--
3.4	*Early-stage venture capital*	*0.007*	*0.013*	*0.025*	*0.025*	*0.016*	*0.012*	--	*46*	*-25*	*-28*
	relative to EU	--	*43*	*43*	*42*	*43*	*46*	--			
3.5	*ICT expenditures*	--	--	*5.5*	*5.2*	*5.6*	*5.4*	*5.2*	*83*	*-2*	*7*
	relative to EU	--	--	*85*	*83*	*85*	*84*	*83*			
3.6	*SMEs using non-technological change*			*46.0*					*108*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*1.92*	*2.14*	*2.29*	*2.67*	*2.50*	*2.35*	--	*74*	*0*	*0*
	relative to EU	--	--	*74*	*81*	*77*	*74*	--			
4.2	*Exports of high technology products*	*5.5*	*5.9*	*6.4*	*6.1*	*5.7*	*5.9*	--	*33*	*-2*	*-6*
	relative to EU	--	*30*	*31*	*30*	*31*	*33*	--			
4.3	*Sales new-to-market products*			*16.3*		*4.5*			*99*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*33.1*		*2.9*			*43*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*5.54*	*5.46*	*5.39*	*5.50*	*5.35*	*5.15*	--	*78*	*-3*	*-3*
	relative to EU	--	--	*77*	*79*	*78*	*78*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*21.0*	*23.3*	*24.9*	*28.8*	*25.5*	--	--	*19*	*5*	*5*
	relative to EU	*19*	*20*	*19*	*20*	*19*	--	--			
5.2	*New USPTO patents*	*6.5*	*6.0*	*6.9*	*6.9*	*8.0*	--	--	*11*	*11*	*6*
	relative to EU	*11*	*10*	*10*	*10*	*11*	--	--			
5.3	*New Triad patents*	*2.8*	*3.0*	*2.8*	--	--	--	--	*13*	*5*	*1*
	relative to EU	*12*	*14*	*13*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*92.3*	*137.7*	*129.4*	*148*	*18*	*16*
	relative to EU	--	--	--	--	*142*	*162*	*148*			
5.5	*New community designs*	--	--	--	--	--	*69.3*	*71.1*	*85*	--	--
	relative to EU	--	--	--	--	--	*101*	*85*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.24 Sweden

1. Introduction

Sweden has maintained its position among the leading economies in Europe and together with Finland is considered an innovation leader. However, compared to 2000, it has lost momentum in a number of macroeconomic indicators such as real GDP growth (from 4.3% to 3.5%) or unemployment (from 5.6% to 6.3%). Despite the decline in Swedish performance, its absolute position remains well above EU25 average. According to the 2005 summary innovation index (SII), Sweden is the leading country in Europe. The composite indicators for innovation and entrepreneurship as well as the index for intellectual property both rank Sweden as number one among the EU25 Member States. In terms of innovation drivers, knowledge creation and application, Sweden comes second. In all but two of the innovation indicators Sweden is well above the EU average. The two notable exceptions being business financed R&D at universities and the share of high-tech exports. Sweden is losing momentum in seven indicators including business R&D expenditures, early-stage venture capital, employment in high-tech services, exports of high-tech products, med-hi/high-tech manufacturing employment, new EPO patents, and new triad patents.

2. Major challenges and policies

Due to the above-mentioned performance level, it is difficult to single out individual challenges, however, more detailed analysis suggests that there are at least three major challenges. First of all, Sweden needs to balance a decrease in innovation activity of large industrial groups by stimulating further growth of small strategic innovators in order to maintain it's lead. Additional challenges relate to promoting more high-tech intensive export as well as improve the co-operation and linkages in innovation system.

Strengthen the knowledge base within SMEs

Currently, SMEs account for 98% of all Swedish companies and employ about 60% of the total labour force in the private sector. At the same time, SMEs account for a relatively low share of the total R&D investments and show clear weaknesses in terms of technological competitiveness. Furthermore, their position as subcontractors to large industrial groups places them in a somewhat vulnerable situation. It is also estimated that 20 companies are financing nearly 70% of the business R&D in Sweden and they account for 70% of all Swedish USPTO patents. The recent data indicates that some 50% of the total Swedish business R&D is under foreign control.

As far as policy responses are taken into account, the measures designed to address the problem of weak knowledge base within SMEs include the new tax regulation which lower taxes for SMEs, support to SMEs with ambitions to go global and export their products, and the Design Year 2005 recognising the importance of design for businesses. In addition, it is noteworthy that the new policy for regional development has a stronger focus on private business in terms of small and medium sized companies (SMEs). The active involvement of SMEs is a major change as the old corporatist model had its main focus on big companies.

Increase the intensity of high-tech exports

Sweden ranks below the EU average in high-technology exports as a percentage of total exports. In 2003, the share of exports of high technology products as a share of total exports was estimated at 13.1% which represented 74% of the EU average. If the trends are taken into account, high-tech exports and employment in medium/high-tech manufacturing are those two indicators which are 'falling further behind'. During the period from 1998 to 2004, the share of high-tech exports declined by 25%. Admittedly, these two indicators are not quick to change as they depend very much on the industry structure. Yet the most common policy responses include initiatives leading to the structural change by fostering high-tech start-ups and early stage venture capital. As far as the latter is concerned Sweden is taking a leading role.

Improve the co-operation and linkages in innovation system

In recent decades, the Swedish foundation for public private partnerships (PPP) has eroded as a consequence of deregulation and globalisation. The worrying finding is that it is no longer possible to engage in the type of long-term joint venture that constituted the foundation of the Swedish innovation model. For this reason, Sweden needs to reinvent a model for cooperation between public and private actors which will allow the country to stay competitive in the forthcoming future.

3. Policy learning

3.1 Governance

The concept of innovation policy was more or less absent in the Swedish general political rhetoric until the end of the 1990s, although the importance of innovation and production of new knowledge for socially and ecologically sustainable economic growth has been widely recognised since the 1970s. In the absence of a dedicated innovation policy, the general policy agenda has developed along two different strands, one in growth policy and another in research policy. This dual development is partly manifested in the distribution of responsibilities between the Ministry of Industry, Employment and Communication and the Ministry of Education, Research and Culture, as well as the different government agencies under their respective authority.

During the last years, a significant move towards increased and more efficient coordination between these policy fields was reached, however, most coordination efficiency has been achieved within each of the two strands rather than between them. A major reorganisation of the organisational structure for public funding of R&D and support to business and regional development, part of a move towards a national innovation policy, was up to now most explicitly manifested by the establishment of the Swedish Agency for Innovation Systems (VINNOVA) in 2001. In 2004, an Innovation Policy Council was established which serves as an advisory body within the government structure. The Council is a forum for discussions about Swedish innovation policy and measures to achieve economic growth through renewal and is headed by the Minister responsible for industry.

3.2 Recent policy trends

An important milestone in establishing an explicit innovation policy is the strategy, "Innovative Sweden", which was formulated in 2004. For the time being, it is rather considered as a broad visionary style and not as an explicit action plan. The key objective of this strategy is to increase Sweden's competitiveness. Also, the objectives of the Swedish innovation policy have been further strengthened by the government declaration of 2004 and subsequently in proposal for the bill labelled "Research for a better life" which was published in 2005. The bill points out the strategy and organisation for public R&D investments from 2005-2008, with the main focus being long-term financing of internationally competitive research environments, i.e. centres of excellence. It is important to note that the bill states that R&D seems to be a prerequisite for innovation in Sweden but that investments in R&D alone are not enough. An agency which aims at providing management and seed capital to high-tech start-ups was launched in 2005 called "The Innovation Bridge". It is a state-owned consortium with seven regional offices and an annual budget of 22 MEUR. Furthermore, the year 2005 was designated as the Year of Design with the view to foster creativity and innovation by the means of national campaign. During 2005, strategies for further strengthening six identified key industrial sectors; metallurgy, forest, vehicle, ICT, life science and aero/space, were jointly established by involved parties. Also, a public funded program for supporting R&D actions in SMEs was announced.

4. Possible orientation for future actions

The major challenges in front of Sweden include development of small innovative companies, promotion of high-tech sector, and establishment of more effective cooperation between public and private actors.

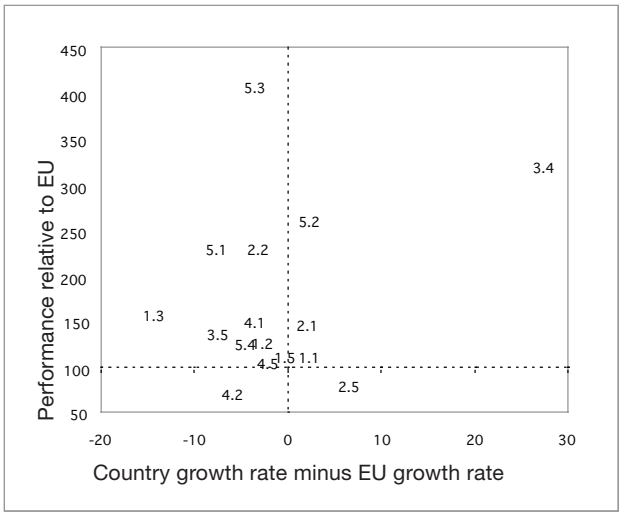
Taking into account the above-mentioned drawbacks, it is very important in the future to:

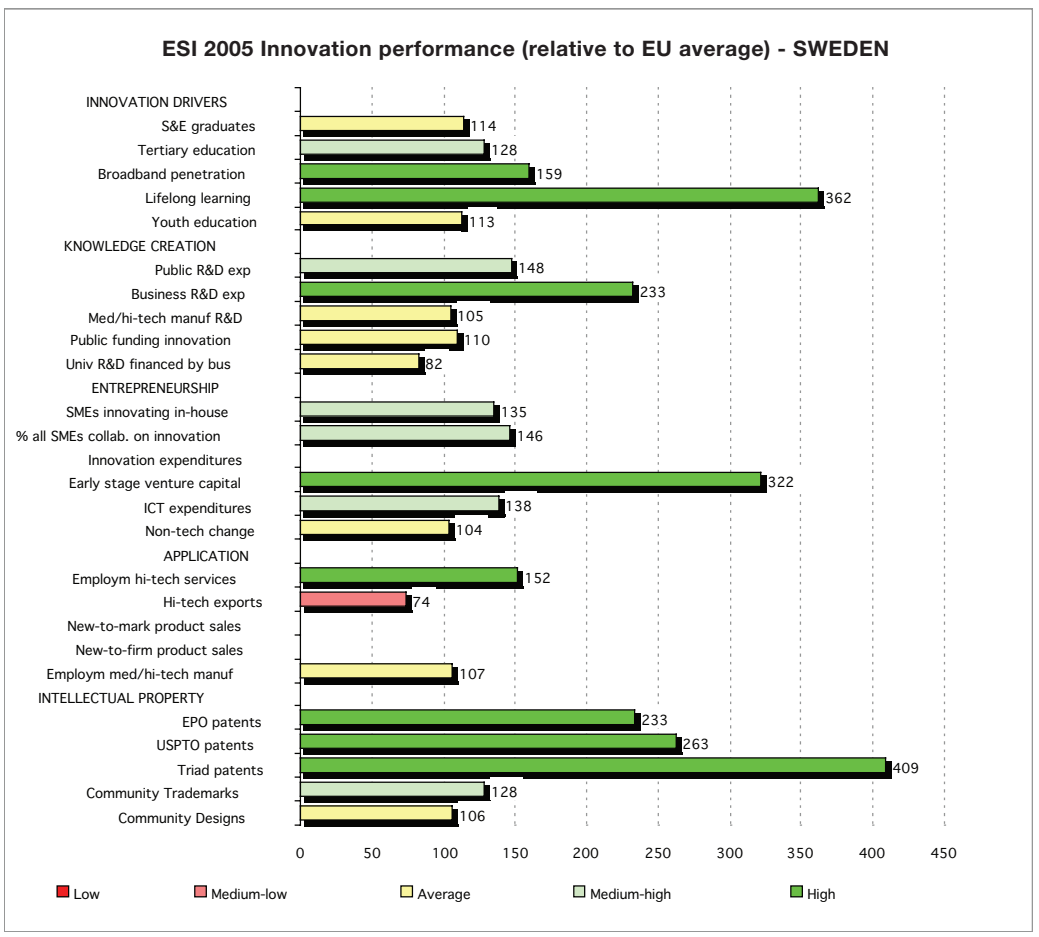
1. Develop innovative capacity within SMEs sector. The major problem is that SMEs account for a relatively low share of the total R&D investments and show clear weaknesses in terms of technological competitiveness. They mainly play the role of subcontractors to large industrial groups. In this respect, two issues seem to be very important and relevant. First, the new beneficiaries of innovation support instruments should be increasing SMEs, and not necessarily large companies. Second, it is ought to be remembered that although R&D is important for innovation other measures supporting the development of innovative projects are equally important.

2. Promote the development of high-technology exports. Looking at trends, the worrying finding is that during the period from 1998 to 2004, the share of high-tech exports declined by 25%. The most common policy responses include initiatives leading to the structural change by fostering high-tech start-ups and early stage venture capital.

3. Review the existing model for cooperation between public and private actors, in order to establish better cooperation between private and public actors in the framework of long-term development projects.

SWEDEN - EIS 2005 results





Indicator quality concerns:

Three CIS indicators are missing due to concerns by Statistics Sweden over their reliability: new-to-market and new-to-firm product sales under applications, and innovation expenditures under innovation & entrepreneurship.

	SWEDEN					(2003)	(2004)	2005		Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.74*	*0.74*	*0.72*			*-1.5*	*0.0*
	relative to EU	--	--	--	--	*175*	*175*	*169*				
	rank	--	--	--	--	*1*	*1*	*1*				
		1998	1999	2000	2001	2002	2003	2004				
	INPUT - Innovation drivers											
1.1	*S&E graduates*	*7.9*	*9.7*	*11.6*	*12.4*	*13.3*	*13.9*	--		*114*	*11*	*9*
	relative to EU	--	*103*	*114*	*113*	*117*	*114*	--				
1.2	*Population with tertiary education*	*27.6*	*28.5*	*29.7*	*25.6*	*26.4*	*27.2*	*28.2*		*128*	*2*	*4*
	relative to EU	--	--	*149*	*127*	*129*	*128*	*128*				
1.3	*Broadband penetration rate*	--	--	--	--	*4.6*	*8.6*	*12.1*		*159*	*35*	*50*
	relative to EU	--	--	--	--	--	--	*159*				
1.4	*Participation in life-long learning*	--	*25.8*	*21.6*	**17.5**	*18.4*	**34.2**	*35.8*		*362*	--	--
	relative to EU	--	--	*273*	**222**	*230*	**368**	*362*				
1.5	*Youth education attainment level*	*87.5*	*86.3*	*85.2*	**85.5**	*86.7*	*85.6*	*86.3*		*113*	*0*	*0*
	relative to EU	--	*115*	*112*	**112**	*113*	*112*	*113*				
	INPUT - Knowledge creation											
2.1	*Public R&D expenditures*	*0.86*	*0.91*	--	*0.96*	--	*1.02*	--		*148*	*4*	*2*
	relative to EU	*130*	*140*	--	*143*	--	*148*	--				
2.2	*Business R&D expenditures*	*2.76*	*2.74*	--	*3.31*	--	*2.93*	--		*233*	*-2*	*1*
	relative to EU	*238*	*226*	--	*265*	--	*233*	--				
2.3	*Share of med-high/high-tech R&D*	*90.8*	*91.7*	*92.8*	*93.7*	--	--	--		*105*	*1*	--
	relative to EU	*102*	*103*	*104*	*105*	--	--	--				
2.4	*Enterprises receiving public funding*			*9.1*						*110*	--	--
2.5	*Business financed university R&D*	--	*3.9*	--	*5.5*	--	*5.5*	--		*82*	*8*	*1*
	relative to EU	--	*59*	--	*82*	--	--	--				
	INPUT - Innovation & entre-preneurship											
3.1	*SMEs innovating in-house*			*35.2*		--				*135*	--	--
3.2	*Innovative SMEs co-operating with others*			*13.4*		--				*146*	--	--
3.3	*Innovation expenditures*			--		--				--	--	--
3.4	*Early-stage venture capital*	*0.007*	*0.057*	*0.095*	*0.093*	*0.097*	*0.081*	--		*322*	*-1*	*-28*
	relative to EU	--	*195*	*168*	*154*	*262*	*322*	--				
3.5	*ICT expenditures*	--	--	*8.5*	*8.5*	*9.2*	*8.8*	*8.7*		*138*	*0*	*7*
	relative to EU	--	--	*131*	*135*	*139*	*138*	*138*				
3.6	*SMEs using non-technological change*			*44.0*						*104*	--	--
	OUTPUT - Application											
4.1	*Employment in high-tech services*	*4.38*	*4.76*	*5.13*	**5.18**	*5.22*	*4.85*	--		*152*	*-3*	*0*
	relative to EU	--	--	--	*157*	*161*	*152*	--				
4.2	*Exports of high technology products*	*16.4*	*17.8*	*18.7*	*14.2*	*13.7*	*13.1*	--		*74*	*-12*	*-6*
	relative to EU	--	*90*	*91*	*69*	*75*	*74*	--				
4.3	*Sales new-to-market products*			--		--				--	--	--
4.4	*Sales new-to-firm not new-to-market products*			--		--				--	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*8.63*	*8.26*	*7.90*	**7.72**	*7.27*	*7.03*	--		*107*	*-5*	*-3*
	relative to EU	--	--	--	*111*	*106*	*107*	--				
	OUTPUT - Intellectual prop-erty											
5.1	*New EPO patents*	*307.0*	*308.5*	*361.5*	*383.0*	*311.5*	--	--		*233*	*-2*	*5*
	relative to EU	*281*	*261*	*271*	*270*	*233*	--	--				
5.2	*New USPTO patents*	*139.2*	*158.7*	*178.7*	*196.5*	*187.4*	--	--		*263*	*9*	*6*
	relative to EU	*228*	*252*	*268*	*274*	*263*	--	--				
5.3	*New Triad patents*	*99.6*	*94.6*	*91.4*	--	--	--	--		*409*	*-2*	*1*
	relative to EU	*434*	*425*	*409*	--	--	--	--				
5.4	*New community trademarks*	--	--	--	--	*90.0*	*118.3*	*111.5*		*128*	*11*	*16*
	relative to EU	--	--	--	--	*138*	*139*	*128*				
5.5	*New community designs*	--	--	--	--	--	*112.8*	*89.0*		*106*	--	--
	relative to EU	--	--	--	--	--	*165*	*106*				

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 1.25 UNITED KINGDOM

1. Introduction

Over the past decade, the UK economic growth has been steady and stronger than in most other major industrialised countries. The economy is operating at close to full capacity and according to International Monetary Fund's recent estimations it will continue growing at about 2.5% annually. The UK presents a relatively strong innovation performance both in absolute terms for specific indicators and in terms of recent trends. The country ranks 7th on the summary innovation index (SII) out of 25 EU Member States. Its good standing is due to excellent performance on several education indicators, most notably S&E graduates and lifelong learning (172% and 215% of EU average respectively), and mid-range performance in several other categories. The UK performs well above the EU average for e.g. total innovation expenditures, venture capital, ICT expenditures, employment in high technology services, and in Triad patents. Nonetheless, the trends are persistently negative in several indicators, most notably business financed university R&D where the overall EU trend is positive.

The UK is surprisingly weak on innovation demand, which is almost entirely due to very low levels of capital investment and a high percentage of firms that report a lack of customer responsiveness as a barrier to innovation. The UK fails to translate its potential in knowledge generation into commercial products or services. The indicators of the market output of innovation activity in UK enterprises were well below the EU25 average in 2000 both in terms of new-to-market and new-to-firm products (33% and 65% of EU25 average respectively). The result of the latest community innovation survey (covering 2004) suggest that new-to-market product innovation accounts for 7% of firms turnover and new-to-firm accounts for an additional 15%.

Compared to the UK's peer countries Austria, Belgium, the Netherlands, Germany, France and Italy, the UK has high levels of new S&E graduates, which is only slightly surpassed by France. The life long learning indicator is similarly above the peer countries. The most similar country in terms of strengths and weaknesses is Sweden. However, Sweden is leading in all innovation related indicators. It is unlikely that the UK adopts much of the Swedish innovation system and its policies due to significant differences in governance and the willingness of firms to cooperate.

2. Major challenges and policies

Based on analysis of EIS results and trends analysis one can put forward the following main challenges facing the UK in terms of innovation potential:

Low business expenditure on R&D

The UK level of business R&D expenditure is below many of its peer performance countries. Although this indicator improved between 2002 and 2003 from 1.25% of GDP to 1.3% of GDP, its persistently low levels could be a cause of negative trends for high tech exports and employment in medium-high and high-tech manufacturing - both of which have been declining faster than the EU average. However, this measure largely ignores the existence of R&D in the services sector, which has grown substantially.

The problem of low investments in R&D has been recognised by policy makers. The DTI's new Five Year Programme (2004), based on the DTI Strategy (2003), set out policies with an aim to stimulate the industries and jobs of the future through science and innovation. The goals of this programme include e.g. boosting R&D from its current level of 1.9% of national income to 2.5% per year by 2014, which is on the other hand well below 3% Barcelona target. In 2004 the Government published a framework document that sets out its ambition for UK science and innovation for the period 2004-14 («Science & innovation investment framework 2004-2014»). One of the goals highlighted in this document is increased business investment in R&D.

The Technology Strategy Board, formed in October 2004, will determine priorities for €460 million DTI funding over the period 2005 to 2008 to support businesses investing in new and emerging technologies. The Board is business-led and will use its range of expertise and knowledge to identify and back key technologies to give the UK a competitive advantage.

Set up in 2005, Enterprise Capital Funds (UK 70) are designed to be commercial funds investing a combination of private and public money in small high-growth businesses that are seeking up to £ 2 million of equity finance. ECFs are expected to fulfil a market gap in the availability of equity finance at this level. Also the measure Grant for Research and Development (formerly SMART UK 09 and SPUR) has been re-launched and will be administered by Regional Development Agencies.

Decline of University R&D financed by business

A major challenge for the UK system is the decline of business-funded university R&D. Given the strong policy push to increase private funding of university research, a continual relative decline from 7.3% in 1999 to 5.6% in 2003 is observed. Although this is linked to substantial real increases in other sources of funding it may also be a failure of UK innovation policy. This decline is probably contributing to the long term financial sustainability problems in the public research sector, due to inadequate public funding of the increasing costs and the assumption that the gap would be covered by private sources. The UK performs below average on this indicator and its trend performance has been strongly below the EU average trend, declining from 14% above the EU average in 1999 to 11% below the EU average in 2003. Although the UK total collaborative research income rose in 2002-2003 for the third year running, this trend could mean that the science-business relationships are not really well developed in the UK innovation system and that the policy response should bring incentives to science-business cooperation.

A better science-business cooperation or knowledge transfer is at the core of various DTI reports and several initiatives and programmes exist. Few measures are especially worth a mention in this context. Collaborative Research and Development was already introduced in 2003. It stems from UK Technology Strategy and Programme resulting from the DTI's Innovation Report. Collaborative Research and Development (UK 65) aims at all UK based businesses wishing to exploit technology through collaborative R&D funding for projects between businesses, universities and other potential collaborators. Another new supporting measure is called Web-based Toolkit (UK 67). This project unveils a set of model agreements to help business-university collaborative working and speed up negotiations for Intellectual Property (IP). The toolkit's goal is to take the hassle out of negotiating collaborative research agreements. It particularly focuses on financial contribution, the use and exploitation of IP, academic publication and confidentiality. Knowledge Transfer Networks are designed to stimulate innovation in the UK's key technology sectors by promoting collaboration, best practice and knowledge sharing between industry and universities. These networks have been allocated £ 40 million.

In this context, one should mention consolidation of Higher Education Innovation Fund (HEIF 2, UK 38), which incorporates funding previously channelled through the University Challenge fund (UK 11), the Science Enterprise Challenge fund (UK 21) and HEROBC scheme (UK 22). HEIF aims to increase the capacity of Higher Education institutions to work with business and the community supporting a range of activities including commercialisation, enterprise education, collaborative research and consultancy. The goals of HEIF 2 include e.g. support for transfer knowledge from universities into business and the community through the applied research, and linking with all types and size of business. The total funding for HEIF 2 is €260 million (£186 million) for period 2004-2006.

Below average innovation capacities of SMEs

The proportion of SMEs involved in innovation in 2004 was only 71 percent of the EU25 average. A below average percentage of the UK's SMEs innovate in-house (86% of EU average) or are involved in innovation cooperation (79%). Hence, one of the most important challenges for the UK innovation policies is to boost the relatively weak intensity of innovation activity in enterprises.

Most of the previously mentioned measures – e.g. Enterprise Capital Funds (UK 70), Collaborative Research and Development (UK 65) or Web-Based Toolkit (UK 67) – address the problem of raising innovative potential of SMEs in some way, e.g. by providing innovation funding opportunities or promoting cooperation with research base. Another programme that is relevant in this context is Knowledge Transfer Networks (UK 64), which is also part of UK Technology Strategy and Programme. This measure provides a wider, more flexible range of networking activities to broaden knowledge transfer into UK businesses and will focus on areas that have the potential to maximise UK productivity.

3. Policy learning

3.1 Governance

Innovation policy in the UK remains centralised, at least as far as England is concerned (the devolved governments and their agencies in Scotland and Wales operate distinct policies). The focus point of innovation governance is the Department of Trade and Industry (DTI). It aims at increasing competitiveness and scientific excellence in order to generate higher levels of sustainable growth and productivity. The DTI attempts to foster the creation and growth of new companies, it encourages the acquisition, development and use of technology and provides R&D support and advice to SMEs and larger firms in the fields of energy, space, and civil aeronautics through a number of measures. With regard to science and

science policy, the Office of Science and Technology (OST), located in the DTI, is responsible for the funding of basic research.

Policy making for innovation promotion in the UK is strongly evidence-based. The use of assessment, monitoring, evaluation and related activities has been broadly accepted throughout UK Government for several years, and has been progressively developed to meet changing needs and pressures. The UK maintains, through a number of bodies, a good array of statistical and indicator-based information on the inputs, outputs and performance of the UK innovation system. However, locating evaluation reports and reviews can be problematic as they are not systematically brought into the public domain.

The Government seeks and receives policy advice from a a number of committees and advisory groups, located at various levels of the governmental system. The approach involves cross-departmental coordination and policies and measures are frequently shared between two or more ministries/departments. In this respect, the UK Government aims to operate a policy of "joined-up government" – which attempts to ensure that policy decisions and implementation are coordinated across all government departments and agencies, and consulted with relevant stakeholders. For example, the Technology Strategy Board, formed in October 2004, will determine priorities for 460 million € of DTI funding over the period 2005 to 2008 to support businesses investing in new and emerging technologies. The Board acts as a high level forum for interaction between business, government and other stakeholders.

3.2 Recent policy trends

The government is well aware of the main challenges of the UK innovation system. Strengthening innovation capacity is high on the agenda (see e.g. «Science & innovation investment framework 2004-2014» and DTI's Five Year Programme) and becomes a central topic of the high-level policy task forces such as e.g. inter-ministerial «Steering Group on innovation in the knowledge based economy» (set up in 2004).

Recent policy measures such as already mentioned Enterprise Capital Funds (UK 70), Knowledge Transfer Networks (UK 64) or Collaborative Research and Development (UK 65) all address systemic weakness of the UK system. New Higher Education Innovation Fund (HEIF 2, UK 38) can be seen as a good practice example since it has been adapted and rationalised, and now incorporates funding for activities previously supported through different policy measures.

4. Possible orientation for future actions

Based on analysis of EIS indicators and revealed trends as well as in reference to existing policy strategic documents the following policy recommendations can be made:

Increase business and public R&D expenditure

- *Raise public R&D expenditure*
- *Create incentives for increased business R&D expenditures*

Further promote business finances university R&D

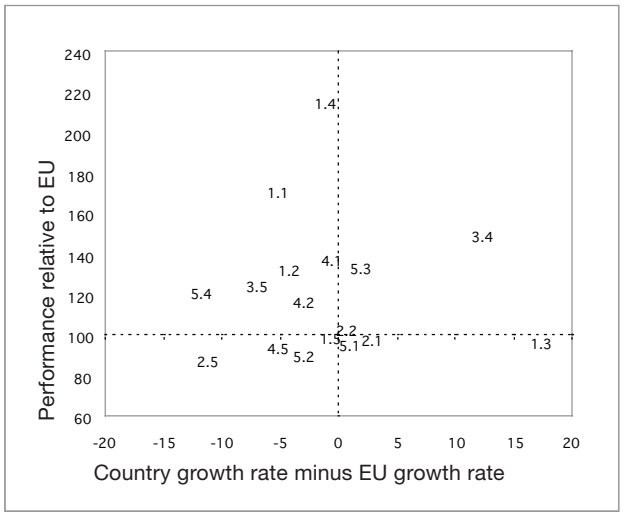
- *Raise awareness on possibilities and advantages of jointly funded business-university projects, especially among SMEs*
- *Revisit priorities of public R&D funding taking into account market realities in order to create more possibilities of joint public-private research projects*

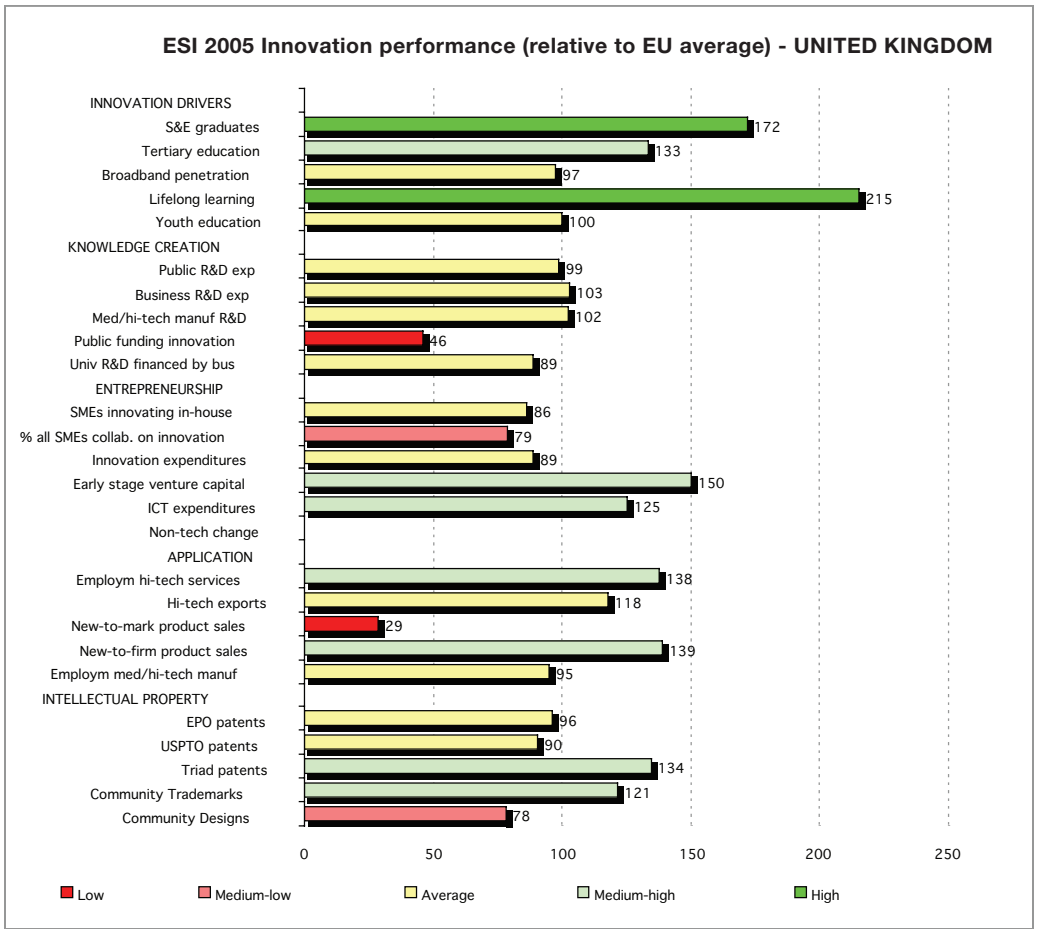
Raise innovativeness of SMEs

- *Ease access to start-up finance for innovative SMEs*
- *Strengthen initiatives encouraging cooperation between SMEs and between SMEs and research organisations*

Provide business advisory services in the field of product and services commercialisation

UNITED KINGDOM-EIS 2005 results





Indicator quality concerns:

The drop in high tech exports could reflect volatility in key exports (aerospace or pharmaceuticals). The sales share from new-to-market products is also unusually low at 1.7%, compared to rates in the UK peer countries, such as 3% in the Netherlands, 4.6% in Austria, 5.1% in Belgium, 5.7% in France and 6.6% in Denmark. As noted above, the results for the share of firms receiving public support might not be comparable with countries that provide direct support.

	UNITED KINGDOM					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.51*	*0.49*	*0.48*		*-2.6*	*0.0*
	relative to EU	--	--	--	--	*120*	*116*	*114*			
	rank	--	--	--	--	*8*	*10*	*11*			
		1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*15.2*	*15.6*	*16.2*	*19.5*	*19.5*	*21.0*	--	*172*	*4*	*9*
	relative to EU	--	*166*	*159*	*177*	*171*	*172*	--			
1.2	*Population with tertiary education*	--	*27.3*	*28.1*	*29.7*	*29.4*	*29.2*	*29.2*	*133*	*0*	*4*
	relative to EU	--	--	*141*	*148*	*144*	*137*	*133*			
1.3	*Broadband penetration rate*	--	--	--	--	*1.6*	*3.7*	*7.4*	*97*	*67*	*50*
	relative to EU	--	--	--	--	--	--	*97*			
1.4	*Participation in life-long learning*	--	*19.2*	*21.1*	*21.7*	*22.3*	*21.3*	*21.3*	*215*	*-1*	--
	relative to EU	--	--	*267*	*275*	*279*	**229**	*215*			
1.5	*Youth education attainment level*	--	*75.4*	*76.5*	*77.1*	*77.2*	*78.2*	*76.4*	*100*	*0*	*0*
	relative to EU	--	*101*	*100*	*101*	*101*	*102*	*100*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.61*	*0.59*	*0.63*	*0.62*	*0.64*	*0.68*	--	*99*	*5*	*2*
	relative to EU	*92*	*91*	*95*	*93*	*94*	*99*	--			
2.2	*Business R&D expenditures*	*1.20*	*1.25*	*1.21*	*1.27*	*1.25*	*1.30*	--	*103*	*2*	*1*
	relative to EU	*103*	*103*	*99*	*102*	*100*	*103*	--			
2.3	*Share of med-high/high-tech R&D*	*89.5*	*90.7*	*90.6*	*91.1*	--	--	--	*102*	*1*	--
	relative to EU	*101*	*102*	*102*	*102*	--	--	--			
2.4	*Enterprises receiving public funding*			*3.8*					*46*	--	--
2.5	*Business financed university R&D*	*7.3*	*7.3*	*7.1*	*6.2*	*5.8*	*5.6*	--	*89*	*-10*	*1*
	relative to EU	*114*	*111*	*109*	*92*	*89*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*22.4*		--			*86*	--	--
3.2	*Innovative SMEs co-operating with others*			*7.2*		--			*79*	--	--
3.3	*Innovation expenditures*			*1.61*		--			*89*	--	--
3.4	*Early-stage venture capital*	*0.012*	*0.017*	*0.061*	*0.081*	*0.047*	*0.038*	--	*150*	*-16*	*-28*
	relative to EU	--	*57*	*108*	*134*	*127*	*150*	--			
3.5	*ICT expenditures*	--	--	*7.6*	*7.4*	*8.6*	*8.0*	*7.9*	*125*	*0*	*7*
	relative to EU	--	--	*117*	*117*	*130*	*125*	*125*			
3.6	*SMEs using non-technological change*			--					--	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.72*	*4.18*	*4.36*	*4.76*	*4.46*	*4.40*	--	*138*	*0*	*0*
	relative to EU	--	--	*142*	*145*	*138*	*138*	--			
4.2	*Exports of high technology products*	*23.2*	*24.4*	*25.4*	*26.4*	*25.5*	*21.0*	--	*118*	*-9*	*-6*
	relative to EU	--	*124*	*123*	*129*	*140*	*118*	--			
4.3	*Sales new-to-market products*			*1.7*		--			*29*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*16.7*		--			*139*	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*7.76*	*7.60*	*7.33*	*7.17*	*6.71*	*6.27*	--	*95*	*-8*	*-3*
	relative to EU	--	--	*105*	*103*	*98*	*95*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*101.0*	*111.2*	*128.4*	*138.4*	*128.7*	--	--	*96*	*6*	*5*
	relative to EU	*92*	*94*	*96*	*97*	*96*	--	--			
5.2	*New USPTO patents*	*59.1*	*60.7*	*61.9*	*66.5*	*64.5*	--	--	*90*	*3*	*6*
	relative to EU	*97*	*96*	*93*	*93*	*90*	--	--			
5.3	*New Triad patents*	*30.6*	*29.7*	*30.0*	--	--	--	--	*134*	*3*	*1*
	relative to EU	*133*	*133*	*134*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*97.7*	*104.3*	*105.8*	*121*	*4*	*16*
	relative to EU	--	--	--	--	*150*	*123*	*121*			
5.5	*New community designs*	--	--	--	--	--	*59.3*	*65.8*	*78*	--	--
	relative to EU	--	--	--	--	--	*87*	*78*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B.2 CANDIDATE AND ASSOCIATE COUNTRIES

B 2.1 BULGARIA

1. Introduction

The GDP per capita for Bulgaria, one of the acceding countries, has been growing in an accelerated trend it remains under the 1/3 level of the EU-25 at 30.8% (2004). The overall economic performance of the Bulgarian economy during the last 7 years has been very positive. While the investment promotion policy has been formulated and implemented aggressively since 2003, which yielded very positive results on the FDI inflows, the innovation promotion policy as an integral part of the enterprise policy has been somewhat underestimated. The innovation performance of the economy is supporting this thesis. For example, the R&D to GDP ratio has not improved much since 1996 and fluctuates around 0.5 percent. Further deterioration may be expected if the government policy does not support private expenditures on R&D, which are at a very low level (around 20 percent of the total R&D expenditures). The target is to reach 1% for GERD by 2010, as set out in the National Innovation Strategy. It is clearly observable that although the R&D in Bulgaria is expected to accelerate, by the 2013 the Bulgarian economy would be further lagging behind the Barcelona goal of 3 percent R&D to GDP.

Bulgaria ranks in 26th 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 increased slightly to 0.1% of GDP in 2003 from 0.09% in 2002. Exports of high technology products have increased from 1.7% in 1999 to 2.9% in 2003, but are still only at 16% of the EU average. IPR rates are extremely low.

2. Major challenges and policies

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. 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.

Extremely low levels of business expenditures on R&D (BERD)

The 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.

Insufficient effort to boost human potential for innovation through life-long learning

Innovation drivers in the form of an educated workforce are generally closer to the EU25 performance with the notable exception of life-long learning which is only at 13% of the European average. Equally although tertiary education rates are reasonable, the importance of the share of science & engineering graduates reaches only 70% of the EU25 position (although this indicator is rather volatile it seems likely that this figure of 70% reflects reality). Moreover, the life-long learning indicator shows no signs of improving. The recent Commission progress report noted that the functioning of the labour market continues to be hampered by low regional mobility of the workforce and skills mismatches, due to persistent labour market rigidities and an education and training system which is ill-adapted to labour market needs and does not adequately provide for continuous updating of skills through life-long learning.
From an innovation policy perspective, the labour

market rigidities limit the potential for the creation and growth of new innovative enterprises, while the weak life-long learning system hinders the diffusion of new technologies and innovation management skills necessary for improved productivity.

An industrial structure with low and declining med-hi-tech manufacturing employment (BERD) and weak rates of high-tech exports.

Bulgaria's performance on these 'application' indicators are symptoms of barriers in the national innovation system (such as the lack of venture capital or tax incentives for innovative enterprises) to the creation and growth of new technology based firms. Yet diversification and structural change in the industrial and service sectors is vital if Bulgaria is to sustain longer-run growth. Aside from the aforementioned NIF, several other instruments exist aimed at promoting innovative enterprises including the European Virtual Incubator (BG 10) which addresses the start-up of technology based companies, and the Guarantee Fund for Micro Crediting (BG 03) will help SMEs with absorption of technologies and the start-up of technology-based companies.

3. Policy learning

3.1 Governance

The national structures for policymaking and implementation are relatively new and inexperienced, because the clear separation between the two processes was made in Bulgaria in 2004 when the state agencies (reporting directly to the Council of Ministers) turned to executive agencies (reporting to a respective ministry). Thus the policymaking process remained within ministries, where new directorates were formed for the sake of policymaking, while implementation went to the executive agencies. In general the policy measures are designed either by the ministries or by the parliamentary commission for economic policy. The Council for Economic Growth (CEG) serves as a consultative platform for policy design, but it may be also interpreted as a quasi-law-making forum. CEG involves highly representative government officials as well as highly representative business associations. Because the policy design process is very slow, it can be concluded that there are no systematic efforts to gain all the stakeholders' input to the design of policy measures. It is rather done on an ad-hoc basis.

Even of Bulgarian innovation governance system is currently better developed in terms of structure, better established in terms of legislation and better coordinated than it was just a few years ago but the innovation governance system (IGS) is not performing very well. The weaknesses of the IGS are centered on several major hindrances for better innovation performance. First of all, there are still weak horizontal and vertical mechanisms for coordination of the main stakeholders. Secondly, the increasing resources for innovation are far from being sufficient. Thirdly, there is a very weak political will to fill in one of the major gaps in the rapidly developing Bulgarian financial system – the one with the venture enterprises. In general, the slow lawmaking process is impeding the potential of the economy for a faster development. There are also some institutional design options, which are not on the political agenda but could rapidly improve the financing of innovation.

The national innovation governance system is more a set of nice intentions than a network of adequately working institutions with the sufficient administrative powers, financial resources and human capacity to interact proactively and support innovation. It may be expected that within the next few years at least the governance of the innovation system, if not innovative performance, would be significantly improved.

3.2 Recent policy trends

A coherent policy mix in favour of innovation in Bulgaria is still more of an expectation than of a reality. The National Innovation Strategy presents only a good framework for development of such a policy mix, but the real encouragement measures are laid in the future. Much has been set for implementation in 2005 by various institutions and although institutions are working on each of the measures, the real progress has been achieved only as concerning the National Innovation Fund (NIF) measure (BG 15), which has been brought out of the pipeline. Having in mind the elections (June 2005), the electoral dispositions and the low inclination for policy coherence between the various governments, it is very probable that implementation of the measures set out in the Innovation Strategy is delayed.

Measures for encouraging innovation exist in Bulgaria although still limited, their level of financing is increasing. The government envisages increasing the financing for the NIF from BGN 5mln. in 2005 to BNG 101mln. in 2013. It can be inferred that these resources are proposed to increase by more than 2 000 percent, using the sums for the start year of 2005 as a base. However, these funds are not still granted to the NIF and these objectives remain only good intentions. In Bulgaria the explicitly set measures in favour of innovation, along with the appropriate finance, are still relatively new additions to the overall policy mix. In this context the new measures

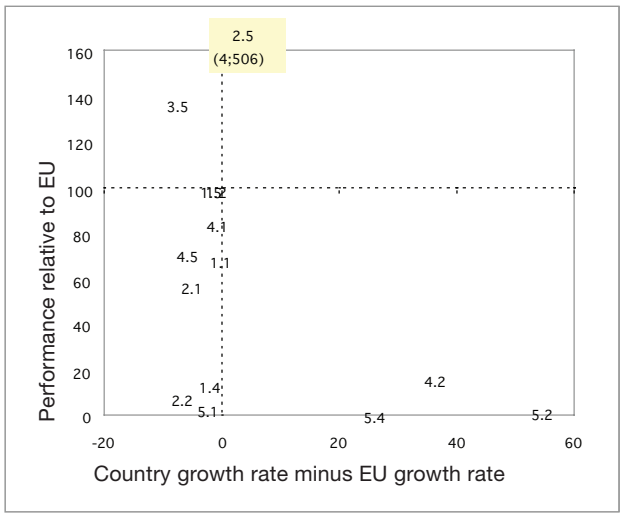
try to fill the missing categories of measures rather than shift from one measure to another.

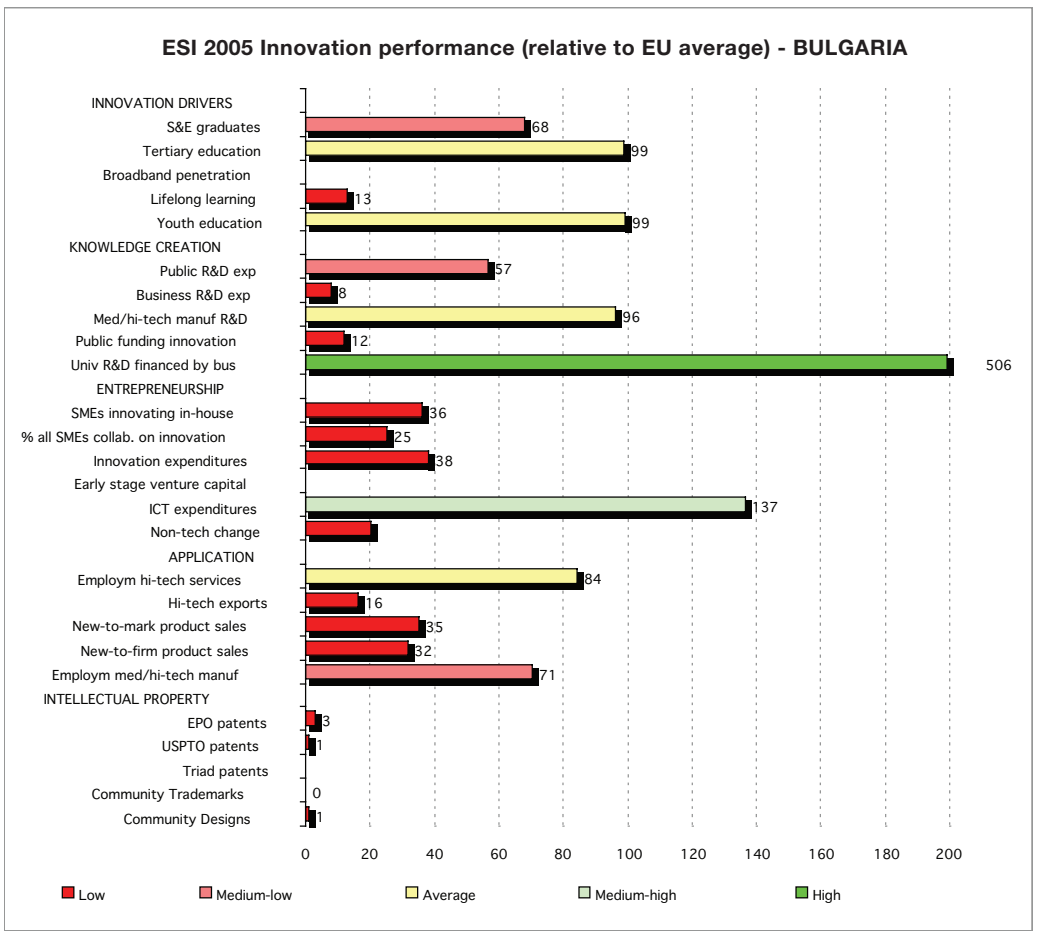
4. Possible orientation for future actions

The targets are clear but too general and the extent to which targets are met is unsatisfactory. There is clear deficit in the innovation governance system which needs to be more efficient, but most important of all those measures that are already on the table needs to be implemented together with the need financing.

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.

BULGARIA - EIS 2005 results





Indicator quality concerns:

No known.

	BULGARIA					(2003)	(2004)	2005		Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.24*	*0.25*	*0.24*			*-0.7*	*0.0*
	relative to EU	--	--	--	--	*57*	*58*	*56*				
	rank	--	--	--	--	*26*	*26*	*26*				
		1998	1999	2000	2001	2002	2003	2004				
	INPUT - Innovation drivers											
1.1	*S&E graduates*	*5.5*	*6.5*	*6.6*	*7.9*	*11.7*	*8.3*	--		*68*	*9*	*9*
	relative to EU	--	*69*	*65*	*72*	*103*	*68*	--				
1.2	*Population with tertiary education*	--	--	*18.2*	*21.3*	*21.2*	*21.3*	*21.7*		*99*	*4*	*4*
	relative to EU	--	--	*91*	*106*	*104*	*100*	*99*				
1.3	*Broadband penetration rate*	--	--	--	--	--	--	--		--	--	*50*
	relative to EU	--	--	--	--	--	--	--				
1.4	*Participation in life-long learning*	--	--	--	*1.4*	*1.3*	*1.4*	*1.3*		*13*	*-2*	--
	relative to EU	--	--	--	*18*	*16*	**15**	*13*				
1.5	*Youth education attainment level*	--	--	*74.9*	**78.2**	*77.5*	*75.6*	*76.0*		*99*	*-1*	*0*
	relative to EU	--	--	*98*	**103**	*101*	*99*	*99*				
	INPUT - Knowledge creation											
2.1	*Public R&D expenditures*	*0.46*	*0.45*	*0.41*	*0.37*	*0.40*	*0.39*	--		*57*	*-2*	*2*
	relative to EU	*70*	*69*	*62*	*55*	*59*	*57*	--				
2.2	*Business R&D expenditures*	*0.11*	*0.12*	*0.11*	*0.10*	*0.09*	*0.10*	--		*8*	*-5*	*1*
	relative to EU	*9*	*10*	*9*	*8*	*7*	*8*	--				
2.3	*Share of med-high/high-tech R&D*	--	*61.8*	*78.0*	*80.3*	*85.9*	--	--		*96*	*11*	--
	relative to EU	--	*69*	*87*	*90*	*96*	--	--				
2.4	*Enterprises receiving public funding*			*1.0*						*12*	--	--
2.5	*Business financed university R&D*	*25.5*	*27.2*	*30.8*	*27.0*	*33.2*	*31.4*	--		*506*	*5*	*1*
	relative to EU	*399*	*416*	*471*	*402*	*506*	--	--				
	INPUT - Innovation & entrepre-neurship											
3.1	*SMEs innovating in-house*			*9.4*		--				*36*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*2.3*		--				*25*	--	--
3.3	*Innovation expenditures*			*0.69*		--				*38*	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--		--	--	*-28*
	relative to EU	--	--	--	--	--	--	--				
3.5	*ICT expenditures*	--	--	*8.7*	*8.5*	--	--	*8.6*		*137*	*0*	*7*
	relative to EU	--	--	*134*	*135*	--	--	*137*				
3.6	*SMEs using non-technological change*			*8.5*						*20*	--	--
	OUTPUT - Application											
4.1	*Employment in high-tech services*	--	--	*2.51*	**2.71**	*2.66*	*2.69*	--		*84*	*0*	*0*
	relative to EU	--	--	--	*82*	*82*	*84*	--				
4.2	*Exports of high technology products*	--	*1.7*	*1.6*	*1.8*	*2.6*	*2.9*	--		*16*	*31*	*-6*
	relative to EU	--	*9*	*8*	*9*	*14*	*16*	--				
4.3	*Sales new-to-market products*			*2.1*		--				*35*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*3.8*		--				*32*	--	--
4.5	*Med-hi/high-tech manufacturing employ-ment*	--	--	*5.61*	**5.50**	*5.33*	*4.66*	--		*71*	*-8*	*-3*
	relative to EU	--	--	--	*79*	*78*	*71*	--				
	OUTPUT - Intellectual property											
5.1	*New EPO patents*	*3.1*	*3.0*	*4.2*	*2.6*	*3.7*	--	--		*3*	*3*	*5*
	relative to EU	*3*	*3*	*3*	*2*	*3*	--	--				
5.2	*New USPTO patents*	*0.2*	*0.5*	*0.2*	*0.6*	*0.8*	--	--		*1*	*61*	*6*
	relative to EU	*0*	*1*	*0*	*1*	*1*	--	--				
5.3	*New Triad patents*	--	--	--	--	--	--	--		--	--	*1*
	relative to EU	--	--	--	--	--	--	--				
5.4	*New community trademarks*	--	--	--	--	*0.1*	*0.6*	*0.3*		*0*	*42*	*16*
	relative to EU	--	--	--	--	*0*	*1*	*0*				
5.5	*New community designs*	--	--	--	--	--	--	*0.9*		*1*	--	--

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 2.2 ICELAND

1. Introduction

Iceland's economic performance has improved significantly over the past decade. This trend can partly attributed to the shift in policy towards financial stability and market liberalisation during the 1990s. Average GDP growth has slightly fallen from 5.7% in 2000 (average between 1995-2000 of 5.1%) to 3.8% in 2004 (EU-25 average 0.9%). Iceland invests heavily in biotechnology and the hydrogen economy. The former is largely funded from external sources and partly explains Iceland's excellent performance on R&D.

In terms of innovation performance based on the 2004 European Innovation Scoreboard (EIS) indicators Iceland is strongly moving ahead in the major trend indicators and performs well above EU-average in the summary innovation index (SII). It ranks 13th out of 33 countries. Some of the remarkable performance areas are public R&D expenditures (the 3% Barcelona target was achieved already in 2001), one of the highest business R&D expenditures as well as life long learning, where Iceland is only surpassed by Sweden. The country has above average performance in all three categories of innovation inputs but below average performance in both output categories (IPR and application). One of the areas requiring further attention is the number of S&T graduates and the level of innovation expenditures by firms.

Relatively low level of innovation expenditures by firms and below average IPR performance is a consequence of the Icelandic industry structure dominated by low R&D intensive SMEs in services sector and fisheries as well as predominance of technology adopters among innovative companies. Iceland's innovation performance is to a large extent determined by two large multinationals: one produces significant share of USPTO patents, the other accounts for half of business R&D expenditure.

The trend results for Iceland are excellent for all but one indicator, i.e. new triad patents, which falls below the EU25 trend average. Trend growth is particularly good for business R&D, the share of university R&D financed by the business sector, exports of high technology products, although from a very low base, and employment in medium-high and high tech manufacturing, again from a very low base.

2. Major challenges and policies

Limited supply of human resources for innovation

As mentioned, Iceland invests in biotech and the hydrogen economy. In order to be competitive in these two highly advanced sectors in the long-term, the country has to ensure sufficient supply of new S&E graduates (currently at 81% of the EU average) and improve youth education attainment levels (70% of the EU average). Otherwise, future developments in these two areas will have to rely on attracting foreign researchers and highly-skilled labour.

The problem has been recognised by the government. One of the national objectives for innovation gives an increased weight to research training of young scientists in an internationally competitive environment. The measure «Increasing the number of students in Science and Engineering programmes» (IS 26) aims at increasing youth's interest in pursuing courses and careers in engineering, science and technology. The Minister of Education, Science and Culture appointed a working group with a task of e.g. proposing ways to stimulate interest among primary and secondary school students in university courses that involve research; looking for ways to increase the diversity and quality of science teaching material in primary and secondary schools; evaluating the quality of curricula, teaching methods and facilities for science teaching in primary and secondary schools.

Low employment in medium and high tech manufacturing

Although Iceland is catching up very fast in this area, it remains far below EU average (30% of EU average). The government took a number of initiatives to address this challenge. Relevant new measures include e.g. Fund for Graduate Training (IS 20), New Business Venture Fund (IS 4), Programme on nanotechnology and -science and post-genomic biomedicine (IS 28) and Impra innovation centre (IS 15).

Limited awareness on the importance of protecting IPR

Innovation outputs as measured by intellectual property indicators do not reflect investments in R&D. Iceland is below EU average as regards all EIS IPR indicators. In November 2004, Iceland signed WIPO Patent Cooperation Treaty (PCT). During this process, the Icelandic Patent Office has become a European PatLib centre. It is expected that introduction of the new legislative framework will contribute to raising awareness on IPR among Icelandic companies.

3. Policy learning

3.1 Governance

Iceland's innovation policy framework and national innovation system were substantially restructured at the beginning of the 1990s as a result of several external and internal developments e.g. OECD evaluation of S&T policy in early 1980s and evaluation of the environment for innovation and entrepreneurship in early 1990s. The process continued in 2003 when the Science and Technology Policy Council (STPC) was established.

Establishment of STPC was an important step ahead as one of the weaknesses of the Icelandic innovation system is limited systematic interaction among organisations and institutions. With innovation now becoming an inter-ministerial issue, the STPC is expected to have a major influence on the innovation system coordination – fragmentation is still seen as one the weaknesses of the system.

Another response to the perceived weaknesses is merging research institutions. There are currently five mergers involving universities as well as smaller research institutes. One of the mergers involves four institutions dealing with agricultural issues, which will then form together the 'Agricultural University'.

3.2 Recent policy trends

The latest steps in national innovation policies came with a new legislation of science and technology policy and the funding of RTD, which was enacted by the Parliament in January 2003. This encompasses three individual laws on the STPC, on public support to scientific research as well as on public support to technology development and innovation.

In 2005 one new research programme was launched and its focus does not come to much surprise. It is dedicated to 'Nanotechnology and Nanoscience and post-genomic biomedicine'. Financially, there is a bias favouring the biomedicine part. This is easy to grasp given that one of the two large companies in Iceland are focusing on genomic research. This programme may help establishing a knowledge cluster in the area of biomedicine. It can also be useful in order to tap knowledge from the given company and obtain positive spill-over to the Icelandic research scene as well as the economy.

4. Possible orientation for future actions

Based on analysis of EIS indicators and revealed trends as well as in reference to existing policy strategic documents the following policy recommendations could be put forward:

Implement long term programs aimed at increasing numbers of S&E graduates

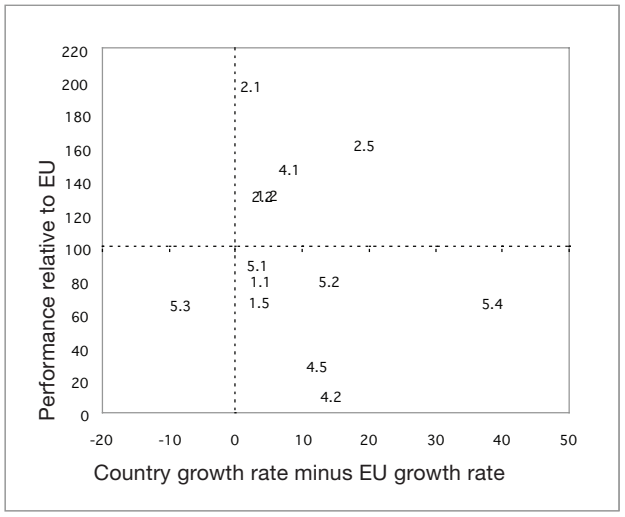
- *Adapt S&E academic programs to market realities with a focus on future Iceland's strategic development priorities (select and focus key fields e.g. biotechnology, biomedicine, and hydrogen research)*
- *Support professional traineeship and employment schemes for S&E graduates*
- *Create incentives for high-school students planning to study at S&E faculties, e.g. grant schemes, loans etc.*
- *Provide incentives to attract outstanding foreign S&E graduate and post-graduate students as well as researchers and scientists.*

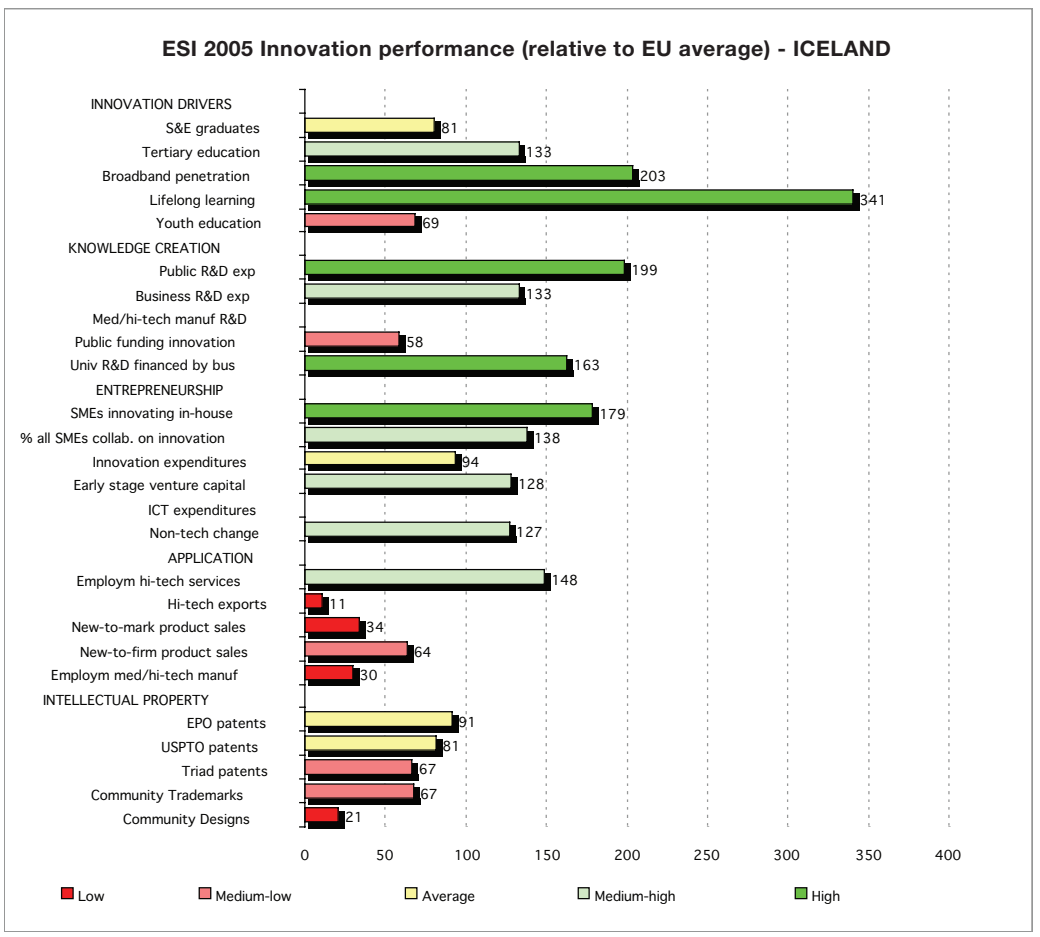
Continue with measures encouraging higher employment in medium and high tech technology sectors

- *Continue with cross-sectoral and sector specific measures encouraging creation of high tech start-ups and spin-offs*
- *Coordinate these measures with actions focusing on increasing numbers of S&E graduates (see above)*

Implement measures to raise awareness on IPR procedures and benefits among SMEs

ICELAND - EIS 2005 results





Indicator quality concerns:

The new-to-firm and new-to-market sales shares are surprisingly low for a developed economy with a high standard of living

	ICELAND					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.42*	*0.44*	*0.45*		*4.0*	*0.0*
	relative to EU	--	--	--	--	*98*	*104*	*106*			
	rank	--	--	--	--	*15*	*13*	*13*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*7.0*	*6.3*	*8.4*	*9.1*	*9.2*	--	--	*81*	*13*	*9*
	relative to EU	--	*67*	*82*	*83*	*81*	--	--			
1.2	*Population with tertiary education*	--	*22.0*	*23.7*	*23.9*	*25.7*	*28.7*	*29.2*	*133*	*9*	*4*
	relative to EU	--	--	*119*	*119*	*126*	*135*	*133*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*15.5*	*203*	--	*50*
	relative to EU	--	--	--	--	--	--	*203*			
1.4	*Participation in life-long learning*	*19.3*	*20.2*	*23.5*	*23.5*	*24.0*	*31.7*	--	*341*	--	--
	relative to EU	--	--	*297*	*297*	*300*	**341**	--			
1.5	*Youth education attainment level*	--	*45.4*	*49.4*	*49.4*	*51.1*	*52.6*	*53.9*	*69*	*4*	*0*
	relative to EU	--	*61*	*65*	*65*	*67*	*69*	*70*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*1.31*	*1.28*	*1.20*	*1.27*	*1.34*	*1.37*	--	*199*	*5*	*2*
	relative to EU	*198*	*197*	*182*	*190*	*197*	*199*	--			
2.2	*Business R&D expenditures*	*0.76*	*1.11*	*1.56*	*1.81*	*1.80*	*1.67*	--	*133*	*6*	*1*
	relative to EU	*66*	*92*	*128*	*145*	*144*	*133*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	--	--	--	--	--	--	--	--
	relative to EU	--	--	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			*4.8*					*58*	--	--
2.5	*Business financed university R&D*	*9.2*	*4.0*	--	*10.9*	--	--	--	*163*	*21*	*1*
	relative to EU	*144*	*61*	--	*163*	--		--			
	INPUT - Innovation & entre-preneurship										
3.1	*SMEs innovating in-house*			*46.5*		--			*179*	--	--
3.2	*Innovative SMEs co-operating with others*			*12.6*		--			*138*	--	--
3.3	*Innovation expenditures*			*1.70*		--			*94*	--	--
3.4	*Early-stage venture capital*	--	--	*0.294*	*0.236*	*0.048*	--	--	*128*	--	*-28*
	relative to EU	--	--	*519*	*393*	*128*	--	--			
3.5	*ICT expenditures*	--	--	--	--	--	--	--	--	--	*7*
	relative to EU	--	--	--	--	--	--	--			
3.6	*SMEs using non-technological change*			*54.0*					*127*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.90*	*3.99*	*4.41*	*5.50*	*4.81*	--	--	*148*	*8*	*0*
	relative to EU	--	--	*143*	*167*	*148*	--	--			
4.2	*Exports of high technology products*	*1.9*	*2.1*	*1.7*	*1.3*	*1.7*	*2.0*	--	*11*	*8*	*-6*
	relative to EU	--	*11*	*8*	*6*	*9*	*11*	--			
4.3	*Sales new-to-market products*			*2.0*		--			*34*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*7.7*		--			*64*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*1.94*	*1.59*	*1.49*	*1.74*	*2.02*	--	--	*30*	*10*	*-3*
	relative to EU	--	--	*21*	*25*	*30*	--	--			
	OUTPUT - Intellectual prop-erty										
5.1	*New EPO patents*	*84.8*	*109.6*	*114.0*	*117.9*	*121.8*	--	--	*91*	*9*	*5*
	relative to EU	*78*	*93*	*85*	*83*	*91*	--	--			
5.2	*New USPTO patents*	*23.9*	*36.9*	*59.3*	*70.1*	*58.0*	--	--	*81*	*20*	*6*
	relative to EU	*39*	*59*	*89*	*98*	*81*	--	--			
5.3	*New Triad patents*	*13.5*	*17.1*	*14.9*	--	--	--	--	*67*	*-7*	*1*
	relative to EU	*59*	*77*	*67*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*24.6*	*17.4*	*58.7*	*67*	*55*	*16*
	relative to EU	--	--	--	--	*38*	*20*	*67*			
5.5	*New community designs*	--	--	--	--	--	*7.0*	*17.3*	*21*	--	--
	relative to EU	--	--	--	--	--	*10*	*21*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 2.3 ISRAEL

1. Introduction

Israel's economy grew strongly in 2004 and after 30 years of investment and development, the Israeli high-tech industry (employing 130,000) has made very significant achievements, compared to other countries. It is now recognized that most of Israel's economic growth can be attributed to growth in the high-tech sectors. This situation is neither balanced nor ideal.

Although there are no EIS statistics available to compare Israel to the European countries, a number of international comparisons demonstrate a healthy technological sector combined with some structural imbalances:

- *National spending on civilian R&D is the highest in the world, at 4.8% of GDP and 78% of Israel's R&D spending is in the business sector.*
- *In terms of venture capital raising Israel is just behind California and Massachusetts, and ahead of any European country; 11% of VC fund investments went to the seed stage; and 28% to the early stage.*
- *Israel occupied 19th place in the global competitiveness rankings.*

A recent OECD report found a very significant 1 in 12 Israelis now employed in high-tech industries. Yet most of this employment is in the central region of Israel. It is essential to create employment opportunities in high-tech all over the country, and for all sectors of the population.

2. Major challenges and policies

The following challenges appear to be the most relevant ones:

- Innovation expenditure

Innovation expenditure is high in Israel from high-tech companies benefiting from high venture capital support. But innovation expenditure in traditional sectors is low and there is an inherent policy risk in neglecting the low-tech end of the production. Maintaining and increasing budgetary appropriations for support of innovation (as part of a re-orientation of Government Priorities) is hence very important. The demand for funds from the Office of Chief Scientist (OCS) already far exceeds supply. This has always been the case, due to OCS selectivity, but the gap has widened very significantly since 2000, with only approximately 1 in 6 projects receiving OCS funding in 2004. Adequate budgets must also be appropriated for several years in advance to avoid constant budgetary fluctuations, uncertainty and occasional controversy.

- University reform

The university system is quite strong with about 1% of total publications worldwide, very strong scientific links with leading universities around the world and significant revenues from out-licensing university research-based knowledge (at some Universities e.g. Hebrew University and Weizmann Institute). Apparently there is a favourable 'transfer of technology' environment. Some of the OCS programs, in particular Magnet, involve support for university R&D as part of Industry-University development of generic technologies.

However, there is a general perception of a need to modernize the universities and accomplish a reform that will allow them to remain at the front end of research internationally, but also reinforce their cooperation with - and role for – the traditional companies in Israel.

- Governance and policy capabilities

Because of other priorities a broad and encompassing innovation policy has never been an explicit target of the Israeli government. A Strategic Level of Policy Making is both lacking and needed. Two areas that are expected for improving innovation governance are:

- *Creating Strategic ITP capabilities to systematically set new priorities which take into account changes in the internal and external environments;*
- *Designing & implementing new programs and institutional changes.*

Developing new modes of government support for innovation are important for sustaining the momentum of the previous year.

3. Policy learning

3.1 Governance

Generally, policy-making and evaluation practices in Israel are fairly unsystematic and lack a clear methodology. Notwithstanding, it is well-known that Israel is one of three countries (together with Finland and Korea) in which government policy has been very successful in catalyzing the establishment of world class high-tech industries. But important challenges remain:

- *very large degree of control by the Ministry of Finance over the size of the OCS budget,*
- *Israel lacks a supra-Ministerial mechanism for the formulation of long term innovation strategy.*

3.2 Recent policy trends

This year there was an amendment of the basic Israeli R&D law, the 1984 Law for the Encouragement of Research & Development in Industry, in March 2005. It had been prohibited to remove know-how developed with the assistance of the Chief Scientist from Israel. After the amendment, companies may request the OCS's permission to transfer know-how abroad, and procedures have been put in place to address multiple scenarios.

New policy measures refer to:

- *the reform of the primary and secondary education system is underway (the Dovrat commission),*
- *the Israeli biotechnology incubator was established in Jerusalem,*
- *the government established new bilateral industrial R&D co-operation agreements with: the State of New York (USA); the State of Maryland (USA); and the State of Victoria (Australia),*
- *the government established a bilateral R&D fund with IBM and another with Alcatel,*
- *the OCS established 3 new consortia comprising industrial companies and academia, under the Magnet pre-competitive R&D program,*
- *the government established several new programs for SMEs and traditional industry under/with the Nitsos program,*
- *Tamir: The OCS launched a new program to support and encourage the transfer of industrial R&D projects from foreign multinationals to their Israeli based subsidiaries, with a view to increasing manufacturing later in Israel,*
- *the OCS invested € 21 million in a Nanotechnology Fund, together with the Technion and philanthropists, to support the development of the nanotechnology industry in Israel,*
- *the government is planning to establish a private equity fund to support traditional industries,*
- *negotiations are underway with the US regarding intellectual property regulations affecting innovation and R&D in the pharmaceutical industry.*

4. Possible orientation for future actions

Israel is a mixed country with spectacularly good performance in the high-tech sector and in scientific achievements but with moderate success in the traditional sectors of the economy. The success can be much more attributed to the private sector than to systematic and coherent policy intervention.

As competition pressures increase it is critical that innovation and productivity growth be brought to the 85% of the economy which is not high-tech. This must be designated as a strategic priority, and financial means must be assured to start addressing this issue.

In addition, it is important to make innovation policy more explicit and improve governance in the sense of better and more explicit co-operation among public bodies, more consultation with stakeholders and last but not least better statistical coverage and utilisation of benchmarking and evaluation tools.

B 2.4 NORWAY

1. Introduction

The current macroeconomic performance of Norway is outstanding. The country has one of the world's highest per capita GDP. The oil and gas sector provides a solid contribution to this macroeconomic success, but also other sectors, such as manufacturing and private and public services perform very well. The overall economic situation was recognised by the international competitiveness rankings; The Global Competitiveness report for 2004-2005 ranked Norway as the sixth most competitive economy in the world.

There is a contrast between the present economic performance and innovation performance, as measured by the European Innovation Scoreboard (EIS), where Norway ranks 16th out of 33 countries. Apart from the indicator of lifelong learning, tertiary education, the use of Internet, SME innovation cooperation and to a lesser extent early stage venture capital and employment in high tech services, all other innovation indicators for Norway are at or below EU25 average, most notably S&E graduates (76%), business R&D expenditure (87%) and innovation expenditures (65%). Norway's best performance is in innovation drivers, with all indicators but the supply of S&E graduates well above EU average. Most of the indicators for knowledge creation are below EU average.

There are many potential explanations for this discrepancy between high macroeconomic and relatively low innovation performance. The Norwegian economy is characterised by large shares of GDP originating from low-tech or medium low-tech manufacturing, oil and gas, services and fisheries. The low business R&D investments as a percentage of GDP is partly a reflection of the Norwegian industrial structure characterised by a very large number of SMEs operating in sectors with low R&D intensity. The country has few large high-tech "locomotives". However, low or medium tech sectors also invest in innovation through acquiring new technology from other firms or from investment in ICT. In this respect the low performance of Norway on total innovation expenditures (65% of the EU average) is puzzling. If accurate, this could suggest under investment at the time the data was collected. Another aspect not captured in EIS is the fact that Norwegian industry is best at process innovations that are not included in EIS. Process innovation may be equally or even more profitable in oil and gas, metals etc. compared to new to firm or new to market products.

2. Major challenges and policies

The following challenges have been identified in the 2005 Trend Chart analysis.

Below average business investment in R&D and innovation

Business R&D expenditures were at 87% of EU average, but trend is generally positive. The increase may be due to the general upturn in the economy, but the public tax incentive SkatteFUNN (NO 33) may have had an effect. SkatteFUNN gives tax allowances for R&D investments leading to the development of new products, services or production processes. 20% of expenses for R&D projects in SMEs, and 18% in large companies, may be deducted. The actual impact of the measure has not yet been evaluated, but the measure has become very popular among companies and has already been considered a success by government.

Another relevant measure in this respect is the programme for user-initiated research (NO 02). The main objective of this measure is to increase industrial R&D. The underlying idea is that research carried out within the framework of publicly funded R&D programmes should be initiated, controlled and co-funded by companies in order to ensure industrial relevance. The programmes are moreover to contribute to closer cooperation between companies as well as between companies and research institutions. These programmes have seen substantial budget cuts in recent years, but the new white paper on research envisages increase in funding.

Relatively low public R&D funding

The Government recognised the problem of the relatively low level of public R&D investments in comparison to for example other Nordic countries. The recent white paper on research envisages an increase in total R&D expenditures to 3% of GDP by 2010. In fact public investments in R&D have been increased significantly over last years (0.82% in 2003, while the target for 2010 is 1%). The Government proposed to increase the capital of the Fund for Research and Innovation to € 6 billion (NOK 50 billion) from 1 January 2006. With increased funding the priority will be given to e.g. internationalisation, basic research and investments in research-based innovation and business development.

Insufficient levels of new S&E graduates

The number of new S&E graduates was below the EU-averages reaching a level of 76% of EU average.

In terms of relative performance to the EU25, Norway is catching up in this area. The Government is taking the low number of S&E graduates seriously; the issue is visible in debates and policy documents e.g. latest white paper on research («Commitment to research»). Many possible plans and ideas for concrete measures are currently discussed, e.g. special student loans for students who decide to become teachers in science and mathematics, granting students extra credits for scientific disciplines and engineering etc. However, up to now, no new specific measure was introduced to deal with this issue.

Below average university R&D financed by industry

The indicator for business financed university R&D is at 87% of EU average. This may suggest weak linkages in innovation system, especially underdeveloped science-industry relations. The Norwegian innovation policy mix is driven by innovation system perspective and offers several measures targeting interaction and cooperation between companies, research institutions and/or other actors. These include well-established programmes such as IFU and OFU contracts (NO 01), programmes for user initiated research (NO 02), MOBI (NO 30), ARENA (NO 32) and value creation 2010 (NO 28) and the initiatives Centres for research based innovation and Centres of Expertise which were introduced in 2005 and 2006 respectively. The Research-based brokering (NO 52) aims at strengthening collaboration between industry and research institutes. The programme is based on a network of competence brokers who mainly work in research institutes. Through this network, managers of companies with limited R&D activity can establish links to research institutes.

3. Policy learning

3.1 Governance

Norway has taken several significant steps towards a closer coordination of innovation policy related measures and strategies. By establishing Innovation Norway, the Government has managed to gather much of the non-R&D related innovation policy activities under one roof. The reorganisation of the Research Council of Norway and the establishment of a large Division for Innovation also reflect a stronger focus on innovation, as does the recent establishment of a department for research and innovation policy in the Ministry of Trade and Industry. However, the fact that R&D and non-R&D innovation policy measures are divided between the Research Council and Innovation Norway may be of concern. From the companies' perspective this is an artificial dividing line, and it may also encourage the development of more old-fashioned linear approaches to innovation policy. Nonetheless, the two institutions do cooperate. The regional offices of Innovation Norway, for instance, also represent the Research Council of Norway and its industry-oriented programmes.

Another aspect of innovation governance is the development of a comprehensive innovation policy gathering activities of direct or indirect relevance to company innovation under one strategy. The Norwegian innovation policy is, like the EU policies, based on a systemic, company-centred, approach to innovation, as opposed to a more linear, research-centred ideology.

The processes leading up to the recent publications of the white papers on research and regional policies illustrate the active involvement of stakeholders in the development of Norwegian innovation policies. In preparing their white papers, the Ministries of Education and Research and Local Government and Regional Development both made extensive use of input from various stakeholders.

3.2 Recent policy trends

There is a strong interest in innovation policies in Norway at the moment, both on the political level (party politics) and the policy level (in ministries and agencies). Moreover, this interest reflects a general understanding of innovation as a broad phenomenon, which encompasses more than research activities. In spring 2005, two white papers on research were published: «Commitment to research» and «On regional policy». Both define areas of strategic action and propose specific actions, which yet remain to be translated into actual measures. The white paper on research places strong emphasis on measures aimed at strengthening cooperation between research institutions and companies and at increasing industrial R&D in general. To enable Norway to become a leading research nation, the Government aims for an increase in the total investments in research to 3 per cent of GDP by 2010.

The Research Council of Norway is currently in the process of developing a new model for policy measures aimed at innovation. According to the new model, public support for innovation should primarily take the form of indirect measures with direct measures forming a supplement. The Norwegian innovation policy mix has traditionally had its basis in measures providing direct support for R&D and other innovation activities. When the indirect support scheme SkatteFUNN (NO 33) was introduced in 2001, it was seen as a supplement to the basic portfolio of direct measures. Now the Innovation

Division of the Research Council argues that SkatteFUNN should be the foundation for public R&D support, while the direct measures could "fill in the gaps"; indirect measures fail to reach certain groups of companies. This revision is well in-line with industry wishes. This is an innovative and risky approach. The evaluation of SkatteFUNN is now under way and it is not certain that it delivers the additionality expected by policy makers.

4. Possible orientation for future actions

Based on analysis of EIS indicators and revealed trends as well as in reference to existing policy strategic documents the following general policy recommendations could be put forward:

Increase public R&D expenditures

- *Notably in technologies supporting the restructuring and upgrading of traditionally strong Norwegian industries as well as emerging technologies.*

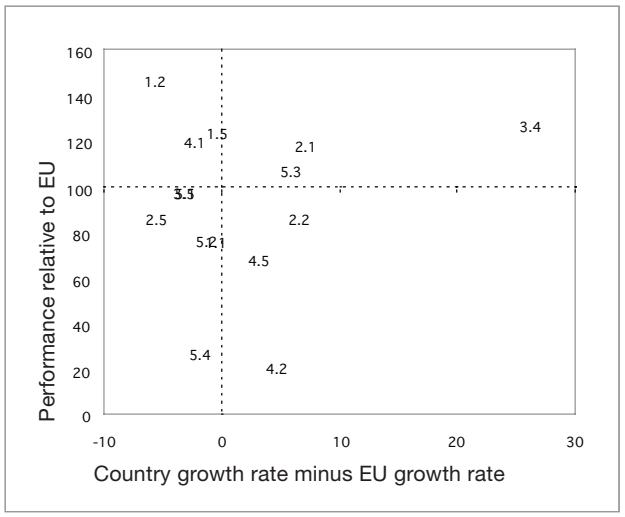
Implement measures aimed at increasing S&E graduates

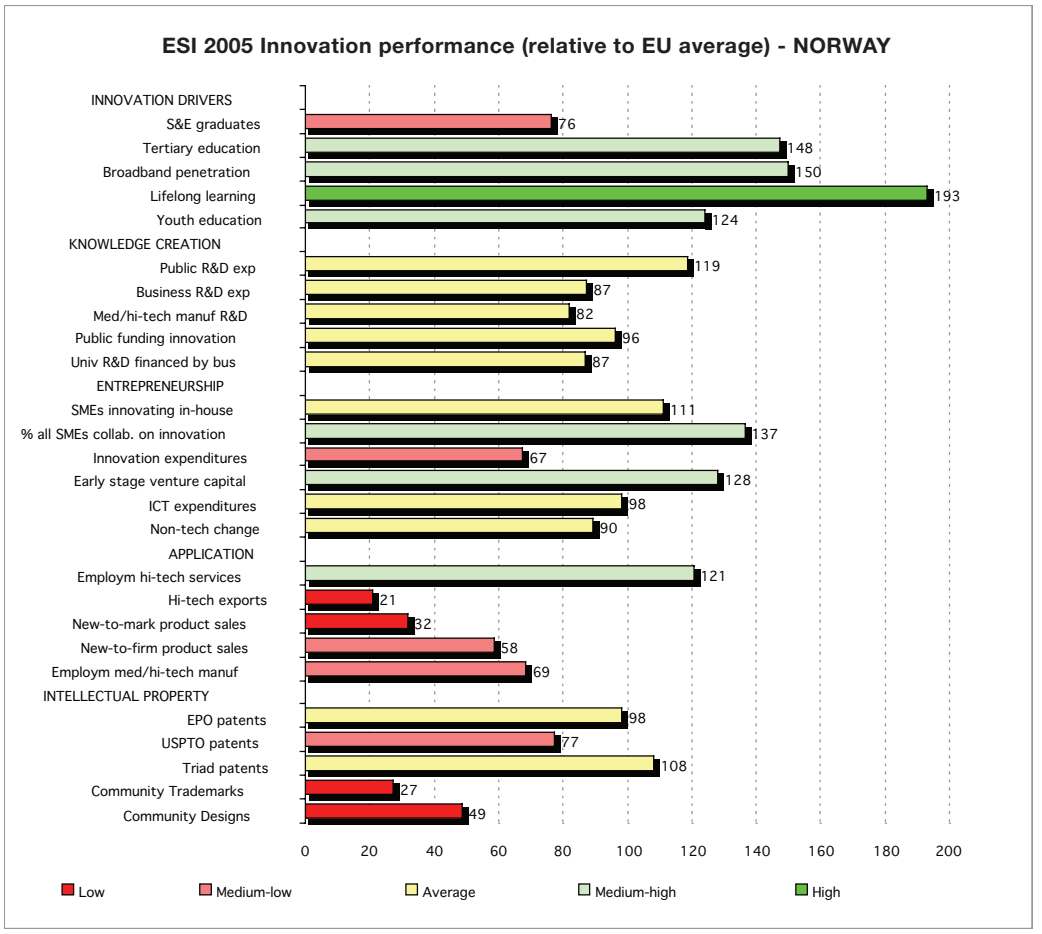
- *Adapt university curricula to market realities (in cooperation with industry)*
- *Support traineeship and employment schemes for S&E graduates*
- *Create incentives for high-school students planning to study at S&E faculties, e.g. grant schemes, loans etc.*
- *Provide incentives to attract foreign S&E graduate and post-graduate students and researchers.*

Consolidate and strengthen measures supporting networking, especially as regards science-industry relations

- *Encourage stronger cooperation between groups of SMEs (sectoral and cross-sectoral) with universities and research centres*
- *Consolidate and revisit funding levels of existing measures supporting joint science-industry R&D and innovation projects*

NORWAY - EIS 2005 results





Indicator quality concerns:

None known.

	NORWAY					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.40*	*0.40*	*0.40*		*0.3*	*0.0*
	relative to EU	--	--	--	--	*94*	*94*	*94*			
	rank	--	--	--	--	*16*	*16*	*16*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*7.5*	*7.2*	*7.9*	*8.6*	*7.7*	*9.3*	--	*76*	*8*	*9*
	relative to EU	--	*77*	*77*	*78*	*68*	*76*	--			
1.2	*Population with tertiary education*	*28.5*	*29.6*	*31.6*	*34.0*	*33.9*	*31.3*	*32.3*	*148*	*-1*	*4*
	relative to EU	--	--	*158*	*170*	*166*	*147*	*148*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*11.4*	*150*	--	*50*
	relative to EU	--	--	--	--	--	--	*150*			
1.4	*Participation in life-long learning*	--	--	*13.3*	*14.2*	*13.3*	**19.4**	*19.1*	*193*	--	--
	relative to EU	--	--	*168*	*180*	*166*	**209**	*193*			
1.5	*Youth education attainment level*	*93.4*	*94.4*	*95.1*	*96.1*	*94.9*	*93.3*	*95.3*	*124*	*0*	*0*
	relative to EU	--	*126*	*124*	*126*	*124*	*122*	*124*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	--	*0.73*	--	*0.64*	*0.71*	*0.82*	--	*119*	*9*	*2*
	relative to EU	--	*112*	--	*96*	*104*	*119*	--			
2.2	*Business R&D expenditures*	--	*0.92*	--	*0.96*	*0.96*	*1.10*	--	*87*	*8*	*1*
	relative to EU	--	*76*	--	*77*	*77*	*87*	--			
2.3	*Share of med-high/high-tech R&D*	*72.7*	--	--	--	--	--	--	*82*	--	--
	relative to EU	*82*	--	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			*8.0*					*96*	--	--
2.5	*Business financed university R&D*	--	*5.1*	--	*5.8*	--	*5.0*	--	*87*	*-4*	*1*
	relative to EU	--	*78*	--	*87*	--	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*28.8*		--			*111*	--	--
3.2	*Innovative SMEs co-operating with oth-ers*			*12.5*		--			*137*	--	--
3.3	*Innovation expenditures*			*1.22*		--			*67*	--	--
3.4	*Early-stage venture capital*	*0.006*	*0.015*	*0.039*	*0.046*	*0.035*	*0.032*	--	*128*	*-2*	*-28*
	relative to EU	--	*52*	*69*	*76*	*95*	*128*	--			
3.5	*ICT expenditures*	--	--	*5.4*	*5.7*	*6.1*	*6.2*	*6.2*	*98*	*4*	*7*
	relative to EU	--	--	*83*	*90*	*92*	*97*	*98*			
3.6	*SMEs using non-technological change*			*38.0*					*90*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*3.60*	*3.91*	*3.77*	*4.37*	*4.10*	*3.85*	--	*121*	*-2*	*0*
	relative to EU	--	--	*122*	*133*	*127*	*121*	--			
4.2	*Exports of high technology products*	*4.8*	*4.5*	*3.3*	*3.6*	*4.6*	*3.7*	--	*21*	*-1*	*-6*
	relative to EU	--	*23*	*16*	*18*	*25*	*21*	--			
4.3	*Sales new-to-market products*			*1.9*		--			*32*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*7.0*		--			*58*	--	--
4.5	*Med-hi/high-tech manufacturing em-ployment*	*5.05*	*4.75*	*4.48*	*4.18*	*4.59*	*4.53*	--	*69*	*1*	*-3*
	relative to EU	--	--	*64*	*60*	*67*	*69*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*118.1*	*121.5*	*136.2*	*156.1*	*131.3*	--	--	*98*	*2*	*5*
	relative to EU	*108*	*103*	*102*	*110*	*98*	--	--			
5.2	*New USPTO patents*	*44.0*	*51.0*	*55.2*	*59.0*	*55.1*	--	--	*77*	*5*	*6*
	relative to EU	*72*	*81*	*83*	*82*	*77*	--	--			
5.3	*New Triad patents*	*24.7*	*24.2*	*24.2*	--	--	--	--	*108*	*7*	*1*
	relative to EU	*108*	*109*	*108*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*18.4*	*38.1*	*23.9*	*27*	*14*	*16*
	relative to EU	--	--	--	--	*28*	*45*	*27*			
5.5	*New community designs*	--	--	--	--	--	*31.7*	*41.0*	*49*	--	--
	relative to EU	--	--	--	--	--	*46*	*49*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 2.5 ROMANIA

1. Introduction

Romania ranks second to last on the SII out of 33 countries. It falls in the 'catching–up' group of countries, characterised by SII values below average, but with an above average trend performance. Its worst performance is for IPRs, which is expectable given the low level of inputs. It performs very poorly on innovation drivers, knowledge creation and poorly on innovation & entrepreneurship and applications. Only two indicators are above the EU average: the percentage of SMEs that have introduced non-technical change and the new-to-market product sales. The country improves its performance and is catching up in most of the few indicators for which data is available, but this is partly due to its low initial position. Romania's best performance is for innovation drivers, where the supply of new S&E graduates has doubled between 1998 and 2003.

2. Major challenges and policies

Romania faces serious challenges in its effort to build a national innovation system. Resources are limited and the governance system is not yet put in place. Hence, while almost all areas need intervention, it is suggested to address most urgently:

SMEs innovate in house

Romanian SMEs innovating in-house are only 49% of the EU average and the country ranks 26th among all. The overall structure of the economy, as well as the traditional character and the size of national SMEs, explain the low share. In terms of company innovative profile, data shows an overwhelming majority of non-innovator firms (over 80%, the highest percentage of non-innovator firms among all countries examined), about 10% of intermittent innovator firms, about 3% of strategic innovator firms, and a very small percentage of adopter and modifier firms.

There are already some measures supporting company innovation, such as:

- *The multi-annual programmes for SMEs funded by the National Agency for SMEs and Co-operatives (NASMEC), established in 2003. In this context innovation is promoted through the national investment programme for newly-created enterprises and micro-enterprises, the national programme for small- and micro-enterprises' access to training and consultancy services (EMPRETEC) and possibly the automotive cluster promotion (RO 24)*
- *The TransIno Programme, with the purpose to encourage and promote technology transfer and innovation between R&D units, firms and universities (RO 23)*
- *INVENT Programme for stimulating invention application, which is a component of the National Research, Development and Innovation (RDI) Plan (RO 13).*

SMEs may also benefit from sectoral research programmes, depending on the way each of these programmes is implemented.

BERD

Business R&D expenditure is only 18% of the EU average putting Romania in the 25th rank among the countries studied. As in other CEECs this share has been constantly reducing over the past years because of the restructuring of the economy. There is an urgent need to reverse this trend and orient BERD towards applicable and commercialisable results.

Until now there were no specific measures addressing the increase of BERD. However, all the sectoral programmes, such as agro-food (RO 9), life-sciences (RO 12), transport (RO 11), energy and the environment (RO 10) aim i.a. at increasing the rates of expenditure on research and technological innovation in enterprises.

The stimulation of private sector involvement in R&D activities becomes now more explicit and is among the 2005-2008 priorities. Announced measures for implementation refer to:

- *Implementation of co-operation mechanisms between regional technology transfer centres, entrepreneurial management centres and business incubators to facilitate dissemination of information on research and innovation and technological transfer to economy, especially to SMEs;*
- *Evaluation of private sector RDI needs in order to facilitate thematic planning at national level;*
- *Consideration of RDI expenditure as fiscally deductible expenditure.*

Early stage VC

With 10% of the EU average Romania ranks 20th among the 23 countries for which this indicator is available. However, one should keep in mind that trend data for venture capital indicators have not been used as these data suffer from high year-to-year fluctuations and are considered to be less. It is nevertheless clear that venture capital is practically absent in the country and no specific measures have addressed this need as yet.

Measures announced under the 2005-2008 Gov-

erning Programme foresee the development of a National Risk Capital Fund for R&D and Innovation, initially based on state capital and further developed with private funds.

3. Policy learning

3.1 Governance

The governance system in Romania is in the process of being created, adopting general recommendations from international organisations and learning lessons from other European countries. The decentralisation of the decision-making system and the externalisation of the RDI management are important elements in this endeavour. Significant changes were undertaken during this period, of which the most relevant are:

- *The transformation of the former Research Department of the Ministry of Education and Research into the National Authority for Scientific Research in March 2005 (RO 31).*
- *The creation of the National Centre for Programme Management (RO 34) in order to co-ordinate and optimise the management of RDI programmes and projects. It currently manages three programmes of the National RDI Plan, i.e. CORINT (RO 8), BIOTECH (RO 15) and INFOSOC (RO 14).*
- *The adoption of new legislation regarding the functioning of regional development structures and their involvement in the management of structural funds (RO 35).*

However, significant further steps need to be undertaken to organise the involvement of stakeholders in all stages of the policy cycle as well as to assure the systematic adoption of modern tools, such as evaluation and benchmarking.

3.2 Recent policy trends

Innovation policy has only recently become a priority, after a long effort to restructure the research organisations and the productive sector. During the last year a broad number of measures were put in place in order to meet the national targets for innovation enhancement and comply with the Lisbon agenda in view of the accession negotiations:

- *Creation of two new funding instruments: 'Excellence Research' Programme (RO 28) in April 2005, and 'Research, techniques and security and defence systems-SECURITY' Programme (RO 29) in November 2004, the latter as a component of the National RDI Plan.*
- *Creation of the National Registry of Experts in Higher Education and Research (RO 30) in April 2005, comprising national and international experts who will make part of the consultative commissions and councils of the Ministry of Education and Research.*
- *Adoption of new legislation regarding implementation of the Sectoral R&D Plans (RO 32).*
- *Update of the National R&D Strategy (in August and November 2004) (RO 33), in view of justifying the 2005 state budget and in view of inclusion in the National Development Plan 2007- 2013.*

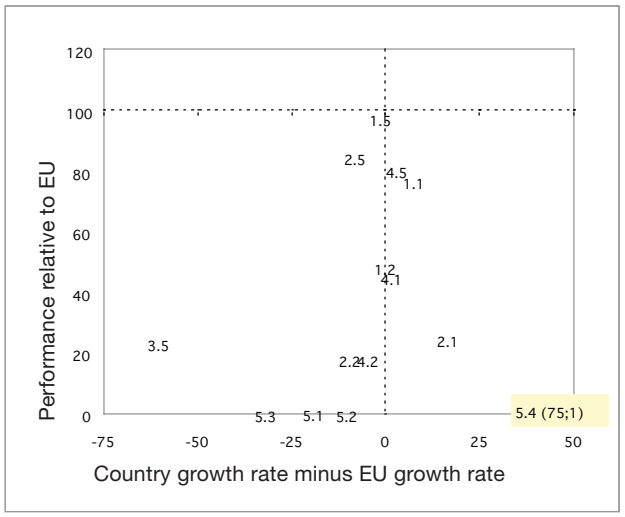
The formal evaluation of the National RDI Plan over 2001-2003 carried out by the Ministry of Education and Research in 2004 has shown positive evolutions of most indicators, due to improvements in the innovation legal framework, consolidation of the R&D system and slow-down of the brain drain. Nevertheless, much more remains to be done.

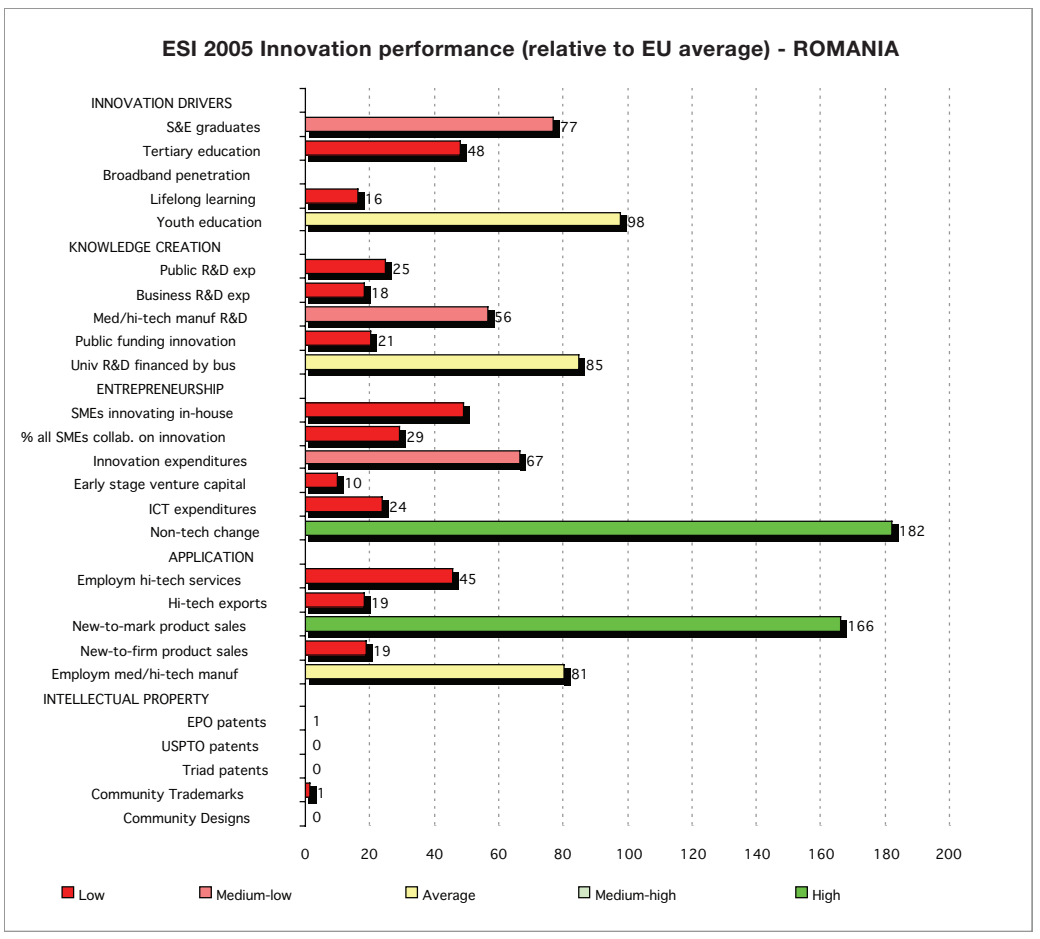
4. Possible orientation for future actions

The National Innovation System in Romania is rudimentary and the first steps towards its effective functioning have only just started. As yet most funding appears to be channelled towards research rather than innovation, internationalisation rather than the domestic system, infrastructure rather than business. Important elements remain, of which priorities are to increase public R&D funding up to 1% of the GDP by 2007; strengthen innovation and technology transfer mechanisms and infrastructures enhance the integration of Romanian researchers into international networks and programmes, particularly at EU level. These are areas on which the Ministry of Education and Research is currently placing the strongest emphasis, especially in the context of Romania's expected accession to the EU in 2007.

For the future it is important to put more emphasis on technology diffusion and its absorption by the business sector. Since it is clear that the private sector is not a driving force behind change, it is all the more important for policy makers to shape an innovation conducive environment. Finally, delays arising from communication among ministries and governmental bodies or from the interaction with other RDI stakeholders suggest that there is still considerable room for improvement to achieve effective innovation governance.

ROMANIA - EIS 2005 results





Indicator quality concerns:

None known.

	ROMANIA					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.16*	*0.16*	*0.16*		*-0.2*	*0.0*
	relative to EU	--	--	--	--	*38*	*38*	*38*			
	rank	--	--	--	--	*32*	*32*	*32*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	*4.2*	*4.1*	*4.5*	*4.9*	*5.8*	*9.4*	--	*77*	*17*	*9*
	relative to EU	--	*44*	*44*	*45*	*51*	*77*	--			
1.2	*Population with tertiary education*	*8.7*	*8.7*	*9.3*	*9.8*	*9.8*	*9.6*	*10.6*	*48*	*5*	*4*
	relative to EU	--	--	*47*	*49*	*48*	*45*	*48*			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	--	--	--	*50*
	relative to EU	--	--	--	--	--	--	--			
1.4	*Participation in life-long learning*	*1.0*	*0.8*	*0.9*	*1.1*	*1.1*	*1.3*	**1.6**	*16*	--	--
	relative to EU	--	--	*11*	*14*	*14*	**14**	**16**			
1.5	*Youth education attainment level*	*81.0*	*77.8*	*75.8*	*77.3*	*75.3*	*73.8*	*74.8*	*98*	*-1*	*0*
	relative to EU	--	*104*	*99*	*101*	*98*	*96*	*98*			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.11*	*0.10*	*0.11*	*0.15*	*0.15*	*0.17*	--	*25*	*19*	*2*
	relative to EU	*17*	*15*	*17*	*22*	*22*	*25*	--			
2.2	*Business R&D expenditures*	*0.38*	*0.30*	*0.26*	*0.24*	*0.23*	*0.23*	--	*18*	*-7*	*1*
	relative to EU	*33*	*25*	*21*	*19*	*18*	*18*	--			
2.3	*Share of med-high/high-tech R&D*	--	--	*68.7*	*52.2*	*50.3*	--	--	*56*	--	--
	relative to EU	--	--	*77*	*58*	*56*	--	--			
2.4	*Enterprises receiving public funding*			*1.7*					*21*	--	--
2.5	*Business financed university R&D*	*12.2*	*16.7*	*6.5*	*6.0*	*5.6*	*8.5*	--	*85*	*-7*	*1*
	relative to EU	*192*	*255*	*99*	*90*	*85*	--	--			
	INPUT - Innovation & entrepre-neurship										
3.1	*SMEs innovating in-house*			*13.9*		*12.5*			*49*	--	--
3.2	*Innovative SMEs co-operating with others*			*2.9*		*3.4*			*29*	--	--
3.3	*Innovation expenditures*			*1.32*		*1.00*			*67*	--	--
3.4	*Early-stage venture capital*	--	--	--	*0.004*	*0.005*	*0.003*	--	*10*	--	*-28*
	relative to EU	--	--	--	*6*	*12*	*10*	--			
3.5	*ICT expenditures*	--	--	*8.6*	*4.9*	--	--	*1.5*	*24*	*-53*	*7*
	relative to EU	--	--	*132*	*78*	--	--	*24*			
3.6	*SMEs using non-technological change*			*77.3*					*182*	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	*1.67*	*1.41*	*1.35*	*1.43*	*1.57*	*1.45*	--	*45*	*2*	*0*
	relative to EU	--	--	*44*	*43*	*48*	*45*	--			
4.2	*Exports of high technology products*	--	*2.8*	*4.6*	*4.9*	*3.1*	*3.3*	--	*19*	*-10*	*-6*
	relative to EU	--	*14*	*22*	*24*	*17*	*19*	--			
4.3	*Sales new-to-market products*			*7.8*		*7.6*			*166*	--	--
4.4	*Sales new-to-firm not new-to-market products*			*1.6*		*1.3*			*19*	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*6.21*	*5.83*	*4.98*	*4.91*	*5.50*	*5.32*	--	*81*	*1*	*-3*
	relative to EU	--	--	*71*	*70*	*80*	*81*	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*1.3*	*1.0*	*1.1*	*1.2*	*0.9*	--	--	*1*	*-14*	*5*
	relative to EU	*1*	*1*	*1*	*1*	*1*	--	--			
5.2	*New USPTO patents*	*0.2*	*0.2*	*0.2*	*0.4*	*0.2*	--	--	*0*	*-4*	*6*
	relative to EU	*0*	*0*	*0*	*1*	*0*	--	--			
5.3	*New Triad patents*	*0.1*	*0.1*	*0.0*	--	--	--	--	*0*	*-30*	*1*
	relative to EU	*0*	*0*	*0*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*0.3*	*0.1*	*1.1*	*1*	*91*	*16*
	relative to EU	--	--	--	--	*0*	*0*	*1*			
5.5	*New community designs*	--	--	--	--	--	--	*0.0*	*0*	--	--
	relative to EU	--	--	--	--	--	--	*0*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 2.6 SWITZERLAND

1. Introduction

Switzerland is a small open economy with a high relative Gross Domestic Product (GDP) per capita, high share of exports and imports in GDP and very large international investment flows. While exports of goods still make the largest part of exports, the share of exports of services (mainly financial services) has continuously grown in the last 15 years. The aggregate economic performance in terms of GDP growth is estimated at 1.7%. This remains below the EU25 average, estimated at 2.3%. Although the unemployment rate increased from 2.6% in 2000 to 4% in 2004, the number of people without jobs is still lower compared to the EU25 average of 9%.

Switzerland is among the leading countries in Europe in terms of innovation and is ranked in second place out of the 33 countries, according to the 2005 European Innovation Scoreboard (EIS). In most of the innovation indicators Switzerland is well above the EU average (e.g. lifelong learning, EPO patents, USPTO patents, and value added in high-tech manufacturing). Only two indicators (S&E graduates and public funding innovation) fall below the EU25 average. More specifically, the share of new S&E graduates is only 63% of the EU average but Switzerland can rely on immigration of highly skilled workers, particularly for its pharmaceutical sector. The declining trend relates mainly to two indicators, notably early-stage venture capital and med-hi/high-tech manufacturing employment. In contrast, the most positive trends could be noted in the number of new S&E graduates and new community trademarks.

2. Major challenges and policies

Due to the above positive innovation performance, it is rather difficult to identify major structural difficulties. Nevertheless, a more detailed analysis suggests that the major challenges are to improve relatively weak presence in future technologies and create more entrepreneurship culture among young people.

Improve relatively weak presence in promising technologies

Switzerland shows a relatively weak presence, as measured by the number of patents in promising technologies including nanotechnology, biotechnology and information technology. This challenge has been recognised with a wide range of measures promoting applied research in different fields of technology e.g. CH 1 Biotechnology - Life Science aims to promote the fast growing Swiss biotech industry. The measure CH 5 MedTech - Life Science aims to help small firms that find it difficult to commercialise their research output, whereas measure CH 6 Nanotechnology and Microsystemtechnic is designed to consolidate the Swiss economy by implementing new, nanometre-based technologies. Moreover, knowledge valorisation is addressed by different funding programmes based on the principles of indirect support and the bottom-up approach of the Innovation Promotion Agency (KTI). It would appear that the missing elements in the national innovation system are an effective system of R&D results diffusion to industry and strong cooperation between science and business sector.

Create more dynamic entrepreneurship culture and encourage young people to follow a career in science

Different experts and studies indicate that the climate for entrepreneurship could be more attractive. The framework conditions for start-ups should be improved and an entrepreneurial culture has to be promoted in order to increase innovative activities. In particular, young people should be encouraged to think in a career as an entrepreneur. In order to address these challenges, the Federal Government follows a long-term strategy as expressed in the most important innovation related policy paper in Switzerland "Promotion of Education, Research and Technology", issued every four years. Given the fact that there is a willingness of increasing funding for R&D, the government will need to study very attentively the trends in supply of researchers and S&E. According to the most recent statistics for 2003, there is only 7.7 new S&E graduates per 1000 population aged 20-29 and for the time being Switzerland relies on the supply of foreign highly-skilled workers especially in its pharmaceutical sector.

3. Policy learning

3.1 Governance

The development of innovation policy in Switzerland is rather broadly organised and involves a number of public actors such as SBF (State Secretariat for Education and Research), BBT (Federal Office for Professional Education and Technology), SWTR (Swiss Science and Technology Council), ETH Council (Council for the Federal Institutes of Technology), SNF (Swiss National Science Foundation) and KTI (Innovation Promotion Agency). Some of them (SBF, SWTR, BBT) are also strongly involved in the preparation of main innovation policy paper for the Government, notably the ERT-message. The SWTR is the main advisory body of the administration and the Government for technology and science sub-

jects. The SBF is the contact point for all national research institutions for policy-related questions in the area of science, research and education. The BBT is responsible for applied research and technology transfer to enterprises. The SNF and the KTI are the most important funding institutions. While the SNF focuses on basic research, the KTI fosters applied R&D by focusing on technology transfer. Starting with the year 2005, the innovation governance structure experienced a kind of simplification. The former BBW (Federal Office for Education and Sciences) and the GWF (Swiss Science Agency) merged into the SBF (State Secretariat for Education and Research). However, so far it seems that this was primarily an organisational measure without implications for the conduct of or competencies for innovation policy making. Furthermore, what is missing in the Swiss national innovation system is an adequate horizontal co-ordination at ministerial level and strategic intelligence across agencies and ministerial departments. The positive emerging finding is the fact that evaluation studies are initiated and carried out regularly.

3.2 Recent policy trends

The year 2005 can be defined as a period of quest for simplification of the national innovation system and future planning of innovation policy. As noted earlier, the innovation governance structure experienced some simplification with the merger of the BBW (Federal Office for Education and Sciences) and the GWF (Swiss Science Agency) into the SBF (State Secretariat for Education and Research). Moreover, the administration continued to implement the ERT-message (2004-2007), which was issued in November 2002 by the Federal Government. It contains the policy goals, general strategy and measures, in order to promote education, research and technology during the four-year period. The ERT-message (2004-2007) states that education, research and technology are of primary importance for Switzerland. As a result, the budget will be increase by approximately 6% annually. In total, it is estimated that for the period 2004-2007 the budget allocated for this is 11.3 billion EUR what should enable Switzerland, according to many observers, to keep its international position especially in basic and applied research.

Within the last few month five new innovation measures were issued by federal authorities. Among those, knowledge and technology transfer was further promoted by a new measure implemented by both the Innovation Promotion Agency (KTI) and the State Secretariat for Education and Research (SBF). It aims at promoting knowledge transfer consortiums consisting of service centres, which will reinforce and expand collaboration between firms and universities.

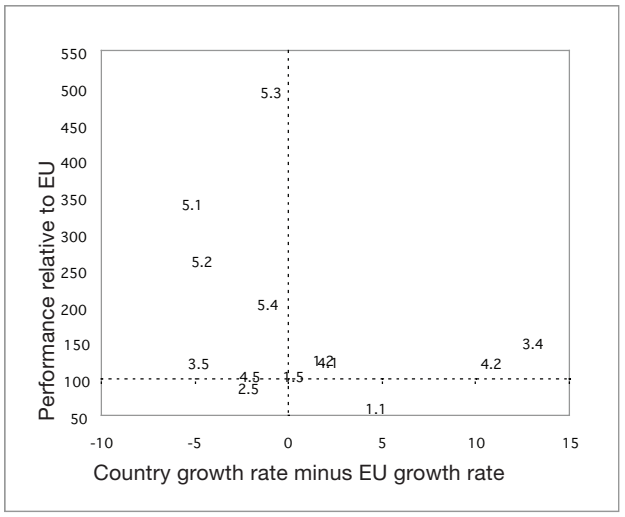
4. Possible orientation for future actions

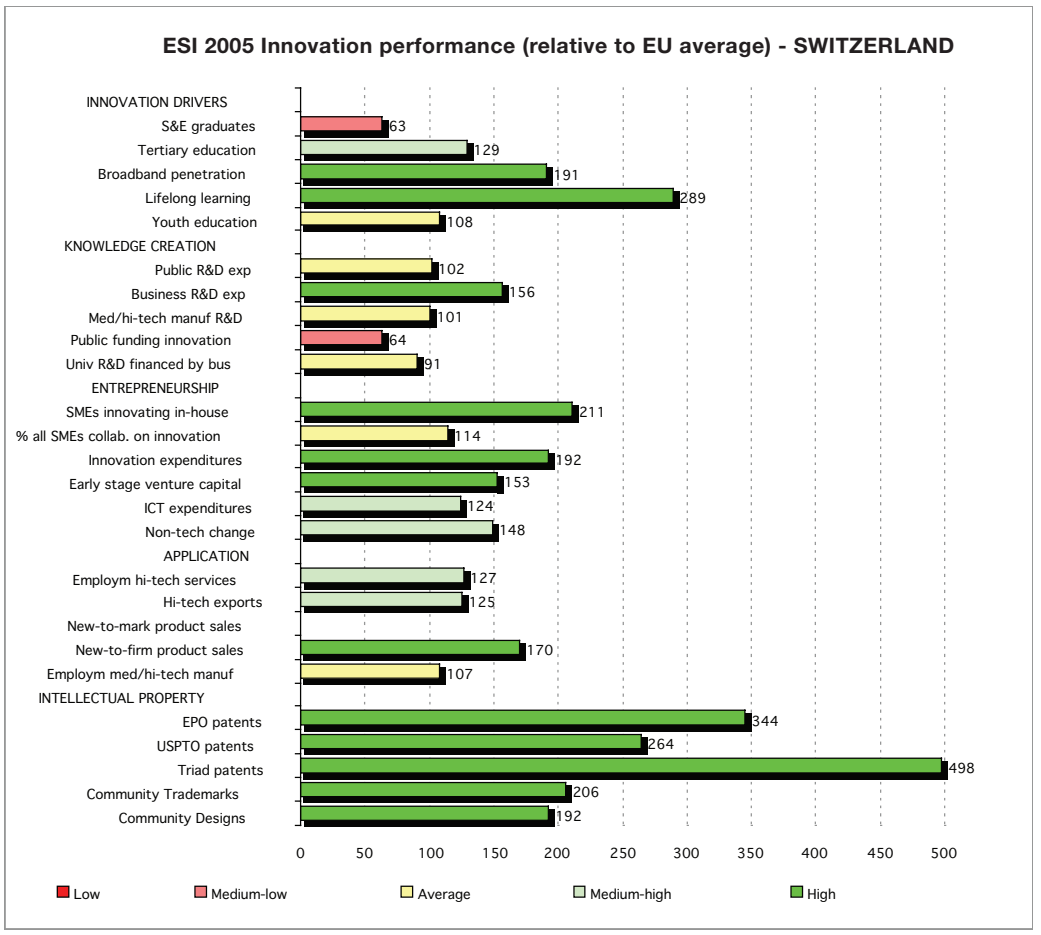
There is a growing recognition among the policy-makers that investment in the science sector will be required to further improve the innovation performance. In this context, it is necessary to continue investment in promising technologies and increase the visibility of universities areas of competence. In addition, there is a need to further improve the entrepreneurial culture especially among young people.

Taking into account the above-mentioned challenges, it is important in the future to:

- *Continue investment in applied research and innovation, with the particular focus on promising applied R&D areas. Since this challenge is already supported by a range of specific sector-oriented measures, it is necessary to take further steps in order to improve relationships between science and industry. One very interesting measure is the promotion of service centres which will help companies to identify knowledge for commercial use and launch of centres of excellence, with the involvement of the business sector.*
- *Efforts aimed at promotion of entrepreneurship among young persons should be connected with initiatives to encourage young people to pursue scientific careers.*

SWITZERLAND - EIS 2005 results





Indicator quality concerns:

Data for new-to-market sales are not used as the Swiss innovation survey asks companies only for new-to-world market sales.

	SWITZERLAND					(2003)	(2004)	2005		Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.70*	*0.70*	*0.71*			*0.5*	*0.0*
	relative to EU	--	--	--	--	*166*	*166*	*168*				
	rank	--	--	--	--	*2*	*2*	*2*				
		1998	1999	2000	2001	2002	2003	2004				
	INPUT - Innovation drivers											
1.1	*S&E graduates*	*4.5*	*4.5*	*6.0*	*7.5*	*7.0*	*7.7*	--		*63*	*14*	*9*
	relative to EU	--	*48*	*59*	*68*	*62*	*63*	--				
1.2	*Population with tertiary education*	*22.9*	*23.6*	*24.2*	*25.4*	*25.4*	*26.9*	*28.2*		*129*	*6*	*4*
	relative to EU	--	--	*121*	*126*	*124*	*126*	*129*				
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*14.5*		*191*	--	*50*
	relative to EU	--	--	--	--	--	--	*191*				
1.4	*Participation in life-long learning*	*33.3*	*31.1*	*34.7*	*36.0*	*34.4*	**24.7**	*28.6*		*289*	--	--
	relative to EU	--	--	*439*	*456*	*430*	**266**	*289*				
1.5	*Youth education attainment level*	*77.0*	*76.0*	*77.7*	*84.5*	*83.9*	*82.4*	*82.9*		*108*	*1*	*0*
	relative to EU	--	*102*	*102*	*111*	*110*	*108*	*108*				
	INPUT - Knowledge creation											
2.1	*Public R&D expenditures*	--	--	*0.67*	--	--	--	--		*102*	--	*2*
	relative to EU	--	--	*102*	--	--	--	--				
2.2	*Business R&D expenditures*	--	--	*1.90*	--	--	--	--		*156*	--	*1*
	relative to EU	--	--	*156*	--	--	--	--				
2.3	*Share of med-high/high-tech R&D*	--	--	*90.1*	--	--	--	--		*101*	--	--
	relative to EU	--	--	*101*	--	--	--	--				
2.4	*Enterprises receiving public funding*			*5.3*						*64*	--	--
2.5	*Business financed university R&D*	*7.1*	--	*5.1*	--	*6.0*	--	--		*91*	*-1*	*1*
	relative to EU	*111*	--	*78*	--	*91*	--	--				
	INPUT - Innovation & entrepre-neurship											
3.1	*SMEs innovating in-house*			*54.8*		--				*211*	--	--
3.2	*Innovative SMEs co-operating with others*			*10.4*		--				*114*	--	--
3.3	*Innovation expenditures*			*3.48*		--				*192*	--	--
3.4	*Early-stage venture capital*	--	--	*0.052*	*0.025*	*0.036*	*0.038*	--		*153*	*-15*	*-28*
	relative to EU	--	--	*92*	*41*	*97*	*153*	--				
3.5	*ICT expenditures*	--	--	--	*7.6*	*7.3*	*6.9*	*7.8*		*124*	*2*	*7*
	relative to EU	--	--	--	*121*	*111*	*108*	*124*				
3.6	*SMEs using non-technological change*			*63.0*						*148*	--	--
	OUTPUT - Application											
4.1	*Employment in high-tech services*	*3.36*	*3.77*	*3.72*	*4.10*	*3.83*	*4.04*	--		*127*	*2*	*0*
	relative to EU	--	--	*121*	*125*	*118*	*127*	--				
4.2	*Exports of high technology products*	*18.0*	*20.2*	*19.8*	*21.0*	*21.6*	*22.3*	--		*125*	*5*	*-6*
	relative to EU	--	*103*	*96*	*102*	*119*	*125*	--				
4.3	*Sales new-to-market products*			--		--				--	--	--
4.4	*Sales new-to-firm not new-to-market products*			*20.5*		--				*170*	--	--
4.5	*Med-hi/high-tech manufacturing employment*	*7.93*	*7.60*	*7.70*	*8.10*	*7.48*	*7.09*	--		*107*	*-5*	*-3*
	relative to EU	--	--	*110*	*116*	*109*	*107*	--				
	OUTPUT - Intellectual property											
5.1	*New EPO patents*	*437.7*	*445.9*	*488.1*	*512.1*	*460.1*	--	--		*344*	*0*	*5*
	relative to EU	*401*	*377*	*365*	*361*	*344*	--	--				
5.2	*New USPTO patents*	*180.1*	*180.6*	*187.5*	*198.2*	*188.3*	--	--		*264*	*2*	*6*
	relative to EU	*295*	*287*	*281*	*276*	*264*	--	--				
5.3	*New Triad patents*	*114.3*	*110.8*	--	--	--	--	--		*498*	*0*	*1*
	relative to EU	*498*	*498*	--	--	--	--	--				
5.4	*New community trademarks*	--	--	--	--	*136.9*	*206.6*	*180.0*		*206*	*15*	*16*
	relative to EU	--	--	--	--	*210*	*243*	*206*				
5.5	*New community designs*	--	--	--	--	--	*148.8*	*161.2*		*192*	--	--
	relative to EU	--	--	--	--	--	*218*	*192*				

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

B 2.7 TURKEY

1. Introduction

Turkey is one of the least innovative countries studied, but very poor comparable data availability prevents the computation of a reliable SII and the identification of countries with a similar pattern of strengths and weaknesses. In terms of the trends in the areas of innovation performance, the country is in the 'catching up' quadrant.

Turkey lags far behind the EU average and its performance is quite weak in terms of the availability of venture capital, royalty and licence fee receipts, university-company research collaboration, share of gross foreign direct investment in GDP, private sector spending on R&D, researchers in R&D per million population, high-tech exports and patent applications granted by the United States Patent and Trademark Office (USPTO) per million population. The trend results show improvements for tertiary education and for public R&D expenditures (currently 69% of the EU average), but no improvements for business R&D and large declines in ICT expenditures and exports of high technology products. Since the forth quarter of 2003, Turkey has experienced a recovery favouring the transition to a more stable economy after the crises in 2001, however unemployment remains high and FDI comparably low.

2. Major challenges and policies

Among the many challenges identified it seems most important for Turkey to focus on input innovation drivers and knowledge creation, in order to improve the conditions that will ultimately lead to a more innovative business community. Hence the following challenges appear the most urgent ones to meet:

Population with tertiary education

Turkey ranks last in the 33 countries considered in terms of population with tertiary education, with only 46% of the EU average. Although there is a very clear catching up trend in the 5 years captured by the EIS, the share is still far too low for pursuing a knowledge-based economy. It is absolutely imperative that the government further stimulates university enrolment and increases public expenditure for the tertiary education through the creation of new universities and the introduction of scholarships and student loans to attract a higher share of the population. Linking university curricula with the market needs is absolutely crucial, in order to translate the improvement of the indicator into a more innovative and competitive economic structure.

Broadband and ICT

The broadband penetration rate is also extremely low being only 3% compared to the EU average. Similarly overall ICT expenditure in Turkey is only 50% of the EU average, leading the country to the 30th rank. ICT applications and utilisation improve rapidly dominated by telecommunications both mobile and fixed. Increases in consumption, production and trade are of an order of magnitude of 10% per year over the last years. Internet utilisation is far lower than the EU average and so is the number of home computers, but significant growth rates indicate a catching up trend in this case as well.

The diffusion of ICT is among the priorities of the Turkish government. There is a variety of direct support measures via public agencies like KOSGEB, these have included in the recent past grants up to 70% for the procurement of software, Internet cafés free of charge, Internet-related services to SMEs, grants for e-business activities and ICT related consultancy and trainings. The Master Plan on National Information Infrastructure of Turkey foresees an investment amount of € 40 billion by the year 2010, of which infrastructure investments entail nearly 38 % of the total amount, and the rest is allocated for hardware such as PCs and other equipment. Turkey has also made advances in on-line access in some public and business related areas.

Increasing university-industry co-operation

The weak linkages between actors in Turkey are a priority to be addressed for the creation of a National Innovation System. Although Turkey ranks very well in business financed university R&D, all evidence indicates that overall the co-operation is very weak; hence increasing university-industry co-operation is a target of the Eighth Five Year Development Plan (2000-2005). It explicitly states the need to encourage the improvement of university-industry collaboration through the establishment of technological support and development centres, techno-parks and technology institutes to enhance the technological potential of industry.

The government has addressed the issue not only through this general statement but also with concrete measures, notably through:

- *The University-Industry Joint Research Programme (USAMP) to facilitate the development of collaboration between enterprises and other actors with a view to joint innovation activities and knowledge exchange (TR 7). The University-Industry Joint Research Centres of TUBITAK (TR 07) are seen as the major institutions which help development of a*

climate conducive to co-operation.

- *Support the establishment of technology parks (the Law on Technology Development Zones) to increase rates of expenditure on research and technological innovation in enterprises (TR 18).*

Although these recent efforts to stimulate co-operation between firms and universities have demonstrated positive results, much remains to be done in this area and initiatives are required for cluster development and networking among firms. A first pilot clustering initiative (TR 26, Bartin Regional Development Project) may offer important lessons in this direction.

- NTBF creation and the provision of early stage venture capital

The productive structure of Turkey is composed of traditional sectors and firms. While upgrading it is a prerequisite for long-term competitiveness such an upgrading is not easy. There is a vicious circle at the moment of low input innovation drivers and limited market expectations. Macroeconomic conditions led investors to keep away from relatively longer term investments bearing risks. Hence, new business development is limited and mostly not in high tech areas, whereas venture capital is not developed because of the low numbers of highly profitable eligible investments. Legislative measures for venture capital are not sufficiently attractive and at the moment only three venture capital companies (Vakif Girisim, Is Girisim and KOBI Girisim). Vakıf Risk and Risk) are active in the sector. Another World Bank supported project was the TTGV Girizzim Fund (TR 28), a government backed pilot project launched in June 2004. The fund's target was to invest in early stage technological start-up companies in sectors of ICT, biotechnology and healthcare, and advanced microelectronics. However, the fund only made one investment.

Incubators also support NTBF and high growth potential firms. Besides KOSGEB's Technology Development Centres (TEKMER), which are establishments in collaboration with universities, three incubators are also active as private incubators. Ericsson, Siemens, and Koç Holding from Turkey undertake missions in this specific business area.

3. Policy learning

3.1 Governance

Turkey has a long tradition of science and technology policy making and considerable improvement were made over the years for the inclusions of almost all stakeholders in science, technology and innovation policy-making. However, the limited market opportunities and the lack of a shared vision and commitment by all stakeholders in implementation of policies, have not allowed a fully functioning national innovation system yet.

Some important steps have been undertaken including strategy and an effort to address the whole governance cycle. The Vision 2023 Project completed by the end of 2004 and the new science and technology strategies were prepared with the involvement of the largest stakeholders. Monitoring and evaluation practices of innovation measures started in 1998 as a requirement of the World Bank funded Industrial Technology Project (ITP). TUBITAK started to take steps for establishing a benchmarking system.

Despite these efforts the system remains rather fragile. Inclusive monitoring is limited, interaction among agencies and interministerial co-operation are almost not existent. Only a small proportion of the innovation schemes and measures are monitored and evaluated. Policy benchmarking is not a systematic practice in Turkey, but trans-national learning is important in policy making and designing innovation measures.

In total, one may argue that the important steps undoubtedly already undertaken remain isolated and only through an increasing interaction they can create the necessary critical mass that will trigger change. Further there is still an urgent need for designing and implementing policies at regional level, and ensuring co-ordination, coherence and complementarity between national and regional policy making and governance.

3.2 Recent policy trends

There are still significant problems in ensuring commitment for the implementation of policies, establishing strong linkages between the elements of the NIS, and allocating sufficient resources compared to the size of the target groups. Until recently, the progress made towards meeting the national and EU Lisbon and Innovation Action Plan objectives was limited.

A small number of new measures has been designed and implemented since 2000. The resources allocated for ongoing and new measures have also been low. However, since September 2004, the Government started to attach more importance to R&D and allocated higher resources to approach the Barcelona target. Another problem is that the policy mix is not strategically focused on priorities. Only two new innovation policy measures started during the period covered by this report:

- *A new tax incentive scheme has been devised by the Ministry of Finance (MoF), whereby companies can benefit from a tax exemption scheme allow-*

ing them to offset 40 % of their R&D expenditures.

- *TUBITAK-TIDEB launched the 'Technopreneurship Competition' to stimu¬late technology-based entrepreneurship in 2005. Selected entrepreneurs with the best ideas will be trained by the Turkish Institute for Industrial Management (TUSSIDE) to develop their business plans. At the end of the training, the best three business plans will be awarded a cash prize.*

While the recent developments are promising, it is remarkable that they are heavily research oriented and do not put sufficient emphasis on innovation.

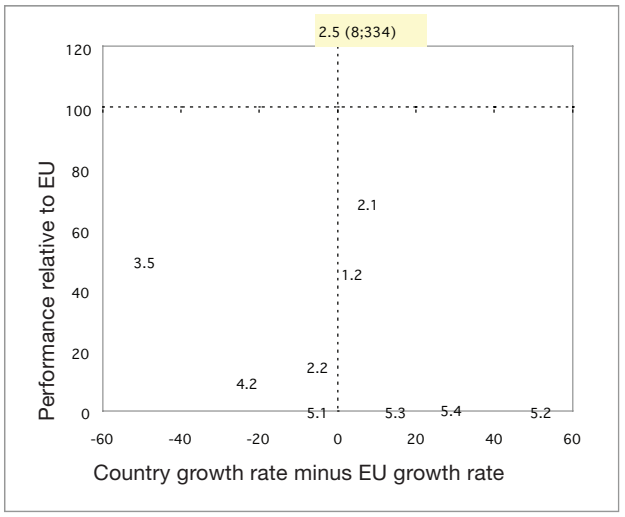
4. Possible orientation for future actions

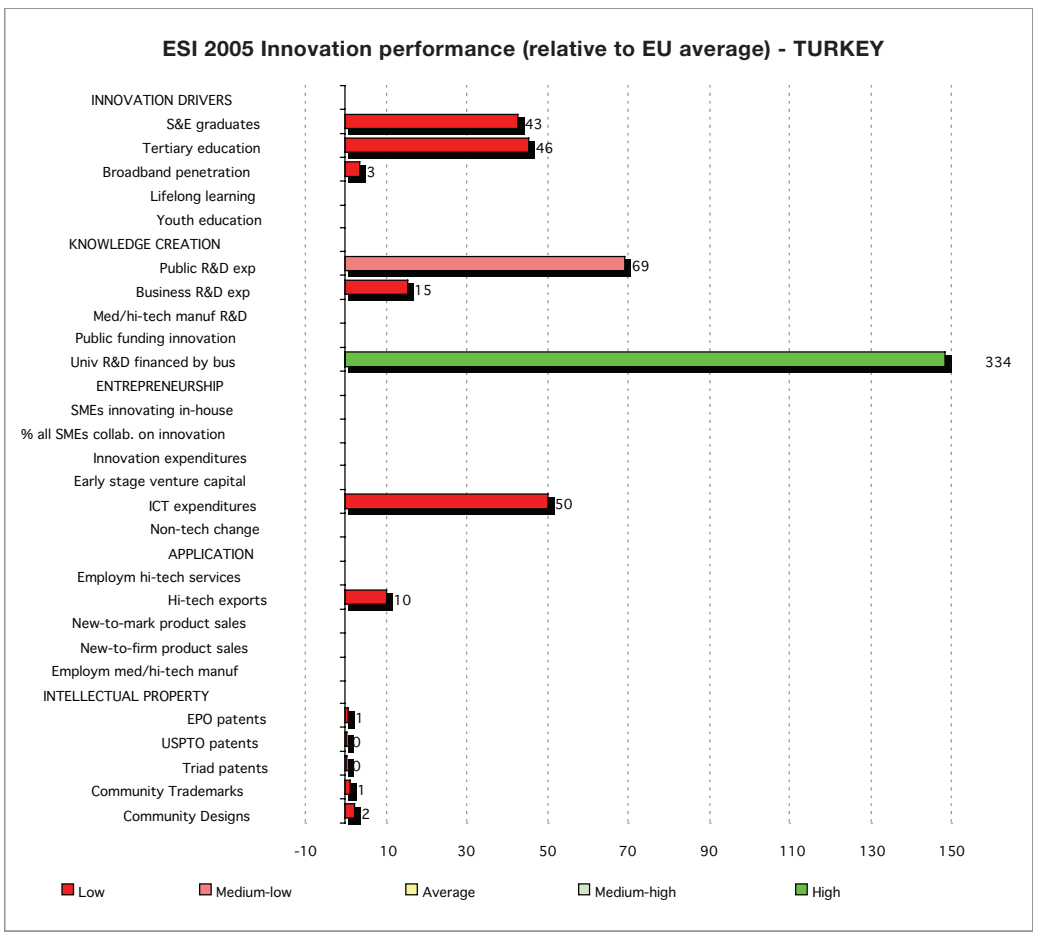
The recent improvement of macroeconomic conditions and political stability has given an initial impetus to Turkish innovation policy. A variety of measures, partly supported by the EU and the World Bank, have been put in place.

However, it is very important to reinforce this line, recognise the relevance of the diffusions on technology and the generalised adoption of innovation and learn from current lessons, which should apply more emphatically in the future. In particular for the major challenges policies are expected:

- *to improve innovation governance, through the adoption of an effective policy life cycle.*
- *to encourage the applications and utilisation of ICT and the internet in particular.*
- *to make the best out of cluster schemes and initiatives.*

TURKEY - EIS 2005 results





Indicator quality concerns:

The share of university R&D funded by the business sector could be incorrect. Overall data availability is very poor.

	TURKEY					(2003)	(2004)	2005	Rela-tive to EU	Trend	Trend EU
	SII	--	--	--	--	*0.06*	*0.06*	*0.06*		*-4.3*	*0.0*
	relative to EU	--	--	--	--	*15*	*14*	*14*			
	rank	--	--	--	--	*33*	*33*	*33*			
		1998	1999	2000	2001	2002	2003	2004			
	INPUT - Innovation drivers										
1.1	*S&E graduates*	--	--	--	--	--	*5.2*	--	*43*	--	*9*
	relative to EU	--	--	--	--	--	*43*	--			
1.2	*Population with tertiary education*	*7.5*	*8.1*	*8.3*	*8.4*	*9.1*	*9.7*	--	*46*	*8*	*4*
	relative to EU	--	--	*42*	*42*	*45*	*46*	--			
1.3	*Broadband penetration rate*	--	--	--	--	--	--	*0.3*	*3*	--	*50*
	relative to EU	--	--	--	--	--	--	*3*			
1.4	*Participation in life-long learning*	--	--	--	--	--	--	--	--	--	--
	relative to EU	--	--	--	--	--	--	--			
1.5	*Youth education attainment level*	--	--	--	--	--	--	--	--	--	*0*
	relative to EU	--	--	--	--	--	--	--			
	INPUT - Knowledge creation										
2.1	*Public R&D expenditures*	*0.34*	*0.39*	*0.43*	*0.48*	*0.47*	--	--	*69*	*10*	*2*
	relative to EU	*52*	*60*	*65*	*72*	*69*	--	--			
2.2	*Business R&D expenditures*	*0.16*	*0.24*	*0.21*	*0.24*	*0.19*	--	--	*15*	*-3*	*1*
	relative to EU	*14*	*20*	*17*	*19*	*15*	--	--			
2.3	*Share of med-high/high-tech R&D*	--	--	--	--	--	--	--	--	--	--
	relative to EU	--	--	--	--	--	--	--			
2.4	*Enterprises receiving public funding*			--					--	--	--
2.5	*Business financed university R&D*	*17.7*	*18.5*	*19.4*	*21.1*	*22.0*	--	--	*334*	*9*	*1*
	relative to EU	*277*	*283*	*296*	*315*	*334*	--	--			
	INPUT - Innovation & entrepreneurship										
3.1	*SMEs innovating in-house*			--		--			--	--	--
3.2	*Innovative SMEs co-operating with others*			--		--			--	--	--
3.3	*Innovation expenditures*			--		--			--	--	--
3.4	*Early-stage venture capital*	--	--	--	--	--	--	--	--	--	*-28*
	relative to EU	--	--	--	--	--	--	--			
3.5	*ICT expenditures*	--	--	*13.1*	*5.6*	*4.1*	*3.2*	--	*50*	*-41*	*7*
	relative to EU	--	--	*202*	*89*	*62*	*50*	--			
3.6	*SMEs using non-technological change*			--					--	--	--
	OUTPUT - Application										
4.1	*Employment in high-tech services*	--	--	--	--	--	--	--	--	--	*0*
	relative to EU	--	--	--	--	--	--	--			
4.2	*Exports of high technology products*	--	*3.4*	*4.0*	*3.2*	*1.6*	*1.8*	--	*10*	*-29*	*-6*
	relative to EU	--	*17*	*19*	*16*	*9*	*10*	--			
4.3	*Sales new-to-market products*			--		--			--	--	--
4.4	*Sales new-to-firm not new-to-market products*			--		--			--	--	--
4.5	*Med-hi/high-tech manufacturing employment*	--	--	--	--	--	--	--	--	--	*-3*
	relative to EU	--	--	--	--	--	--	--			
	OUTPUT - Intellectual property										
5.1	*New EPO patents*	*0.7*	*1.1*	*1.2*	*1.3*	*1.0*	--	--	*1*	*0*	*5*
	relative to EU	*1*	*1*	*1*	*1*	*1*	--	--			
5.2	*New USPTO patents*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	--	--	*0*	*59*	*6*
	relative to EU	*0*	*0*	*0*	*0*	*0*	--	--			
5.3	*New Triad patents*	*0.1*	*0.1*	*0.1*	--	--	--	--	*0*	*17*	*1*
	relative to EU	*0*	*0*	*0*	--	--	--	--			
5.4	*New community trademarks*	--	--	--	--	*0.5*	*0.9*	*1.0*	*1*	*46*	*16*
	relative to EU	--	--	--	--	*1*	*1*	*1*			
5.5	*New community designs*	--	--	--	--	--	*1.7*	*2.0*	*2*	--	--
	relative to EU	--	--	--	--	--	*2*	*2*			

Bold: break in series / 2000 data for CIS indicators refers to CIS 3 survey / 2002 data refer to estimates based on CIS Light data

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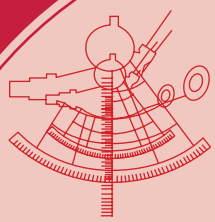

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