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INNOVATION POLICY IN SEVEN CANDIDATE COUNTRIES: THE CHALLENGES

BULGARIA, LATVIA, LITHUANIA, MALTA, ROMANIA, SLOVAKIA AND TURKEY


Bulgaria


Latvia


Lithuania


Malta


Romania


Slovakia


Turkey

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VOLUME 2 working papers and innovation policy profiles for seven candidate countries

Innovation policy profiles for seven candidate countries

2.1 Bulgaria
2.2 Latvia
2.3 Lithuania
2.4 Malta
2.5 Romania
2.6 Slovakia
2.7 Turkey

Working paper

2.8 Innovation capabilities of the seven EU candidate countries

EXECUTIVE SUMMARY

Why is innovation an issue for candidate countries?

Starting from the 1995 Green Paper on Innovation, the EU has increasingly placed innovation at the heart of its' economic policy objectives. This process culminated in the strategic goal set by the Lisbon European Council in March 2000, that the European Union (EU) should become the most competitive and dynamic knowledge-based economy in the world, capable of sustaining economic growth with more and better jobs and greater social cohesion by the year 2010.

In the candidate countries, during this period of intense policy action in favour of innovation, the attention of Governments and stakeholders was focused on building the necessary legislative, regulatory and institutional environment for a functioning market economy. Allied to regulatory reform, a significant effort has been undertaken to change corporate ownership structures, promote the creation of private enterprises and improve the functioning of industry and services with a view to meeting the competitive pressure of the Single European Market. Much of the growth achieved has been due to improved cost-efficiency by existing enterprises and through new activities introduced by foreign direct investors rather than by the creation of new local sources of entrepreneurial value and innovation.

To sustain growth, however, Governments in the candidate countries now face the challenge of designing and adopting new more complex policy solutions. For most of the candidate countries, the issue is no longer about meeting the conditions for entry to the EU, but about identifying and mobilising factors enabling them to continuously improve the level of competitiveness of their economies. Innovation is a core element of knowledge-based economies and a major source of competitiveness. As highlighted in a recent report, **innovation is diverse and pervasive.** It is not just based on research or science and technology, or even on enterprise and ingenuity (entrepreneurial skill and knowledge). It also involves managerial and marketing skills, organisational, social, economic and administrative knowledge[1].

The need to take account of the "diverse routes to innovation" has been explicitly recognised in the March 2003 Commission Communication "Innovation Policy: updating the Union's approach in the context of the Lisbon Strategy"[2]. Accordingly, it is in this context that the study set out to "examine and analyse the current framework conditions for selected innovation issues" in

1 Innovation Tomorrow: Innovation Policy and the Regulatory Framework. Report for the European Commission, DG Enterprise, Innovation Directorate October, 2002.

2 See: http://www.cordis.lu/innovation-policy/communications/

the CC7. This report is the second of two studies examining the level of development of and the key challenges for innovation policy in the countries currently in the process of accession to the European Union. The first study was carried out during the period June 2000 to September 2001 and covered the so-called Luxembourg Group (Cyprus, the Czech Republic, Estonia, Hungary, Poland and Slovenia, or CC6)[3]. This second study was completed during the 15-month period from October 2001 and concerns the so-called Helsinki group (Bulgaria, Latvia, Lithuania, Malta, Romania, the Slovak Republic and Turkey, or CC7). The analysis was carried out in parallel with the conclusion of the accession negotiations with 10 of the 13 candidate countries[4].

In order to fulfil its remit, the study team carried out an exhaustive analysis of information and data on innovation performance and the policy framework for innovation in each of the candidate countries. This analysis takes into account the opinions and views of over 300 key stakeholders in the CC7 (public authorities, innovation support organisations and the business community) collected at national level through interviews, an innovation policy workshop and an opinion survey.

This executive summary is structured around six main challenges arising from the main findings of the study, illustrated by examples of policy development from the seven countries, and proposing a number of corresponding policy options.

3 See: http://www.cordis.lu/innovation-policy/studies/

4 This process was capped by the historic decision of the Copenhagen European Council Summit, in December 2002, which agreed on enlargement of the EU to 25 Member States from 1 May 2004 (the current EU15 plus Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic and Slovenia).

CHALLENGE 1: Increase business innovation intensity to sustain growth rates high enough to narrow the 'cohesion gap'

Main findings

Despite the apparent diversity of the CC7 in terms of geography, size and culture, a factor common to six out of seven of the countries, excluding Malta, is the low level of economic development. The CC7 have on average level of gross domestic product (GDP) per capita equal to only 33% of the EU15 average. The level of development plays a very important role in understanding the current institutional capacity and hence innovation capabilities of these economies.

More specifically, labour productivity can be used as a proxy of innovation activity in the enterprise sector. In this respect four (Latvia, Romania, Lithuania, Bulgaria) of the CC7 have rates of manufacturing productivity below 40% of the EU level; while Turkey and Slovakia perform slightly better with rates between 40 and 60% of the EU level. Evidence suggests that the majority of this gap is due to intra-sectoral differences; or to put it another way, differences in technology, management and organisation. Accordingly, convergence to average EU income levels will be a long process for the majority of the CC7.

Domestic entrepreneurship is a key mechanism for generating managerial and technical innovation. However, statistics suggest that the high rates of entrepreneurship in the CC7 group are mainly an expression of 'survival' rather than exploitation of new innovation opportunities. Moreover, clear improvements in demand side conditions suggest that the problems for innovators and entrepreneurs have now shifted to the supply side, especially to issues of access to credit. 'Young' and 'old' firms are increasingly facing supply side problems like access to trained workers and to technology. This is a new phenomenon and suggests **a new stage of entrepreneurship** where requirements for growth have become more diverse.

A significant lag in innovation performance…

A thorough analysis of the available data on innovation performance of the candidate countries was carried out by the study team[5]; building on and extending the framework of indicators used by the European Innovation Scoreboard[6] (see full table of indicators below).
The analysis suggests that as a group the CC7 lag behind both the CC6 and the EU15 in all

5 See the working paper of Slavo Radosevic and Tomasz Mickiewicz "Innovation capabilities in seven candidate countries: an assessment. Volume 2.8 of this study.

6 The EIS is part of the European Trend Chart on Innovation initiative funded by the European Commission, Directorate-General for Enterprise. See: http://www.cordis.lu/trendchart

four groups of indicators of the innovation scoreboard. However, the gap seems to be the biggest in the creation of new knowledge and the smallest in the indicators for 'innovation finance, output and markets'.

Most fundamentally, investment in the creation of new knowledge is the weakest dimension of innovation capability of the CCs. Low investments in public R&D are accompanied by very limited investment in R&D by the business sector, which, with the exception of Slovenia and the Czech Republic, ranges between 35% and 9% of the EU average. **The very weak position of the majority of the CC7 with respect to business expenditures on R&D is likely to continue.** Turkey and Latvia have recorded very high relative increases in the last four years but starting from very low levels. On the other hand, the other countries are further slipping behind in investments in business R&D.

There is only limited comparable data on innovation activity (the transmission and application of knowledge) in enterprises due to **the absence or pilot nature of innovation surveys (applying the Community Innovation Survey methodology) carried out in the CC7.** Where data exists it suggests that the share of SMEs innovating is relatively high in some of the CC7 countries. However, this is interpreted as the result of a more intensive search effort of firms for new market opportunities while commercial relevance of these activities is still low as shown by the share of sales based on innovative products and processes. Hence, the **CC7 are still lagging behind in terms of economic relevance of innovative activities.**

Candidate Countries Scoreboard 2002

No	Indicator	EU	MT	BG	CY	CZ	EE	HU	LT	LV	PL	RO	SI	SK	TR
1.1	New science and engineering graduates	100	60	46		39	67	44	91	54	58		128		53
1.2	Pop with 3rd level education	100	33	100	126	55	139	66	212	86	55	47	67	50	38
1.3	Life-long learning	100	114		36		62	35	44	192	61	13	44		38
1.4	Employment in medium/ hi-tech manufacturing	100	94	73	14	121	63	116	42	23	100	65	115	89	16
1.5	Employment in hi-tech services	100	85	75	51	89	94	90	56	61		40	75	84	
2.1	Public R&D / GDP	100		70	30	81	79	67	79	43	67	15	101	36	79
2.2	Business R&D / GDP	100		9	4	63	12	28	5	16	20	23	65	35	21
2.3.1 A	EPO patents / population	100	2	2	4	8	5	11	1	2	2	1	13	4	
2.3.2	USPTO hi-tech patents / population	100	21	1		5		2	4		0	0	4	2	0
3.1	SMEs innovating in-house	100	35				75		116		9		38		56
3.2	SMEs innovating co-operation	100	44				116		107						161
3.3	Innovation expenditure	100					65				111		105		
4.1	Hi-tech venture capital / GDP	100				9		14	372	258	19		62		54
4.2	New capital	100	213								13				40
4.3	New-to-market products	100	582				92								145
4.4 A	Internet access / population	100	81	24	70	43	96	47	22	23	31	14	96	53	12
4.5	ICT expendi-tures / GDP	100	51	48		116	120	111	74	99	74	28	59	94	45
4.6 A	Inward FDI / GDP	100	280	87	78	141	176	143	68	96	70	58	51	80	16

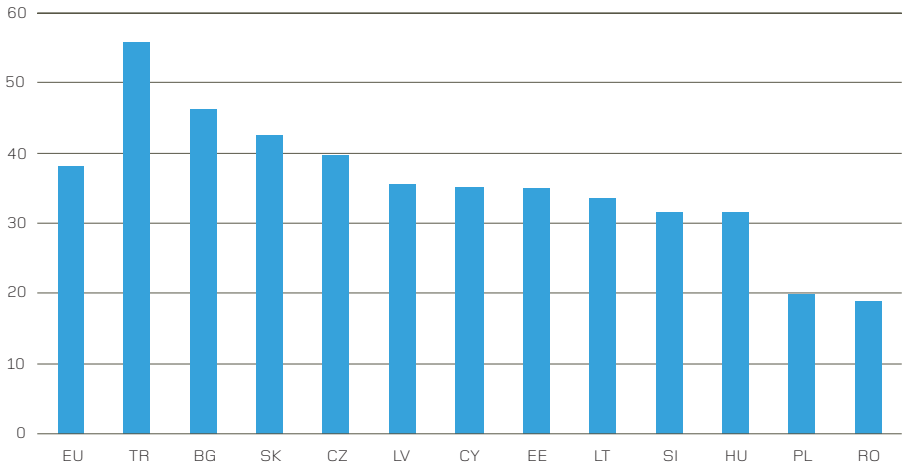
Source : Calculated based on 2002 European Innovation Scoreboard: Technical Paper No. 2, Candidate Countries.
For full definition of indicators, see: www.cordis.lu/trendchart

The weak financial systems of the CC7 mean that both existing and new technology based firms are unable to mobilise specialised funds for innovation. Share of new capital raised on stock markets (except Malta) and venture capital are marginal and these sources play a very limited role in innovation in CCs. Funding for innovation comes mainly from self-retained earnings from domestic firms or in the case of foreign firms from parent company.

...and falling further behind rather than catching up

Trends of innovation indicators suggest that the CC7 are falling further behind the EU15 in knowledge-based activities. This is not due to one single indicator but a variety of factors influencing different dimensions of innovation capability.

Innovation Scoreboard Trend (average based on 10 indicators)[7]



Source: Calculations of Study Team based on Candidate Countries Innovation Scoreboard (see table above).

Nevertheless, it should be kept in mind that convergence is a moving target. Recent structural changes in the majority of the CCs have been radical and fast. However, they are still insufficient for growth based on innovation and knowledge. The policy framework for the period until 2010 is even more challenging than that of adapting regulatory regimes towards a market economy. Building stronger national innovation systems in the competitive environment of an enlarged EU will require the creation of numerous new interfaces between private and public agents, between supply and demand for investment and innovation, and between domestic and foreign markets.

7 Calculated as the percentage change between the last year for which data area available and the average over the preceding three years, after a one year lag.

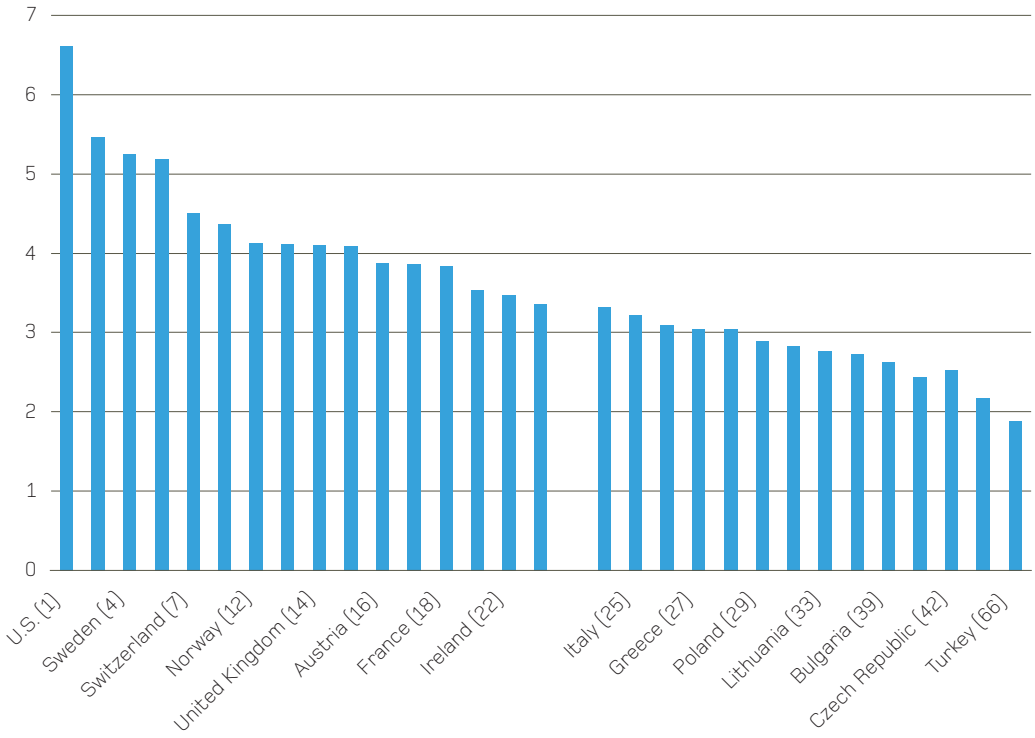
Policy options

→ The insufficient level of understanding of innovation processes in enterprises needs to be remedied as rapidly as possible by carrying out the Community Innovation Survey in all candidate countries. Foresight type activities should be encouraged in order to give substance to priorities in favour of technologies or fields of activity.
→ Given that the major weakness of the CC7 is extremely low manufacturing productivity, policy should be rebalanced away from high-tech and towards technology transfer and assimilation in existing manufacturing enterprises. This is in line with innovation activities favoured by enterprises and will be most likely to deliver significant productivity gains.
→ A stronger emphasis on organisational innovation and on design and marketing of innovative products should be built into schemes. This could involve an obligation to undertake feasibility studies including, marketing, prior to aid for "R&D" and by broadening the range of eligible expenditure of existing "R&D" aids to include training and consultancy support.
→ One of the major constraints to innovation is the extremely weak financial system and the quasi-absence of private-equity for innovative high-risk firms. Governments throughout the CC7 need to study in more depth the current and future demand for seed and early-stage capital; and consider what form Government intervention could most effectively take to help close this "equity gap". The use of Structural Fund support to develop such schemes should be considered as a priority.

Innovation surveys highlight relative weakness of candidate countries

Aside from the European Innovation Scoreboard, a number of other organisations and surveys are also active in tracking trends in innovation performance and capacity. A leading international index is the Global Competitiveness Report's 'Innovation index'. The innovation index seeks to explain the elements of innovation that are linked to economic growth. It is composed of both hard data and survey data. The hard data includes indicators such as US patents granted per million population and gross tertiary enrolment rates. The survey evidence includes replies received to questions such as "What is the extent of business collaboration in R&D with local universities" and reflects the opinions of over 4,500 respondents in 75 countries.

Innovation Index of the Global Competitiveness Report (2002)



Source: Global Competitiveness Report 2002. World Economic Forum. Number between brackets indicates overall position of country in index.

The results of the GCR Innovation Index for 2002 presented in the diagram above underline the low position of the candidate countries and the extent of catching up required.

CHALLENGE 2: Recognise the pervasive nature of innovation as a cross-cutting policy issue

Main findings

So far most policy measures taken in the candidate countries have been in support of research in specific technology fields and related infrastructure (a "first-generation" policy approach based); tentative steps have been taken towards policies focusing on diffusion of innovation and knowledge from an innovation systems perspective ('second-generation' policy). Creating a business environment favourable to innovation implies not only direct measures to support innovation in enterprises but also taking into account the impact on innovation of a range of other policies. In this context, the application of a so-called "Third-Generation" approach to innovation policy (where innovation is placed at the heart of other policy areas, in a manner similar to environment issues) in the candidate countries seems overly ambitious, though much needed.

In particular, while the Governments of the CC7 have begun to adopt measures aimed at improving the business environment by improving company law (bankruptcy rules, etc.); and reducing red-tape and costs hampering start-up of new firms; this has not been done taking into account the need to stimulate innovative activity. Similarly, reforms to competition policy, education and training, intellectual and industrial property rights, or financial regulations have been made as part of the broader process of adopting EU or international standards and rules; without taking account of the impact on business innovation.

Some examples of how trends in other policy fields can influence innovation include:

→ Competition policy developments are rarely considered in terms of their influence on innovation and Governments have yet to realise the potential for switching State aid towards horizontal measures aimed at business R&D;

→ there is little recognition of the scope for using fiscal aids to stimulate innovation, in part this is due to inadequacy of accounting rules, etc. allowing proper identification of R&D costs;

→ IPR rules in the CC7 offer a lower level of protection for innovators and this in itself may act as a barrier to research-orientated foreign direct investment.

As part of the opinion survey carried out for this study, leading private, public and non-governmental stakeholders were asked for their views on the way in which Governments handle innovation as a policy issue. On average, only a quarter of respondents considered that CC7 governments give sufficient priority to promoting an innovative society. Consultation of business interests is a key mechanism in ensuring that new legislation does not hinder enterprises from undertaking innovation activity. In this respect, only 22% of those surveyed believed that CC7 governments consult sufficiently the business sector. One example of more enlightened consultation mechanisms in the CC7 is the Lithuanian Sunrise Commission.

The Sunset and Sunrise initiatives in Lithuania

In 2000, the Lithuanian Government set up two inter-ministerial commissions, with participation of the business community, aimed at supporting improvements to the business environment. The "Sunset Commission" worked to identify overlapping and redundant administrative functions; while the "Sunrise Commission" assisted in speeding up the implementation of measures to streamline the functions and procedures dealing with business and economic matters, including those related to innovation. Created as a temporary working group, the Commission has now become permanent and works on a range of issues from taxation, transit and custom, construction regulations, financing of enterprises, public procurement, etc.

Policy options

→ The creation of an innovation advisory committee operating at inter-ministerial level and with the resources to prepare and issue consultative opinions addressed to Government ministries is a relatively low cost option for improving co-ordination. The involvement of business representatives in such bodies is essential.

→ A more in-depth examination is required of the IPR framework in candidate countries and its influence on innovation performance is required. This could be the subject of a future study funded by the Commission services.

CHALLENGE 3: Mobilise more effectively relative strengths in human resources for innovation

A combination of an economic structure with a high share of industry and past investments in education has produced a relatively favourable situation for absorbing new technologies provided that retraining programmes and investment are in place. However, the introduction and diffusion of new technologies is still confined to sectors with a high share of foreign investors and the potentially favourable education structure has been turned into a factor of economic growth only in a few (metropolitan) regions of the CC7. Moreover, a high share of entrepreneurs with secondary level education, is unsuitable for economy wide technology-based entrepreneurship based on high-level skills.

Supply side difficulties in recruiting and training skilled workers are evident from the country level analysis where high demand for highly qualified workers is reflected in a growth in the number of students following higher education courses (e.g. in Bulgaria, Lithuania and Turkey). However, the proportion of students following engineering and science courses remains inadequate and this is compounded by the reduction over the nineties of R&D personnel in industry due to cost-cutting and a brain drain of highly skilled researchers to more industrialised countries.

Unsuitable educational levels of entrepreneurs, skills gaps for engineers and brain drain of research staff, are compounded by low levels of investment in training by enterprises, particularly by SMEs. The relatively weak position of the CC7 countries in terms of vocational training is consistent with their weakness in the diffusion of quality control systems and suggests a structural weakness in the diffusion and utilisation of technology. With respect to this situation, the policy analysis highlights a number of issues including:

→ Co-ordination between lifelong learning and technology/innovation policies is insufficient. The anticipation of skills needs related to pervasive technologies such as ICT remains under-developed as a basis for developing life-long learning policies;
→ There have been improvements in training methods related to innovation management, with this topic being introduced with the support of the private sector and international donors;
→ Most of the CCs report initiatives aimed at increasing the importance given to engineering and scientific careers but these are sporadic;
→ There is weak networking between universities and industry with respect to curricula development.

Baltech Consortium and the promotion of innovation studies

The Baltech Consortium was set up in 1997 with the aim of creating a solid base for wider partnership and closer co-operation among universities in the Baltic Sea Region within the area of specialist science and technology education and training. The long term goal is to create a virtual "Baltic Sea University of Science and Technology" based on a number of Universities around the Baltic Sea as a strategic resource for the development of education and research corresponding to the needs of the region. Current members of the consortium include Estonian, Latvian, Lithuanian and Swedish universities.
The consortium has developed an International Master of Science Programme in Engineering and Management at Kaunas University of Technology (Lithuania) focused on skills in engineering and enterprise and innovation management skills development based on study programmes already operating in Swedish universities.

Policy options

→ Maximising the potential of the relatively favourable human resource qualification structures in the candidate countries requires urgent attention. Governments should give a priority to two main types of schemes: measures to avoid researchers emigrating or to attract 'returning fellows' back; and second, aid to encourage transfer of knowledge through recruitment or short-term placements of researchers in industry.
→ Reinforcing the current ad hoc initiatives to introduce innovation management as a part of core science/engineering and business/economic curricula in higher education should be a target of education ministries in the CC7.
→ There is a need to link financial support for technology upgrading (equipment acquisition) in enterprises with continuous vocational training funding and initiatives on key technologies (for instance creation of 'technology training centres' through public-private partnerships).

CHALLENGE 4: Increase the rate of creation and diffusion of ICT in the economy as a source of value added and productivity

Main findings

Evidence suggests that information and communication technologies have a positive impact on productivity, competitiveness and employment. However, this impact depends on both the capacity to generate new ICT and to diffuse them throughout the enterprise sector. In terms of the capacity to produce ICT products and services, there is a clear distinction between the CC6, which are close to the EU level in terms of the share of IT expenditures in GDP, and the CC7, which are lagging behind, notably Bulgaria, Romania and Turkey. The poor performance of Bulgaria and Romania belies somewhat their claims made in policy documents, notably in Bulgaria, to be strong in the ICT sector. Using Internet hosts as a proxy indicator for the diffusion and application of ICT in their economies, all CCs are lagging significantly behind the EU, with rates of internet usage five times lower in CC than in the EU15. Once again, with the exception of Malta and Slovakia, the CC7 group of countries performs worse than the CC6 group, amongst which Estonia has rates comparable to the EU countries.

Relatively high-prices of IT-related services and the pending liberalisation of the telecommunications sector in all candidate countries could be an explanatory factor for the extent of the gap. The strengths and weaknesses of the ICT-related industries are similar in the Central and Easter European CCs. An industrial and educational specialisation under the previous system, led to a sizeable pool of specialists, particularly in software. However, limited national markets, weak financial resources and difficulties for small companies to link up to international networks are disadvantages.

A range of 'information society' policy documents exist in the CC7 and the broad lines of governmental strategies are in place, but most neglect the importance of diffusing ICT in the enterprise sector. The Romanian and Turkish systems stand out in so far as their governments provide incentives in favour of the uptake of ICT by the business community. A clear difference can be noted in this respect with Latvia, Lithuania, Malta and Slovakia which engage more funds in favour of the public (e-Government) and education sector. In Bulgaria, there is a long-standing focus on the local IT industry but at present few concrete policy measures to actually stimulate its development.

Reinforcing ICT potential: 'Software Parks' and incentives in Romania

In Romania, the most significant measure taken to encourage ICT developments is the concept of establishing software parks in a number of cities. The Information Technology & Communication Ministry aims to attract to the parks mostly small, start-up companies that cannot afford to pay a large amount of money on rent or public utilities. The intention is to create a software park in every Romanian city that has a university centre. Negotiations with investors are at an advanced stage in four to five major cities (Brasov, Bacau, Timisara and Iasi) with the most advanced software park located in Galati. Software companies locating to the park benefit from real incentives both from the State and local authorities that can range from the exemption of income taxes for employees to commercially attractive rents. When the company has sufficiently developed to become self-supporting, another company will take its place in the park.

Another measure supporting the start-up of technology-based companies is the preferential tax payments regarding software and information technology specialists' salaries – which are exempt of taxes on their salaries. This measure is directly aimed at stemming the brain-drain of IT specialists from Romania.

Policy options

→ The main focus of Government action in the CC7 in the field of ICT should be to encourage a more rapid diffusion of these technologies to existing enterprises as a key driver for productivity growth. As a generic technology ICT enables new innovations in both manufacturing processes, embedding of ICT in existing products and development of new services delivered through the application of such technologies. Financial incentives for upgrading IT systems are a baseline response, which could be facilitated by EU Structural Fund resources.

→ Appropriate attention should be paid to human resource and organisational issues related to ICT diffusion. Consultancy, funding for hiring new IT employees, measures to train and retain specialists in ICT in the economy, and targeted research programmes will also be vital to ensure that development of ICT can also take place.

CHALLENGE 5: Establish a set of innovation policy measures reflecting the diversity of innovation processes in enterprises

Main findings

Innovation as a policy issue is best embedded in Turkey, Latvia, Lithuania and Romania. However, the level of coherence and coverage of the policy frameworks for innovation policy varies. Turkey has set the most ambitious goal of "establishing a national innovation system", while the Baltic States recent policy documents set objectives corresponding largely to EU orientations for innovation policy. In contrast, Romanian policy remains largely focused on restructuring the R&D system and stronger links between R&D institutes and industry. Bulgaria has belatedly developed an innovation policy in late 2002. Innovation policy is not yet a focus of decision-makers attention in Malta and Slovakia.

Moreover, there is a significant gap between declarations in support of innovation and concrete implementation and funding. Aside from Turkey and Romania where there are some substantial funding programmes, the other CCs have allocated levels of funding to innovation that are extremely low and essentially focused on research institutes or the few R&D performing firms in the economy. Moreover, the analysis suggests that up to now, in the CC7, policy efforts have focused on 'high-tech' infrastructure and little attention has been paid to raising awareness of innovation, improving innovation management capacities in companies, and ensuring that companies have access to competent advisory services in a range of innovation topics.

Three examples of the degree of policy sophistication and implementation were examined by the study:

→ **Industry-science relations:** during the 1990s, the restructuring of 'branch' research institutes led to a severe down-sizing of industrial research capacity and a re-orientation to short-term technical services. Funding programmes for collaborative market-oriented R&D are under-funded and the main focus of attention is on infrastructure in the form of Technology Parks with only a few examples (e.g. in Malta) of universities developing commercialisation activities.

Company mentoring by the Technology Development Foundation of Turkey

Since 1991, TTGV has been co-operating with the experts from universities and research institutes to evaluate and supervise technology development projects in industry. A pool of nearly 1500 experts has been formed who visit companies at a regular interval and, in particular, act as mentors for companies with projects supported by TTGV.

This scheme has increased the interaction between science and industry, and created a common ground for future co-operation. In addition, and to further stimulate co-operation, TTGV shares the cost of service purchased by industry from a university and/or a research centre for the projects it supports.

→ Political support expressed for the concept of **New Technology Based Firms (NTBFs)** has not been matched by significant policy measures. Faced by a more negative business environment for high-tech start-ups, the public policy response has been infrastructure-driven in the form of incubators. This ignores a series of other barriers related to legal aspect of IPR commercialisation, the equity gap; and lack of tax incentives for R&D in young research-intensive firms.

Creation of a Technology Venture Fund in Malta

A Technology Venture Fund (TVF) with a initial capital of €2.4 million is being set-up to part finance new technological initiatives and to support the development of technology and innovation within SMEs. The fund aims to boost the-finance available to innovative enterprises and hence enhance the chances of success during the start-up phase of a business venture. The fund will also invest in established businesses seeking a capital injection for innovative projects. It is intended that this fund will have a twofold mission: one to seek to fill in a gap that has been missing for a long time mainly; the availability of risk capital financing for innovative knowledge-based ventures and, that it will also enhance Malta's reputation as a location for high-tech investment.

→ The support and development of **business networks (clusters)** is still an embryonic policy concept. Inter-firm cooperation is essentially organised by traditional business federations and there are only rare examples of innovation focused co-operation. Barriers to such co-operation include the dominance, in the Mediterranean countries, of inward oriented family-run firms in the Mediterranean countries; and of key manufacturing sectors by foreign direct investment firms with little in-country R&D or innovation based linkages in the Central and Eastern European CCs.

Information system cluster in Latvia

In October 2000, with support from the EU PHARE programme the Industrial Cluster Restructuring project was launched under the supervision of the Latvian Ministry of Economy. One part of this project is the creation of an information system cluster which aims to increase sharply the exports of IS related products and services. It also hopes to create a favourable environment for investments and innovative activities in Latvia by basing it on a common vision of IT development and by promoting all kinds of collaboration between firms, universities, scientific establishments and investors.

The IS cluster incorporates 18 companies that signed a co-operation agreement within the project in March 2001. The main co-operation principles mutually agreed upon by the cluster participants are outlined in the Ethical Code of the IS cluster. Since PHARE funding ended in October 2001, co-ordination has been undertaken by the Latvian Association of Information Technologies and Telecommunications.

Policy options

→ EU Structural Funds can assist in closing the funding gap but this will require significant improvements in the current range of instruments and funding schemes and their take-up by the enterprise sector. The EU should reinforce funding available to RIS-NAC and/or extend the Regional Innovative Action Programmes rapidly to the candidate countries with the necessary financial resources and access to expertise enabling them to launch and test a series of pilot schemes with a view to their full integration in future Structural Fund programmes.

→ Government's need start 're-engineering' their policy delivery processes – creating first the awareness of the need in enterprises through information and training; then building competence in enterprises or in supporting organisation to manage innovation projects. Such programmes are a vital first step in stimulating the interest and ability of enterprises to absorb funding available for industrial R&D or innovation projects.

→ Enterprises in the candidate countries are more likely to look to clients, competitors or other enterprises as innovation partners. Yet, sectoral or technology specific aspects of innovation are largely ignored in current policies, which focus mainly on generic technologies and infrastructure (technology parks, etc.). A stronger emphasis on funding co-operative sectoral structures involving partnerships of enterprises, research centres and other intermediaries should be infused into current policies; including in more 'traditional' sectors where the bulk of enterprises and employment is to be found. **Linkages with foreign direct investment firms, a key source of technology and organisational change, should be encouraged.**

→ Industry-science relations remain very weak and a major priority is to create an 'entrepreneurial culture' in higher education and research establishments. Government funding for the creation of interface services (advising academics on IPR management, first contact point for enterprises, etc.) is one option but higher education institutes should also be encouraged to examine other more entrepreneurial methods such as redefining promotion criteria of academics to give greater weight to industrial research co-operation, the creation of 'commercial subsidiaries' responsible for maximising return from research result, etc.

CHALLENGE 6: Reinforce the institutional capabilities for designing, delivering and evaluating innovation policy

Main findings

The capacity to design and implement innovation policy depends on a number of factors. The first is the existence of a clear remit (or at a minimum a clear division of competence) for designing policy. Responsibility for innovation policy lies with a ministry for enterprise/economic policy in Bulgaria, Latvia, Lithuania and Slovakia; and with a ministry for Education/Science in Malta, Romania, and Turkey. However, policy 'competition' between the lead ministry and other governmental organisations is in evidence in all cases.

Moreover, at the present time, the only country with significant institutional resources and capabilities in the field of (science, technology and) innovation policy is Turkey. In the other countries, the capacities and resources of the leading Ministries or agencies are very limited, and often subject to a state of flux in terms of recent reorganisation of bodies responsible for designing and overseeing policy implementation. In a number of countries, EU or bilateral funds have been used to 'import' know-how on innovation policy design or management, such as was the case for the design of the Bulgarian innovation policy.

Bulgaria: design of a first 'innovation policy'

In October 2002, the Bulgarian Ministries of Economy and of Education and Science published the result of a year long study and consultation on a Science, Technology and Innovation (STI) Policy. The policy was developed jointly by senior civil servants and an expert team (made available by the Bulgarian-Dutch bilateral assistance programme). The policy paper is the first that explicitly suggests actions in favour of an innovation policy in the country. Through 16 proposed actions and an accompanying budget plan for a ten year period, the Policy aims to: strengthen the competitiveness of Bulgaria's industry through science, tecnology and innovation; strengthen the science and technology sector through co-operation and concentration and intensifying the relationship with industry; provide a favourable environment for keeping graduates in science and technology in Bulgaria.

In terms of implementation, Turkey is the only country with specialised governmental and non-governmental agencies with a track-record of managing funding and delivering assistance to enterprises for innovation. For the purposes of EU Structural Funds, for instance, separate

implementation agencies are a considerable advantage. The higher level of policy sophistication of Turkey is reflected in the existence of an "evaluation culture" in the field of technology and innovation policy.

The CC7 lack a layer of innovation intermediaries who are able to counsel and support enterprises. Such organisations, often non-profit technology/innovation centres but also private sector consultants, play a key role as "programme promoters" ensuring that Government funds reach quickly and effectively enterprises targeted. Technology transfer and knowledge diffusion structures have been developed or planned in most countries (notably Business Innovation Centres and Technology Parks) but they only offer a very limited range of innovation services to firms. The concentration of such structures in national capitals is an issue; with only Romania and Turkey seeking to develop networks of regional level intermediaries.

Policy options

→ The issue of consolidating and making sustainable 'transnational policy learning' is one that can be usefully addressed at both national and EU level. The integration of candidate countries into EU level 'open policy benchmarking' initiatives such as the BEST initiative or the European Trend Chart on Innovation is a first step. However, broader training and 'multi-country' or inter-regional policy design or appraisal mechanisms could also be encouraged through existing EU financial mechanisms. The Governments of the candidate countries also need to recognise the importance of motivating and retaining staff in specialised 'innovation policy' services.

→ Governments should consider the advantage of creating 'agencies' able to act as implementing authorities for Structural Fund actions in favour of innovation. Building in evaluation and monitoring capacities at both ministerial and agency level will be a key aspect of organisational reinforcement for the period up to 2005. Funding for twinning actions between agencies from EU member states and their counterparts in the candidate countries could facilitate the transfer and adaptation of policy management tools.

→ Business services are very generic in nature and there is little technology support (testing and certification, prototyping, etc.) or innovation management advice (innovation 'audits', advisory services on IPR, etc.). Priority should be given to reinforcing the capacities of existing intermediaries and to creating stronger networks. Pilot actions funded through EU or national funds to train or accredit intermediaries are an obvious first step.

→ There is a need to deepen the analysis at national and multi-country level of specific factors affecting innovation capacities in the candidate countries. Most obvious targets for future studies or analysis include innovation financing and industrial networks and innovation (including the role of large foreign direct investment firms).

CHAPTER 1: Why a study on innovation policy in the candidate countries?

1.1 What does innovation policy have to do with accession?

Negotiations to enlarge the European Union (EU) from its current 15 Member States (the EU15) began on 31 March 1998 with the so-called Luxembourg Group (Cyprus, the Czech Republic, Estonia, Hungary, Poland and Slovenia); and with a further group of six countries, the so-called Helsinki group (Bulgaria, Latvia, Lithuania, Malta, the Slovak Republic and Romania) in October 1999.

The negotiations revolved around 31 'Chapters' covering various policy fields of the EU's legislative 'acquis'[8], including industry, SMEs and research policy. The negotiations were concluded with 10 of the candidate countries (CCs) in 2002; and the Copenhagen European Council Summit, in December 2002 agreed on enlargement of the EU to 25 Member States from 1 May 2004[9].

The three CC7 countries not meeting the Copenhagen Economic criteria have still some years of adjustment before being able to meet the competitive pressures of the Single Market.

Aside from meeting the 'acquis', the three other CCs still have to fulfil the economic, and in the case of Turkey political, criteria for enlargement. The economic criteria asks whether a candidate country has a) a functioning market economy and b) the capacity to withstand competitive pressure and market forces within the EU. While Bulgaria was classified as a functioning market economy in the 2002 Commission Regular Report[10], neither Romania nor Turkey met the two economic criteria. In short, these three countries have some years of adjustment before being able to compete in the Single Market[11].

8 The common rules, standards and policies that make up the body of EU law.

9 The current EU15 plus Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic and Slovenia.

10 See Towards the Enlarged European Union. Strategy Paper and Report of the European Commission on the progress towards accession, 9 October 2002.

11 See the DG Enlargement website for the most up to date developments: http://europa.eu.int/comm/enlargement/negotiations/index.htm

It is precisely the ability of the enterprises in the CCs being able to meet competitive pressure in a wider EU where there is a fundamental relation between preparation for accession and innovation policy[12]. **Creating an innovative knowledge-based economy is a prerequisite enabling the CCs to close the existing gap in competitiveness[13] after joining the EU.**

This obligation is enshrined in the decision of the Lisbon European Council Summit[14] in March 2000 to set a new strategic goal for the European Union (EU): *'to become the most competitive and dynamic knowledge-based economy in the world capable of sustaining economic growth with more and better jobs and greater social cohesion by 2010'*. The overall strategy called on the Commission and the Member States to prepare the transition to a knowledge-based economy and society by stepping up the process of structural reform for competitiveness and innovation. The recognition of the importance of innovation policy as a lever for growth was further confirmed in the 2000 Commission Communication on Innovation in a knowledge-driven economy[15].

Successful innovation involves much more than exploiting scientific research results.

At the *Barcelona European Council* (15-16 March 2002), the 'Lisbon goal' was reviewed and an agreement reached on increasing R&D expenditure across the EU from 1.9% of GDP in 2000 to 3% by 2010. In this context, the need to boost private investment in R&D[16] has been underlined[17].

However, successful innovation involves much more than exploiting scientific research results. Indeed, a 2002 report[18] from the EU's Economic Policy Committee stressed that the supply of R&D (the amount of R&D carried out, or the number of skilled researchers) is a *necessary* but *insufficient* condition for a successful innovation system. Broader framework conditions including the 'demand' for innovation (growth and stability oriented macro-economic environment, effective competition, good science-industry links, access to risk capital and management expertise for start-ups) and networking conditions (knowledge transfer organisations, research mobility) are essential.

12 Defined as "A set of policy actions to raise the quantity and efficiency of innovation activities whereby innovation activities refer to the creation, adaptation and adoption of new or improved products, processes or services". See: Innovation Policy in a knowl edge-based economy. Study by MERIT for DG Enterprise, June 2000.

13 Defined as the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis. See Commission Communication on Productivity: the Key to Competitiveness of European Economies and Enterprises. 21/5/2002.

14 See: http://europa.eu.int/council/off/conclu/mar2000/

15 See: COM(2000) 567, 20/9/2000. The Communication can be downloaded from http://www.cordis.lu/innovation-smes/communication2000/home.html

16 In OECD countries, a 1% increase in business R&D expenditure has been estimated to generate on average a 0.13% increase in total-factor productivity. See OECD: Science, Technology and Industry Outlook 2001. Pg 55.

17 Commission Communication "More Research for Europe – Towards 3% of GDP", COM (2002) 499 final.

18 See: http://register.consilium.eu.int/pdf/en/02/St05/05402en2.pdf

The December 2002 Commission Communication on *'Industrial policy in an Enlarged Europe*[19] reiterates this message on the need to developing a more systematic EU approach for improving the framework conditions favourable to industrial competitiveness. Both the 'Industrial Policy Communication and the 2003 Spring Report on the Lisbon Strategy[20] pinpoint as a crucial issue the need to boost productivity, which despite record growth remains weaker than that of the US and based more on employment growth than investment or innovation. The Spring Report underlines that knowledge, innovation and entrepreneurial capacity (or business dynamism) must be recognised as the three factors contributing to productivity growth and hence improved competitiveness.

As the March 2003 Commission Communication on *Innovation Policy: updating the Union's approach in the context of the Lisbon Strategy*[21] underlines: adopting a broader vision of the diverse routes to innovation, for instance acknowledging that factors influencing innovation differ across business sectors, should be a guiding principle to all those working in the field of innovation policy. While research is a major contributor to innovation, if there is no entrepreneurial innovation there is no value creation. Except in certain types of technology-based firms, the focus is not only on *technological innovation* but also on *organisational innovation* (impact of new working methods on competitiveness) and *presentational innovation* (design and marketing).

In line with such thinking, the main focus of this study will be the manner in which the CC7 are developing innovation policies that foster a positive institutional and economic framework for business innovation in its many and diverse forms.

1.2 Why not a study on all thirteen candidate countries?

This study is a follow-up to the report produced during the course of 2000-2001 on the challenges of developing innovation policy in six candidate countries (Cyprus, Czech Republic, Estonia, Hungary, Poland and Slovenia, hereinafter referred to as the CC6)[22]. In spite of the contrasting size and circumstances of the CC6 (comparing countries as distinct as Cyprus and Poland not being an easy task), the findings of the first study provided a comparative vision of the drivers and barriers to the development of innovation policy. The key findings of this first study are summarised briefly in the box below.

19 COM(2002) 714 Final, 11 December 2002.

20 Communication from the Commission. Choosing to grow: knowledge, innovation and jobs in a cohesive society. Report to the Spring European Council on the Lisbon strategy of economic, social and environmental renewal. COM(2003) 5 final. 14.1.2003.

21 See: http://www.cordis.lu/innovation-policy/communications/

22 Innovation policy in six candidate countries: the challenges. A study co-ordinated by ADE S.A. for the Enterprise Directorate-General, European Commission, Luxembourg. Available at: http://www.cordis.lu/innovation-smes/src/studies.htm.

Carrying out a comparative analysis on the seven candidate countries covered by this study (Bulgaria, Latvia, Lithuania, Malta, Romania, Slovakia and Turkey, hereinafter referred to as the CC7) is if anything more demanding.

Table 1 – Key statistics for CC7

Country	Area (km^2)	Population in 1000	GDP/ capita (€)
Bulgaria	110.971	8.170	1.600
Latvia	64.589	2.373	3.300
Lithuania	65.300	3.696	3.300
Malta	315,6	391,4	9.900
Romania	238.391	22.435	1.800
Slovakia	49.035	5.401	3.900
Turkey	769.604	65.293	3.200
EU15	3 191 120	374.5 million	

Source: Progress towards meeting economic criteria for accession: the assessment from the 2001 Regular Report, DG for Economic and Financial Affairs, Enlargement Papers N°6, November 2001. http://europa.eu.int/comm/economy_finance.

The countries differ in territorial size from Latvia and Lithuania, which are comparable to Ireland, to Romania, which is similar in size to the United Kingdom. The inclusion of Turkey alone would increase the territory of the EU15 by 25%. The differences in population are also huge varying from the population of Malta, which is approximately the same as Luxembourg; to that of Turkey, which would become the second most populated member state after Germany. Geographically, only one country, Slovakia, is located in central Europe while all the others are to a greater or lesser extent to be found on the periphery of a future enlarged EU. This differs from the CC6 where only Cyprus, could be considered to be on the outside edge of the EU.

Box 1 - Key findings of the CC6 study

How did the transition process influence the potential for businesses to innovate ?

→ The economic and social cohesion of an enlarged EU will depend on the CC6 adopting pro-growth strategies based on technological change and innovation;

→ Privatisation and new firm creation has created a significant group of small dynamic high-tech firms;

→ Restructuring of the enterprise sector was led by foreign investment resulting, in most cases, in a dual economy with highly productive foreign owned firms contrasting with the struggling domestic SME sector.

Where do the CC6 stand in terms of innovation performance ?

→ Human Resources for innovation: despite maintaining relative levels of funding in education, the education and vocational training systems in the CC6 produce a workforce that is over-specialised in secondary vocational skills. Skills shortages exist in the field of information technologies and managerial techniques;

→ Knowledge creation: domestic technological activity is relatively more developed in the CC5 (CC6 excluding Cyprus) than in Greece, Portugal and Spain. The relative orientation of the R&D systems of the CC5 fall between the focus on academic output of the EU Cohesion countries and the technology (patents) focus of the EU High income countries. However, the potential for catching up based on new technologies is severely restricted by weak business demand for R&D;

→ Transmission and application of knowledge: the CC6 lack the technology-oriented segment of small firms that feed the innovation dynamic in the more advanced EU countries. A few (larger) firms are investing heavily in innovation, while the overwhelming majority of SMEs are not undertaking innovation;

→ Innovation financing: the financial systems of the CC6 remain a major barrier to an increase in innovation activity. There are serious weaknesses (due to the small size and weakness of stock-markets) in the ability to generate venture capital that would support an increase in the number of innovative small firms.

Is the legal and administrative environment conducive to stimulating innovation ?

→ Administrative simplification has become a policy priority in the CC6, however, effectiveness of the actions taken has not always been as encouraging;

→ Only Poland and Hungary offer fiscal incentives to companies to undertake R&D or innovation projects;

→ The enforcement of EU state aid rules should lead to a reorientation towards horizontal schemes in favour of R&D. However, existing grant and loan schemes are failing to incite firms to undertake risky projects.

Who is responsible for innovation policy matters in the CC6 ?

→ Four out of six countries attribute responsibility for innovation policy to the ministry of economy or industry. Only three out six governments have an agency responsible for implementing innovation policy measures;

→ Even where there are specific government departments with a remit for innovation and technology policy, they do not play a role in co-ordinating policy and funding of innovation matters across ministries.

To what extent have governments developed an innovation policy ?

→ None of the CC6 can be considered to have developed a fully-fledged innovation policy;

→ Hungary is more advanced than the other countries in terms of the existence of a range of programmes and their longevity. In Estonia, there is now a relatively high awareness of the importance of developing an innovation policy and the national innovation agency has been restructured;

→ Poland and Slovenia have implemented innovation surveys in the enterprise sector and developed various policy statements although implementation is not always assured due to lack of funds;

→ The Czech Republic has reoriented its research policy to give more support to relations with industry while Cyprus has developed a number of ad hoc initiatives such as high-tech incubators.

What types of initiatives have been taken to support innovation ?

→ The level of development of innovation and technology management courses in higher or further educations is uneven across the CC6, Hungary, the Czech Republic and Slovenia are further advanced;

→ Use of innovation management tools is not yet widespread although foreign investment has led to the dissemination of IMTs. No specific policy initiatives on IMTs had been launched by end 2001;

→ Policy activity in the area of research-industry links has been relatively intense in most of the CC6 since the mid-nineties. For instance, Poland and Hungary had launched centres of excellence favouring co-operation between R&D centres and firms;

→ Considerable attention has been paid to the creation of business development and incubator structures with however a differing emphasis across countries. In Estonia, the main focus has been on university spin-offs, in Hungary newly created firms are assisted develop innovation plans. Aid from international donors has been used to create network of business and innovation intermediaries, with however doubts on sustainability.

1.3 What was the aim of the study?

The aim of this study was to **"examine and analyse the current framework conditions for selected innovation issues"** in the CC7. The selected issues grouped in three broad themes are summarised in the box below.

Box 2 - Main themes and selected issues of the study

The innovation policy framework

→ Identification of major actors in the design and implementation of innovation measures affecting enterprises;
→ The main innovation policy developments for the period 1996-2000;
→ Review of the legal and administrative framework including competition rules and their applications, administrative procedures to create companies, protection of intellectual property rights, etc;
→ Examination and comparative analysis of company tax incentives to promote investments in innovation (technology and intangibles);
→ Review of measures aimed at promoting the start-up and development of technology based firms, including financial support (venture capital, loans and grants).

Measures to foster innovation in business

→ Examination of teaching programmes and methods (at higher education and life-long learning level) and the training of instructors with a view to fostering an innovation and enterprise culture;
→ Review of existing schemes to encourage the secondment of (young) researchers and engineers to enterprises, to help with their innovation and technology transfer projects;
→ Review of main support schemes for the uptake of information and communication technologies (ICT) in enterprises.

Business innovation interfaces

→ Co-operation between the research community (both University and research centres) and industry, mainly as regards the exploitation of research results;
→ Co-operation between large firms and SMEs;
→ Co-operation between domestic and foreign owned.

This report provides an overall summary of the response to these issues in the form of a series of questions. The aim is to guide the reader logically and clearly through the analysis to a series of overall conclusions on the challenges facing the candidate countries in developing innovation policies.

The key questions and the corresponding chapters of this report are as follows:

→ **How innovative are the candidate countries?** Chapter 2 reviews available statistical data on innovation performance of each of the seven candidate countries, and compares this to the situation for the CC6 and EU15.

→ **Is it easy to be an innovator in the candidate countries ?** A review of the legal and administrative framework for innovation in the CC7 is provided in Chapter 3, in line with the increasing importance attributed to the 'business environment' as a barrier or driver for innovation.

→ **What is being done to create a knowledge-based economy?** Drawing on the analysis of chapter 2, the steps being taken by Governments to respond to the needs of enterprises for skilled human resources; and to encourage the creation and diffusion of information and communication technologies is studied in Chapter 4.

→ **What is being done to support business innovation ?** Chapter 5 is the core of the report and examines in turn, the question of which institutions are responsible for innovation matters and the organisation of the 'national innovation system'; whether governments and other stakeholders have taken steps to develop an innovation policy; and specific measures taken to increase co-operation and networking with a view to enhanced innovation performance.

→ **What should be done to improve innovation performance?** This concluding chapter summarises the key findings of the study from the point of view of enterprises in the CC7 and suggests a number of broad options and priorities for policy-makers.

1.4 How did you arrive at your conclusions?

Aide à la Décision Economique (ADE S.A, Belgium) led the study consortium in partnership with two co-contractors: the School of Slavonic and East European Studies (SSEES) of the University College London (UK) and LOGOTECH S.A. (Greece):

- → **ADE** provided the overall methodological framework and was responsible for organising workshops and panel meetings, and for the final editing and production of all reports. ADE took the lead role in writing and producing the comparative analysis presented in this final report and supervised and reviewed the work of the experts for Latvia, Lithuania, Malta and Slovakia.
- → **SSEES-UCL** carried out the analysis of available indicators and data on innovation performance of the seven candidate countries. In addition, they contributed to moderating multinational panel meetings and national workshops and to drawing up final conclusions and policy options.
- → **LOGOTECH** was primarily responsible for the opinion survey (drafting of questionnaire and comparative analysis of results for the seven countries) and also supervised and reviewed the work of the national experts for Bulgaria, Romanian and Turkey. Like SSEES, they provided input to the final report.
- → **National experts (see annex 2) for each of the seven countries** played an integral and vital role in developing the qualitative analysis of innovation matters and policy issues. In addition to a review of available documentation, they carried out interviews and an opinion survey with key stakeholders, and organised a policy workshop (see boxes below).

Box 3 - Consultations with stakeholders

The technical specifications of the study provided for the setting up of a *"multinational panel of five experts…to follow the progress of this study"* (see annex 2). Two workshops took place, the first having the aim, to discuss in a round table manner the status and dynamics of innovation issues in the candidate countries, drawing on the variety of experience and knowledge of the members of the panel, and second, to validate the main findings and conclusions of the study. Indeed, the panel members provided additional input and suggestions with respect to the themes being analysed allowing the study team to confirm certain hypothesis or emerging issues at a comparative level.
In addition, an innovation policy workshop was organised in each country during the month of October 2002. The aim was to validate with a group of invited stakeholders, the provisional findings, including the results of the opinion survey, and policy options proposed by each national report. Each half-day workshop brought together between 15 and 25 stakeholders and included presentations by a member of the core team and the national experts.

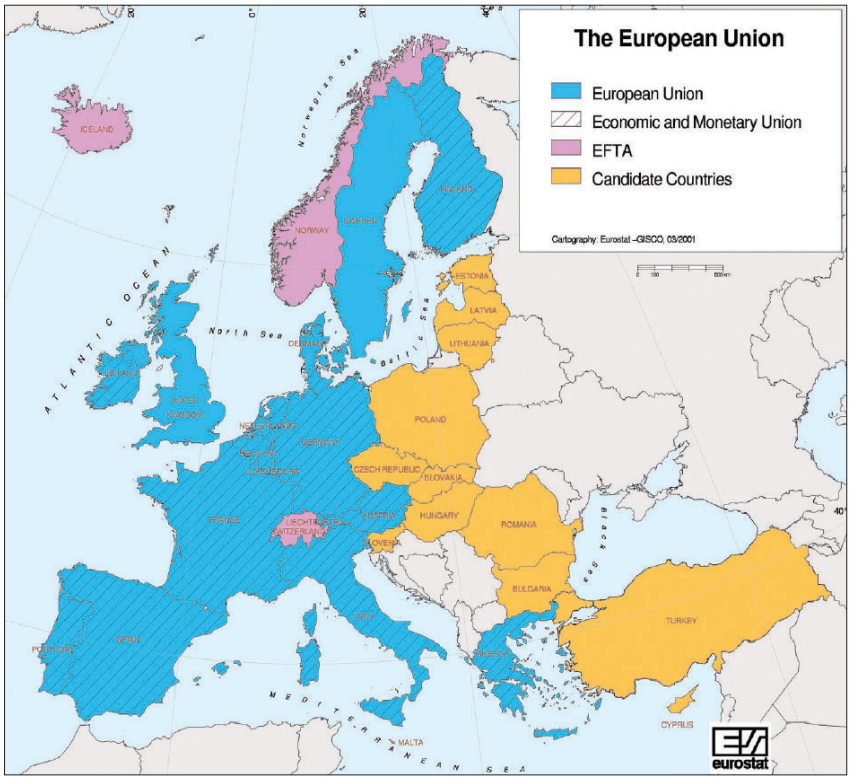
In carrying out the study, the study team examined the views and priorities of public authorities responsible for fostering business innovation. The study also analysed the opinion of a group of 'innovative' large enterprises and SMEs on the policy framework and their needs in terms of innovation support (see box below). The results of this opinion survey are integrated into the various sections of the report in order to back up qualitative findings.

Box 4 - An opinion survey of leading innovators

As part of the study, the national experts carried out an opinion survey of leading private sector stakeholders. The sample was intentionally biased towards existing innovative companies in order to collect views from those people most likely to be able to respond to questions regarding a range of issues including: the influence of the legal and economic environment on business innovation; current innovation policy developments, and policy mechanisms in the "innovation system".
The survey sampled from 30 to 50 people with one third being enterprises (managing directors, directors of research, etc.) and the remainder from private sector stakeholders (business federations, etc.). Companies to be surveyed had to meet at least one of the following criteria to qualify as 'innovative': internal R&D unit; participate in national/international funding programmes for innovation/R&D, etc.

Over 300 people were interviewed, surveyed or participated to workshops organised in the seven candidate countries by the study team. The study team would like to express their gratitude to everyone who participated in the interviews and surveys or the workshops and panels at national or European level. The support and advice of the staff of the Innovation Policy Unit of the Enterprise Directorate-General is also gratefully acknowledged.

Map 1 – The European Union and candidate countries



CHAPTER 2: How innovative are the candidate countries?

The capability to diffuse information and knowledge throughout all business sectors is an important feature of sucessful economies.

Despite a decade of economic reform, the enterprise sector in the candidate countries (CCs) still faces significantly greater challenges than their counterparts in the EU. Most observers would probably rapidly conclude that by definition the CCs are less innovative than the current EU15 Member States. Of course, the actual situation is not clear-cut as first assumptions might predict.

The analysis of this section[23] provides a baseline review of the innovation capability of the CC7, compared to both the CC6 and EU15[24]. The objective is to identify particular strengths or weaknesses of the CC7 and draw conclusions with respect to policy priorities.

The indicators are organised in four groups, namely:

→ Economic development and output indicators (productivity, finance, trade and foreign direct investment) which take into account the variety of factors that come into play when enterprises make decisions on how much to invest in knowledge creation or absorption.

→ Indicators on human resources are used as a proxy for the capacity of the candidate countries to absorb new technologies. The critical role of human resources (educational levels of population, education expenditures, educational level of entrepreneurs) in fostering innovation is thus acknowledged.

→ Growth requires increasing explicit technological effort through R&D and industrial innovation, and diffusion of existing knowledge throughout the economy. These areas are represented by a variety of science and technology (S&T) indicators that approximate knowledge creation.

→ The fourth group of indicators attempts to measure the 'distributive capability' of an economy. The capability to diffuse information and knowledge throughout all business sectors is an important feature of successful economies. Transmission and application of knowledge is measured by indicators of innovation activities; quality control; vocational training, information and telecommunication infrastructure.

23 This section draws on a working paper by Slavo Radosevic and Tomas Mickeiwicz of SSEES-UCL. See Volume 2.8 of this study.

24 However, the analysis is primarily focused on the CC7 and is not a complete study on all candidate countries. Two groups are used as references, the southern-European 'Cohesion Countries' (Greece, Portugal and Spain, labelled SEU-3); and the other twelve Member States or the 'developed EU' (DEU-12).

A final section provides a summary analysis comparing the CC7 with other economies using the European Innovation Scoreboard framework[25]; and identifying trends in the scoreboard indicators to appraise whether there is a catching-up process underway.
The quantitative nature of the analysis conveys important features of innovation capability of candidate countries. However, it a deeper understanding of innovation issues in the CC7 requires taking into account qualitative aspects of the innovation process like organisational structures at the firm level, or the complicated institutional interface between political, economic and cultural change in individual economies. Some of these issues have been addressed in the country reports produced within this study and are dealt with in subsequent chapters of this overall report.

2.1 What is the relation between economic development & innovation?

68% of respondents to the opinion survey stated that the macro-economic situation in the CC7 discouraged innovators

The broader economic context is an important starting point since innovation is driven by economic competition, trade openness and property rights incentives, which are a function of macroeconomic and institutional set-ups. Opportunities and incentives for innovation are highly dependent on levels of income and productivity.

Box 5 - Macro-economic stability – a precondition for innovation

Two key macro-economic indicators play an important role in influencing innovation activities:

→ High rates of price increases (inflation) make calculation of future profitability of investment in innovation difficult and create 'wrong' incentives as financial investments often become more profitable than cost reduction and new product development. By 2001, all 13 candidate countries with the exception of Romania and Turkey had inflation below 10%.

→ Government budget deficits also create economic instability, increasing the cost of finance and public borrowing may crowd out opportunities for investment in innovation. However, most of the candidate countries have succeeded in reducing the general government budget deficit to below or around 5% by 2000. This source of economic instability and hence of disincentive to innovate remain present however in Malta and Turkey.

25 See http://www.cordis.lu/trendchart

Income and productivity

As noted in the introduction, the CC7 are a highly divergent group in terms of size (geography and population). However, in terms of income levels, strong similarities in levels of GDP per capita suggest that the CC7 are actually a rather homogenous group, as was the case for the CC6[26]. However, the CC7 countries are on average less-developed than the CC6 with average GDP per capita of 7,900 EUR (purchasing parities standards, PPS) in 2000: only 61% of the CC6 and only 14% of the EU15 average.

Moreover, the economic performance of the CC7 was worse than the performance of the CC6 during the 1990s. Indeed, the process of de-industrialisation in the CC7, and in particular the Baltic Countries and Bulgaria, was more intense and has significantly changed the structure of economic activities. Only in Turkey did industry grow at rates higher than the overall economy.

The average annual GDP growth rate of the CC13 is 2.7% compared to 2% for the EU15. This is not sufficient to close the income gap

Most worrying in terms of economic cohesion is the relatively slow speed of convergence between the candidate countries and the EU15. From 1999-2002, the average annual GDP growth rate of the CC13 was 2.7% compared to 2% for the EU15. This is not sufficient to close the income gap. However, it is important to bear in mind that income levels do not directly reflect the scale of innovation activities. Countries may grow for some time based on favourable export trends or domestic demand. However, in the long term, growth depends on accumulation of technology and intensity of innovation activities.

A more direct indicator of innovation activities is labour productivity[27], which shows the value added (in PPS) that is being created by employees. While most of the CCs have managed to narrow the productivity gap with the EU15 during the period 1995-2001, there is increasing polarisation. On the one hand, Bulgaria, Romania and Cyprus have not improved their relative position while most of the CC6 countries and Latvia from CC7 have made significant gains in productivity levels[28].

Among sectors of economic activity manufacturing is the most innovation intensive. Data on labour productivity in manufacturing in the wider Europe show there are three groups of economies in terms of labour productivity (see table 2): those whose labour productivity in manufacturing and in total economy is below 40% of the EU level, a second group where labour

26 The coefficient of variation (standard deviation divided by the average) of GDP per capita for the CC7 is 0.3; which is similar to the result for the CC6 (0.2).

27 Difference between labour productivity and GDP per capita arise with labour participation rates. The higher are the unemployment rates, the greater are differences between GDP per capita and national productivities. Other factors, like capital flows including remittances and age structure of population can also affect income levels.

28 The CC6 have on average improved more than the CC7 group. Growth theory would suggest that the increase in productivity should be faster in countries that have lower initial productivity levels. However data suggests only a weak correlation primarily due to slow rates of growth of productivity in Romania and Bulgaria.

productivity is between 40-80% of EU level, and a third group whose labour productivity in manufacturing and economy is above 80% of EU level.

Data on productivity provides a first example of the difficulty in classifying countries of the enlarged EU into specific groups. Firstly, there is no clear 'East-West' split with Greece and Portugal performing similarly to the group of 'advanced CCs'. Secondly, the productivity gap for group 1, particularly in manufacturing, is very high, yet this group includes Estonia considered a success story in transition. In short, convergence to EU15 productivity levels seems unlikely even in the medium term.

Table 2 – Labour productivity in 1998, EU15=100

	Labour productivity in manufacturing	Labour productivity in total economy
	EU-15=100, 1998	
Group 1	**20-40%**	**>40%**
	Bulgaria	Bulgaria
	Latvia	Latvia
	Estonia	Lithuania
	Lithuania	Romania
	Romania	Estonia
	Poland	Poland
Group 2	**40-60%**	**40-80%**
	Slovakia	Turkey
	Hungary	Slovakia
	Turkey	Portugal
	Portugal	Hungary
	Czech R	Czech R
	Greece	Slovenia
	Slovenia	Greece
Group 3	**80%>**	**80%>**
	Spain	Spain
	All other EU economies	All other EU economies

Source : Based on Eurostat Statistics in Focus. Theme 2 13/2001.

The majority of the productivity gap comes from differences in technology, management and organisation.

From the point of view of innovation, the explanation for the productivity gap appears to be country rather than sector specific[29]. Research suggests that the sectoral content of the productivity gap with the EU varies between 27.7% in Slovakia to 5.3% in the Czech Republic. Hence, the majority of the productivity gap comes from intra-sectoral differences or differences in technology, management and organisation, which are country specific[30].

Finally, unstable rates of productivity growth combined with high rates of unemployment in some CCs[31] suggest that the initial sources of growth and productivity may be soon exhausted and that the issue of technical change as the major source of long-term and sustainable growth will inevitably become part of the policy agenda. The previous study on the CC6 suggested that this has been already recognised by policy makers through the increasing importance given to innovation policy.

Finance, trade and foreign direct investment

A developed financial system performs many activities, which support innovation, such as innovation assessment, venture capital financing, long-term finance, preferential loans, etc. Self-retained earnings represent an important source of new investments. However, external funding from either banks or stock market is important in complementing internal sources. A weak financial system and dominance of own funding for innovation hinders catching-up process and suggests that there is weak national system of innovation (See Box 6).

Box 6- Finance and venture capital in the candidate countries – no room for innovators?

Broadly speaking, the banking systems of the candidate countries are less competitive (higher costs of capital) and less efficient (the capacity to convert deposits into loans). Even the relatively efficient and competitive banking systems of Cyprus, Czech Republic, Estonia and Malta, are not necessarily innovation-friendly. More fundamentally, the banking systems of the CC, particularly those of Bulgaria, Lithuania and Romania, are very shallow in terms of the share of domestic credit provided by banks as a % of GDP.

Despite much effort made to establish capital markets in the CCs, only Cyprus, Hungary and Turkey have relatively well developed stock markets. However, certain advanced EU countries, such as Austria and Belgium, also have comparatively small market capitalisation (as a % of GDP).

29 Labour productivity differences can be due to intra sectoral differences in productivity, which are most often related to technology and organisation, as well as due to sectoral differences, i.e. differences due to prevalence of sectors with inherently low productivities like labour intensive industries.

30 This result has been confirmed also by a large-scale enterprise survey, which concluded that the major sources of productivity growth in transition economies are not inter-sectoral but intra-sectoral reallocations. Carlin, W, S. Fries, M. Schaffer and P. Seabright (2001), Competition and enterprise performance in transition economics: evidence from a cross-country survey, EBRD Working Paper, No. 63.

31 High growth rates of industrial productivity in Poland, Slovakia and the Baltic States came at the cost of significant increases in unemployment.

→ This suggests that orientation rather than only availability of finance is important if the link between finance and innovation in the candidate countries is to be understood. This issue deserves to be studied further in the near future.

Given the 'shallow' financial systems and under-developed stock markets (a main 'exit' route for investors), it was to be expected that private equity (including venture capital) investments would be very limited in the CC7. Indeed, venture capital investments in the CC7 constitute the most undeveloped component of the financial system.

→ Enlargement will bring with it an accompanying reduction in investment risk. However, public intervention to support the development of venture capital, and in particular seed and early-stage financing, must be a priority if the 'equity gap' is to be reduced for innovators in the candidate countries. A more detailed study into seed and early-stage funding mechanisms for new technology based firms in the candidate countries should be commissioned.

Openness towards trade and FDI, or internationalisation of an economy, is an essential feature of the catching-up process. However, it is not openness itself that matters but how a country uses it as way to upgrade technologically[32]. This historical lesson is highly relevant for the CCs, which given significantly lower levels of development are relatively highly integrated into the world economy in terms of trade[33].

Only Estonia, Hungary and Malta have developed important shares of high-technology manufacturing exports.

In terms of manufacturing, there has been a much larger shift from raw material to manufacturing based products in the CC6 than in the CC7 (only Turkey performs similarly to the CC6). However, only Estonia, Hungary and Malta have important shares of high-tech manufacturing exports, and this is largely due to ICT production by multinational companies (MNCs). The other CCs have shares of high-tech exports similar to those of Italy and the the three southern EU countries (Greece, Spain and Portugal, or SEU 3).

Integration into the world economy and technology and knowledge flows is further facilitated through foreign direct investment (FDI). In CCs, FDI firms are more export and more import intensive than domestic firms[34]; and as might be expected generate significantly higher productivity and profitability[35]. However, in terms of technology and knowledge transfer, the impact of FDI may not always be as clear-cut. Evidence suggests, *"technology often transfers through the parent-subsidiary relationship and trade, but that in practice the expected spillover benefits to purely domestic enterprises rarely materialize"*[36]. Moreover, surveys hint at a crowding out effect on local firms in competing industries, so that trade may be a more important channel of technology transfer than FDI[37].

32 Radosevic, Slavo (1999), International technology transfer and catch-up in economic development, Edward Elgar, Cheltenham.

33 The intensity of trade integration of the CCs ranges from 77% (Turkey) to 342% (Estonia) reflecting differences in size. On average the CC7 are somewhat less integrated in trade than the CC6.

34 There is a positive and moderate relationship between FDI and trade since FDI can explain 59% of variation in trade amongst European countries. Excluding Slovakia and Slovenia, FDI explains 77% of variation in trade intensity. In these two economies domestic firms are very trade active and able exporters.

35 Huyna (1999).

36 See: Economic Survey of Europe 2002 n°1. Chapter 4: Technological Activity in the ECE Region during the 1990s. pp. 175. United Nations Commission for Europe.

37 J. Damikan, M. Knell, B. Macjen and M. Rojec, Is technology transferring to the accession countries? Evidence from panel data for ten transition countries. 2001.

2.2 The human potential for innovation

Human resources are essential to growth and innovation as they determine absorptive capacities of economies, or the capacity to exchange and diffuse new technologies. Moreover, knowledge creation is constrained by the quality and structure of skills of the active population. Currently, the EU15 have a lower percentage of the population with third level education (21.2%) than the United States (36.5.2%) and Japan (29.9%)[38]. How will the introduction of the CCs affect this position?

In terms of educational structure of the economically active population, the central and eastern European candidate countries (CEE CCs)[39] have relatively higher levels of education than other countries with similar levels of income[40]. Indeed, the paradox between low levels of income and relatively higher levels of education is more pronounced in the CC7 group than in the CC6.

The central and eastern European candidate countries have relatively higher levels of education than other countries with similar levels of income

The part of economically active population with first level education is very small (except for Romania and Poland which have large agricultural populations); while, all CEE CCs (except Romania) have a share of the population with second-level education higher than the EU average (reflecting the importance of the labour force still employed in industry). As data from the International Labour Organisation (1999) highlights, in terms of third-level education, the situation is more polarised: Slovakia (44%), Lithuania (43%) and Estonia (41%) have the highest share of economically active population with third level education in Europe; while all the other CCs are at the lower end of the ladder, from 17.6% (Romania) to 11.3% (Czech Rep.). However, even this trailing group of CEE CCs are above Portugal, Austria and Italy.

In short, apart from Slovakia, the Baltic States and Romania, the education structure of the CEE CCs is compressed on the edge (low shares of both least educated and people with higher education but with a relatively high share of population with secondary level education).
An economic structure with a high share of industry and high levels of investment in education is favourable for absorbing new technologies provided that investment and retraining (see 2.4 below) programmes are in place.

38 Source: European Innovation Scoreboard 2002. www.cordis.lu/trendchart/

39 No data is available for Cyprus, Malta or Turkey.

40 If current investment in education are a proxy for long-term growth potential then the outcome across the CCs is likely to be very different. Similar to current patterns of education levels, investments (as a % of GDP) in education range from very high 6.8% in Estonia and 6% in Latvia to low 3.1-3.7% in Romania, Turkey and Bulgaria.

However, there is no basis for unqualified optimism and it would be more correct to state that the education levels of the CEE CCs does not seem to be either a major constraint or advantage for the diffusion of new technologies, given their income levels. Introduction and diffusion of new technologies is still confined to sectors with a high share of foreign investors; and the potentially favourable education structure has become a factor of economic growth in only a few (metropolitan) regions.

The potentially favourable education structure has been turned into a factor of economic growth in only a few regions.

Finally, the **educational levels of entrepreneurs** in the CEE CCs broadly reflects the educational structure of the population; namely a predominance of entrepreneurs with secondary level education. This is unsuitable for promoting technology-based entrepreneurship relying on high-level skills. The emergence of new types of supply side difficulties for growth of firms like access to trained workers and to technology is a symptom of this problem (see section 2.4).

2.3 Knowledge creation and investment

The ability to generate investments, both tangible and intangible, for a prolonged period of time is essential if the CCs are to sustain growth and catch-up. Around half the cost of innovation is related to physical investments or investments in embodied technology.

The CCs will bring a relatively small amount of new R&D funding into an enlarged EU (see table below). Gross expenditure on R&D (GERD) in the CC13 is only 4% of the EU15 total, or somewhat less than the total R&D funding of Spain. The manpower contribution will be more important: R&D personnel (full-time equivalent, FTE) of the CC13 is half that of Germany or somewhat smaller than the UK R&D system. However, a bulk of this contribution will come from the CC6, which have considerably more developed R&D systems in manpower (60% of CC13) and especially funding (80% of CC13) terms[41].

41 Poland, Czech Republic and Hungary are major players in terms of funding and personnel: Poland contributes 36% while Czech Rep. and Hungary contribute 25% and 11% in terms of funding respectively. The Romanian R&D system amounts to 19% of CC13 in terms of manpower but contributes only 8% of funding.

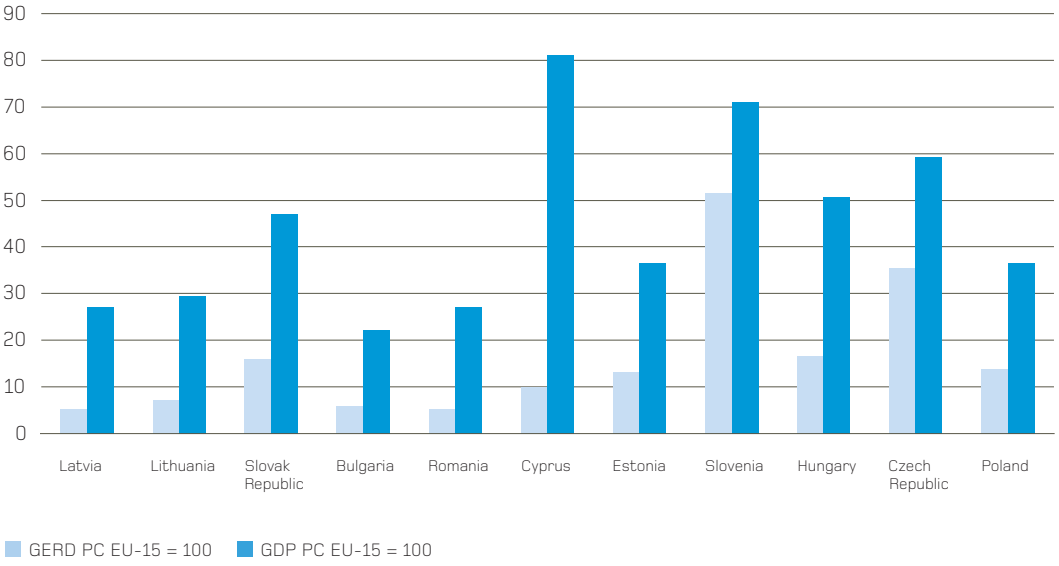
Table 3 – GERD and R&D personnel in candidate countries, 1999

	R&D expenditure (mio € PPS)	Share	R&D personnel (FTE)	Share
EU-15	148179	100%	1667513	100.0%
SEU-3	8188	5.5%	149697	9.0%
CC6	4731	3.2%	141524	8.5%
CC7	1156	0.8%	92122	5.5%
CC13*	5887	4.0%	233646	14.0%

Source : Based on R&D and innovation statistics in candidate countries and the Russian Federation 1990-99, Eurostat.
* Not including Turkey.

However, the 'R&D gap' between EU15 and CC13 is much higher in terms of GERD per capita than in terms of GDP per capita (see figure 1). The R&D gap per capita ranges from 5% (Latvia) to 51% (Slovenia); while the income gap ranges from 22% (Bulgaria) to 81% (Cyprus) of the EU15 level. The difference between the two gaps is significantly bigger for the CC7 than for the CC6[42]. This suggests that the R&D systems of CC7 countries are much poorer in terms of capital intensity. Apart from Slovakia, the GERD per capita is extremely low in Latvia, Lithuania, Romania and Bulgaria.

Figure 1 – Income and GERD gap per capita, 1999



Source: Based on Eurostat.

42 In the CC6 (without Cyprus) the ratio between the two gaps is 2.3 times while in the CC7 this ratio is 4.2 times.

Compared to GDP, the CC7 have the lowest level of investment in R&D; on average a GERD/GDP ratio of 0.52% in 1999. On the other hand, the average research intensity of the CC6 at 0.87% of GDP is slightly higher than that of the SEU-3 economies.

Dislocation of domestic R&D from innovation and investment processes in the economy limits dramatically the scope of innovation policy in the CCs.

Moreover, this very low level of investment in R&D in the CC7 came after a very sharp drop in absolute and relative terms during the 1990s[43]. Particularly striking is that the recovery of GDP in the second half of the 1990s did not affect the downsizing of the R&D system. This trend is driven by shrinking demand for domestic technology and by reduced government funding. This suggests that R&D has not played an important role in economic growth, which is rather driven by acquisition of foreign technology via trade and FDI. Dislocation of domestic R&D from innovation and investment processes in the economy limits dramatically the scope of innovation policy in the CCs.

Table 4 – GERD/GDP by country groups, 1999

Group	CEE AACC-7	CEE AC-6	SEU-3	DEU-12
Average	0.52	0.87	0.78	2.16
Min	0.40	0.69	0.68	1.03
Max	0.68	1.25	0.89	3.8
Standard deviation	0.10	0.41	0.09	0.70

Source: Based on Eurostat data

Business Expenditure on R&D (BERD) as a component of GERD is significantly lower in the CCs than in the EU15 (the latter lagging significantly the US and Japanese performance)[44]. In absolute terms, Slovenia and the Czech Republic are far ahead of the other candidate countries, but Turkey and Latvia are the countries catching up the fastest while Romania and Bulgaria continue to fall further behind.

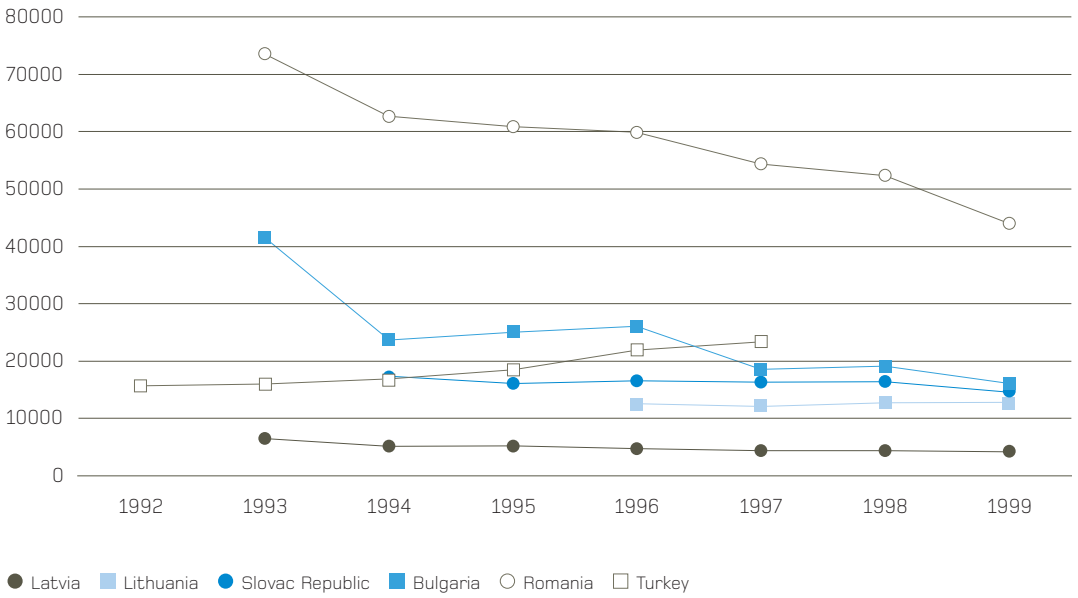
43 By the mid-1990s this fall has slowed down except in Romania where it continued until 2000. In that respect, Romania is exceptional and a better understanding is required of the causes of the continuous decline of its R&D system.

44 In the EU15, BERD stood at 1.28% of GDP in 2001, compared to 2.04% in the US and 2.11% in Japan (European Innovation Scoreboard 2002).

The 'general' shrinking of R&D systems suggest that declining demand, public and private, for R&D is the main driving factor behind this process.

There has been a decline in **R&D personnel** in the CC7 over the period 1992-99, with the exception of Turkey. This trend has been particularly dramatic in Bulgaria (a drop of 61% between 1993 and 1999), followed by Romania and Latvia. Emigration and switching to other activities seems to be a principal cause in Romania and to a lesser extent Bulgaria. This trend is perceptible in the business, government and higher education sectors. The general shrinking of R&D systems suggest that declining public and private demand for R&D is the main factor behind this process.

Figure 2 – R&D personnel in CC7, FTE, 1992–99



Source: Eurostat, R&D and innovation statistics in candidate countries and Russia 1992-1999.

How inventive are the candidate countries – orientations of R&D systems

The ranking of countries on input side of R&D system is closely related to outcomes of R&D activities, most easily assessed in terms of patents and scientific papers. Apart from Latvia, the CEE CC7 countries have levels of patenting much below CC6 economies like Poland, Czech Republic and Hungary. Several CCs (notably Slovenia) have relative patenting rates higher than the SEU3; but still significantly below the average of DEU12.

Table 5 – Relative productivity of R&D systems

Country	Resident patents/GERD	Resident patents per 1000 R&D personnel	S&T journal articles/GERD	S&T journal articles per 1000 R&D personnel
DEU12=1	1.00	1.00	1.00	1.00
SEU3	0.44	0.16	1.74	0.88
CC6	2.19	0.30	4.47	0.74
CC7	4.80	0.23	5.46	0.41

Source: 1998 or latest available year. Calculations based on WB CDROM World Development Indicators 2001, OECD MSTI 2000, Slovenian Statistical Office data, and for Estonia on Hernseniemi (2000).

In relation to the southern EU economies, the CCs exhibit stronger technology (patents) orientation but weaker science (papers) orientation.

As measured by both patents and S&T journal articles, the relative productivity of the CC13 R&D systems is high compared to GERD (Table 5, column 1 and 3). Relative productivity of the CC7 group tends to be higher than the CC6 group when measured by GERD. However, when measured in terms of patents per (FTE) researcher, the 'productivity' of CC7 is significantly lower than that of the DEU and even CC6 economies. When compared to DEU economies both groups of CCs are lagging more in terms of patenting than in terms of papers. This stronger science orientation of CCs could be expected given the low capital intensity of their R&D systems. However, in relation to SEU3 economies both group of CCs exhibit stronger technology (patents) orientation but weaker science (papers) orientation. This intermediate position of the CCs in terms of S&T orientation reflects in part their more developed industrial structure.

2.4 Diffusion and absorption of knowledge

Innovation is based on investment in knowledge generation as well in knowledge utilisation and diffusion. Innovative activities of enterprises are essential to this process even when based on the diffusion of less advanced technology. It is therefore important to consider the diffusion of quality control techniques, vocational training and IT infrastructure as channels for diffusion.

Innovation surveys, such as the (Community Innovation Survey, CIS), are a relatively new statistical-source that sheds light on the multi-faceted and interactive nature of the innovation process. In the CC7, innovation surveys have been undertaken in Latvia, Lithuania, the Slovak Republic, Romania and Turkey[45].

45 However, these innovation surveys were of a pilot type and their quality varies greatly. Accordingly comparisons made should be taken as highly tentative.

The most appealing but also the most problematic indicator is the share of innovative enterprises (table 6), the data throwing up two seemingly counterintuitive facts. First, the share of innovative firms in CCs is scattered across the range of values of the EU15. Second, no clear pattern emerges between the CC6 and CC7: in Lithuania, Romania and Latvia the share of innovators is higher than in Slovenia, Poland, Turkey and Slovakia.

How should this data be interpreted? The answer is that the frequency of innovative activities does not tell us anything about the economic relevance of these activities. Especially in the early transition years, firms in the CCs searched extensively for new products and processes. However, as innovation became costly and as market barriers increase they gradually decreased the frequency of innovation activities while the revenues based on innovation activities gradually increased.

Table 6 – Share of innovative enterprises*

Ireland	73%
Germany	69%
Lithuania	**68%**
Austria	67%
Netherlands	62%
United Kingdom	59%
Romania	**56%**
Sweden	54%
European Economic Area	53%
Latvia	**48%**
France	43%
Luxembourg	42%
Slovenia	**38%**
Poland	**36%**
Finland	36%
Spain	29%
Belgium	27%
Turkey	**25%**
Slovak Republic	**17%**

* various years between 1996-1999.
Source: Radosevic (1999b), Slovak Statistical Office, Lithuanian Statistical Office, Turkish State Institute of Statistics.

Hence, a high rate of innovators in Ireland and Lithuania signifies a qualitatively different situation. In the case of Bulgaria, Lithuania and Romania, a high rate of innovators is a result of the frequency of search efforts of firms. In this respect, lower rates of innovators in Slovakia, Turkey, Slovenia, and Poland[46] does not mean that the revenues from new products and processes in these countries are lower. In fact, the outcome may be exactly the opposite[47]. So that, a higher frequency of innovators in some CC7 countries suggests that they are still lagging in terms of the economic relevance of innovative activities.

In order to restore productivity growth, there is a need for technical change and technological learning or assimilation in the broadest sense.

The structure of innovation expenditures in the CC7 is available for Slovakia, Romania and Turkey. In the latter countries, the dominant share of innovation expenditures goes on acquisition of machinery and equipment; while R&D and other intangible components are very marginal. The Slovakian structure of innovation expenditures has a much bigger share of intangibles and in that respect is similar to Slovenian structure of expenditures. However, a strong preference for technology acquisition, as opposed to pure R&D, in the innovation process in the CC7 may be considered positively. In order to restore productivity growth, there is a need for technical change and technological assimilation. Hence this mode of innovation may be best suited to the needs of enterprises, at least in the short-term.

Sources of information for innovation, which are considered as important by enterprises, serve as a useful reference point for planning innovation policy. Despite significant national variations there are several main sources of information, which characterise enterprises in the candidate countries, namely:

→ Sources within enterprise (from 25% in Lithuania to 65% in Latvia of innovators considering the source as very important);
→ Clients (42% in Slovakia), competitors (around 40% in Latvia and Slovakia) and suppliers; and
→ Social networks (professional associations, fairs) within which enterprise operate.

46 The share of innovators in Poland decreased from 62% in 1992 to 36% in 1997.

47 Unfortunately, due to lack of data on share of innovation expenditures in total sales or share of revenues based on new products/processes it is not possible to validate fully this hypothesis.

Innovation surveys suggest that sector and technology specific measures matter more for innovativeness of enterprises compared to general measures.

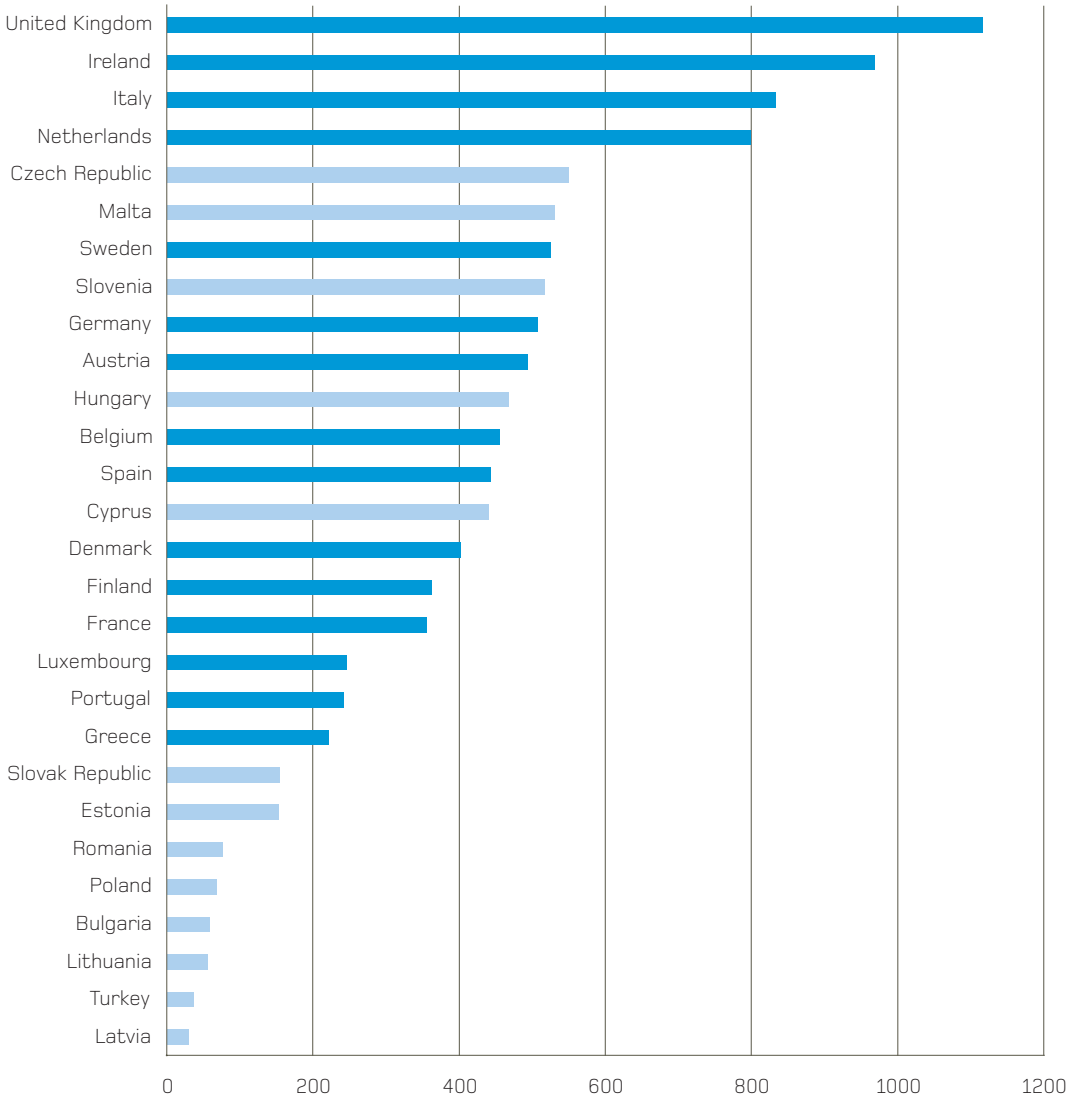
However, similarly to results in the EU15, universities and research institutes are not considered as very important direct sources of information (from 3% in Lithuania to 15% in Slovakia). Universities serve as sources of skilled professionals i.e. as indirect knowledge providers rather than as direct sources of knowledge for innovation. Innovation surveys suggest that the direct market and social environment of enterprise is the main source of information for innovation[48]. Yet, this aspect is not taken into account by innovation policy in the CC. Innovation surveys suggest that sector and technology specific measures matter more for innovativeness of enterprises compared to general measures like tax incentives or horizontal measures like innovation centres and S&T parks.

Innovation surveys in candidate countries show that most innovators consider improving product quality as the key objective of their innovation activities. With an increasing openness of markets, quality has become essential for successful exporters as well as for domestic markets. Improved quality depends on introduction and wide diffusion of innovation management techniques, including industry specific and general quality standards. In most of the CCs, there seems to be trend of catching up in quality standards to EU levels, however current penetration rates of ISO9000[49] certificates show a very sharp divide between leading (Czech Rep., Malta, Slovenia, and Hungary) and laggard CCs (Latvia, Turkey, Lithuania, etc.).

48 This is what interactive model of Kline and Rosenberg would suggest to be the typical situation.

49 The definition of quality in ISO 9000 refers to those features of a product or service that are required by customer. ISO 14000 is primarily concerned with environmental management.

Figure 3 – ISO9000 standard certificates per 1mn pop, 2001



Source: ISO9000 and ISO14000 in brief., http://www.iso.ch.

Innovation policy in CC7 should take into account the important role that quality management techniques play in competitiveness.

If quality certification is considered as a proxy for the capability to achieve best practice levels of production efficiency then most of the CC7 are lagging behind the CC6. Innovation policy in CC7 should take into account the important role that quality management techniques play in competitiveness. Mastering quality should be the first step towards improved innovation capability.

Training as a source of knowledge diffusion

A deficit in funding training in the business sector…

Diffusion and absorption of new technologies is crucially dependent on a skilled workforce, which is one of the main determinants of quality (production) and innovation capability. As noted above, education indicators suggest a relatively favourable position of the CEE CCs, however, in a period of radical structural change, improving skills and learning capability are vital preconditions for technology adoption and diffusion. Until recently, this aspect of national innovation systems in CCs has been unknown territory as there were no internationally comparable surveys of vocational training. A first survey by Eurostat[50] of continuing vocational training in enterprises in candidate countries enables an analysis of the level of investment in training.

Differences between the CC are substantial in terms of the percentage of enterprises that have undertaken training since 1999: ranging from 69% in the Czech Republic to 11% in Romania. Among the CC7, there is a notable difference between the Baltic States (Latvia and Lithuania) and Bulgaria and Romania. Moreover, the gap between the leading CCs and the others grows much larger in terms of the percentage of employees in manufacturing participating in continuous vocational training: the Czech Republic and Slovenia are at levels comparable to leading EU countries; while the other CCs are at the bottom of the ladder.

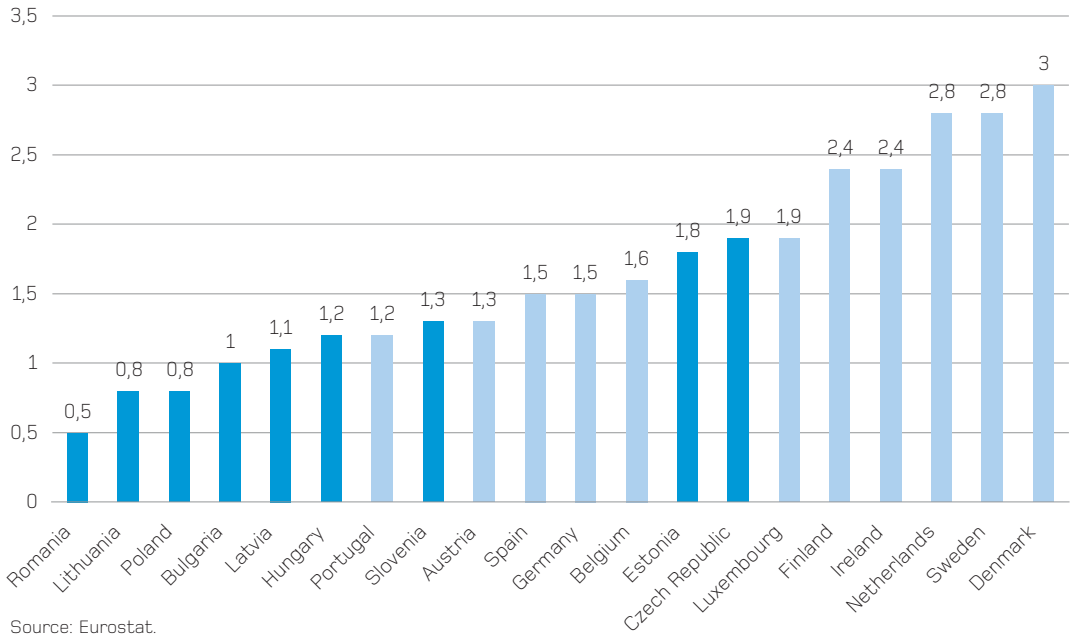
In all CCs, large enterprises are much more frequent providers of training than SMEs, Large firms offer training relatively less frequently in Bulgaria, Poland and Romania. The absence of training in small firms is particularly acute in Romania where only 8% offer training[51]. These data have important implications for innovation policy, although they partly reflect slow rates of privatisation and restructuring of large firms in these three economies.

Finally, costs of training as percentage of labour costs are significantly lower in the CC7 countries (Latvia, Lithuania, Bulgaria and Romania) and Poland than in the CC6 group. To conclude, investments in vocational training reflect general differences in investment in intangible assets like

50 Second European survey of continuing vocational training in enterprises. Eurostat, Statistics and Focus 8/2002.

51 The conclusions to be drawn from this leading indicator are corroborated by the findings of studies such as national reports on vocational education and training. For instance, the Bulgarian experts of the ETF concluded in 1999 that "The incentives and measures for promoting the CVT in enterprises are insufficient. With the economic crisis, training in enterprises, not only in the state, but also in the private sector has stagnated".

Figure 4 – Costs of training as % of labour costs, 1999



Source: Eurostat.

R&D and innovation expenditures. Moreover, the relatively weak position of the CC7 in vocational training is consistent with their lag in the diffusion of quality control systems.

ICT as a driver of growth and innovation

The innovation process is increasingly dependent on ICT technologies[52]; although use of ICT is not necessarily linked to its production. Nevertheless, the capacity to produce ICT and related services is a potential advantage for their application in an economy. In this respect, the candidate countries have done remarkably well to overcome the socialist legacy.

CC7 economies are clearly lagging behind in terms of ICT production and IT services.

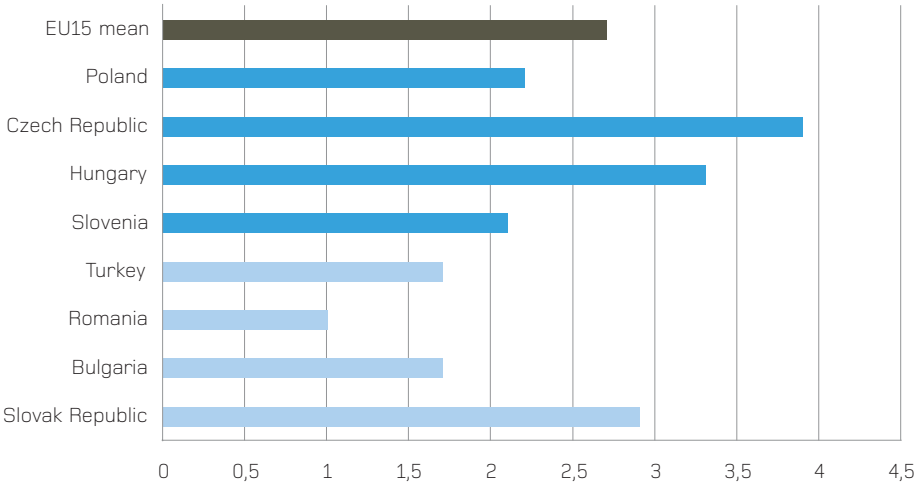
Two observations can be made with respect to the share of IT expenditures in the CC economies (see figure 5 below). First, the CC6 are very close to the EU15 level of 2.7% of GDP while CC7 are lagging behind. Slovakia's share is third among CCs and in this respect this economy again 'naturally' belongs to the more developed CC6[53]. Second, CC7 economies (notably Romania, Bulgaria and Turkey) are clearly lagging behind in terms of ICT production and IT services.

52 Information technology (IT) refers to the combined industries of hardware for office machines, data processing equipment, data communications equipment and of software and services. Information and communication technology (ICT) refers to IT plus telecommunications equipment and services.

53 Hungary and Czech Republic have a share of IT expenditures above the EU level, which reflects a heavy presence of electronics-related FDI in these countries. Share of IT expenditures in Poland is surprisingly high which partly reflects FDI in electronics.

Unfortunately, data on diffusion and application is limited. The number of internet hosts and users; and the proportion of private households with a PC are the best available proxies for the degree of IT diffusion.

Figure 5 – IT expenditure as % of GDP



Source: Eurostat 2001.

The CC's position with respect to these indicators varies greatly: Slovenia, the Czech Republic and the two island economies perform as well as Belgium and France in terms of the percentage of households with a PC; while all other CCs are at the same level or below that of Greece.

However, in terms of Internet users per 100 inhabitants and the number of Internet hosts, while Estonia is close to the EU average[54]; the other CCs are lagging with rates of Internet use five times lower than the EU15. Overall, the CC7 economies, except Malta and Slovakia, lag behind in terms of Internet penetration making difficult the diffusion of information in their economies, which in turn may have effects on the potential for long-term growth[55].

54 Compared to IT expenditures, Hungary performs poorly on diffusion suggesting it has primarily developed as a production location in electronics.

55 The difference between Estonia and other two Baltic economies is especially striking. From an innovation perspective it would be interesting to understand what lies behind these differences; and will the significantly higher rate of penetration of internet in Estonia lead to diverging innovation capability between Baltic economies?

2.5 An innovation deficit ?

In order to summarise the analysis, the European Innovation Scoreboard[56] framework is used to arrive at some overall conclusions. A first major issue is that the lack of fully comparable data in the candidate countries hinders the construction of a meaningful summary index. However, even the partial data, organised in several groups of indicators, enables interesting conclusions to be drawn, which reinforce the analysis of the previous sections[57].

2.5.1 Innovation strengths and weaknesses of the candidate countries

Based on table 7 several conclusions on the innovation capabilities of the CCs can be highlighted:

→ First, on average CCs lag behind the EU15 in all four groups of indicators of the innovation scoreboard. The gap seems to be the biggest in the creation of new knowledge and the smallest in the indicators for 'innovation finance, output in markets'.

→ Second, in terms of human resources for innovation, the CCs lag behind the EU on average by 30% when we take into account all indicators in this group. CCs fare the best in terms of share of population with 3rd level education and employment in medium and high tech sectors. However, the CCs lag significantly behind in terms of new S&E graduates and participation in life long learning. With respect to lifelong learning activities, only Malta and Lithuania are above the EU average. In short, CCs fare well in terms of human resource 'capacities', but are far behind in terms of 'orientation' and scale of investments into human resources for innovation.

→ Third, investment in the creation of new knowledge is the weakest dimension of the innovation capability of the CCs. This is in particular surprising for the CCs, which entered into the transition process with extensive R&D capacities. Low investments in public R&D are accompanied by very limited investment by business sector, which with exception of Slovenia and Czech Republic, ranges between 35% and 9% of the EU average. Participation of the CCs in technology frontier activities through USPTO and EPO patents is marginal with partial exception of Slovenia and Hungary.

→ Fourth, the limited data on application of knowledge in enterprises suggests that the CCs are performing somewhat better than might be expected[58]. Share of SMEs that cooperate on innovative activities is above the EU average, except in Malta. Differences in industry structure could explain differences in innovation expenditures across countries[59].

→ Fifth, a relatively better position of the CCs in the category 'Innovation finance, output and

56 The EIS attempt to capture the multidimensional nature of the innovation capability of the EU countries. For further information see: http://www.cordis.lu/trendchart

57 Data for the CCs is compared with the weighted EU average, i.e. by summing the numerator and denominator across all EU countries. This provides a better reference point for the CCs. For indicator 1.1. the EU mean is an unweighted average.

58 However, the data is limited to only 6 countries and generalisations are less robust.

59 In Poland and Slovenia expenditure is largely confined to large firms while in Estonia SMEs are more innovation active.

markets' is entirely due to a high share of FDI and high share of expenditures on ICT. The financial systems of the CCs are very weak and enterprises are unable to mobilise funds for innovation. Share of new capital raised on stock markets (except Malta) and venture capital are marginal and these sources play marginal role in innovation in CCs[60]. Funding for innovation comes mainly from self-retained earnings from domestic firms or in the case of foreign firms from parent companies.

Table 7 – Candidate Countries Scoreboard 2002

No	Indicator	EU	MT	BG	CY	CZ	EE	HU	LT	LV	PL	RO	SI	SK	TR
1,1	New S&E grads	100	60	46		39	67	44	91	54	58		128		53
1,2	Pop with 3rd education	100	33	100	126	55	139	66	212	86	55	47	67	50	38
1,3	Life-long learning	100	114		36		62	35	44	192	61	13	44		38
1,4	Empl med/hi-tech manufacturing	100	94	73	14	121	63	116	42	23	100	65	115	89	16
1,5	Empl hi-tech services	100	85	75	51	89	94	90	56	61		40	75	84	
2,1	Public R&D/GDP	100		70	30	81	79	67	79	43	67	15	101	36	79
2,2	Business R&D/GDP	100		9	4	63	12	28	5	16	20	23	65	35	21
2.3.1 A	EPO patents/pop	100	2	2	4	8	5	11	1	2	2	1	13	4	
2.3.2	USPTO hi-tech patents/pop	100	21	1		5		2	4		0	0	4	2	0
3,1	SMEs innovating in-house	100	35				75		116		9		38		56
3,2	SMEs innovating co-operation	100	44				116		107						161
3,3	Innovation expenditure	100					65				111		105		
4,1	Hi-tech venture capital / GDP	100				9		14	372	258	19		62		54
4,2	New capital	100	213								13				40
4,3	New-to-market prod	100	582				92								145
4.4A	Internet access/pop	100	81	24	70	43	96	47	22	23	31	14	96	53	12
4,5	ICT expenditures /GDP	100	51	48		116	120	111	74	99	74	28	59	94	45
4.6A	Inward FDI/GDP	100	280	87	78	141	176	143	68	96	70	58	51	80	16

Source: Based on European Innovation Scoreboard 2002. Technical Paper No. 2, Candidate Countries, DG Enterprise.

60 The data on share of high-tech venture capital in Latvia and Lithuania are of poor quality and should be discounted.

2.5.2 Trends in innovation indicators: hope for convegence?

Trends in innovation indicators over time allow some conclusions as to whether the CCs are improving their position, and the speed of change, with respect to the EU. Table 8 shows trends for ten indicators for which data are available[61]. Trends are calculated as the percentage change between the last year for which data are available and the average over the preceding three years, after a one-year lag.

Table 8 – European Innovation Scoreboard – Trends for Candidate countries

No	Indicator	EU*	BG	CY	CZ	EE	HU	LT	LV	PL	RO	SI	SK	TK
1,1	New S&E grads	13,7	7,2			38,2	-14,4	53,2	0,1					
1,2	Pop with 3rd education	17,9	17,8	16,4	7,1	-0,1	5,7	7,4	4,2	0,4	14,2	-1,1	8,2	
1,3	Life-long learning	21,4				7	-1,1	-7,5	7,9		22,2			
1,4	Empl med/ hi-tech manufacturing	-2,1		-4,6	5,1	20	6,6	-15,4	105,7		-21,4	1,6	2,1	2
1,5	Empl hi-tech services	18,3	24,3	-0,1	22,8	17,5	-11,9	8,4		-8,6	30,4	10,5		
2,1	Public R&D / GDP	-2	11,5		26	-2,8	10,5	17,9	-14,6	5,9	-34,1	-10,5	-27	57,8
2,2	Business R&D / GDP	5,4	-37,4		12,9	26	26,4	-30,4	83,7	-14	-43,6	9,7	-30,3	85,8
4.4A	Internet access / pop	155	226,1	99,1	154,2	148,8	199	189,4	89,5	106,3	83,7	164,3	63,7	153,3
4,5	ICT expenditures / GDP	14,8	17,5		33,8	13,8	32,2			40,5	34,7	22,6	38,9	1,9
4.6A	Inward FDI / GDP	99,3	180,9	-3,3	86,8	117,1	25,3	89	26,5	83,6	28,1	28,1	195,1	34,3

Source: EC (2002a), 2002 European Innovation Scoreboard: Technical Paper No. 2, Candidate Countries, November 26, European Trendchart on Innovation, DG Enterprise.

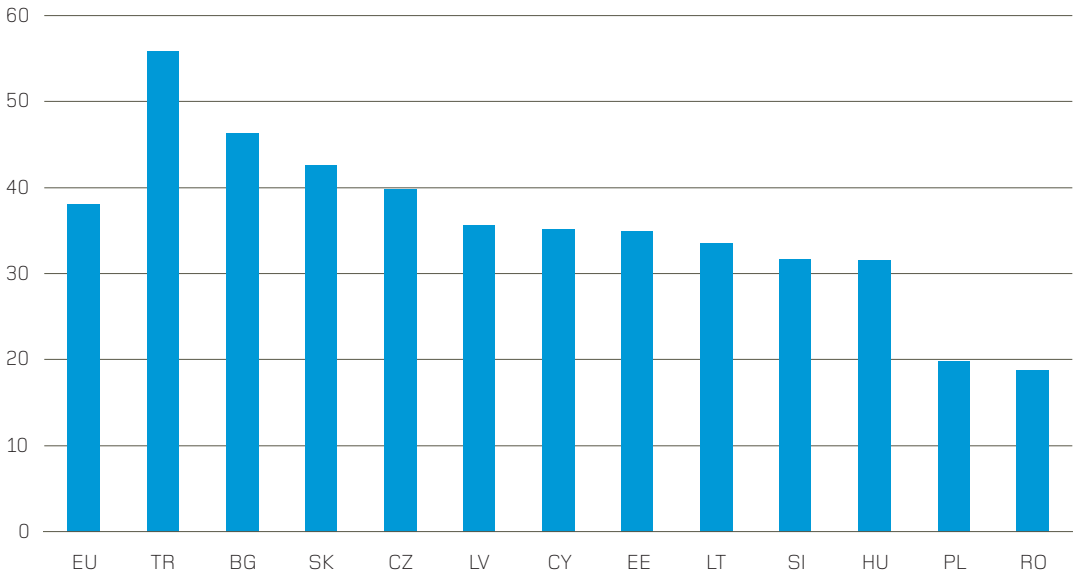
Figure 6[62] shows average trends across countries based on 10 indicators from table 8[63]. Eight out of 12 CCs countries are falling behind in terms of this composite indicator. Turkey, Bulgaria, Slovakia and the Czech Republic are the only CCs that are on average improving with respect to the EU average.

61 Malta was excluded as there were only four trend indicators available.

62 Simple average are disproportionably influenced by the rates of growth of Internet access variable. Also, the time segment for which trends are calculated are relatively short (four years) for structural variables that are changing at much slower rates or are influenced by cyclical events (expenditure based variables).

63 The aggregate trend per country is calculated as the un-weighted average of the trend values of 10 indicators. Rates of growth are extremely crude measure of trends in innovation capability. Nevertheless, the average trend of 10 variables provides an approximation of the direction of change (catching up or falling behind) of the CCs.

Figure 6 – Innovation Scoreboard Trend (average based on 10 indicators)



Source: calculations based on table 8.

Hence, most of a CCs are falling further behind in knowledge-based activities. There does not seem to be clear relationship between CCs in terms of aggregate Scoreboard variables and trends. Turkey and Bulgaria are countries, which lag in most of the Scoreboard variables in terms of levels but are leading in terms of trends. On the other hand, growth rates of Estonia and Slovenia, which are in the top group in terms of levels, record lower trend rates. Romania remains low in terms of levels as well as trends.

Box 7 – Innovation performance of the CC7 – challenge for innovation policy

- → The analysis suggests that convergence to the EU income levels will be a long process for the majority of the CCs. However, in terms of levels, the analysis indicates that the most developed CCs (Cyprus, Malta, Slovenia, Czech Republic, Estonia, Hungary) are in many respects comparable to the EU 'Cohesion Countries' (Greece, Portugal and Spain).
- → Trends of selected innovation indicators suggest that CCs are falling behind the EU15 in innovation and knowledge-based activities. This is not due to one single indicator but a variety of factors operate on different dimensions of innovation capability.
- → Nevertheless, it should be kept in mind that convergence is a moving target. Recent structural changes in the majority of the CCs have been radical and fast. However, they are still insufficient for growth based on innovation and knowledge. To date, the Governments of the CCs has been concerned with systemic and regulatory changes towards a market economy. The policy framework for the period until 2010 is even more challenging.
- → CCs have very weak and fragmented systems of innovation. Building stronger national innovation systems in the competitive environment of an enlarged EU will require the creation of numerous new interfaces between private and public agents, between supply and demand for investment and innovation, and between domestic and foreign markets. This requires new approaches and strategies for both policy makers and enterprises alike.

CHAPTER 3: Is it easy to be an innovator in the candidate countries?

Since the 1995 Green Paper on Innovation there has been recognition that one of the factors acting as a barrier or driver to business innovation is the legal and administrative environment. Stronger performance of the US economy in terms of generating value from innovation is often attributed to the more 'business-friendly' legal environment notably in terms of the creation, management and dissolution (bankruptcy) of companies, easier access to finance and more favourable intellectual property rules. This chapter considers whether the legal and administrative framework in the CCs can be considered to influence negatively their innovative performance.

3.1 Is the overall business environment improving?

Two factors help to explain varying progress amongst the candidate countries in transforming their business environment and stimulating economic development. First, the initial conditions have an important influence on a country's progress e.g. stable political transformation process, extent and modes of privatisation, etc.[64] The second factor is the effectiveness of a country's regulatory framework with strong incentives to change from the European integration process[65].

A tremendous increase in the share of private ownership has been a key feature of the transition process in the CEE CCs. By 2001, the share of private sector ranged from 65% (Romania and Slovenia) to 80% (Slovakia, Hungary, Czech Republic and Estonia). However, ownership transformation is not sufficient to change corporate behaviour in favour of innovation.
The incentive to innovate may be negatively influenced by poor financial discipline, implicit subsidies through tax credits, weak enforcement of bankruptcy legislation and little action to strengthen competition and corporate governance.

Analysts from the Economist Intelligence Unit (EIU) and EBRD conclude that the CC6 have a more advantageous business climate for entrepreneurship, than the CC7 (See table 9 below).

64 For ratings on initial conditions see European Bank for Reconstruction and Development (2001), Transition Report:, pp.19.
65 European Bank for Reconstruction and Development (1999), Transition Report 1999-Ten Years of Transition, p. 22.

Table 9 – Country Rankings for Business Environment in the CC7

	EIU 2000-05		EIU 1996-2000		EBRD 2001	Index of Economic Freedom 2002	
Country	Score	Rank	Score	Rank	Regional	Rank	Score
Estonia	7.4	1	6.86	1	1	4	1.8
Cyprus	n/a	n/a	n/a	n/a	n/a	23	2.15
Hungary	7.26	2	6.42	2	3	32	2.4
Poland	7.07	3	6.22	3	6	45	2.7
Czech Rep.	7.01	4	6.18	4	10	32	2.4
Slovenia	6.96	5	6.08	5	2	79	3.1
Lithuania	6.95	6	5.74	7	16	29	2.35
Latvia	6.88	7	5.87	6	9	38	2.5
Malta						45	2.7
Slovakia	6.57	8	5.46	8	8	60	2.9
Turkey						105	3.35
Bulgaria	5.94	10	4.03	17	15	106	3.4
Romania	5.24	15	4.1	15	18	131	3.7

Source: Economist Intelligence Unit (2001).
Wendy Carlin (2001) et. al., Competition and Enterprise Performance in Transition Economies: Evidence from a Cross-Country Survey, EBRD Working Paper N°63. Ranked out of 25 countries concerned by EBRD operations.
The Heritage Foundation (2002), http://cf.heritage.org/index/indexoffreedom.cfm

Although there are some differences in positions of countries in these rankings, there are at least two similarities. Firstly, Estonia is ranked as having the most favourable business environment; while, Romania and Bulgaria have the most unfavourable climate for enterprises. Lithuania, Latvia and Slovakia make up a group of moderately performing countries, although Latvia is improving and the EBRD places it above the Czech Republic.

An alternative ranking, which has the merit of also covering Cyprus, Malta and Turkey, is the economic freedom index of the Heritage Foundation. As might be expected Cyprus is clearly a leading candidate country in terms of business environment. The Maltese weakness (45th overall position) can be explained by more negative ratings than Latvia and Lithuania in trade, fiscal burden, government intervention, foreign investment, wages and prices. Turkey's poor evaluation is mainly due to the high fiscal burden and the economic crisis.

The negative positions of Romania and Bulgaria suggest that both have many obstacles to establishing administrative rules favourable to business.

One of the striking differences[66] between the Economic Freedom index and those of the EBRD/EIU is the position of Lithuania. Its fairly high position in the former index is due to a positive evaluation of trade and monetary policy, government intervention, foreign investment, wages and prices. However, other indicators influencing the business environment such as the fiscal burden, banking/finance and property rights are all less favourable. The negative position of Romania and Bulgaria in all three indexes suggests that they still face many obstacles to establishing a legal framework and administrative procedures favourable to business.

Encouragingly, the European Bank of Reconstruction and Development (EBRD) has suggested that the CC7 began to converge[67] towards the more favourable situation in the CC6 during 2000; following the decision to begin accession negotiations in late 1999. Hence, the accession process exerted a significant pressure on the institutional environment for business in the CCs.

The EU changed the emphasis of discussions with the CCs from legislative alignment to concrete measures to improve the business environment.

Moreover, beginning from 2001, the EU changed the emphasis of discussions with the CCs from legislative alignment to concrete measures to improve the business environment[68]. Indeed, the Commission has stressed the need to move from a transformation-oriented phase to a so-called 'post Lisbon' enterprise policy[69].

3.2 How heavy is the administrative burden?

While each country has its own peculiarities, the main challenges in terms of easing the administrative burden are broadly similar: improving the registration process of firms; decreasing the number and cost of licences required for operating; reducing costs due to legislative amendments, audits and inspections; speeding up bankruptcy procedures while improving

66 The Heritage Foundation index includes policy areas such as trade, fiscal burden, Government intervention, monetary policy, foreign investment; banking, wages/prices and property rights. The EBRD survey include aspects of macro-economic, as well as taxation, policy stability, business regulation, the operation of the judiciary, law and order, infrastructure and finance imposed obstacles on the operation and growth of their business. The EIU survey measures the quality of the business environment by using quantitative data, business surveys and expert assessments.

67 Except in the case of Bulgaria where excessive Government control and weak enforcement of existing laws hinder new investments and active corporate restructuring. For more details see the EBRD Transition Reports for 2001 and 2002.

68 In the framework of the BEST (Business Environment Simplification Task Force) extended to all thirteen CCs in January 2001. For more information see: http://europa.eu.int/comm/ enterprise/enterprise_policy/enlargement/best.htm.

69 Commission of the European Communities SEC(2054) 2001, Commission Staff Working Paper, Report on the Candidate Countries' Measures to Promote Entrepreneurship and Competitiveness, p. 3.

guarantees for creditors, etc. Although only indirectly related to innovation, these broad framework conditions are fundamental since an individual with an innovative idea may very well be dissuaded from creating a new firm if she believes that the time required will be such that a competitor in another country will be able to move faster and seize a window of opportunity for placing a product on the market. Equally, inefficient bankruptcy procedures may deny new innovative entrepreneurs access to needed capital or labour tied up in a failing company.

Another issue which remains top of the agenda in the CC7 is the continuing prevalence of corruption.

Another issue that remains top of the policy agenda in the CC7 (except Malta) is the continuing prevalence of **corruption.** In Bulgaria, for instance, the slow and unpredictable functioning of the judicial system and the prevalence of the petty corruption are deterrents to entrepreneurial activity[70]. In Latvia, pervasive corruption remains a problem, with foreign business, in particular, complaining of local and state bureaucracies demanding bribes for the myriad permits needed to carry on business[71]. While in Slovakia, corruption scandals forced four ministers to resign in the year of 2001[72]. Corruption reduces incentives to innovate by undermining the certainty of being able to profit fully from an innovation (e.g. by retaining full control over intellectual property).

The extent of red tape and administrative burdens facing a new entrepreneur in the CC7 are summarised in table 10 below on the basis of the findings of the country reports as well as other available studies on the business environment[73].

Creation of a company

Most observers agree that the length of time and costs related to creating a company in the candidate countries are excessive. The seven countries appear to be divided into two broad groups: the first where some significant steps have been taken to speed up and simplify the process of company creation; and the second where the costs and procedures remain a heavy burden on entrepreneurship. The main issue appears to be as much the time and procedures required as the cost.

In Bulgaria, the limited capacity of courts[74] in handling registration of a rapidly growing number of applications results in delays[75]. The registration process consists of five main steps and the lack of co-ordination and co-operation between competent institutions slows down the process, as well as increasing costs on firms[76].

70 Commission of the European Communities, Regular Report on Bulgaria's Progress Towards Accession. (2001).

71 Financial Times, Survey-Latvia, 15 June 2001.

72 Financial Times, Survey-Slovakia, 4 July 2001.

73 Detailed information was not obtainable for Malta and Slovakia.

74 Unofficial estimates suggest that there 50% of caseloads in courts concern company registration. See Thomas O'Brien, Christian Filipov (2001), The Current Regulatory Framework Governing Business in Bulgaria, World Bank Working Paper, WTP 513, pp.12.

75 Theoretically the process of company registration takes 15 days but takes much longer in Sofia and larger districts. Yordanka Gancheva (2000), Rules, Regulations and Transaction Costs in Transition Bulgaria, Institute for Market Economics Working Paper, pp. 11-12.

76 Ibid. pp. 13.

Table 10 – Comparative review of 'Red Tape' facing businesses

Country	Time required for company registration / in days	Average fee for company registration	Number of inspections which a firm is subject to per year	Average length of bankruptcy process	Number of approvals required to start business	Comments / Remarks
Bulgaria	15 days	51.13 EUR	N/A	N/A	N/A	The limited capacity of courts in handling registration of a rapidly growing number of applications. Unofficial estimates suggest that there are 50% of caseloads in courts concerns company registration.
Latvia	14 to 30 days (possible to speed the process to four days with double fee)	35 to 440 EUR (latter relates to joint-stock companies)	N/A	5 to 6 years	N/A	43.5% of respondents answered that they were satisfied with the procedures relating to company registration. Considerable improvements in reducing red tape, however, certain measures aimed at stimulating innovation are limited and not fully effective e.g. income tax reduction.
Lithuania	5 to 10 days	70 to 150 EUR	N/A	2 to 5 years	N/A	The procedure of company registration is favourable and easy to fulfil, however the liquidation is an opposite. Few incentives for innovation in newly established enterprises. Priority funding receives enterprises, that show successful activity of 2 years.
Romania	20 days	N/A	11 to 23 inspections	N/A	Between 23 and 29 authorisations and approvals	Survey found actual length of time required to create company varies between 49 to 102 days. The climate for entrepreneurship is evolving quite slowly. The notion of the so-called one-stop-shop not entirely successful.
Turkey	15 days	379 EUR	Minimum of 1 inspection every 5 years	3 years minimum	15 procedures including 6 approvals	Significant administrative constraints need to be further tackled. Different measures encouraging innovation, however, their effectiveness is limited.

Source: Country Reports for this study. Specific enquiries carried out by national experts. Bulgaria: Yordanka Gancheva (2000), Rules, Regulations and Transaction Costs in Transition Bulgaria, Institute for Market Economics Working Paper; Latvia: Latvian Development Agency (2001), Survey on the Business Environment in Latvia; Romania: Financial Times, Survey-Romania, Phelim McAleer and Mihai Statulescu, 3 October 2001; Turkey: Commission of the European Communities SEC(2054) 2001, Commission Staff Working Paper, Report on the Candidate Countries' Measures to Promote Entrepreneurship and Competitiveness.

In Romania, a business start-up needs up to 29 authorisations and approvals, it takes between 49 to 102 days to register a new company, and 83 pages of forms have to be completed.

In Romania, the climate for starting a new business remains hostile: a business start-up needs between 23 and 29 authorisations and approvals; it takes 49 to 102 days to register a new company and 83 pages of forms have to be completed. Difficulties faced by new firms in **Turkey** also appear significant with up to 15 procedures to be completed and company registration costs of on average €379.

Although there is a trend to establish 'one-stop-shops', they often remain (e.g. in Bulgaria) pilot actions; or fail to bring about full improvements. In Romania, for instance, all the organisations, which must be consulted before establishing a company, are located in the same premises; but the number of approvals has not been reduced by the one-stop-shop[77].

In certain of the candidate countries, the process of creating a company appears to be improving. For instance, in Malta company registration is carried out at a one-stop shop and all documents can be filed and fees paid immediately. In Slovakia, the creation of an on-line access to the Commercial Register is a positive step[78], but entrepreneurs continue to complain about the lengthy and ponderous company registration processes. Finally, in a 2001 survey in Latvia, some 32% of respondents answered that they could complete the registration of a company in a period of between 6 to 10 days; while 43.5% stated they were satisfied with company registration procedures.

Growing an enterprise

Prior to 2001, the **Bulgarian** government had reviewed the requirements in terms of licenses and permits. Similarly, in **Turkey,** an SME Action Plan Framework has been launched, in order to support business promotion. Also, a programme for reducing red tape was launched by the government in 1998, although studies on administrative simplification began in 1987. In **Latvia,** a 2001 survey[79] found the business environment is improving steadily with respondents stating that the government 'never' looks after the needs of business declining since 1999 from 27.2% to 8.6%. However, there is still much to be done to reduce the main constraints to business development, which include excessive bureaucracy, corruption and lack of incentive for SMEs[80].

In **Lithuania,** recent policy developments aiming at reducing administrative constraints underline that the Lithuanian government has recognised the importance of improving the business environment[81]. In addition, the 'Sunrise Programme' seeks to improve the business environment climate through a reduction of administrative obstacles (see box).

77 For more details see Innovation Policy Profile for Romania in Volume 2 of this study.

78 Commission of the European Communities, Regular Report on Slovakia's Progress Towards Accession, SEC (1754), pp. 47.

79 Latvian Development Agency (2001), Survey on the Business Environment in Latvia; Analysis, pp. 3, 21-22.

80 Ibid. p. 31.

81 For instance a study on Administrative Barriers to Investment (2000) was carried out on the request of the Government by the Foreign Investment Advisory Services (FIAS), part of the World Bank Group. See: http://www.fias.net

Box 8 – The Sunset and Sunrise initiatives in Lithuania

In 2000, the Lithuanian Government set up two inter-ministerial commissions, with participation of the business community, aimed at supporting improvements to the business environment. The "Sunset Commission" worked to identify overlapping and redundant administrative functions; while the "Sunrise Commission" assisted in speeding up the implementation of measures to streamline the functions and procedures dealing with business and economic matters, including those related to innovation. Created as a temporary working group, the Commission has now become permanent and works on a range of issues from taxation, transit and custom, construction regulations, financing of enterprises, public procurement, etc.

However in Romania, the situation is less positive: heavy state controls continue with SMEs subject to between 11 and 23 inspections a year, compared with a maximum of 8 in the US[82].

Bankruptcy and liquidation

The ease of 'entry' and difficulty to 'exit' is an important feature of the business environment in several of the CC7.

An additional shortcoming of the administrative system in many candidate countries is the extremely lengthy bankruptcy and liquidation process. In Latvia, for instance, this procedure can take approximately from 5 to 6 years; while in Turkey, the liquidation process takes a minimum 3 years[83]. The ease of 'entry' and difficulty to 'exit' is an important feature of the business environment of several other CC7.

A survey of bankruptcy law, carried out by the EBRD in 2001[84] across Central and Eastern Europe (not including Cyprus, Malta and Turkey) underlines the weakness of bankruptcy laws in both terms of extensiveness and effectiveness[85]. The country level analysis carried out by this study corroborates this conclusion; with a particular difficulty for Governments to implement legislative changes to bankruptcy procedures.

82 Financial Times, Survey-Romania, Phelim McAleer and Mihai Statulescu, 3/10/01.

83 European Commission, SEC(2054) 2001, Commission Staff Working Paper, Report on the Candidate Countries' Measures to Promote Entrepreneurship and Competitiveness, p. 107-108.

84 EBRD (2001), Transition Report 2001, pp. 36.

85 Extensiveness measures the extent of legislation in force, while effectiveness describes the quality of legal provisions.

Box 9 - Liquidation and Bankruptcy Procedures

A number of amendments to the Bulgarian commercial code were adopted in October 2000 with the main aim being to facilitate timely and transparent cessation of non-performing companies. Two important changes were: the reduction of the claim period to 30 days and the removal of the right to challenge rulings of the bankruptcy court. Nevertheless, these legislative changes on bankruptcy and liquidation have not been followed up with effective implementation[86].

In 2001, the Lithuanian parliament adopted two new laws on bankruptcy and on enterprise restructuring with the objective of enhancing the effectiveness of bankruptcy procedures[87]. However, the Lithuanian Free Market Institute (LMFI) has warned about a danger that provisions would make it possible to institute bankruptcy even when the company can meet financial obligations. Despite this easing of instituting nominal bankruptcy it takes from 2-5 years to liquidate a failing company[88].

The extent of red tape continues to hamper entrepreneurship.

To sum up, under pressure of the EU accession process, the CC7 governments have taken actions to simplify the business climate and reduce administrative burdens. However, the challenges remain significant and, in particular, the extent of red tape continues to hamper entrepreneurship. Only Malta has adopted a coherent SME policy aligned largely with EU practice, while the other six countries have still significant obstacles to overcome.

Table 11 – Results of the opinion survey: Legal & administrative framework for innovation

A.1. Legal & administrative environment for business innovation	CC7	Bulgaria	Romania	Turkey	Malta	Lituania	Latvia	Slovakia
New technology based firms specific legal or administrative obstacles to their creation	0	0	↘	↘	0	↗	↘	↗
The legal framework for doing business supports firms to develop and commercialise ideas for new products and / or services	↘	0	↘	↘, ↗	↗	↘	↘	↘
Administrative procedures are an important constraint on enterprises wishing to innovat	↗	↗	↗	↗	↗	↗	0	↗
Public authorities provide sufficient support and information to enterprises on intellectual property rights	↘	0	↘	↘	0	↘	↘	↘
The tax system encourages innovation in enterprises	↘	↘	↘	↘	0	↘	↘	↘

Note: (↘=Disagree) - (↗=Agree) - (0=Neutral)

86 Ibid. pp. 47-48.
87 European Commission, SEC(2001), Regular Report on Lithuania's Progress Towards Accession, pp. 170.
88 http://www.freema.org/Research/Bankruptcy.phtml

→ Administrative procedures, the tax system and the legal framework were considered by respondents in all countries as pernicious to innovation activities of enterprises;
→ Malta is the only exception to a generally negative response of survey respondents concerning the business environment. This corroborates the findings of other recent studies;
→ Only Lithuanian and Slovakian respondents considered that NTBFs face few legal and administrative obstacles;
→ In all countries, except Malta, information to enterprises on IPR is not sufficiently supported. One of the main reasons is the lack of trained personnel on IPR issues;
→ Tax incentives either do not exist or do not encourage innovative enterprises in all the CC7, except Malta.

3.3 Is there a level playing field for innovative enterprises ?

3.3.1 Competition, State Aid policies and Innovation

A recent OECD working paper[89] presents three cases where competition is conducive to innovation. First, the "Darwinian effect" where innovative efforts are intensified in order to meet competitive pressures from other firms and survive. Secondly, so-called "neck-and-neck competition" encourages firms to increase their technological position vis-à-vis their competitors. Thirdly, competition between new and old products leads to positive "mobility effects", that is, skilled-workers switch from old to new lines of production stimulating productivity[90]. Lack of a competitive environment can therefore reduce the incentive to innovate.

The EU has consistently taken the view that the CCs will be ready for accession only if their companies and public authorities have become accustomed to a competition discipline

More fundamentally, the economic Copenhagen criterion required the existence of a functioning market economy in each candidate country before accession. Indeed, the EU considers that the CCs will be ready for accession only if their companies and public authorities have become accustomed to a competition discipline well before the date of entry; enabling them to withstand the competitive pressure of the internal market[91].

One development that could signal the first signs of a stronger integration of the industrial networks of an enlarged EU is the increasing number of merger cases that affect both the EU

89 Sanghoon Ahn (2002), Competition, Innovation and Productivity Growth: a review of theory and evidence, OECD Economics Department Working Papers N°317, pp. 7.
90 Of course, there are also cases where undue competition can stifle innovation by for instance dissuading firms to invest in research & development due to the inability to capture the economic returns from the investment (e.g. if intellectual property rights are not well protected) or the investment requires economies of scale.
91 European Commission. State Aid Scoreboard

and one or several of the Candidate Countries[92]. In terms of innovation, this could lead to an increased diffusion of new technologies but potentially also too less positive effects (e.g. closure of R&D units in candidate countries due to rationalisation of merged companies innovation efforts).

In terms of capacity of the CCs to create a truly competitive climate at national level, the findings of the Commission's 2002 Report on Progress to Accession underline that while anti-trust legislation is already largely in line with the 'acquis', more attention is need to ensure effective application and enforcement of rules. This is true in the CC7 where Lithuania, Latvia and Malta and Slovakia (which have all closed the Competition Chapter in the accession negotiations) are somewhat better placed in terms of enforcement than Bulgaria, Romania and Turkey[93]. Indeed, the first four countries were ahead of Hungary and Poland, in closing the competition chapter.

The Lisbon Strategy called for 'less and better aid' in order to increase competitive-ness and in this context, the Commission takes a favourable view of State aid for horizontal objectives and notably R&D.

Progress in the field of State aid is more gradual, indeed in Turkey there is no progress in aligning state aid policy with the 'acquis'[94], and the Commission remains concerned about incompatible fiscal aid schemes, which have not been converted into regional aid. The Lisbon Strategy called for 'less and better aid' in order to increase competitiveness and the Commission takes a favourable view of State aid for horizontal objectives, notably R&D[95].

Table 12 – State Aid for manufacturing and R&D in the CC

Country	% of total State aid for horizontal objectives	State Aid to manufacturing € /employee 2000	State Aid for R&D 2000
Bulgaria	1	84	-
Cyprus	30	1,179	0.9
Czech Rep.	17	241	28.2
Estonia	10	18	0.3
Hungary	50	571	4.8
Latvia	15	129	-
Lithuania	3	1	0.2
Poland	55	246	23.5
Romania	18	145	7.1
Slovenia	51	288	19.8
Slovakia	12	87	8

Source: European Commission. State Aid Scoreboard, 27.11.02.

92 Speech by Commissioner Monti to 8th Annual Competition Conference between the Candidate Countries and the European Commission, Lithuania, June 2002.

93 See European Commission (COM(2002) 700): Towards the Enlarged Union Strategy Paper and Report of the European Commission on Progress towards accession (9.10.2002). See also EBRD (2001), Transition Report 2001, pp 12.

94 European Commission, COM(2002) 700. Op. cit.

95 This is justified on several counts: the aims of such aid, the often considerable financial requirements and risks of R&D operations and, given the distance from the market-place of such projects, the reduced likelihood that such aid will distort competition and trade.

As the 2002 State Aid Scoreboard highlights, the candidate countries already spend less aid per capita (expressed in purchasing power parity standards) than the EU Member States. Moreover, as the table above shows, the amounts of aid granted to the horizontal objective of R&D remain relatively limited in absolute terms and only Cyprus gives more aid per person employed in manufacturing (defined as including aid for horizontal objectives such as R&D, SMEs, etc.) than the EU average of €790. In short, there remains considerable scope for expanding state aid support for enterprise R&D efforts.

3.3.2 Access to finance and fiscal incentives

Establishing a framework conducive to innovation requires provision of easier access to finance and fiscal incentive for innovative firms[96]. However, if access to capital is limited by high interest rates accompanied by general mistrust between enterprises and banks, incentives for enterprises will be weakened.

A high level of nominal interest rates in candidate countries has negatively influenced SMEs borrowing.

The progress in improving the banking sector has been sluggish, especially in South-Eastern Europe where macro-economic shocks, inexperience and lack of appropriate training led to a number of severe banking crises in Bulgaria (1997), Romania (1999) and Turkey (2000-2001). Moreover, a high level of nominal interest rates (caused by general lack of financial resources in the banking system, high risk associated with lending, and high costs for raising capital), in candidate countries has negatively influenced SMEs borrowing. Costs of loan financing (market lending rates) varied in 1998 from 13% in the Czech Republic to 150% in Bulgaria although differences have been reduced since then as inflation has been brought under control[97].

As is outlined in section 2.1, it is difficult to draw hard and fast conclusions about the efficiency and effectiveness of the CC7 banking systems, particularly with respect to their capacity to support innovation. Indeed, the orientation of the banking systems (e.g. towards short-term commercial investments rather than longer-term higher risk investments) is as important as the availability of finance. This said, the CC7 have a less developed financial systems than the CC6, which is in line with the level of reform of the banking and non-bank financial sectors[98].

Evidence from the country reports tends to confirm the data analysis. The CC7 can be split into three broad groups:

96 European Commission (COM 2000) 567 final, Communication from the Commission to the Council and the European Parliament: Innovation in the knowledge-driven economy.

97 Francesca Pissarides (1998), Is lack of funds the main obstacle to growth: the EBRD's experience with small and medium-sized business in central and Eastern Europe, EBRD Working Paper N°33.

98 See EBRD Transition Reports for 2001 and 2002.

→ Shallow banking systems dominate in Bulgaria, Lithuania and Romania, which have a very poor capacity to provide credit to enterprises. The Latvian banking system also performs relatively poorly with a level of competitiveness equal to that of the Greek financial system;
→ Slovak and Turkish banking systems perform best in terms of their capacity to provide domestic credit, but are uncompetitive due to relatively high cost of capital;
→ The Maltese banking sector (like that of Cyprus) is highly efficient, although still with a relatively higher cost of capital. It equals the performance of EU countries like Spain and the Netherlands; and has the highest ratio of domestic credit to GDP (similar to those of Germany and the UK).

According to the country reports of this study, the penuiary of capital is more severe in Bulgaria and Romania[99]. The **Bulgarian** banking system provided loans to only 7.6% of new firms in 2000 compared to 13% in 1996. Banks placed part of the blame on the quality of investment projects[100]; but the business perception of the banking system is negative, "you cannot get credit. To obtain a loan, three times the equity is required. That is useless for a young entity"[101].

The private sector in Romania is undercapitalised and SMEs find it extremely difficult to obtain short-term finance.

The private sector in **Romania** is undercapitalised and SMEs find it extremely difficult to obtain short-term finance due to high interest rates and an inefficient banking system[102]. In comparison to other CC, Romania has failed to attract foreign investment in the banking sector with 40% of the total assets of the banking system in the hands of the State. Hence, the financial market suffers from the delay in introducing more efficient (banking techniques. Moreover, investment banking services and venture capital funds remain reserved to large companies.

While the Nordic banks have penetrated significantly the **Latvian** and **Lithuanian** banking sectors, the situation remains unfavourable for entrepreneurs seeking private finance. The Latvian report for this study notes there is a perception in the banking sector that there are very few investment projects of high enough quality. In Lithuania, the level of mistrust in the private sector is still quite high: "The situation with SMEs is not so good, as the economic recovery is not so advanced that the entrepreneurs are ready to risk their assets against loans"[103].

99 Other studies underline that reliance on internal funds from retained earnings is about 57% in Bulgaria, and 66% in Romania. See Francesca Pissarides (2001), Financial structures to promote private sector development in south-eastern Europe, EBRD Working Paper N°64, pp. 8.

100 See Yordanka Gancheva (2000), Rules, Regulations and Transaction Costs in Transition Bulgaria, Institute for Market Economics Working Paper, pp. 11-12.

101 Financial Times, Survey-Bulgaria, 20 November 2001.

102 EBRD (2001), Strategy for Romania, pp. 14.

103 Financial Times, Survey-Lithuania, 27 April 2001.

In Slovakia and in Turkey, the main obstacle to the development of SME remains access to finance.

Slovakia has made significant progress in restructuring and privatising the banking system notably with the privatisation of the two largest state-owned banks during 2001[104]. However, SMEs still face obstacles in terms of access to finance, a situation which the Government acknowledged by creating a number of different financial instruments operated by the National Agency for Development of SMEs and the Slovak Guarantee and Development Bank. However, demand exceeds supply for the programmes and funding remains a constraint for business growth.

Following the **Turkish** financial crisis in November 2001, the aim of the banking rescue packages has been a better-balanced banking sector with a group of efficient and profitable banks at the core and smaller banks at the margin[105]. The banking crisis led to enormous difficulties in industrial firms dependent on bank loans and guarantees for their operations. However, by 2002, due to the reform programme and economic recovery, banks restarted loan programmes for SMEs with favourable conditions.

Corporate Taxation

In terms of **corporate taxation,** a clear trend is the reduction of the fiscal burden on enteprises and notably small or micro enterprises. Yet, only three (Latvia, Malta and Turkey) of the CC7 have introduced direct fiscal incentives aimed at encouraging innovation. However, according to the country reports, these types of subsidies have proven to be ineffective.

Only Latvia, Malta and Turkey have introduced fiscal incentives aimed at encouraging innovation.

Turkey has been a precursor in introducing fiscal incentives for innovation. However the tax postponement incentive (20% of yearly corporate tax not exceeding total annual R&D expenses is postponed for a period of three years interest-free) has been criticised by business. The low uptake of this incentive is due to the fact that SMEs are not used to accounting for R&D expenditures as a separate item in their balance sheets[106].

The **Latvian** Government has made attempts to stimulate entrepreneurship by introducing income tax exemptions of 20% for companies undertaking R&D activities and involved with knowledge intensive technologies. However, this has not proved to be conducive to stimulating innovation due to criteria applied[107].

104 EBRD (2001), Transition Report 2001, pp. 191.
105 The cost of rescuing the banking system is estimated to be around 20% of GNP. See Financial Times, Survey-Turkey, 13 July 2001.
106 For more details see Innovation Policy Profile: Turkey, Volume 2 of this study.
107 For more details see Innovation Policy Profile: Latvia, Volume 2 of this study.

In **Malta,** the Business Promotion Act provides for reduced corporate taxation for certain sectors such as manufacturing, waste treatment, software development and R&D, if a company designs and develops new products or production processes[108]. Moreover, the Income Tax Act (2001), creates the opportunity to deduct (from the total income for the calculation of income tax due) 120% of any expenditure on scientific research carried out in Malta at the request of any commercial entity[109].

In Lithuania, scientific, training and educational services provided by registered higher education or scientific institutions are exempt from VAT[110]. However, no similar measures exist for private firms. Neither Romania nor Slovakia has introduced specific fiscal measures although both countries have reduced the tax burdens[111]. In Bulgaria, the Government abolished a patent tax for each person employed in a company performing patent activity.

3.3.3 Intellectual Property Rights

A common shortfall of the IPR regime in the CC7 is especially a lack of adequate administrative capacity.

Access to finance is only one part of the equation involved in a decision by an enterprise to proceed with investment in an innovative project. Intellectual property rights (IPRs) are also essential to knowledge generation. While the CC7 have now broadly established a legal framework for IPR in line with the *'acquis';* they continue to lack adequate administrative capacity to enforce regulations. Moreover, membership of international organisations[112], such as the European Patent Office, does not guarantee an adequate domestic environment. For example, the Commission has pointed to the lack of independence of the Turkish Patent Institute as a weakness of the IPR system.

In terms of innovation, the overall benefits of IPRs for developing economies are ambiguous: a strong IPR framework can hinder diffusion and encourage investors to licence instead of investing. This is especially relevant in countries that have weak R&D systems.

While some of these concerns may be of relevance for CCs they are largely outweighed by the benefits, which should accrue to these economies via for instance, increased FDI. Weak IPR rules deter foreign investors from entering into R&D intensive sectors. In addition, most of the CCs are small economies, which have to follow a policy of openness and economic freedom for which strong IPRs are an indispensable element.

108 For a new company, the rate of tax is 5% for seven years, followed by a rate of 10% for the next six years, then 15% for the five years thereafter. After this, a company pays the normal rate. For existing companies the rate of reduced corporate taxation is 10% for six years, 15% for the following five years, and thereafter the normal rate.

109 For more details see Innovation Policy Profile: Malta, Volume 2 of this study.

110 For more details see Innovation Policy Profile Lithuania, Volume 2 of this study.

111 In the case of Romania reduced tax rates for micro-enterprises have been introduced; and in Slovakia, a 1999 reform improved tax deductibility of expenses, losses carried forward and depreciation rules; and reduced corporate tax rates.

112 All candidate countries are members of the World Intellectual Property Organisation (http://www.wipo.org/); while eight out of 13 are members of the European Patent Office (EPO). Latvia, Lithuania and Romania are expected to become members in the near future. See http://www.european-patent-office.org/epo/members.htm

The issue, then, is whether there is policy commitment in the CC7 to enhance IPR protection. Unfortunately, no national level appraisal on IPR policy has been identified. So in order to understand where CCs stand, the results of an index of IPR constructed for EU economies and expanded for candidate countries is used[113].

The index is constructed as a scoreboard of five features of patent protection: (1) extent of coverage, (2) membership in international patent agreements, (3) provisions for loss of protection (4) enforcement mechanism, and (5) duration of protection. Each of these categories is broken into several sub-components and weighted in the way that each category ranges in value from 0 to 1. These categories are summed as unweighted components so the index value ranges from zero to five.

Higher values of the index indicate stronger levels of protection. However, the does not show the degree to which IPR laws are enforced and this should be taken into consideration when interpreting data.

Table 13 shows that CCs have on average a lower value of IPR index (2.88) compared to the EU15 (3.48). However, the range of values within the EU15 is bigger than within the CC13. Disaggregating data into sub-groups shows that more developed groups (DEU-12 and CC6) have stronger IPR frameworks than the less developed groups (SEU3 and CC7 respectively).

Table 13 – Index of patent rights, 1995–CEE CCs, others – 1990 by country groups

	CC13	EU15	CC7	CC6	CEE CC7	CEE CC6	SEU-3	DEU-12
Min	1.89	1.98	1.89	2.24	2.57	2.86	1.98	2.95
Max	3.75	4.24	3.19	3.75	3.19	3.75	3.62	4.24
Mean	2.88	3.48	2.06	3.13	2.47	3.31	3.58	1.66
Standard deviation	0.51	0.68	0.59	0.92	0.59	0.92	0.45	0.52

Ginarte and Pack (1997) and Smarzynska (2002)

Small island economies (Cyprus and Malta) are lower down the index suggesting that it is the size of the domestic R&D system that influences the extent to which IPR rules are developed. In general, CEE CCs have relatively high values in the index given their levels of development and size of the R&D system. However, their R&D systems are to a great extent public based, rather than business based, which reduces demand for IPRs.

113 The original list of Ginarte-Park (1996) does not include transition economies. An index for CEE CCs was created by Smarzynska (2002). Although the time periods for CEE CCs and other countries are not the same they enable a systematic comparison of index.

Research[114] suggests that there is a threshold level of development, R&D and openness above which there is a strong interest to provide tight IPRs. Hence, IPR is driven by the investment or resources committed to knowledge creation. If the CCs are to progress further in knowledge based activities they will have to improve their IPR framework and in particular effective enforcement.

Box 10 – Main findings on the business environment & innovation

- → The legal and administrative environment is more hostile in the CC7 than in CC6. The front-runner in adopting transparent and efficient business rules amongst the CC7 is Malta. The other countries have also adopted policy documents aiming at reducing business barriers, but the climate conducive to business development in general, and innovative businesses in particular, remains less than positive. Over-regulated systems hamper the development of firms particularly in four of the seven countries, namely Romania, Bulgaria, Lithuania and Turkey;
- → Creating a favourable business environment implies a series of actions – not exclusively those regulating company registration time/costs, inspections and licences – but also improving competition policy, continuing the fight against corruption, revising bankruptcy rules, and ensuring access to capital and security of IPR. In all these areas, the CC7, with the exception of Malta, perform poorly;
- → As the business environment is rather weak in the majority of CC7 countries, particular attention should be paid to putting in place a system of business impact assessment for new legislative proposals. Without such mechanism and further dialogue between the governments' representatives and business representations, the results on the business climate are likely to be insufficient;
- → Governments need to re-examine the current system of fiscal incentives in order to stimulate more directly innovation in enterprises.

114 Ginarte, Juan. C and Walter G. Park (1996), Determinants of patent rights: a cross-national study, Research Policy, pp. 26.

CHAPTER 4: What is being done to achieve a knowledge-based economy?

In an optimistic scenario, the average annual real GDP growth, in the Candidate Countries is likely to be 4.8% from 2000-2009[115]. However, this is on the condition that the CCs adopt 'knowledge-driven' economic development strategies in line with the Lisbon Strategy (see introduction). This chapter investigates two main drivers of growth and innovation; by examining to what extent private firms in the CC7 can mobilise skilled human resources for innovation; and acquire and benefit from ICT applications.

In a first section, drawing on the country reports and complementing the data analysis of section 2.4, the analysis sheds light on the main policy issues with respect to human resources and ICT. The scope of policy development in the CC7 in favour of both human resources measures for innovation in business and ICT diffusion is then examined in section 4.2.

4.1 Barriers and drivers to a knowledge economy

An initial scenario of a positive relation between favourable initial endowments in candidate countries economies, such as cheap skilled labour, worldwide technological development and the increased demand for skilled labour seems obsolete. On the contrary, evidences suggest that the candidate countries economies have labour forces with lower productivity, flexibility and quality[116]. Accordingly, improving **higher education and lifelong learning systems is fundamental** in developing a knowledge-based economy.

However, the quality of human capital is not a sufficient prerequisite for higher employment and growth; but accompanied by the diffusion and application of new technologies, improvements to education and training systems can lead to increased productivity and ultimately economic growth.

Similarly, a high quality **ICT infrastructure** is a necessary but not sufficient condition for economic development. In order for ICT to have an impact on competitiveness, it must be diffused and

115 Commission of the European Communities, Directorate General for Economic and Financial Affairs (2001), The Economic Impact of Enlargement, pp. 4.

116 See section 2 of this report and the working paper by Radosevic & Mickiewicz: Innovation Capabilities of the Seven Candidate Countries (Volume 2.8).

applied in the business sector thereby facilitating: restructuring of production processes, changes in work organisation; and rationalisation of supply chains. When both supply and demand conditions for ICT are met, evidence exists that these technologies have positive impacts on productivity, competitiveness and employment.

ICT influences economic growth in two key ways: first by contributing to an increase in overall investment (IT related capital deepening); and secondly by contributing to multi-factor productivity (MFP)[117] growth. The ICT-producing sector (manufacturing and services) has provided a significant boost to productivity growth in some EU countries[118]. However, other countries with small ICT sectors, like Austria, have also experienced high MFP growth[119].

4.1.1 Innovative human resources?

In section 2.2, it was stressed that the CCs have relatively positive educational structures, which do not seem to be a major constraint for absorption of new technologies. However, the orientation of education systems and low investment in life-long learning may leave the CCs lagging in maximising potential. Beyond the conclusions of the data analysis, each of the country reports attempted to identify specific trends or issues arising in their employment markets, which could influence innovation potential, including with respect to R&D personnel.

A skills mismatch particularly for technology specialists

A serious imbalance in the demand and supply of professionals with higher education skills.

Relatively low rates of economically active population allied to low unemployment rates of highly skilled people in the CC7 suggest current and growing shortages or skills mismatches in the labour markets[120]. Growing demand for highly skilled workers is not necessarily met by supply and it would appear that this trend intensifies over time.

117 MFP is a measure of productivity at the economy-wide level as it relates output growth to the combined use of labour and capital inputs. Growth in MFP is key to long-term economic development, as it indicates rising efficiency in the use of all available resources. See: OECD (2001), Science, Technology and Industry Outlook, Drivers of Growth: Information Technology, Innovation and Entrepreneurship.

118 From 1995-1999, ICT investment contributed significantly to annual average GDP growth in Germany (0.3%), France (0.4%), Italy (0.3%) and Finland (0.6%). ICT industries also account for significant shares of economic activity and employment. Differences in the share of employment in ICT industries in the EU15 are substantial: from Finland (9%) to Portugal (4%). OECD, Science, Technology and Industry Scoreboard 2001 – Toward a knowledge-based economy.

119 There is a debate on whether MFP is a reflection of rapid technological progress in the production of computers, semi-conductors and related products, or if ICT leads to other sectors of the economy becoming more efficient and innovative. See Dirk Pilat and Frank C. Lee (2001), Productivity Growth in ICT-Producing and ICT-Using Industries: A source of Growth Differentials in the OECD.

120 For instance, in Bulgaria, the level of unemployment was significantly lower, in 1999, for groups with higher levels of education (6.7%) than for those with general secondary education (15.7%) or even persons with vocational secondary education (13.3%)Modernisation of Vocational Education and Training in Bulgaria. Human Resource Development Centre. September 1999.

Even in those countries with a high share of 3rd level education such as **Slovakia,** there is an excess supply on the labour market due, in part, to insufficient levels of qualifications and a lack of flexibility[121]. Equally, the 2002 **Lithuanian** Labour Market Forecast identified a serious imbalance in the demand and supply of professionals with higher education skills[122]. While there is an increase in the number of students seeking a university degree, only 9% chose engineering and 3% computing, compared to 30% orientated towards business studies. Innovation policy documents identify a lack of engineering skills as a main obstacle to innovation development in Lithuania.

In the **Maltese** economy, growth in high-tech manufacturing, IT-oriented services and financial services is generating a strong demand for advanced technical skills, which is not satisfied by the local labour market[123]. In contrast, the situation is more positive in **Turkey,** which experienced, between 1995 and 1999, an increase of almost 28% of the labour force with higher education. The 8th five-year Development Plan forecast an increase in both the demand and supply for skilled human resources in priority sectors like ICT, machinery and construction.

A decline in R&D personnel and evidence of a brain drain

In section 2.3 the general trend towards a shrinking of the R&D system in terms of expenditure and personnel was highlighted; due to a decline in demand for R&D but also in the capacity to generate new knowledge. The country reports for this study highlighted a number of country specific difficulties in retaining R&D personnel notably in the business sector.

Statistics for **Lithuania** suggest that the total number of R&D personnel decreased by 9% from 1996 to 2000, and the trend in terms of number of scientists was very similar. The main reason for this decline was the inability of the private sector to absorb high skilled staff laid off from public sector R&D institutes and the high demand for scientists in foreign countries. R&D personnel statistics show a low level of R&D related personnel in business sector (some 4.6% of the total in the country).

During the nineties, there was also a significant decline in domestic demand for R&D personnel in **Bulgaria,** allied to emigration due to foreign demand for skilled human resources[124]. At the same time, the supply of skilled human resources has been increasing notably with an upward trend in the number of PhD students in high-tech sectors. The main factors explaining this trend are: a tradition favouring higher education; the fast development of IT sector in EU and USA that attract many Bulgarian IT engineers; and the combination of hardware and software skills that most of the experts offer.

121 See Innovation Policy Profile: Slovakia. Volume 2 of this report.

122 Demand for 11,000 professionals compared to a supply of 6,100.

123 See Innovation Policy Profile: Malta. Volume 2 of this report.

124 According to national statistics, in 1999 the total number of the scientists employed in the business sector was 910, in the sectors of engineering and technology and more specifically in chemical technology - ICT and equipment and in chemistry. See Innovation Policy Profile: Bulgaria. Volume 2 of this report.

A similar trend is reported in **Romania** where the number of R&D employees in the business sector decreased by almost 50% from 1995 to 2000. Here, however the outflow would seem to have been in part absorbed by a remarkable increase, almost 61%, in R&D employees in the higher education sector. The main reasons for this trend were the decrease in public funding and the re-orientation of the research units towards other types of activities, like production and services.

4.1.2 Is ICT becoming a pervasise influence?

In principle, a rapid liberalisation of telecommunication will lead to lower communication costs resulting in an important contribution of ICT to new competitive conditions through economies of scale and as a result lower prices of services[125]. In the CCs, the telecommunication sector is moving towards full liberalisation, foreseen in Bulgaria, Latvia, Lithuania, Romania, Malta on 1 January 2003 and on 1 January 2004 in Turkey. Moreover, the process of liberalisation in mobile telephony, data transmission, Internet services, etc. has begun. Relatively high prices of IT-related services and societal attitudes in some CCs (in particular Bulgaria, Romania, Latvia, Lithuania, and Turkey) may in part explain their weak performance in information society statistics[126].

Development of the ICT sectors across CC7

In the CC7 (except Malta and Turkey), the basis for national ICT industries was the industrial structures of the Soviet system. This allowed a rapid development of a domestic ICT sector, for instance, in Lithuania, the first personal computer was produced and the first private mobile phone and Internet service provider was launched by 1991.

In Latvia, most of the enterprises in the sector were established or strongly developed during the Soviet period. To support the development of these enterprises, the three main universities devoted resources to training highly qualified ICT specialists[127]. This heritage has created a number of strengths in the current Latvian ICT sector including: market niches at the local and global levels (see the example of DATI Group below); enterprises have a strong scientific potential as they employ many former university and research specialists; and a growing number of graduates in IT specialities and in software development.

125 An EU example is the cost of leased lines, used to transport large volumes of information between firms. Liberalisation brought lower prices and the cost between Paris and London of a 2 Mbit/s line was reduced by 92.4% from 1998-2000

126 European Commission (2001), Reports on Progress to Accession.

127 See Innovation Policy Profile: Latvia (2003). Volume 2 of this report

Box 11 - IT sector in Latvia and the case of the DATI Group

DATI Group is one of the largest IT providers in Eastern Europe and is active in programme-systems and data transmission[128]. It began operations in 1995 with the aim being to create an association representing the whole IT spectrum. Since then, it has proven the capability of specialists from Latvia to compete in the European IT market given their intellectual potential and experience in international business. Aside from contracts in Latvia, the company has implemented projects in Germany, Austria, Switzerland, UK and Scandinavian countries. In 1999, DATI Group was certified according to ISO 9001 quality standards

The company employs 500 highly skilled specialists, including 30 PhDs and five university professors. DATI Group incorporates Riga Information Technology Institute (RITI), the first private research institute in Latvia focusing on: software engineering R&D, quality assurance, testing and training. In 2000, DATI Group spent €1 million in order for 203 employees to perform teaching for three months. "We made an investment for the coming years", according to one of the DATI Group leaders[129].

On the other hand, a number of weaknesses persist including insufficient public and private investment in the ICT sector; small software companies that have trouble in handling major international orders and a lack of experience in marketing; University curricula do not strike a balance between academic and professional training; and lack advanced equipment due to insufficient funding.

The diffusion and use of ICT in the business sector varies widely in **Slovakia.** IT suppliers tend to be clustered in the larger cities around main customers, namely public authorities, large enterprises and banks. Equally, foreign owned firms invest significantly in ICT while many domestic SMEs have serious difficulties in keeping up with trends in technologies and skills[130]. There is a real risk of a widening gap between businesses that have the means to adopt advanced ICT and those who unable to do so.

The two South-East European countries traditionally claim comparative strengths in IT. **Bulgaria** was a leader in the IT-related industries among Eastern European Countries during the Communist period[131]. However recent data on IT expenditures, suggests a significant lag with respect to other candidate countries. **Romania** has a strong base of software specialists, due to support by successive governments for this specialisation in the education system. However, an unfavourable entrepreneurship culture and lack of financial resources leads many IT specialists to emigrate.

128 http://www.dati.lv
129 Rumbergs O. - In: Kapitals (November 2001).
130 See Innovation Policy Profile: Slovakia (2003). Volume 2 of this report.
131 Financial Times Survey on Bulgaria, 20 November 2002.

In **Malta,** major progress in telecommunications capabilities is a direct result of the liberalisation of the market, consumers have a choice and are benefiting from lower tariffs and better services. The main issue is a lack of ICT specialists due in part to the presence of large FDI companies and a limited local education potential. In **Turkey,** the high-quality telecommunication infrastructure is a main advantage, but poor scientific potential (number of IT specialists) and limited financial resources are the main challenges for the development of an ICT sector.

Box 12 - Main findings on human resource and ICT indicators

Human resources and knowledge diffusion and generation

→ Demand for highly qualified workers is significant and there is evidence of a growing trend in the number of students following higher education courses or undertaking PhDs. However, engineering and science courses are not favoured options, so that businesses requiring advanced technology skills find it difficult to source workers;

→ In terms of R&D personnel, there a negative trend both in terms of employment of R&D personnel in industry and a brain drain of highly skilled researchers to industrialised countries;

→ The relatively weak position of CC7 countries in terms of vocational training is consistent with their lag in the diffusion of quality control systems and hints at a structural weakness in the diffusion and utilisation of technology.

Diffusion of ICT and its application to support a knowledge-driven economy

→ The capacity to develop ICT products and services (share of IT expenditures in GDP) of the CC7, notably Bulgaria, Romania and Turkey, is lagging considerably both the CC6 and EU15;

→ The CC7 are also behind in terms of the diffusion and application of ICT. Relatively high-prices of IT services and the pending telecommunications liberalisation are explanatory factors;

→ The strengths and weaknesses of the ICT-related industries are similar in the CEE CCs. An industrial and educational specialisation has created a sizeable pool of IT and software specialists. However, limited national markets, weak financial resources and difficulties for small companies to compete are disadvantages.

→ In Malta and Turkey, on the other hand, telecommunications infrastructure is relatively advanced but a limited number of IT experts and a less developed IT sector are barriers to development.

4.2 What is being done to support the diffusion of knowledge?

4.2.1 Training and mobility initiatives for innovation

In the EU, reinforcement of life-long learning systems has become a clear political priority since the end of the nineties[132]. The links between lifelong learning and innovation policies are numerous but remain often poorly understood and articulated. The September 2000 Communication on *Innovation in a Knowledge-Driven Economy* called on Member States to implement lifelong learning programmes to improve the assimilation of new technologies and remedy shortage of skills.

Three types of policy response are important. First, there is a need to take into account the implications of the knowledge-based society notably through promoting new basic skills including entrepreneurship and science and technology. Secondly, with the rapid pace of change imposed by certain key technologies (notably ICT), there is also need for an increased focus on competence forecasting for the labour market to avoid shortages. Thirdly, the role of employers, particularly SMEs, is crucial and given the difficulties in making finance or time available for training of employees, appropriate actions to motivate them are required.

As part of the consultation process on the 2001 Communication on Lifelong learning, the European Training Foundation (ETF) summarised the views of the governments of the CCs[133]. Two main points of relevance to training in enterprises arose:

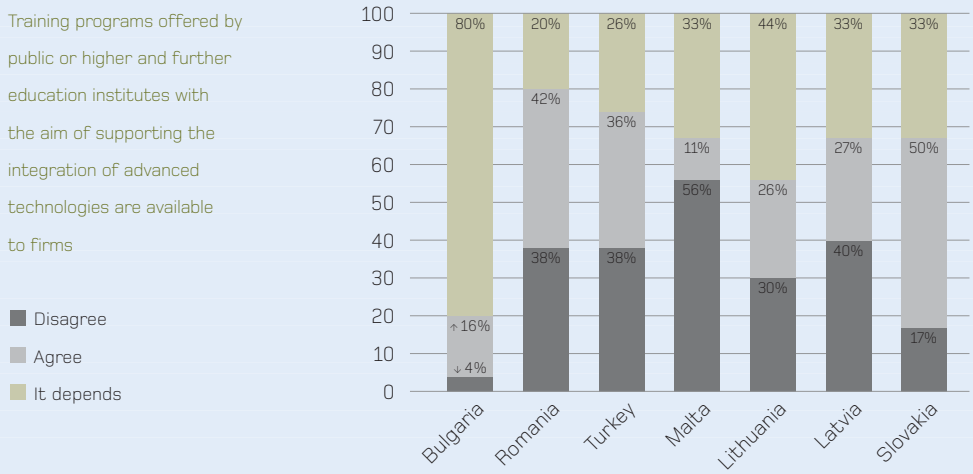
→ Most countries see formal education as the foundation for a lifelong learning strategy and place an emphasis on tackling the inadequacies of the existing education system before putting the principle of lifelong learning into practice;
→ It is largely up to the State to create appropriate conditions for promoting lifelong learning. The potential role of enterprises is under-exploited, except in Cyprus and Malta where the involvement of social partners is a tradition.

132 Lifelong learning is defined as "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective". See http://europa.eu.int/comm/education/life/communication/com_en.pdf

133 See: http://europa.eu.int/comm/education/life/communication/etf_en.pdf.

Only 32% of respondents to the opinion survey considered that there were adequate training programmes assisting enterprises to integrate advanced technologies.

The ETF concluded that there is a significant lack of coherent and integrated lifelong learning strategies. This finding is corroborated by the country reports for this study, which failed to identify coherent government policy frameworks for **training and human resource programmes in favour of innovation.** This finding is also confirmed by the results of the opinion survey concerning the availability of training programmes.



The existence of research-industry mobility schemes, as opposed to more classic science-science schemes, was an issue that the study was requested to examine. No such schemes were identified in any of the candidate countries; and this information was cross-checked with the data available on policy measures under the EU Trend Chart project. Only the CORINT programme in Romania appears to offer some possibility for mobility of industrial researchers.

Little scope for institutional coordination between innovation and training policies…

There are few if any examples of coordination of innovation and training related initiatives in the candidate countries.

Competence for innovation generally resides with the Ministries of Industry in the CC7 (see also section 5.1), except in the cases of Malta and Romania where the Ministry of Education is responsible. As a result, there is a functional separation between administrations responsible for innovation policy and those responsible for lifelong learning[134]. The analysis confirms that there are few if any examples of coordination of innovation and training related initiatives in the CC7.

In **Malta,** for instance, various programmes are implemented by two separate institutions responsible for the development of human resources and skills enhancement: the Ministry of Education and the Ministry of Social Policy. In **Bulgaria,** life-long learning (continuous vocational training) is influenced by the policy activity of five separate ministries.

On the contrary, in **Slovakia,** the Ministry of Education oversees all training and education programmes; while the National Agency for Development of SMEs is responsible for the implementation of programmes for entrepreneurs; delivering them through a network of Regional Advice and Info Centres and Business Innovation Centres. However, innovation management is not a main feature of these courses.

Box 13 - Slovakia – Houses of Technology

In Slovakia, the main suppliers of continuing professional education are the universities and the Association of Slovak Scientific and Technological Societies (ZSVTS)[135]. The latter is a non-governmental organisation with a mission to increase the level of science and technology know-how and of scientific and technological development. ZSVTS represents more than 30,000 members of 50 specialized societies; drawing their members from the majority of enterprises, institutions and technical universities in Slovakia. ZSVTS is co-funded by the Government and by private organisations.

The wide and varied activities of ZSVTS in the field of science and technology are delivered by twice-yearly special programmes with conferences, symposia, fairs, seminars being organised for specialists as well for the public (courses, lectures, training). ZSVTS has created four Houses of Technology (in Bratislava, Banská Bystrica, Zilina and Kosice); which cover the whole territory of Slovakia. The main objective is the promotion of technology transfer towards highly qualified persons.

134 Indeed, competence for education and training is often split between two or more line Ministries. The ETF has underlined that in the candidate countries "the administrative structures and culture of co-operation are not well advanced. Vertical (or sectoral) ways of distributing responsibilities still prevail, hampering the implementation of integrated strategies. Inter-ministerial co-ordination is poor, in particular between the Ministries of Education and Labour".

135 See: http://www.zsvts.sk/index_e.htm

...but entrepreneurship is a key theme of education and training policies.

In Malta, the organization of debates, such as the Graduate Potential Seminar, are a main tool for policy discussion on the development of human resources and the acquisition of innovative skills.

In the CC7, there has been a sustained effort to develop new policy orientations and training programmes. In **Malta,** for example, the organization of national policy debates, such as the Graduate Potential Seminar, are the main forum for discussions on the development of human resources and the acquisition of innovative skills. In order to alleviate the lack of advanced skilled human resources, the Foundation of Human Resources Development monitors human resources management issues. Such initiatives indicate the serious effort of the Maltese authorities to develop human potential and create an enterprise culture, but it is too early to evaluate their effectiveness. Some first initiatives towards an innovation culture within enterprises have also been launched alongside more traditional MBA courses, etc.

In quantitative terms, the situation in continuing vocational training in **Latvia** is impressive with around 3,000 courses for adults. However, the trend in adult training is that employers prefer to hire already trained personnel thereby shifting the burden for financing the training on to the individuals themselves. The Government has adopted a number of policy documents aimed at supporting employment promotion and skills upgrading, notably: the National Employment Plan (including support for entrepreneurship development); the Concept on education development for 2002-2005; and Guidelines for the development of higher education science and technology for 2002-2010. The scope of the last two documents is to strengthen the role of universities in the development of education and science, to restore the scientific potential and to develop research in the field of innovative technologies.

In **Slovakia,** policy orientations in terms of improving the labour market are governed by three main documents: the concept of employment policy until 2002; the National Employment Plan and the National Plan for Regional Development. The Ministry of Labour, Social Affairs and Family is responsible for the implementation of the National Employment Plan that contains four basic pillars, which will be implemented by specific measures. Two of the four pillars focus on enterprise issues namely: The development of entrepreneurship and the encouragement of adaptability of businesses and employees.

Aside from providing funding and policy advice for the overhaul of the education system in the CCs, international donors have played a role in supporting innovative initiatives both in terms of content and methods.

An example of more innovative forms of delivery of learning is the introduction of a distance education system in **Latvia,** which began in 1994 with the support of the EU PHARE programme. Although this led to some important developments in the education sector, there remains a lack of a legislative framework for adult continuing education and consequently a somewhat unorganised administrative environment.

In **Lithuania,** initiatives funded by foreign donors, such as PHARE, are more oriented towards innovation, skills improvement through the use of modern business techniques, management technology and ICTs in business.

… and a growing emphasis on links between education and industry to foster skills adaptations.

In Lithuania, lack of entrepreneurial skills and culture among technical engineering and IT graduates has led to the creation of new programmes.

A number of the country report outline developments in terms of education-industry co-operation with a view to adapting courses towards industrial needs. In **Lithuania,** the lack of entrepreneurial skills and culture among technical engineering and information technology graduates has led to the creation of new programmes, in order to develop innovative and entrepreneurial thinking. Innovation management and the development of innovative skills and techniques is considered very important elements of national human resources development plans.

In **Latvia,** limited networking between industry and universities is a major obstacle. Both parties need to collaborate more, in order to review the curricula of the current specialized knowledge offered, with a view to satisfying skills needs of enterprises. To date, private educational institutions are more flexible in their curriculum development, due to competition.
However, several studies on the labour market have been carried out including a survey of enterprises with respect to their professional training of their employees; and identification of employers' opinion of the necessary professions and specialities in the labour market.

As far as continuing training of specialists is concerned, programmes for IT and engineering are very expensive, since public financing for higher education is insufficient. The cost to firms in order to train their personnel is thus too high and there is a need for the public authorities to offer specific initiatives, in order to eliminate this drawback. Moreover, most human resource development programmes available from educational institutions, mainly focus on

general entrepreneurial education. There are no separate courses on innovation management but this concept is introduced within some management courses.

In **Malta,** the issue of time lags required by Government and then educational institutes to respond to changing skills needs was flagged up as an issue by the country report. Nevertheless a number of specific measures aimed at encouraging students to take up engineering, technology and business oriented courses have been launched. These include the organization of an Open Week with the participation of industries and secondary schools; and Science Weekends in collaboration with Local Councils, schools and technology providers. Moreover, business plan competitions for post–secondary schools are organised.

In Romania, the Government, recognising the lack of an entrepreneurial culture, has set new priorities in order to effectively network the educational system with the private sector.

Recognising the lack of an entrepreneurial culture, the **Romanian** Government has taken initiatives, mainly addressed at higher education, in order to develop academic qualifications adapted to market needs and encourage networking of educational institutions with enterprises. Two trends are visible: firstly, the creation of courses offering a combination of management and high-tech skills; and the networking of Universities with industry for practical training and problem solving in the production process. Another main initiative in favour of human resources development for innovation are co-operation programmes for SME development and continuing professional training. Two new centres were established in order to offer training in specific areas of expertise.

In **Turkey,** out of a total of 77 Universities, some 67% offer undergraduate and graduate level management programmes; while only 17 universities offer specialized BA and MBA programmes on technology and innovation management. The US model influences these programmes and some of them were designed in close cooperation with foreign universities. Another important element of these courses is that they involve the local private sector, since there is a close interaction in the curricula design and in the practical training of the graduates and undergraduates. Within the educational system there are 18 Lifelong Learning Centres, which belong to regional universities. They offer short-term training courses for business sector employees in various levels of employment.

One of the most impressive characteristic of the Turkish system is the number of initiatives, undertaken by the public and non-governmental sector, for the development of human

resources for innovation. These initiatives are designed to provide training and education on the most recent technology developments and some of them are able to adapt to the changing needs of industry. However, they are faced by a lack of funds and of qualified trainers, in order to cover all the areas of expertise. These elements need to be taken into consideration when designing or implementing these initiatives. Finally, in order for these initiatives to be more effective, there is a need for awareness activities towards enterprises on investing in innovation management.

4.2.2 Initiatives in favour of the uptake of ICT in enterprises

ICT diffusion and application is resulting in accelerated changes in business processes, work organisation and skills requirements. Such change is of course induced throughout society and not only in the enterprise sector; with governments ('e-government'), educational institutes, non-profit sector, etc. all adapting to and developing new services or more effective ways to interact with citizens and other organisations.

Supporting the balanced development of the 'Information Society' has been a policy priority in the EU since the middle of the 1990s. Following the Lisbon summit in March 2000, an eEurope Action Plan was launched in June 2000. Recognising the importance of the goal set in Lisbon, the ten CEE CCs agreed to launch an "e-Europe-like Action Plan" and were joined subsequently by Cyprus, Malta and Turkey in defining a common action plan. The eEurope+ Action Plan adopted in June 2001 set a series of targets for the candidate countries to fulfil by 2003. Importantly a number of benchmark indicators were agreed, taking into account the specific conditions of the candidate countries.

The key objectives of the eEurope+ action plan include:

→ Accelerate the putting in place of the basic building blocks for the information society;
→ A cheaper, faster, secure internet;
→ Investing in people and skills including a focus on working in the knowledge based economy;
→ Stimulate the use of the internet.

Benchmarking indicators for the third objective, the most directly related to enterprises, includes the percentage of the workforce with (at least) basic IT training, number of places and graduates in ICT related third-level education; percentage of workforce using telework. Actions include the promotion of networks of learning and training centres for demand-driven ICT[136].

136 For the most recent progress report on eEurope + see: http://europa.eu.int/information_society/topics/international/regulatory/eeuropeplus/doc/progress_report..pdf

Policy initiatives on ICT diffusion

No significant policy debates on the role of ICT as a factor of business development were identified.

In the CC7, information society issues tend to be the competence of the ministry of 'transport/communications' (Bulgaria, Latvia, Romania, Slovakia and Turkey). In Malta, the Ministry of Justice and local Government is responsible for e-Malta and in Lithuania a special committees for Knowledge Society and Information exists. Most of the policy-making of these bodies is focused on the broader societal issues of ICT (e-government, computerisation of administrations, etc.) rather than on promoting ICT uptake in enterprise. Indeed the role of Ministries of Economy in information society initiatives is limited in all countries. Moreover, no significant policy debates on the role of ICT as a factor of business development were identified.

Most of the candidate countries had developed policies in favour of the information society by 2002. Broadly speaking, see also table below, such initiatives take two forms:

→ National strategies for information society or 'informatics' promoted by ministries of transport and communications. These strategies tend to focus on computerising the public sector, e-government (on-line interaction with administrations, etc.) and generally improving the interface between government and citizens. A second sub-theme is the liberalisation of the telecommunications sector leading to a reduction in cost of access, provision of new services, etc.;
→ Programmes to stimulate the information society on a broader socio-economic level through training to improve 'information society literacy', strengthening IT services, etc.

The influence of e-Europe+ on national frameworks is clear. For instance, the most important government initiative in **Turkey** is the "eTurkiye Project" which has a broad ranging remit. Studies are being carried out by 13 working groups covering all aspects of from education and human resources to legal framework and involving experts from public, private and NGO sector.

Malta is a good example of a strategy focusing on strengthening the Government's IT network with a view to meeting targets for delivering public services to citizens. The Government has also launched an **"m-government" initiative,** in response to a survey carried out by the e-Malta commission where citizens expressed a preference for mobile phone services. **Latvia** has similarly focused on e-government spending some €91 million, since 1999, on the National "Informatics" Programme (computerisation of courts, etc) but further funding is lacking; along with sufficient IT specialists to complete the work[137].

137 Ministry of Economy (2001b), p.86.

Table 14 – Summary of main policy initiatives in the field of information society and ICT

Country	Informatics programmes	Information Society	E-Business and ICT in enterprise sector
Bulgaria		National Strategy for Information Society Development (1999)	High-Tech Parks (not operational)
Latvia	National Programme Informatics (1999)	eLatvia (2000)	Information Systems Cluster Project
Lithuania	State Communications and Informatics Development Programme (1996)	Lithuanian National Strategy on Information Society Development (2001)	Concept of E-Business No specific initiatives
Malta	Central Information Management Unit	e-Malta Commission	No specific initiatives
Romania		National Strategy for the promotion of the new Economy and implementation of the information society (2002)	Industrial Parks programme Preferential tax relief for software and IT specialists
Slovakia		Information Society Strategy of the Slovak Republic (2002)	
Turkey		eTurkiye	Grants through KOSGEB, Soft-loans and grants through TTGV and TUBITAK-TIDEB KOBI-NET Portal

In **Romania,** in contrast, there is a stronger emphasis on liberalising the telecommunication sector; modernisation and expansion of fixed line penetration and internet access, etc.. However, R&D on applications and services based on ITC and media convergence; and stimulation of the local IT industry are also Government priorities.

Another common feature of the policy-making process with respect to ICT and information society in the CC7 is that many of the strategies and initiatives developed are not implemented due to lack of funding or delivery mechanisms.

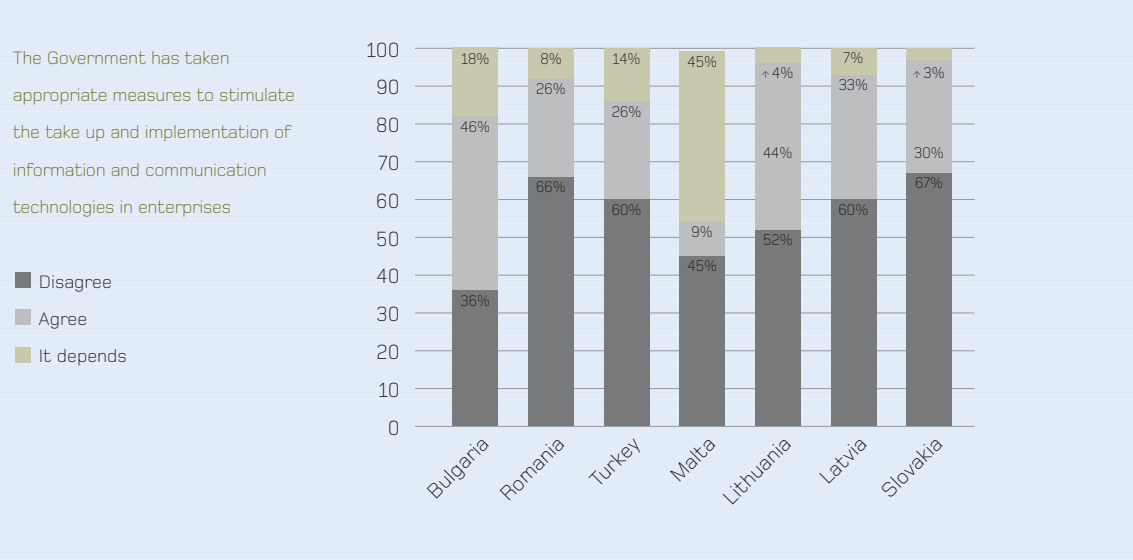
This is the case in **Bulgaria,** where projects aimed at the establishment of a venture capital fund and High Technology Business incubators for ICT based firms have remained on the drawing board as no funding has been forthcoming. Availability of funding has been also an issue in Latvia, where the necessary funding has not been forthcoming. Equally, the 2000 eLatvia programme, which included actions to improve Internet access and create a favourable environment for e-commerce, has yet not been implemented[138].

138 See Innovation Policy Profile: Latvia (2003), Volume 2 of this study

Similarly, in **Lithuania** and **Slovakia** various strategies have either never been adopted or are still waiting to be implemented. In Lithuania, strategies on E-Business (2001) and 'ICT Development 2002-2015' remain dependent on budget priorities agreed at a political level in the framework of the Long Term Economic Development Strategy of Lithuania (2001). In Slovakia, the Government approved the latest strategy in 2002. It aims include e-commerce, e-business and research on ITC, however, funding for the implementation of this strategy is not yet assured.

Initiatives in favour of ICT development for enterprises in the CC7

Generally, initiatives in favour of the up-take of ICT, their diffusion and absorption by enterprises are less common; as are actions to support the development and strengthening of an ICT sector in the candidate countries. This conclusion is backed up the results of the opinion survey where only Maltese respondents considered more positively the efforts of the Government to assist enterprises to integrate ICT.



In **Bulgaria,** the only policy initiative in favour of ITC firms was the National Strategy for High Technology Development, a 1999 policy document, which included proposals for the establishment of high-tech parks for IT companies. The proposals were, however never implemented[139]. Similarly, in **Lithuania,** there are no specific initiatives to reinforce penetration of ICT in business sector. In contrast, in **Latvia,** the PHARE programme has assisted in funding the development of an Information Systems Cluster (see box 3).

139 Ivaylo Gueorguiev (2001), Technology Development Policy in Bulgaria, pp. 17, 20.

Box 14 - Information system (IS) cluster project - Latvia

In October 2000, the Latvian Ministry of Economy with support from the EU PHARE programme launched the Industrial Cluster Restructuring project. The project included the creation of an information system cluster with the aim to increase sharply the exports of IS related products and services. It also aims to create a favourable environment for investments and innovative activities in Latvia by basing it on a common vision of IT field development and by promoting all kinds of collaboration between firms, universities, scientific establishments and investors.

The Latvian IS cluster brings together 18 branch companies that signed a co-operation agreement in March 2001, but is open to new members. Cluster members agreed upon the following strategic aims: by 2010, to become the leading exporter of software development and development-related services in Eastern Europe; by 2010 at least 5,000 highly qualified IT specialists will be employed in export services, generating up to €0.9 billion total annual revenue. Since PHARE funding ended in October 2001, co-ordination has been undertaken by the Latvian Association of Information Technologies and Telecommunications.

In **Malta,** the government introduced a tax incentive, in January 2002, for investment in IT (allowing for the full depreciation of expenditure on IT equipment in one year); although only a fifth of companies questioned in a survey were aware of such support.

Box 15 - Development of 'Software Parks' in Romania

In Romania, the most significant measure taken to encourage ICT developments is the concept of establishing software parks in a number of cities. The Information Technology & Communication Ministry aims to attract to the parks mostly small, start-up companies that cannot afford to pay a large amount of money on rent or public utilities. The intention is to create a software park in every Romanian city that has a university centre. Negotiations with investors are at an advanced stage in four to five major cities, with the most advanced software park located in Galati. Software companies locating to the park benefit from incentives both from the State and local authorities, ranging from exemption of income taxes for employees to commercially attractive rents. The aim is to ensure that companies leave the park as soon as the able to develop further on their own.

Another measure supporting the start-up of technology-based companies is the preferential tax payments regarding software and information technology specialists' salaries – which are exempt of taxes on their salaries. This measure is directly aimed at stemming the brain drain of IT specialists from Romania.

The **Slovakian** country report underlines that support to firms in the field of ICT is lacking. An exception is the National Agency for Development of Small and Medium Enterprises (NADSME) which has established an Internet Information Workplace (IIW) offering training to SMEs in using the Internet and assists in retrieving information. In addition, in partnership with the Foreign Trade Promotion Fund (FTPF), SMEs are offered the opportunity to present their products, services and co-operation proposals. The IIW system supports electronic commerce between enterprises and more than 100 companies are registered and presented.

There are a number of initiatives in Turkey to foster ICT uptake in enterprises.

In **Turkey,** there are a number of initiatives being taken to foster ICT uptake in enterprises. Firstly, the SME agency (KOSGEB) gives grants for procurement of specialised software, supports the establishment of Internet cafés together with chambers and management of industrial zones, etc.[140] and provide free of charge Internet related services for SMEs through its KOBI-NET portal. Second, the Technology Development Foundation (TTGV) provides grant for e-business activities and ICT related consultancy and trainings under its Technology Support Services scheme.

A large number of **short-term training seminars** organized by private companies and NGOs have lead to a considerable increase in the demand for financial and technical support for e-commerce applications. There is a need for designing new e-business support schemes and additional financial resources[141].

140 There are 35 Internet cafés established and the demand from SMEs is important. KOSGEB reports that the Internet cafés have a positive effect on SMEs by pushing them to purchase their own computer systems and Internet connection. KOSGEB's software support is designed for the specific needs of manufacturing SMEs.

141 See Innovation Policy Profile: Turkey (2003). Volume 2 of this study.

Box 16 - Main findings: measures for innovative human resources and ICT diffusion

Stimulating the development of innovative human resources

→ Relations between education and training measures and those in favour of technology development or innovation (management) are insufficient;

→ Some innovation in training methods and topics has been introduced in partnership with the private sector and with the support of international donors. Distance learning, innovation skills improvement, masters programmes with innovation options, etc. but are not widespread;

→ In most of the CC7, initiatives aimed at increasing the attractiveness of engineering and scientific careers exist. However, they appear to be relatively ad hoc and with limited funding;

→ Most countries report weak networking between universities and industry with respect to curricula, etc. although effort are being made to strengthen such links (e.g. in Romania and Turkey);

→ Anticipation of skills needs remains a weak point except in countries with a longer tradition of social-partnerships such as Malta but even here there are difficulties in adapting to business needs.

ICT policies and incentives for business

→ The broad lines of government information society strategies are in place in the CC7, but most neglect the importance of diffusing ICT in the enterprise sector.

→ The Romanian and Turkish systems stand out in as much as their government provides incentives in favour of the uptake of ICT to business community. The other CC7 countries engage more funds in favour of the public and education sector. In Bulgaria, there is a long-standing focus on the local IT industry but at present few concrete policy measures to actually stimulate its development.

CHAPTER 5 What are Governments doing to support business innovation?

5.1 Who is responsible for innovation?

This section explores the nature and structure of governance systems for innovation in the CC7 extending the analysis to the level of agencies, and intermediary organisations, responsible for implementing policy. As noted in the introduction, the diverse and pervasive nature of innovation requires that it be placed at the heart of many other policy fields such as competition, enterprise, research, financial, taxation, etc. policies. As a consequence, while one government body may be responsible for innovation policy, its definition and implementation requires an inter-ministerial approach.

At least three main 'schools of thought' in terms of managing innovation policy within the EU are identifiable.

Models of governance differ amongst the present EU member states; certain governments have established departments or units which co-ordinate innovation policy; while others prefer to create task forces involving several departments of various line ministries in drawing up policy or implementing legislation. Equally, in some Member States, an innovation agency has been established with a view to delivering funding to enterprises or intermediary structures. A first lesson from the EU experience is that there is no 'standard approach', indeed three 'schools of thought' are identifiable.

Firstly, in a number of EU countries, there is **no separation between the government institutions which frame policy and those that implement measures** For instance, in the UK, the Department of Trade and Industry is "at the hub of the UK system of innovation governance" but also "operates and/or funds a number of schemes for the promotion of innovation in companies"[142].

142 European Trend Chart on Innovation: Country Report: United Kingdom.

Secondly, **in other member states, policy is framed by ministries but delivered by semi-autonomous agencies.** For instance, the Finnish TEKES agency manages some 30% of government appropriations for R&D and is the principal source of funding for applied research and commercialisation of R&D. Likewise, in Ireland, there is a distinction between the policy mission of the Department of Enterprise, Trade and Employment and the implementing agency Enterprise Ireland.

Thirdly, in Member States with a federal structure (Austria, Belgium, Germany, Spain), **design and management of innovation policy is increasingly complex** with a strong interplay between federal and devolved administrations. The German system gives a predominant role to the federal ministries, which provide both a strategic orientation to R&D and innovation policy and fund directly innovation and industrial research in enterprises. Nevertheless, there is an increasing division of labour between the Federal government and the regions in launching policy initiatives and financing R&D and innovation policy.

A second message is **the importance of co-ordination structures at ministerial level and consultative mechanisms** to take account of the broader viewpoint of business and society.
In Finland, for instance, the Science & Technology Council, chaired by the Prime Minister, is composed of seven Ministers and ten representative organisations (TEKES, industry, employers and employees organisations, etc.). Its main function is to direct science and technology policy through triennial policy documents, which include statements on allocation of funds. In Germany, in addition to national advisory councils, there is a committee bringing together the Federal authorities and the regional governments in order to co-ordinate research and innovation policies of the different levels of government.

Box 17 - Innovation governance - issues for candidate countries from EU experience

- → There is not a one fits all 'system of innovation governance". However, there may be a rationale in creating an implementing agency for technology and innovation policy objectives;
- → An effective system of innovation governance is not dependent exclusively on the existence of an 'innovation-policy unit'; inter-ministerial committees and consultative forum also play a key role in policy development and management in the majority of EU15;
- → In the larger candidate countries (Bulgaria, Hungary, Romania, Poland and Turkey), the need to develop 'regional innovation policies' is likely to arise and may require the establishment of specific intermediary bodies and coordination mechanisms between different levels of public authorities.

5.1.1 Managing innovation in the candidate countries

The study[143] on the CC6 identified which institutions, if any, were responsible for developing and implementing innovation policy and concluded that in four out of six cases responsibility for innovation matters was assigned to the national ministry for economic affairs or industry. This follows the broad trend in the EU15, however, the division of responsibilities between ministries was often not clear-cut and the views and opinions of ministries of education/research often held sway.

Implementation agencies exist in Cyprus and Estonia; while in Hungary, an agency had been absorbed into the executive branch as the R&D division of the Ministry of Education. Plans for an innovation agency in Slovenia were not implemented due to lack of funding; while in Poland a technology agency had been merged with the SME agency.

The appraisal of the system of governance in the CC6 highlighted a number of weaknesses with respect to the situation in the EU:

The appraisal of the system of governance in the CC6 highlighted a number of weaknesses with respect to the situation in the EU.

- → Although innovation has slowly come to the forefront of the policy debate in most of the CC6 by 2000, clear lines of responsibility for drafting or implementing an "innovation policy" were still missing;
- → The capacity of ministries and agencies to implement policy decision was limited both in terms of human and financial resources; and was further weakened by relatively frequent changes to the executive and implementing agencies;
- → Co-ordination failures were apparent with competing policies being developed by different government ministries or agencies ("science versus industry");
- → Implementation of Government policy documents often depended on the unlikely scenario of several line ministries allocating financial resources to a policy of another ministry;
- → Advisory and consultative mechanisms in the field of innovation were few and far between; with policy debates in most of the six candidate countries failing to include a broad enough set of stakeholders, particularly from business.

143 Innovation policy in six candidate countries: the challenges. A study co-ordinated by ADE S.A. for the Enterprise Directorate-General, European Commission, Luxembourg. Available at: http://www.cordis.lu/innovation-smes/src/studies.htm.

Does a system of innovation governance exist in the CC7?

Against this comparative backdrop, two issues are addressed for the CC7:

→ The structure of government with respect to innovation policy matters (executive and implementing agencies); including the existence of consultative bodies;
→ The development of innovation support system, able to serve as intermediaries or delivery mechanisms for policy initiatives.

Table 15 below summarises the state of play in the CC7 regarding the competence for innovation policy matters at executive (ministerial) and implementing agency level; and whether there exist co-ordination mechanisms for science, technology or innovation policy. In comparative terms, the table and the country-by-country analysis indicates that:

→ In Malta and Romania, a Ministry of Education and Research is the lead actor in developing policy; while in Bulgaria, the two Baltic States and Slovakia, the Ministry of Economy plays a leading role. However, in these latter four countries there are clear signs of policy competition between the Ministries for economy and those responsible for research;
→ The set up is somewhat different in Turkey where an institution operating at ministerial level, TUBITAK, has responsibility to frame policy in the field of science, technology and innovation;

Only Turkey has agencies dedicated to providing support to industry in the fields of technology and innovation.

→ Only Turkey has agencies dedicated to providing support to industry in the fields of technology and innovation. In the other countries, support to enterprises is provided by development or SME agencies; which do not have a remit for providing funding for innovation;
→ Consultative bodies, particularly those involving business interests, are weak or non-existent in four out of seven countries. Lithuania, Malta and Turkey are the exceptions where business interests are represented in debates about science, technology and innovation.

Table 15 – Distribution of competence for innovation policy matters in CC7

Country	Executive level	Main agencies	Co-ordination mechanisms
Bulgaria	Ministry of Economy – no department for innovation or technology development. Ministry of Education and Science.	Agency for small and medium-sized enterprises (ASME) - no specific remit for innovation.	No co-ordination mechanisms.
Latvia	Ministry of Economy has main responsibility for innovation. Ministry of Education and Science responsible for science & technology policy.	Latvian Development Agency – no explicit remit for innovation.	Latvian Council of Science remit is scientific research.
Lithuania	Ministry of Economy – lead role in innovation. Ministry of Education and Science – responsible for science and technology policy.	Lithuanian Development Agency for Small and Medium Sized Enterprises (SMEDA).	Business Development Council & Sunrise Commission on business environment Science Council of Lithuania.
Malta	Ministry of Education and National Culture.	Malta Council for Science and Technology (MCST) Institute for Promotion of Small Enterprises (IPSE).	MCST organises consultations on technology and information society.
Slovakia	Ministry of Education and Science. Ministry of Economy.	Agency for the support of Science and Technology. National Agency for the Development of SMEs.	Government Council for Science. and Technology.
Romania	Ministry of Education and Research (MER), Dept. for Innovation & Technology Transfer.	National Agency for Science, Technology and Innovation absorbed into MER in 2000.	Inter-ministerial council for science, technology and innovation.
Turkey	Science & Research Council of Turkey (TUBITAK).	TUBITAK-TIDEB – grant support for industrial R&D Technology Development Foundation of Turkey (TTGV) – supporting technological innovation activities in firms Small and medium sized industry development organisation (KOSGEB).	Supreme Council of Science and Technology (BTYK).

Source: Innovation Policy profiles. See Volume 2 of this study.

In **Bulgaria,** enterprise and industrial policy is the remit of the Ministry of Economy, which up to 2001 was largely preoccupied with concluding the privatisation process. This Ministry has taken a lead role in drawing up the Science, Technology and Innovation strategy adopted end 2002.

There are no co-ordination mechanisms or joint strategic policy development between the various government ministries, which are responsible, directly or indirectly, for innovation policy matters. The 1999 National Strategy for High Technology Development did propose a number of organisational measures to implement government policy including the establishment of an advisory board, to be chaired by the Ministry of Economy, made up of representatives of various ministries, business representatives, NGOs, universities and the Academy of Sciences. No concrete action appears to have been taken to establish such an advisory board.

Bulgaria: There are no co-ordination mechanisms or joint strategic policy development between the various government ministries.

An Agency for Small and Medium Sized Enterprises (ASME) was created in 1999 by the Small and Medium-Sized Enterprises Act. However, the Regular Report of the Commission noted that *"Greater resources for policy development and particularly implementation are required at the Ministry of Economy and National SME Agency…{and}…the respective responsibilities of these organisations for SME policy could usefully be clarified"*[144]. This comment seems justified given the wide-ranging mission given to the ASME[145] and the fact that, in 2001, it only had 34 full time staff including those in six regional centres.

Latvia: The Ministry of Economy is the primary actor in innovation policy development.

In **Latvia,** the Ministry of Education and Science was given responsibility for the organisation and financing of 'market-oriented research' in 1992. Funding of this type of research was set at 10% (currently about €1.5 million per year) of the state budget allocated to science. The ministry also began supporting, in 1992, the commercialisation of science through plans to develop technological centres and technology parks. From 1997 onwards, the Ministry of Economy took over the lead role initially by developing a National Programme for SME Development (1997-2001), which contained a specific chapter on innovative activities. Since then this ministry - and in particular the Industry Department - can be considered as being the primary actor in framing innovation policy.

Despite the Ministry of Economy having responsibility for the elaboration of the National Innovation Programme, the driving force behind the development of innovation policy in Latvia have been the managers of technology parks and centres, as well as several civil servants from the Ministry of Education and Science. Indeed, while a task force for the development of the

144 The Commission's Regular Report also underlined the lack of an effective policy maker in field of research and argued that both the National Council for Research and Technological Development and that the Ministry of Education and Science lack administrative structures and staff to deal effectively with research-related issues.

145 Including: the co-ordination of activities to implement Government SME policy; encouraging interaction between national and local Government bodies and associations supporting SMEs; improving access to finance for SMEs including the development and proposal of new financial schemes; analysing the impact on competitiveness of SMEs of legal instruments; preparation and execution of projects and programmes for the creation and development of SMEs; assistance to information and advisory services for SMEs and the organisation of training courses and seminars.

National Innovation Programme exists under the auspices of the Ministry of Economy, another working group on innovation issues is also active within the Ministry of Education and Science.

So far a systemic approach to innovation support at government level is missing in Latvia:

In short, although there have been significant changes in government structure, so far a systemic approach to innovation support is missing in Latvia with competing initiatives from two main ministries. This situation is aggravated by the lack of a co-ordinating body, such as a Science and Technology Council.

Latvia: There are no government agencies directly responsible for implementing measures related to innovation.

There are at present no government agencies directly responsible for implementing measures related to entrepreneurship or innovation. However, the Ministry of Economy has delegated many functions related to the promotion of entrepreneurship and investment to the Latvian Development Agency (LDA), notably export promotion and inward investment.

Lithuania: The Ministry of Economy has become increasingly active in supporting policy development in areas concerning innovation.

Until the end of the nineties, the **Lithuanian** Ministry of Education and Science was responsible for defining science and technology policy. Indeed, it created a Department of Science and Studies in 1998 with this purpose in mind. However, the Ministry of Economy has become increasingly active in supporting policy development in areas concerning innovation. A notable example is the 'Sunrise Programme', which aims to improve the environment for doing business, under which a 'Sunrise Commission' comprising representatives of various institutions and business representatives has been established; including a special working group on innovation problems in business.

Another step taken to improve dialogue between Government and enterprises was the establishment in 2001 of the Business Development Council. The aim of the Council is to improve management of the three main strategic action lines of the Ministry of Economy: industrial development, export promotion and SMEs. The Council is an advisory body including representatives of the national authorities, leading specialists of different business sectors, representatives of Chamber of Industry, Trade and Crafts, scientific and research institutes, banks and other institutions. The Council has the mission to oversee the actions taken by all the intermediaries

in the strategy implementation process, set eligibility criteria and advise on major projects, and make proposals to Government regarding improvement of legal acts. A similar institution, the Science Council of Lithuania, represents the interests of science community. It acts as the main source of expertise and consulting on strategy, development and financing of science.

Lithuania: The implementation of innovation policy is hindered by the absence of a government body co-ordinating innovation support.

However, the effective implementation of innovation policy is hindered by the absence of a Government body co-ordinating innovation support initiatives, which are currently implemented separately by various institutions (notably the Ministry of Education and Science and the Ministry of Economy). This lack of policy co-ordination is recognised and the Lithuanian Parliament adopted a resolution in May 2001, which included the recommendation for the establishment of a Science, Technology and Informatics Committee.

The Malta Council for Science and Technology (MCST) was established in 1988 as an advisory body to assist in the formulation of a National Science and Technology Policy.

In **Malta,** the Malta Council for Science and Technology (MCST) was established in 1988 as an advisory body to assist in the formulation of a national science and technology policy. In 1995, the Foundation for Science and Technology was created to implement and co-ordinate science and technology policies under the direction of the MCST, which was reconstituted in 1997 with an increased participation of representatives from industry and the academia.

Since 1996, the responsibility for science and technology lies with the Ministry of Education and National Culture. However, MCST continues to manage science and technology, and it has also been active in promoting strategies in the field of information technologies. Nevertheless, the level of public funding made available to the MCST has been insufficient to allow the implementation of the policy documents adopted.

Malta: Networking initiatives between the organisations involved in enterprise and innovation policy remain sporadic.

The MCST stated aim is a "participatory approach to the formulation of national policies for science and technology", involving actors at all levels of policy formulation. However, networking initiatives between the various organisations concerned by enterprise and innovation and technology policies remain sporadic and there is little in the way of communication and feedback.

In terms of industrial policy, the main actors are the Ministry for Economic Services and the Institute for the Promotion of Small Enterprises (IPSE). The former has been responsible for the drawing up of the 2001 Business Promotion Act and organised a consultation with the social partners on a White Paper "Prosperity in change: challenges and opportunities in industry". A main focus of the activities of the Ministry is simplifying the administrative environment though the Small Business Efficiency unit, which seeks to reduce administrative burdens on companies and is promoting local one-stop shop structures.

The IPSE[146] has the mission to assist SMEs in restructuring or development through consultancy and training, business planning, etc.. It also manages a loan guarantee fund and undertakes sectoral studies. In terms of support for innovation, the main initiative of the IPSE is the creation of a business incubation centre. It is also co-operating with the MCST in creating an IRC.

Slovakia: Neither the Ministry of Education and Science nor the Ministry of Economy, has a direct remit for handling matters related to innovation.

In **Slovakia,** two main ministries have responsibility for innovation policy: the Ministry of Education and Science and the Ministry of Economy, but neither has a direct remit for handling matter related to innovation. The former has been responsible for the development, co-ordination and implementation of the national science and technology policy for most of the 1990s.

Other ministries and the Slovak Academy of Science support policy-making and activities according to their areas of competence. In April 2001, the Parliament adopted an Act creating an Agency for the Support of Science and Technology. The Agency, financed from the State Budget, began operations in July 2001 and is responsible for support to R&D and the promotion of international science and technology co-operation.

Slovakia: The Ministry of Economy established an innovation fund in 1997 but it operations are small scale.

The Ministry of Economy is responsible for the formulation of industrial policy and monitoring the environment in which industry operates. The Ministry is also responsible for SME policy and oversees the functioning of the National Agency for the Development of Small and Medium Enterprises[147]. The Agency has the mission to support the growth of existing and newly formed SMEs. It co-ordinates all support activities including financial measures at national and local levels. It also drafts policy and strategies and submits them for approval to the Government. It is studies and analyses barriers to business development, formulates proposals for their removal, and submits them to the appropriate governmental bodies.

146 See: http://www.ipse.org.mt/index.htm
147 See: http://www.nadsme.sk

The Ministry of Economy established an innovation fund in 1997. This non-investment Fund is intended to support innovation development in the business sector through financing research and development projects. At the present time it is functioning on a rather small scale with minimal personnel and budget (just over €1.1 million in 2002).

The Council for Science and Technology, created in 1991, is the only body with an advisory function to Government on R&D strategies and science and technology initiatives. Although it has undergone various reforms, there are no members from the business or banking sectors. In general, the research community and industrial associations focus more on science and technology policy formulation than on innovation.

The institutional structures responsible for innovation matters have been in a state of flux since the mid-nineties in Romania.

The institutional structures responsible for innovation matters have been in a state of flux since the mid-nineties in **Romania.** Until 1998, a Ministry of Research and Technology existed but it was replaced by a new National Agency for Science, Technology and Innovation (NASTI), with responsibility for policy development and implementation. However, in autumn 2000, NASTI was integrated into the newly created Ministry of Education and Research (MER).

The MER is split into two divisions (Education and Research). The research division (formerly NASTI), led by a deputy Minister, is composed of five departments including a department for innovation and technology transfer. Its role includes strategic planning, design and implementation of policies in the field of research, technology and innovation; including forecasting, monitoring and evaluating resources for policy implementation.

As far as enterprise policy is concerned, there have also been changes in administrative structures with the latest being the establishment of a Ministry for SMEs and Co-operatives. The Ministry is responsible for drafting policies to support SME development and for ensuring that SME interests are integrated into other policy areas. Nevertheless, the European Commission in its 2001-2002 Regular Reports on Romania noted that the Ministry can only be effective if it is given sufficient influence over other ministries that also deal with issues related to SMEs.

Romania: An inter-ministerial council for science, technology and innovation exists.

This issue of overlapping competencies exists with respect to innovation policy, with various ministries such as the Ministry for Regional Development and Prognosis having a role in policy development or funding of innovation initiatives. However, an inter-ministerial council for science, technology and innovation has been established; including representatives of the main ministries and chaired by the MER. This council represents the governmental authorities in the process of establishing R&D and innovation priorities and programmes and is involved in a constant dialogue with three other main groups of stakeholders: technological research institutes, institutes of the Romanian Academy of Science and universities; and the social partners.

In Turkey, the Scientific and Technical Research Council (TUBITAK) is the responsible body for the design, promotion and coordination of research, technology and innovation policy.

Turkey has well-developed institutional structures in the fields of science, technology and innovation (STI). As early as 1963, the **Scientific and Technical Research Council (TUBITAK),** reporting to the Prime Minister, was founded. TUBITAK is responsible for the design, promotion and coordination of STI.

At an inter-ministerial and consultative level, **the Supreme Council on Science and Technology (BTYK)** decides on the action plan for implementation of the policy. It is chaired by the Prime Minister and composed of government ministers and undersecretaries and representatives of other organisations including TUBITAK and the Union of Chambers of Commerce and Industry of Turkey (TOBB). During its annual meetings, the BTYK designates the responsible bodies and coordinators for each policy measure. In addition, the Small and Medium Sized Industry Development Organization (KOSGEB) plans and proposes policies for entrepreneurship and increasing competitiveness, including innovation promotion.

Given the existence of a five-year planning process, the State Planning Organization (SPO) is responsible for preparation, coordination and follow up of the Five-Yearly Development Plans which also contain the actions for the innovation related issues for the period in question. The High Planning Council is the decision-making body and assistant to the Board of Ministers on implementation of the development plans. The High Planning Council is chaired by the Prime Minister and composed of the ministers appointed by the Prime Minister plus the Undersecretary of SPO. The SPO acts as the secretary of the Council.

Box 18 – Main findings on innovation policy management

- → In the majority (Bulgaria, Latvia, Lithuania, Slovakia) of countries, responsibility for innovation falls within the scope of Ministries responsible for industrial and SME policy. In both the Baltic countries, the Ministry of Economy is responsible for overseeing the development and implementation of an innovation programme;
- → In Bulgaria and Slovakia, although the respective Ministries of Economy have taken some initiatives in favour of technology policy, there is no real capacity in these institutions for innovation policy development;
- → In Romania, Malta and Turkey, ministerial level bodies responsible for Education and Science (in the first two cases) and Scientific and Technical Research (in the latter) have the lead responsibility on innovation. However, in Malta, the Ministry of Economy and an institute for SMEs are the most active in promoting enterprise level innovation issues;
- → Only Turkey has an institutional structure with a long-tradition of policy development in the field of technology and innovation policy. It has also developed an "evaluation culture" as part of the conditions set by a World Bank loan funding technology development;
- → Except in Turkey, there are no agencies for delivering innovation support. Various ad hoc arrangements exist for providing partial support in some other countries such as an innovation fund in Slovakia; or the Lithuanian Innovation Centre, a non-profit organisation.

5.1.2 Do the institutions and capacity exist to assist enterprises to innovate?

It is instructive to consider the range and level of development of innovation support organisations in the CC7 with a view to identifying possible gaps in service provision or particular strengths or weaknesses. For instance, in terms of private equity companies, technology transfer brokers and organisations commercialisation of research. Such institutions form part of the innovation system and are key mechanisms in delivering policy.

BICs, in one form or another, now exist in all seven countries; although it is difficult to ascertain to what degree they focus on innovative firms

Table 16 summarises the more detailed information available in the country reports of this study (see Volume 2), with respect to four types of "infrastructure": science and technology parks; industrial R&D, technology transfer and consulting structures; innovation financing and risk capital organisations; networks and associations with an interest in innovation matters. The broad conclusions, which can be drawn, are:

→ The earliest development in innovation support structures was the creation from 1991 onwards of business innovation or incubation centres (the first BIC in Central and Eastern Europe being established in Bratislava in 1991 while BIC-IZOT in Bulgaria was operating before 1990 in a different form). BIC structures now exist in all seven countries; although the degree to which they focus on innovative firms as opposed to general business development varies.

→ The restructuring of state funded industrial research institutes (formally linked to industrial branches) has resulted in their almost complete disappearance (Baltic States) or a long-drawn out process of privatisation and rationalisation (Romania and Slovakia). In contrast, in Turkey over the last decade, a number of industrial R&D institutes as well as prototyping and metrology services have been created.

Technology parks appear to be a favoured tool of policy makers.

→ Technology parks appear to be a favoured policy tool, existing in three countries and with plans for parks in three others. They are often linked, e.g. in the Baltic States and Turkey, to universities or major research centres. The technology park concept is diverse ranging from small incubator structures to large real estate developments. Moreover, innovation and technology services to firms are not always provided.

Technology transfer and knowledge diffusion structures have been developed in most countries.

→ Technology transfer and knowledge diffusion structures have been created in most countries with the smaller countries (the two Baltic States, Malta and Slovakia) concentrating resources in one or two main centres; while in the larger countries (Romania and Turkey) a network of technology centres or industrial liaison offices serve local companies.

Innovation financing mechanisms are still few and far between.

→ Innovation financing mechanisms are still few and far between. Venture capital funds are present in all countries but are focussed on investing in larger (joint-ventures, etc.) initiatives or development phase capital rather than seed or early stage funding. Guarantee funds, not exclusively for innovation or R&D investments, exist in all countries.

Bulgaria

Bulgaria appears to have the least developed innovation support infrastructure.

Broadly speaking, Bulgaria, particularly given its size, has the least developed innovation support infrastructure of the five Central and Eastern European countries covered by this study. The National Agency for SMEs stressed, in its 2001 report, that "Innovation is of exceptional importance to the SME sector. It is a key mechanism through which companies create and maintain their competitive advantage. *Innovation is also of primary significance for the economy in general, as a motor of economic growth".* It recommended that targeted support should be made available for academic entrepreneurs (spin-offs), however the ASME does not so far have the funds or capacities to implement such proposals.

Two organisations active in supporting innovation and technology transfer are the Applied Research & Communications Fund and the BIC-IZOT (see section 5.3.2). The ARC Fund is a non-profit organisation founded in 1991 whose activities include the encouragement of innovation and technology transfer and know-how. It hosts and co-ordinates an IRC as well as the EU funded regional innovation strategy for the South Central region (RIS/SC-Bg)[148].

In terms of access to venture capital, a 2001 report noted that the role of venture capital funds *"in the financing system is still insignificant. Their investments are concentrated in light and food industries, and in IT companies from the technological sector…These funds invest in joint-ventures, the usual investment being from EUR 0.5 to EUR 6 million; An exception to this is Caresbac-Bulgaria, whose investment ceiling is EUR 350,000"*[149].

Latvia

The development of an innovation support infrastructure in Latvia started as early as 1993.

The development of an innovation support infrastructure in Latvia[150] started as early as 1993 when the Latvian Technological Centre (LTC) was established; followed by the Latvian Technology Park (1996), and the Latvian Electronic Industry Business Innovation Centre (LEBIC) in 1997.

148 See: http://www.irc.bg/

149 Bulgarian Technology Development. 2001 (http://www.ced.bg).

150 See http://www.innovation.lv for further details on Latvia innovation support structures.

LTC offers three basic services: business incubator, consulting and information for tenants and tech-oriented firms, and advisory services for obtaining finance. In 2001, LTC supported about 32 firms with more than 270 employees (30 of them holding scientific degrees). The main fields of activities are: electrical engineering and telecommunications; biotechnology; equipment for medicine and biology, etc. LTC also acts as the national project co-ordinator for EUREKA and hosts IRC-Latvia.

LEBIC, initially founded as the Radioelectronics Technology Centre, supports small enterprise development in the electronics industry, enterprise technological modernisation and production for export promoting and professional training for technical personnel.

While there is a comparatively large number of units performing activities related to innovation, there is no formal networking except for the Latvian Association of Technology Parks/Centres and Business Incubators. This lack of networking structures can be explained by the small size of the country and the rather strong informal contacts due to participation in working groups, etc.

In terms of notoriety of innovation or financial intermediaries, a 1998 survey, conducted for the Ministry of Economy, found that 86% of enterprises had never heard of the Guarantee Agency of Latvia, 80% were not aware of the establishment of innovation centres and business incubators, while 63% knew nothing about the National Programme for Development of SMEs.

Latvia: There is still a lack of financial schemes designed for business start-ups and of long-term credits in local currency.

Although the restructuring of the banking sector is almost complete and has led to increasing competition among financial institutions, there is still a lack of financial schemes designed for business start-ups and of long-term credits in local currency. A positive development for SME credit is the introduction of two specially designed financial schemes by *Latvian Mortgage and Land Bank, and the Latvian Unibanka.*

Table 16 – Key actors supporting innovation in CC7 (1/2)

Country	Technology parks logy transfer & consulting structures	Industrial R&D, Techno- financing organisation	Innovation & risk capital	Networks & associations
Bulgaria	→ Several projects currently being prepared (notably in field of ICT).	→ Business Innovation Centre (IZOT). → IRC Bulgaria hosted by the Applied Research & Communications Fund (ARC Fund). → Bulgarian Industrial Association – includes Intellectual Property Centre.	→ Encouragement Bank – State bank providing investment credits for SMEs. → United Bulgarian Bank (Guarantee Scheme supported by USAID). → Five venture capital funds operating - Caresbac has lowest investment ceiling. → ProCredit Bank (set up by consortium led by EBRD).	→ National Network for Micro Crediting (DSK Bank). → Bulgarian Association of Regional Development Agencies (BARDA) 18 full members and 15 associate members (RDAs and business centres).
Latvia	→ Latvian Technology Park (Riga Technical University). → Nordic Technology Park (Riga).	→ Latvian Technological Centre http://www.innovation.lv/ltc/eng/ → IRC Latvia. → Latvian Electronic Industry Business Innovation Centre.	→ Baltic Investment Fund, Baltic Post-Privatisation Fund and Baltic Small Equity Fund (cover all three Baltic states). → Norway-Latvia Business Development Fund.	→ Latvian Association of Technology Parks/Centres and business incubators. → UAC Network – business advisory services. → Academy of Intellectual Property and innovation.
Lithuania	→ Science & Technology Park (Vilnius).	→ Lithuanian Innovation Centre (IRC) http://www.innovation.lt → Kaunas University of Technology Innovation Centre http://www.idc.ktc.lt/en/	→ Baltic Investment Fund, Baltic Post-Privatisation Fund and Baltic Small Equity Fund (cover all three Baltic states). → New mechanism for financing innovation foreseen by government programme.	→ Union of Business Centres including business centres, incubators and technology parks (since 1999).

Table 16 – Key actors supporting innovation in CC7 (2/2)

Country	Technology parks logy transfer & consulting structures	Industrial R&D, Techno- financing organisation	Innovation & risk capital	Networks & associations
Malta	→ No technology parks.	→ Malta University Services Ltd. Institute for Promotion of Small Enterprises (IPSE) → Kordin Business Incubation Centre → IRC being created by MCIST and IPSE.	→ IPSE offers loans guarantee scheme.	→ No networks relevant to innovation.
Romania	→ Technology parks (7 parks are in the development phase under a PHARE 2000 financing programme).	→ Business Innovation Centres [9]. → Regional Centres of Innovation, Implementation and Application of Inventions [3]. → Centres of Innovation and Technology Transfer [13]. → Industrial Liaison Offices (ILO)[12].	→ Equity & venture capital – Black Sea Fund, Danube Fund, Romanian Post-Privatisation Fund. → Government foresees support for risk capital fund.	→ Innovation Relay Centres Network - 6 regional partners based in universities. → Managerial Agency of Scientific, Research, Innovation and Technological Transfer.
Slovakia	→ BIC Bratislava is investigating the creation of a Science & Technology Park.	→ Centre for Advancement of Science & Technology – technology transfer. → 12 Regional Advisory & Information Centres (RAIC). → 5 Business and Innovation Centres (BICs) – 2 are members of EBN. → BIC Bratislava hosts IRC Slovakia.	→ Czech & Slovak Investment Corporations Inc., DBG OstEuropa Holding, GIMV Czech and Slovak SME Fund, Slovak Post-Privatisation Fund. → Government Innovation Fund → Slovak Guarantee Bank.	→ Association of Industrial Research Institutes (20 institutes).
Turkey	→ TUBITAK Marmara Research Center Technological Free Zone Middle East Technical → University Technopolis	→ 12 out of 90 public research institutes carry out industrial R&D. → R&D institutes of TUBITAK: notably Marmara Research Centre (MAM). → R&D/Technology Centres of TTG. → TUBITAK-UME (metrology, prototyping services, etc.). → KOSGEB runs 10 incubators.	→ TTGV supports creation of venture capital funds. → Halk Bankasi – major bank providing credit to SMEs – link to credit guarantee fund. → VakifRisk – local VC company supporting early stage companies.	→ National Productivity Centre; → Union of Chambers of Commerce and Industry. → Istanbul Chamber of Industry. → Quality association of Turkey. Turkish Industrialists → and Business Association.

Source: Innovation Policy Profiles. See volume 2

Lithuania

The Lithuanian innovation community has developed since 1996, beginning with the creation of the Lithuanian innovation centre.

The Lithuanian innovation community has developed since 1996, beginning with the creation of the Lithuanian innovation centre. LIC grew out of the innovation promotion programme initiated by the United Nations Development Programme and supported by Ministry of Education and Science; who remain shareholders along with the Ministry of Economy. LIC is a non-profit organisation with a mission to support and promote commercialisation of scientific and technological achievements and assist in technology transfer. It also supports policy development including the recent Innovation in Business programme.

Following the adoption of a legal framework, technology parks and business incubators were established in 1998, starting with Kaunas University of Technology. However, to date technology parks and business incubators are mainly oriented towards providing favourable physical environment for new start-ups without sufficient attention towards the technological component in innovative activities through interaction between academic, R&D and business communities. The Concept of Development of Technology parks, currently being drafted, aims to stimulate further development of technology parks as a source of technological innovation.

Lithuania: One of the key problems of the innovation support infrastructure are weak contacts to business sectors and the low awareness of SME's.

As a 2001 survey conducted by Lithuanian Development Agency highlighted, one of the key problems of innovation support structures are their weak contacts to business sectors and the low awareness of SME's about available services. The main factors explaining this situation are the low number of innovative firms, the lack of government funds for innovation in enterprises; and the narrow range of services (mainly information and consulting) offered by innovation support bodies. Innovation centres tend to co-operate with industrial federations rather than directly with enterprises, which could explain the low level of awareness in the business community.

There remains a lack of government incentives, venture capital funds, etc. for innovation development in enterprises.

In terms of the adequacy of the financial market to support businesses to innovate, the situation is not very favourable. In particular, SMEs and start-ups have difficulties in getting a loan due to relatively high interest rates and the requirement to have liquid assets as a collateral. At the same time, the state guarantee system is not yet functioning effectively. In general, there is a lack of government incentives, venture capital funds, etc. for innovation development in enterprises.

Malta

The main provider of support to SMEs in Malta is the Institute for the Promotion of Small Enterprises.

The main provider of support to SMEs in Malta is the Institute for the Promotion of Small Enterprises (IPSE) set up for the purposes of assisting enterprise restructuring through the provision of financial packages and expertise. Aside from it's standard business support initiatives, IPSE has created a business incubation centre and provides loan guarantees. The BIC provides a portfolio of business support services to start-up enterprises together with a focus on innovative new-economy businesses. The kick-off model of this project is that of a classical mixed technology type of incubator. However, the vision of the project is to become, in a couple of years, an innovation centre and transform the area into a science park. However, this development depends on participation of private investors.

The University of Malta has also been working on the valorisation of science and technology.

The University of Malta has also been working on the valorisation of science and technology through its commercial arm, Malta University Services Ltd; which acts as a vehicle for technology transfer and focuses on exploiting the commercial potential of the University's research activities. It is active in the field of environmental consultancy, laboratory services and project management.

MCST is promoting the creation of an IRC, which will initially be set up in partnership with the IPSE, Malta Development Corporation (MDC), and Malta External Trade Corporation (METCO) in order to maintain focus on commercialisation of technologies. Since Malta has a limited R&D capability, it is all the more important for SME's to be assisted in sourcing appropriate technologies through tools such as an IRC. The IRC should also contribute to the success of IPSE's BIC.

The availability of different stages of capital financing for the right ventures is still underdeveloped in Malta.

Finally, the availability of different stages of capital financing for private ventures is still underdeveloped and enterprises depend primarily on own and bank finance[151]. It is planned that during 2002, the Malta Enterprise Board will create a mechanism supporting the expansion of seed and venture capital.

Romania

Romania is characterised by a large number of structures supporting business innovation.

Romania is characterised by a large number of structures supporting business innovation; including some nine business innovation centres, three regional centres of innovation, 13 centres of innovation and technology transfer and 12 industrial liaison offices. In addition, seven technology parks are currently in the development phase.

Moreover, the development of such structures started comparatively early, for example, the promotion of innovation and incubator centres started in 1991. The promoter of the "Incubator centres" concept in Romania was NASTI (National Agency for Science, Technology and Innovation), which contributed to the foundation of Business Incubator Centres with its own funds. Later these centres widened their activity to regional development and by 2001, more than 50 BIC types structures have been created, with private and public funding.

There are also several projects for technology parks. One example is the Technopolis Park in the Iasi and Northeast region, co-financed by the PHARE programme. It will function as an innovative business incubator, provide back-up service for SMEs in the park, and a better environment for all investors particularly in terms of communications infrastructure.

PHARE assistance has also encouraged the establishment of industrial liaison offices in the framework of the "Science and technology restructuring system" programme, to stimulate technology transfer and quality management. Similarly, the Romanian IRC network aims at promoting innovation, encouraging exchange of research results between organisations and providing advice, consulting and training support. There are six regional partners based in universities, which provide information to SMEs, universities and research organisations.

Another network structure is the Managerial Agency of Scientific, Research, Innovation and Technological Transfer. This agency, accountable to the Ministry of Education and Research, is

151 See White Paper on Industrial Policy . Ministry for Economic Services, 2001.

based within the Polytechnic Institute of Bucharest and coordinates research, innovation and technological transfer activities within the universities network.

In terms of innovation financing, SMEs are confronted with lack of financial resources.

In terms of innovation financing, SMEs are confronted with a lack of financial resources. The prolonged privatisation of state-owned banks has meant that capital has continued to be placed in loss-making state-owned enterprises. The situation is worsened by corruption in the financial sector and the bankruptcy of a whole range of private and state-owned banks as well as the largest investment fund, FNI. Currently, investment banking services and venture capital funds are limited primarily to larger companies.

Slovakia

The transition to a market economy has significantly influenced the role and structure of the network of industrial R&D institutes that existed under the previous system. A shortage of financial resources and a restrictive fiscal policy limited business demand for R&D leading to a complete re-orientation of individual institutes in the period 1990-1995. The most common strategy was to replace R&D activities by production and other non-research activities (mainly commercial services). It is expected that the restructuring of industrial R&D institutes will be finished before 2005.

In 2001, there were 42 industrial R&D institutes. After the transformation of the Welding Research Institute and State Forest Products Research Institute, all the institutes will be private ones, and the Ministry of Economy will cease to have a direct influence on their operations. The association of industrial research institutes groups the directors of 20 institutes and offers advice to the authorities on issues of technology policy.

Aside from the industrial research institutes, a number of business innovation centres and technology transfer structures exist. Two of the longest standing structures are the BIC Bratislava and the Centre for Advancement, Science and Technology (SARC).

The Business and Innovation Centre (BIC) Bratislava was founded in the late 1991 as an initiative of a private group coming out of a former R&D institute. The Chamber of Commerce and Industry became a minority shareholder later on. Its main mission is to support creation and development of private innovative businesses. A considerably part of them are spin-offs from universities and industrial R&D institutes. In total, 30 innovative companies have been established

in the incubator most of them involved in information technologies, logistics, environmental technologies, heating systems and special services to the industry. BIC Bratislava acts as the host organisation for the IRC Slovakia and is working on the feasibility study for the creation and development of a Science & Technology Park in Bratislava.

SARC is an organisation supported by the Government and overseen by the Ministry of Education. It has developed a technology transfer database, with a view to commercialising R&D results. Training provided by the SARC is sponsored by the PHARE programme and is devoted to research managers notably from technologically oriented SMEs.

In addition to its policy design and co-ordination role, the National Agency for the development of SMEs (NADSME) supports and co-operates with financial institutions in designing various credit and guarantee schemes. It also supports the development of the 12 Regional Advisory and Information Centres (RAICs) and co-operates with the four Business Innovation Centres (BICs) and business consulting centres in Slovakia in their activities aimed at developing managerial and technical skills, as well as marketing and financial strategies of entrepreneurs in the SME sector.

In terms of finance, the Slovak Guarantee Bank, specialising in promoting SMEs exists since 1991 and provides loans at favourable conditions; including for innovation projects of SMEs, as well as start-ups in innovation centres. As noted above, the Ministry of Economy established an Innovation Fund in 1997 with the aim of promoting industrial research and development in industry through subordinated loans.

Turkey

In Turkey, there are a number of private or publicly funded organisations providing innovation support to business.

Although not large in number, given the size of the country, there are private or publicly funded organisations in various regions that provide innovation support to business through technology parks, incubators, R&D centres, consultancy, training and information dissemination mechanisms. The most important are:

→ TTGV, a non-profit organization, established in 1991 by private and public sector stakeholders, to support technological innovation activities of industry including lending of funds and credit risk coverage. TTGV has received financial support from the Government and the World Bank. It is also responsible for facilitating university-industry cooperation, acting as a

catalyst for establishment of Technology parks or service centres, venture capital funds, providing technology support services to SMEs and increasing awareness on innovation. It is a member of the Association for Technology Implementation in Europe (TAFTIE) and provides information, benchmarking and best practice example in innovation matters.

→ TUBITAK-TIDEB was established in 1995 by the Government to provide grant support for R&D projects of industry. It also manages the Eureka programme; university-industry joint research centres; activities to increase awareness on innovation; and assists in managing the R&D tax postponement scheme and R&D investment incentives.

→ Marmara Research Centre (MAM), was established in 1972 as the first R&D institute of TUBITAK. It conducts contract research for industry in the fields of materials and chemistry, ICT, genetic engineering and biotechnology, energy systems and environment, food technology, and earth and marine sciences. MAM also operates an incubator and a technology park/free zone for high-tech enterprises.

→ Established by TUBITAK in 1992, UME provides measurements, training, consultancy, information dissemination, infrastructure support, device control software, equipment and prototype production services to industry. UME was also responsible for accreditation related matters until establishment of TURKAK in 1999 which is now responsible for accrediting national and foreign organisations as well as increasing awareness on accreditation and quality.

KOSGEB was established by the Ministry of Industry in 1990 in order to increase the competitiveness of SMEs.

→ KOSGEB was established by the Ministry of Industry in 1990 in order to increase the competitiveness of SMEs. Working through a network of local branches and institutes, its main tasks include information dissemination, facilitating networking between SMEs, supporting entrepreneurship, providing laboratory services, consultancy and training, supporting modernization and technology development, market research and regional development. It also runs incubators for high-tech start-ups in different regions of the country together with the technical universities.

Partnership and networking actions between different stakeholders of innovation policy exist in Turkey.

Partnership and networking actions between these various stakeholders of innovation policy include working/project groups to implement Government policy actions; and web-based discussion platforms, etc.

In terms of innovation financing, the Decree on Venture Capital Investment Funds foresees a tax exemption for venture capital funds established by 'financial institutions'. As a result, only two venture capital

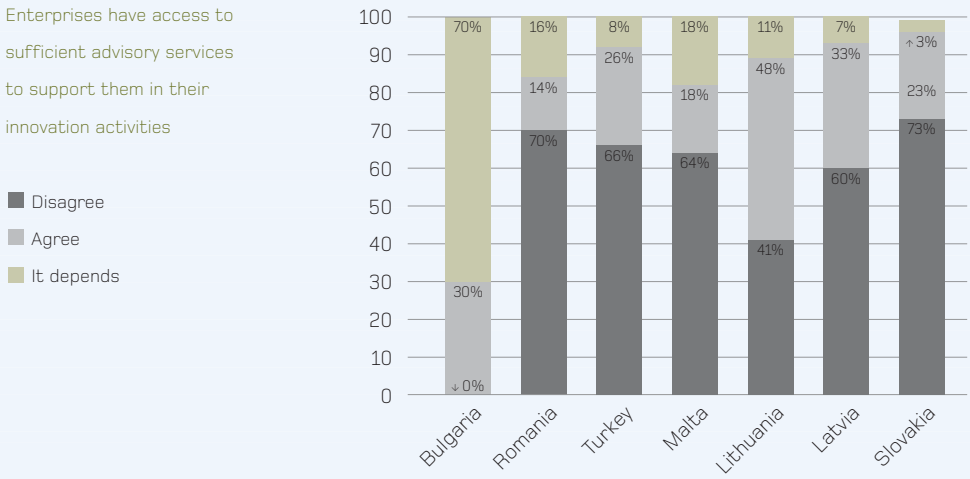
companies have been established by two major banks, which can be considered unfavourable for supporting high risk, high return NTBFs Five others funds are active, but are established outside of Turkey. In total, these seven venture capital funds manage between €210-230 million (four funds investing in seed and early stage and three in expansion and growth stages).

Table 17 – Results of the opinion survey: infrastructure supporting innovation

Infrastructure supporting innovation	CC7	Bulgaria	Romania	Turkey	Malta	Lituania	Latvia	Slovakia
A sufficient level of industrial R&D activity takes place in your country.	↘	↘	↘	↘	↘	↘	↘	↘
Research institutes have sufficient skilled personnel and specialized equipment to respond to innovation related needs of enterprises.	↘	↗	↘, ≈	≈	↘	≈	↘	≈
There are enough infrastructures to support new or growing high technology or innovative firms.	↘	≈	↘	↘	≈	↘	↘	↘
Enterprises have access to sufficient advisory services to support them in their innovation activities.	↘	↗	↘	↘	↘	≈	↘	↘

Note: (↘=Disagree) - (↗=Agree) - (≈=It Depends)

→ Only 10% of respondents considered that the level of applied (industrial) R&D activity was sufficient in their country.
→ Overall, 40% of respondents to the survey felt that research institute personnel were not equipped to meet the needs of enterprises. The responses were particularly negative in Malta and Latvia.
→ Almost 60% of those surveyed considered that innovation support infrastructures to support new high-tech firms were insufficient. Maltese and Lithuanian respondents were more likely to consider infrastructures as adequate.



5.2 Innovation policy in the candidate countries: fact or fiction?

Only in two cases can government documents be considered to concern innovation as a distinct policy.

Innovation policy has developed considerably within the EU over the period concerned by this study (1996-2001)[152]. However, the previous study on the CC6 concluded that none of these countries had a fully-fledged innovation policy by mid-2001. This section considers the evolving nature of Government policy thinking on innovation matters in the CC7. It provides a 'historical' view by charting the main developments in innovation over the period 1996-2002. The timeline diagram below summarises the major policy documents prepared and/or approved by Governments in the CC7 during the period 1996-2002. Only in two cases, Latvia and Lithuania, is the policy document distinctly focused on innovation. In all other cases, innovation matters are a secondary theme of, most often, science or research policy.

152 The European Trend Chart on Innovation monitors policy trends in the EU15 and, increasingly, the CC13. See: http://trendchart.cordis.lu

Time line of selected official 'innovation policy' documents in CC7

	1996			2001
Bulgaria		National Strategy for High-Tech Development (1999)		
Latvia	National Programme for Development of SMEs (1997)	Long-term economic Strategy of Latvia (2001)	National Concept on Innovation (2001)	
Lithuania		Programme of Innovation In business (2000)	White paper on R&D and Technology (2001)	
Malta		White paper on Prosperity in Change (2001)	Business Promotion Act (2001)	
Romania	National Plan for Research Development and Innovation (1997)	Medium Term Strategy 2000-2004 Science & Technology (2000)		
Slovakia	Science & Technology Policy (1998)	Technology policy in Industrial Branches (1999)	New Model of Science & Technology Funding (2000)	
Turkey	Science & Technology Policy (1997)	Science & Technology Policy (19979)	8th Five-Year Development Plan 2001-2005 (2000)	

A review of progress in developing innovation policy is set out below on a country-by-country basis and a comparative analysis of candidate countries policy objectives on innovation matters with those of the EU is presented at the end of this section.

5.2.1 The design and development of innovation related policies 1996-2002

Bulgaria

Until mid-2002, no policy documents specifically concerning innovation had been developed in Bulgaria. The closest was a 1999 National Strategy for High-Tech Development prepared by the Ministry of Economy; with the aim to regulate the legal status of high-tech parks with a view to tax incentives. Although a number of actions were foreseen, an Act on High-Tech Activities and High-Tech Parks did not obtain Parliamentary approval[153].

Until mid-2002, there were no substantive policy documents in the field of innovation. A Science Technology and Innovation Policy document was launched in October 2002.

In October 2002, the Ministry of economy and the Ministry of Education and Science published the outcome of a project for **Science, Technology and Innovation (STI) Policy**[154]. The policy aims include: strengthening the competitiveness of industry through science, technology and innovation; strengthening the science and technology sector through co-operation and concentration and intensifying the relationship with industry; providing a favourable environment to keep graduates in science and technology in Bulgaria. This policy paper is the first that explicitly suggests actions in favour of an innovation policy.

To achieve these goals the paper suggests four types of action:

→ Strengthening the National Innovation System, that is, all institutions and companies involved in the development, transfer and implementation of knowledge;
→ Ensuring collaboration between the science & technology and business sectors;
→ Creating a National Council for Science, Technology and Innovation to coordinate the adoption and execution of STI Policy; composed of the responsible ministries and of entrepreneurs and scientists/technologists;
→ Adequate funding for the actions proposed.

The STI Policy proposes 16 concrete actions. These include:

→ The establishment of a Science Fund for financing promising scientific research projects;
→ Establishment of a Technology Fund for financing R&D projects of consortiums of research institutes and companies;

153 Technology Parks – Issues for Bulgaria. Best Practice study and action plan for Bulgaria. U. Boes (2001), United Nations Development Programme.

154 See: http://www.mi.government.bg. The policy was developed by senior civil servants and an expert team under the Bulgarian-Dutch bilateral assistance programme PSO.

→ Subsidising the employment of science/technology graduates in SMEs;
→ Strengthening the Bulgarian Foreign Investment Agency (BFIA) to enable it to attract foreign R&D-intensive activities;
→ The development of a Technology Development Credit scheme to finance product development in small firms.

The implementation of the STI Policy is estimated to cost about €630 million for the period 2004 to 2013; funding will be sourced from the Bulgarian Government (30%) as well as a loan request to the World Bank and/or other financial institutions.

Latvia

The Latvian authorities have promoted a process of policy definition since 1997 in the field of innovation.

Innovation has been on the policy agenda in Latvia since 1997. Indeed, certain ad hoc actions (notably the creation of technology centres/parks and an IRC) took place between 1992 and 1997 under the auspices of the Ministry of Education and Science. However, the development of innovation policy in Latvia was given a new impetus by the drafting and adoption of the 1997-2001 National Programme for Development of Small and Medium-Sized Enterprises, which was the first to contain a specific chapter on "Innovation activities".

Thereafter, a task force operating under the auspices of the Ministry of Economy developed a first report entitled "Concept on the development of National Innovation System" which was presented to the Cabinet of Ministers in 1998. However it was not accepted due to lack of financial resources and an insufficient degree of refinement of the concept itself. Despite this set back, the idea of developing innovation policy and specific measures remained very much on the agenda. The idea of establishing an Innovation Fund linked to the existing Guarantee Agency was floated and a Regulation on an Innovation Fund was debated. However, the fund never began operations and the Director of the Business Department at the Ministry of Economy admitted in October 2001 that there are still no support measures concerning innovation.

The work of the Ministry of Economy task force on developing an innovation policy has continued and it produced a document entitled 'Latvia from vision to action' during 1999-2000 that served as the basis for the Long-term economic strategy of Latvia adopted by the Government in July 2001. The officials of the Ministry regard this document as a basis for the development of innovation policy. In parallel, a new National Concept on Innovation was prepared and

accepted by the Government in February 2001, which identified five main priorities:

A new National Concept on Innovation was prepared and accepted by the Latvian Government in February 2001.

→ Formation of a society open to innovation;
→ Innovation policy co-ordinated with EU countries;
→ Legal acts and documents favourable for innovative business;
→ Support to innovative enterprises and further growth;
→ Efficient and co-ordinated interaction between all elements of the innovation system.

Theses priorities broadly match the five objectives of the European Commission's 2000 Communication on Innovation in a knowledge-driven economy. The Concept essentially sets out the justification for the preparation of a National Innovation Programme (White paper on Innovation) and, following the Government's approval, a working group submitted it for revision to the Cabinet of Ministers.

Box 19 - Latvia : Defining innovation concepts

The 2001 National Concept on Innovation provides definitions of key terms related to innovation:

→ Innovation (innovative activity) – a process where works and technologies of new research, technical, social, culture or other areas are converted in a product or service demanded in the market.
→ Public policy of innovative development – a set of activities started, accomplished and coordinated by the government: legislative acts, and administrative rules, priorities and their setting mechanisms, implementation instruments, etc. ensuring a co-ordinated, sustain able and balanced action.
→ National innovation system – structures of state economy and the environment necessary for productive innovative activity. The innovation system has four basic components: research (education and science), business activity, investment (financial system), legislation.

Lithuania

A coherent effort to develop an innovation policy in Lithuania started in 1998 when various governmental bodies began drafting innovation policy documents. However, discussion on the need for an Innovation Policy started as early as 1993 at the initiative of a number of institutions. The creation of Lithuanian Innovation Centre and SME development agency in 1996 represented first efforts towards encouraging innovation in Lithuania. However, initially the activities of these institutions towards policy makers were "educational"– transferring and implementing a modern understanding of innovation and shifting thinking from the 'linear' to 'interactive' innovation model.

Since 1998, policy documents in Lithuania have become much more systematic in their coverage of the main areas of innovation.

Since 1998, innovation policy documents have become much more systematic in their coverage of the main areas of innovation: regulatory framework, creation and growth of innovative enterprises, improving key interfaces in the innovation system and development of a society open to innovation. However, the implementation of policies focuses more on the creation of an institutional and regulatory framework, without paying attention to human resources and competencies needed for successful innovative activities and encouragement of knowledge flows between various actors in the innovation system.

Implementation has been more problematic due to inadequate funding of innovation and R&D activities in enterprises.

Despite a number of documents developed in the field of innovation policy, implementation has been problematic due to inadequate funding of innovation and R&D activities in enterprises (which fall under the competence of the Ministry of Economy, while funding of R&D activities is the responsibility of the Ministry of Education and Science) and a lack of consensus about priority areas and actions in innovation development.

These institutional weaknesses are a main obstacle toward the effective implementation of innovation policy. As a result, it has been suggested to establish a co-ordination body reporting to the Government of Lithuania such as a Technology Council (by the White paper on R&D) or a Competitiveness Council (by the Industrial strategy).

Malta

The issue of innovation remains on the sidelines of the policy debate in Malta.

Despite the existence of several institutions concerned with science and technology or enterprise development, the issue of innovation remains on the sidelines of the policy debate in Malta. In part this is due to the dichotomous situation in the economy between a limited number of largely foreign owned exporting firms and the smaller firms operating essentially on the limited domestic market. The former are competitive and source their finance and technology from their parent companies. A second element is the strong role and presence of the government sector in Malta, which has bred a culture of State-dependence and stifled innovation.

Much of the effort in recent years has accordingly been on an important programme of privatisation and the restructuring of the domestic business sector, notably food and furniture industries; through the activities of the Institute for the Promotion of Small Enterprises. In addition, the Business Promotion Act (2001) has put in place a revised regulatory framework and system of incentives for industries aiming to invest, grow or restructure. The latter include reduced rates of corporate taxation, including for software development and research and development; and a broadening of subsidised loan schemes to include intangible expenditure on technology development or expertise.

As early as 1988, science and technology policy was placed on the government agenda through the creation of the Malta Council for Science and Technology which was set up as an advisory body to assist in the formulation of a Science and Technology Policy, adopted by the Government in 1994. The major focus of the policy was the special environment of the island society with two main objectives being sustainable development; and the promotion of integrated resource management. Although some of the priorities mentioned industrial exploitation of science and technology, the concept of innovation in enterprises was absent.

Since 1994, there has been little progress in implementing the policy due in part to the lack of financial resources allocated to the policy itself and the MCST as the responsible agency. However, during 2001-2002, a National R&D Audit was undertaken with a view to defining priorities.

Romania

The development of an innovation policy in Romania began in the mid-1990s as part of policy towards restructuring public research and development capacities.

The development of an innovation policy in Romania began in the mid-1990s as part of broader policy efforts concerning the restructuring and development of public research and development capacities. In 1996, the government adopted the National Programme for Research and Development "HORIZON 2000". The programme was drafted with input from actors throughout the research system. However, this programme proved to be insufficient in terms of areas and economic domains that were financially supported.

From 1997 onwards, the Romanian Government began to redefine the medium and long-term reform programmes in line with EU priorities leading to the progressive development of a new system of Research, Development and Innovation (RDI) financing. The intention was to re-organise R&D activities in order to create greater synergies and effective interaction with the industrial sector. The main programmes related to innovation policy included in the National Plan for RDI, launched in the second half of 1999, are:

→ Re-launching the economy through research and innovation – RELANSIN;
→ Quality and Standards – CALIST;
→ Standardization and quality infrastructure – INFRAS;
→ International co-operation and partnership – CORINT.

In May 2000, the general framework for innovation policy, the Medium Term 2000-2004 Strategy for Science and Technology (part of the National Economic Development Strategy 2000-2004), was approved. The 2000-2004 Science and Technology Strategy is now the principal innovation policy document. The main objective is to increase the involvement of the science and technology sector in the broader economy. The underlying view is that science and technology are essential elements for economic development and are main instruments for sustainable growth and European integration.

Of the five main objectives of Romanian the Medium-Term Strategy, two appear closer to innovation policy.

Of the five main objectives of the Medium-Term Strategy (see box), two appear closer to innovation policy while three are more directly related to improving the overall scientific and research potential of the country, which is considered as being sub-optimal. The new strategy aims to contribute to the restructuring of R&D efforts with the main instrument for implementation of this policy remaining the National Plan for RDI[155].

Box 20 - Main objectives of Romanian Medium-term Strategy for Science and Technology

1 Improvement of legislation in the R&D domain and of the institutional framework;
2 Development of research capacity and an increase of the R&D's contribution to economic development;
3 Development of, and improvement in, the diffusion and absorption capacity of the research results in the socio-economic domain;
4 Development of human resources in the technology domain, as well as an enhancement of communications with international researchers and institutes;
5 Increase in the financial allocations through the State Budget for R&D activities.

Despite delays, due to the November 2000 elections and adoption of a new budget, enhanced political stability finally made it possible to launch all of the above-mentioned RDI programmes during 2001. In total, there are 14 RDI programmes now operational.

Slovakia

In the period up to 1995, a number of attempts were made to define a science and technology for the Slovak Republic. As early as 1990, a government document "Principles of State Policy in Science and Research" was adopted, with technology transfer as one objective. However, the policy was largely science orientated even if the economic exploitation of new knowledge and innovation was one factor underpinning the economic scenario developed by the Government of the time. During 1993-94, the Ministry of Education and Science established a committee, which, drawing on two reports of international experts drew up a policy document on science and technology, which although submitted to the Parliament was never discussed. The evolution of policy during this early period can be summed up as involving a somewhat delayed shift from criticism of the former (pre-transition) R&D management system towards a better

155 In order to avoid a financing gap, the operations of the programme "Horizon 2000" were extended until the year 2002. This allowed financing started under the old schemes to continue without interruption. In a similar manner, the National Plan for RDI has been extended until 2005.

understanding of the need to create pro-enterprise science and technology policy.

In Slovakia, competition between ministries has led to a twin-track policy in favour of technology and science.

Competition between the Ministry of Economy and the Ministry of Education complicated policy development, leading to a two-tier system of policy development - one for universities and academic institutions and another for applied sciences. Although both had a well-planned approach to research and technological development, the system itself was considered somewhat inefficient[156].

The Ministry of Economy has developed a "Technology policy in industrial branches", approved in July 1999.

In 1998, the Government approved a science and technology policy, essentially focused on priorities for academic research; which was updated in September 2000 and approved for the first time by the Slovak Parliament in December 2000[157]. In parallel to these policy developments promoted by the Ministry of Education, the Ministry of Economy also developed a "Technology policy in industrial branches" (approved by the Government in July 1999). The latter policy is aimed at raising competitiveness of products and services provided by industry. It principally concerns a limited number of programmes of the Ministry of Economy but outlines links to the State programmes of Research and development. Objectives of the policy include:

→ A concentration of R&D in key technology areas promoting High-Tech industry;
→ Increased participation in the EU RTD Framework programme;
→ Support measures for technology policy (technical standardisation, testing, industrial property, policy for quality) connected with the pre-accession process;
→ Increased scope of financing of R&D.

156 European Communities (1999), Impact of the enlargement of the European Union towards the associated central and eastern European countries on RTD-innovation and structural policies. Studies. Brussels.

157 There are two sets of priorities: cross-cutting R&D programmes (information society; advanced technologies, etc.); and thematic R&D priorities including competitiveness of the economy and human resources as well as integration into the European Research Area.

There is continuing competition between objectives related to improving the quality and effectiveness of scientific research and those related to technological improvement in industrial sectors.

Finally, in July 2000, the Government has approved a "New model of science and technology funding in the Slovak Republic". It aims to increase transparency in the provision of State budget funds and efficiency of their application by ensuring that funding goes to projects that will improve the competitive capacity of enterprises, and guarantee that the funds invested are returned.

In short, although there have been significant efforts made to improve policy in the field of science and technology, there appears to be continuing competition between objectives related more to improving the quality and effectiveness of scientific research and those related to technological improvement in industrial sectors. During the period 1996-2000, the policy approach to innovation has continued to be based on the traditional science (technology) push model.

Turkey

The main objective of the science and technology policy has been defined as the establishment of the National Innovation System.

The innovation policy of Turkey is embedded in its Science and Technology Policy Documents with the Five-Yearly Development Plans providing budgetary allocations. As early as 1983, a first policy document "Turkish Science Policy, 1983-2003" was issued by the Government. It was, however, mainly focused on increasing R&D activities in the country and defining priority technology areas. A second policy document "Turkish Science and Technology Policy: 1993-2003" was drafted by TUBITAK and approved by the BTYK in February 1993. A "The Project for Impetus in Science and Technology" (1995) was prepared in light of this policy document and was embedded in the Seventh Five-Year Development Plan (1996-2000) as one of the "Fundamental Structural Transformation Projects". The main objective of the science and technology policy defined in these documents is the *"establishment of the National Innovation System that would enable systematic operation of the whole institutions and mechanisms required to carry out scientific and technological research and development activities and to transform the results of those activities into economic and social benefit"*.

In 1997, the BTYK approved the "Policy Agenda on Science and Technology for the Years 1996-1998" that covers arrangements and preparations for establishment of the National Innovation System. The actions proposed were more focused on innovation including: research on regional innovation systems; raising awareness on innovation; dissemination of techniques on technology management, providing support for innovation activities of SMEs, etc.. Other decisions such as increasing the number of venture capital funds, the law of technology development regions, supporting patent expenditures have also been taken to reinforce the policy objectives[158].

The Eighth Five-Year Development Plan (2001-2005) focuses on the need for technological innovation and the actions to be taken in line with the policy approved by the BTYK.
The preparatory studies of the Plan involved a consultative committee, formed by representatives of public and private sector organisations, report on implementation measures. Sectoral specialisation committees on information technologies, biotechnology, electronics industry, etc. also prepared reports. These reports formed the building blocks of the innovation related topics in the development plan.

There is a trend over time from a dominant vision of science and technological development towards placing innovation increasingly at the heart of Turkish policy.

In short, there is a clear trend over time from a dominant vision of science and technological development towards placing innovation increasingly at the heart of Turkish policy. This said, the concept of innovation appears to remain technologically focused with perhaps less emphasis on human resource aspects. Another positive aspect of Turkish policy is the systematic monitoring and evaluation activity for major Government funded innovation support schemes, which started in 1999.

158 This innovation orientation has been confirmed by the updated Science and Technology Policy Document of Turkey (1997, amended in 1999) and by the decisions of the BTYK following its meetings in 1999, 2000 and 2001.

Table 18 – Comparative review of policy objectives related to innovation in CC7

European Union	Bulgaria	Latvia	Lithuania	Malta	Slovakia	Romania	Turkey
Communication: Innovation in a knowledge-driven economy (2000)	National Strategy for High-Tech Development (1999)	National Concept on Innovation (2001)	Programme of Innovation in Business (2000)	No policy document specific to innovation	No policy document specific to innovation	Medium Term Strategy of Science & Technology (2001)	Science and Technology Policy of Turkey (1999)
Coherence of innovation policies	No action identifiable - lack of coherent innovation policy	Innovation policy co-ordinated with EU countries	Encouraging international co-operation	No actions identifiable - lack of coherent innovation policy	No actions identifiable - lack of coherent innovation policy	No priorities identifiable - lack of coherent innovation policy	Overall objective is to improve National Innovation System
A regulatory framework conducive to innovation	Improving general conditions for business is government priority	Legal acts and documents favourable for innovative business	Legal environment for innovation	Small Business Efficiency Unit created	No priorities identifiable	Improvement of legislation in R&D domain and institutional framework	Legal measures in favour of innovation (venture capital, IPR, etc.)
Encourage the creation and growth of innovative enterprises	Creation of high-tech business parks Tax reduction or exemption for high-tech firms	Support to innovative enterprises and further growth	Developing mechanisms of innovation financing	Business incubator developed by IPSE	No priorities identifiable	No priorities identifiable	No direct specific measures for innovative start-ups
Improve key interfaces in the innovation system	High-Tech parks again seen as main tool for integration of research centres and business interests	Efficient and co-ordinated interaction between all elements of the innovation system	Creation of innovation infrastructure and strengthening links between science and business sectors	Creation of IRC Malta	Changes in criteria for research funding	Improvement in the diffusion and absorption capacity of research results in socio-economic domain	Establishment of university-industry joint research centres
A society open to innovation	A Government Action Plan on Life-long Learning exists	Formation of a society open to innovation	Development of national innovation system	No priorities identifiable	No priorities identifiable	No priorities identifiable	Establishment of science & technology centres, etc.

Source: Country reports of this study.

5.2.2 Comparative analysis of innovation policy and measures in the CC7

An innovation policy can only be considered to exist in Turkey.

Tables 18 and 20 provide a comparative overview of main policy objectives and programmes in favour of innovation in the CC7. Table 18 compares national policy objectives with those of the European Commission's 2000 Communication on Innovation in a knowledge driven economy. While such an exercise is always somewhat subjective, the presentation does provide a simplified reading of the policy framework in each country. Broadly speaking the results of the analysis lead to the conclusion that an innovation policy can only be considered to exist in **Turkey.** This said the objective of establishing "a National Innovation system" is not entirely coherent with a strong focus on technology development, as opposed to knowledge diffusion in Turkey. Innovation policy seems excessively supply oriented.

Romania, Lithuania and Latvia have all adopted policy frameworks which provide varying levels of coverage of innovation policy matters.

Romania, Lithuania and **Latvia** have all adopted policy frameworks, which provide varying levels of coverage of innovation policy matters. In Romania, the focus remains the restructuring of the R&D system and increasing the links between R&D institutes and industry as opposed to fostering innovation directly in enterprises. The two Baltic States have adopted innovation policy documents with objectives which mirror those of the EU Communication. In both cases, policy was developed through working groups and task forces although preparation of implementation measures requires further effort.

In **Bulgaria,** the policy debate is centred on the creation of high-technology parks and appears to be mainly driven by real estate rather than technological development or innovation interests. No progress has been made in implementing the partial measures foreseen in the 1999 policy document. The drafting in late 2002 of a new Science, Technology and Innovation Policy may provide a more coherent framework for future Government interventions.

Malta and Slovakia have not yet established any form of policy-making process in the field of innovation.

Malta and **Slovakia** have not yet established a policy-making process in the field of innovation and there is not a coherent innovation policy in these countries at the present time. Malta is perhaps more advanced but policy making is focussed on science and technology or small business support rather than innovation. In Slovakia, the Ministry of Economy has developed a policy statement on technology policy in industrial branches but which is limited in scope and does not provide a coherent framework for government intervention in favour of innovation.

These conclusions are broadly confirmed by the results of the opinion survey.

Table 19 – Results of the opinion survey: Design of Innovation Policy

B.1. Innovation Policy	CC7	Bulgaria	Romania	Turkey	Malta	Lituania	Latvia	Slovakia
Government gives sufficient priority to promoting an innovative society in its policy declarations.	↘	≈	↘	↘	↘	↘	≈	↗
An innovation policy exists.	↘	↘	↘	↘	↘	↘	↘	↘
Consultation procedures permit the business sector to express views on innovation policy measures.	↘	≈	↘	↘	↘	≈	≈	≈
There is a need to support the development of innovation policy at local and regional levels.	↗	↗	↗	↗	↗	↗	↗	↗

Note: (↘=Disagree) - (↗=Agree) - (≈=It Depends)

Opinion survey findings:

→ On average only a quarter of respondents considered that Governments in the CC7 gave sufficient priority to promoting an innovative society;
→ Two-thirds of respondents did not consider that an innovation policy existed in their country;
→ Only 22% of those surveyed believed there was sufficient consultation of the business

sector on Government measures to foster innovation;

→ 84% of respondents believe that Governments in the CC7 should be doing more to support innovation policy at local and regional levels.

The diverse level of development of measures and of funding levels in favour of innovation in the CC7 is striking.

The existence of policy documents does not, of course, ensure that Government measures for innovation are actually implemented; or that financial or technical support reaches and improves the innovation performance of the business sector. Table 20 below summarises the information available in the country reports on the main government funded grant or loan programmes in favour of business innovation in the enterprise sector. The diverse level of development of such measures and of funding levels in favour of innovation in the CC7 is striking.

Once again, **Turkey** lead in the diversity and range of instruments fostering innovation. It has adopted numerous programmes supporting R&D through soft loans and a grant system. Moreover, evaluation results have concluded that companies supported have benefited from an improved competitive position[159].

In terms of the range of programmes and funding levels, **Romania** is also relatively better placed than the other CC7. **Latvia, Lithuania** and **Slovakia** have taken some steps to create grant and loan instruments however, in the view of the current scope and scale (annual budgets for specific technology transfer or industrial research in the range of 0.7 to 2 million Euro in 2001), it is clear that further efforts will be required.

Neither **Bulgaria** nor **Malta** had adopted specific measures and programmes for innovation and technological modernisation by end 2002. This suggest that Government's remain preoccupied with other issues such as privatisation or believe that improving the regulatory system (removing administrative barriers to business and improving the tax system) will be sufficient.

159 See Innovation Policy Profile: Turkey (2003) Volume 2 of this study.

Table 20 – Main grant and loans programmes in favour of business innovation

Country	Programmes	Period and funding levels
Bulgaria	N/A	N/A
Latvia	Grants for market- oriented research projects	→ Since 1993. Co-financing principle: 50% from the state budget source, 50% from private business partner. An annual state budget of €1.5 million. Financial resources are mainly allocated for practical scientific applications and SMEs established by scientists. The average grant amount is around €20 000.
	National Innovation Programme	→ Being drafted for approval of the government.
	PHARE SME Support and Credit Programme	→ 1992-1998: €5.7 million. Government co-financing of €1.48 million.
Lithuania	Innovation in Business Programme	→ Governmental funds for innovation support in enterprises were: €0.7 million in 2000 and 2001. €1 million requested funds for 2002 however government support will cover only 25% of this amount.
Malta		→ N/A
Slovakia	Support Loan Programme	→ €14 million (respectively one third from the State budget, PHARE and from commercial banks). An addition €8.1 million from a revolving facility for 2001.
	Micro-loan programme	→ 1999-2002, €2.1 million (€0.35 million from the state budget and 1.75 million from PHARE) for 2001.
	Technology transfer programme	→ 1999-2002, €116 670 from the 2000 state budget in 2001.
	Innovation Fund	→ €1.16 million foreseen in 2002.
Romania	RELANSIN – economic re-launch through research and innovation	→ State Budget – €90.2 million for the period 2001-2005. R&D projects funded by 70-100%; Technology transfer projects funded by 50-60% from the public funds.
	INVENT: stimulation of application of inventions	→ State Budget – €30.1 million for the period 2001-2005.
Turkey	Technology Development Project Support	→ (1991-2003). Total amount of funds €85.3 million.
	State Support for R&D	→ Soft loan up to 50% of the project budget; rest should be financed by the industrial company itself.
	State Support for R&D	→ Grant financing up 60% of the project budget; rest financed by the industrial company Total amount disbursed to companies from 1995 to end 2001 was €93 million
	State R&D Investment Support	→ Credit financing in accordance with the conditions defined by the Decree. (Interest bearing credit with long repayment period financing up to 50 percent with a max. amount of approx. €200,000.
	Technology Development Support for SMEs	→ Supports for development of a prototype through R&D, including R&D equipment support (up to €28 280; 85% of costs is provided by KOSGEB), consultancy support from universities to the SMEs, participation in fairs, software and publication support (up to €2,262, max. 70%), support for promotion (up to €2,262, max. 50%), training support, support for patenting.

Source: Innovation policy profiles for each country in Volume 2 of this study.

Opinion survey findings:

→ A sizeable majority (on average 81%) of those questioned in each country considered that government funding for R&D within or for private enterprises was inadequate;
→ 74% of people disagreed that enterprises had sufficient support for technology transfer. The situation in Malta seems less infavourable than elsewhere in the CC7;
→ Public funding to support international cooperation of enterprises in R&D is sufficient only in Malta (50% agreed), and to a lesser extent in Turkey (26% agreed).

5.3 Isolated innovators or innovation systems?

A major challenge facing the candidate countries is to increase the intensity of R&D and innovation activity.

As has been stressed in section 2.3, one of the major challenges facing the candidate countries is to increase the intensity of R&D and innovative activity. Statistics on R&D expenditure in the candidate countries suggest that the 'European Paradox'[160] will be worsened by enlargement. However, while the level of GERD and the share provided by the business sector in the candidate countries is much lower than the EU[161], a simple formula of more BERD, more innovation, more growth may not be either readily achievable nor sufficient to guarentee the hoped for results.

A major part of innovation activity is located during the later stages of the innovation cycle (in the redesign of already existing products to market needs, in the application of existing technologies to new areas of application, or simply by commercial exploitation), thus, increased BERD is just one factor amongst a variety of determinants influencing an enterprise's innovation performance[162].

In short, a series of framework conditions which enable private enteprises to plan, undertake and profit from R&D and innovation activities also need to be in place. This said, there are a number of direct measures which Government's can take to stimulate the intensity of business innovation activity.

This section reviews the extent and nature of specific measures taken in the CC7 with respect to three broad objectives:

160 Namely that Europe performs better relative to the USA in academic research than in technological applications. For a recent critique of the concept, see Keith Pavitt (2000), Academic Research in Europe, SPRU EWPS Paper n°43.

161 The R&D investment gap of the EU in comparison with the US is roughly 80% and is primarily due to a low level of business R&D expenditure. In this context, the 2002 Barcelona European Council set the target of an increase of BERD in the EU15 as a share of GERD from 56% to two-thirds by 2010.

162 Wolfagang Polt, et. al., (2001), Benchmarking Industry-Science Relations in Europe – the Role of Framework Conditions.

→ Promotion of industry-science relations (ISR) with a view to increased commercialisation of research results (section 5.3.1);
→ Steps to support the creation and development of new technology based firms (NTBFs) (section 5.3.2); and,
→ The creation of inter-firm networks, or clusters, to jointly develop new innovative products or processes (section 5.3.3).

5.3.1 Research– industry co-operation in the CC7

Co-operation implies a two-way exchange and in analysing research-industry co-operation, it is necessary to take into account factors influencing both the demand side (enterprises) and the supply side (public, higher education or non-profit research organisations). Demand for R&D is determined by factors such as industrial structure (presence of high-tech sectors); enterprise structure (large corporations, SMEs, foreign multinationals); market structure (degree of competition, level and quality of demand); absorptive capacity of firm (skills, innovation management); and innovation performance of the enterprise sector. Major variables that influence the supply side of science are disciplinary structures; relevance of various types of public research; the transfer capabilities; mode of financing; personnel qualifications; research performance and patent applications[163].

The findings of the previous study on the CC6 concluded that on the business side, the need to develop or absorb R&D solutions, which could be used in the production process was not generally regarded as a priority; while universities were not considered as useful sources of information of new knowledge. On the supply side, three main problems were highlighted: universities are still very traditional lacking an 'entrepreneurial' spirit with respect commercialisation of research results; a large share of the public funding directed to industrial research centres was cut during the nineties leading a reduction of pre-competitive industrial research; and finally, the consultation mechanisms between science and industry remained scarce.

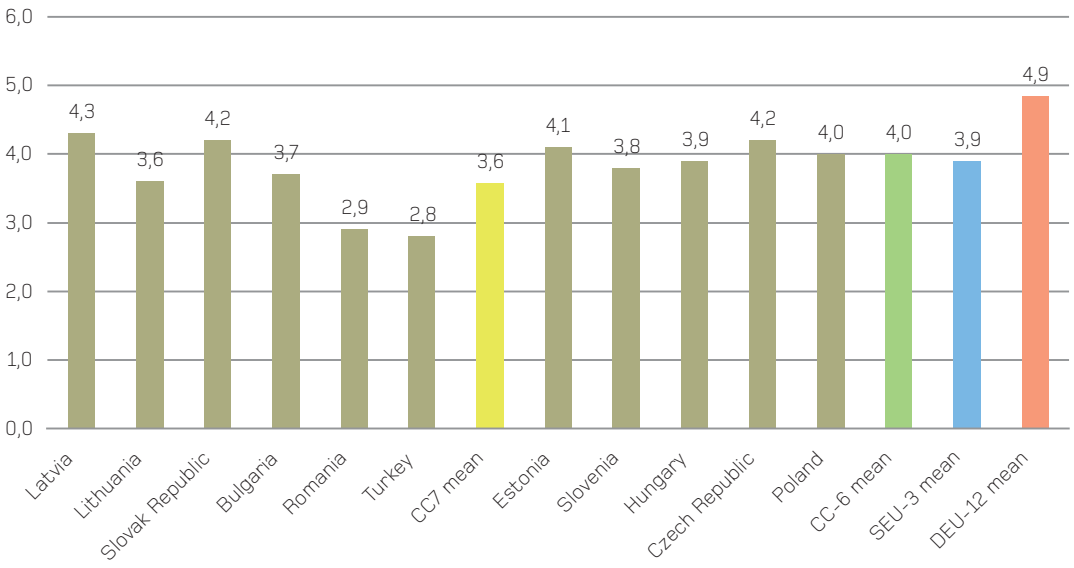
Recent trends in industry–science relations in the CC7

On the demand side, as was pointed out in section 2.4, innovation surveys in the CC7 confirm that very few enterprises, even 'innovators', consider universities as useful sources of information for innovation[164]. The degree to which enterprises carry out innovation in-house or in collaboration with other firms or research institutes was also one of the issues examined in the survey carried out for the Global Competitiveness Report[165]. Amongst the CC7 countries surveyed (not including Malta), Turkey and Romania tend to conduct development mainly in house

163 Wolfagang Polt, et. al., (2001), Benchmarking Industry-Science Relations in Europe – the Role of Framework Conditions.
164 From 1.2% of innovative firms in Slovenia to 2.8% in Lithuania, 5.5% in Latvia and 14.6% in Slovakia, various survey periods between 1994-99. See working paper by SSEES in Volume 2 of this study for more details.
165 Michael E. Porter et al. The Global Competitiveness Report. 2001-2002.

or with foreign suppliers. On the other hand, Latvian and Slovakian enterprises favour collaboration with local suppliers, customers and research institutions. However such survey evidence needs to be treated with some caution and qualified by more in-depth studies.

Figure 7 – Product and Process Collaboration



Source: The Global Competitiveness Report (2001), World Economic Forum. 1 = product and process development in your country are conducted within companies or with foreign suppliers, 7 = in collaboration with local suppliers, customers, and research institutions.

In the CEE CCs, university level research was generally weak under the previous system with the Academy of Science playing a major role in fundamental research; and branch research institutes carrying out industrial research. Broadly speaking, the evolution of the industrial research system in the five CEE CCs covered by this study has been similar, although restructuring of the former networks of industrial (or branch) research institutes has been undertaken with varying degrees of speed or 'brutality' in terms of reduction of State funding. Prior to 1990, these institutes carried out industrial R&D and enterprises, except the largest, were unaccustomed to managing intra-mural R&D or relations with external contract research organisations. Hence, the restructuring of these institutes towards more short-term commercial services, left a gap in the R&D system, even if it also increased efficiency.

The country reports for this study suggest that this restructuring process has been largely completed in Bulgaria, Latvia, Lithuania and Slovakia. Some success stories in restructuring

these centres can be identified (see box below). In Romania, on the other hand, the restructuring and scaling down process is still ongoing and continues to absorb considerable resources that could otherwise be directed towards supporting industrial R&D in a more direct manner.

Box 21 - Sidrabe - industrial R&D in a new era

The Latvian company Sidrabe, with a yearly turnover of €6 million, is as an example of the successful adaptation of an industrial R&D institute to the new competitive conditions. Today, Sidrabe is a manufacturing R&D company specialised in the design and production of surface treatment technologies and equipment. It sells its (innovative) products to clients from the USA, the Netherlands, Austria, Israel, and other countries. However, the enterprise was originally established in 1962, and until restoration of independence of Latvia it supplied equipment and performed various tasks for the Ministry of Defence of the USSR and for the Soviet space research institutes. After the independence of Latvia, privatisation took place through distribution of shares to the employees even before the formal privatisation procedure was launched by the Privatisation Agency. Nowadays, a majority of the company is owned by foreign investors.

From the side of the enterprise sector, there has been a collapse in demand for contract R&D. The reasons are multiple including privatisation and break-up of the largest companies, who were the main clients of the R&D institutes; reduction in State funding for industrial R&D projects; and the need to privilege short-term survival strategies for much of the nineties rather than more speculative product or process innovations[166].

In **Latvia,** additional barriers are a lack of researchers in industry (to act as 'gatekeepers') and rigid bureaucratic procedures in the R&D sector, which impede entrepreneurs interested in collaboration. In **Lithuania,** an innovation survey found that only 6% of new products and 3.7% of new technologies had been developed jointly by companies and R&D institutes. In **Slovakia,** even the presence of FDI companies (e.g. Volkswagen, Siemens, OMV), which could be expected to create new relations between science and industry, has only had a minor impact on the knowledge-base[167].

166 For instance, 52% of Slovakian innovative firms indicated that finance was the major barrier to innovation projects in a 1999 CIS methodology survey.

167 See Innovation Policy Profile: Slovakia (2003). Volume 2 of this study.

In Malta, the increasing number of students impedes in practice academics to be engaged in further research.

Malta and **Turkey** are distinct cases in terms of the trends in the potential of the science base to co-operate with industry. The **Maltese** case is closest to that of Cyprus amongst the candidate countries, namely a small island economy with a rather limited scientific potential. The University of Malta is the only institution of tertiary education where research is conducted but increasing numbers of students limit the time available for academics to be engaged in further research[168].
In contrast, **Turkey** has 77 universities and the highest ratio of R&D personnel as a percentage of the labour force (some 27,000 researchers of which 22.3% in businesses in 2000). It is also the first of the CC7 to launch a technology foresight programme (as part of a strategic programme Vision 2023 to establish new science and technology priorities for the next decade). Panels on a range of sectors and technologies have been established bringing together academics, NGOs, the business and public sectors.

Measures to strengthen industry–science relations

Broadly speaking the CC7 lag behind the CC6 in developing and funding measures to support industry-science relations (ISRs). In the CC6, for example, Hungary and Estonia have developed and successfully launched sophisticated initiatives such as 'Competence Centres'[169]. In the case of the CC7, efforts in Turkey to promote co-operation between science and industry are more long-standing[170] than those in the other six countries. In contrast, in Malta, there exist no formal ISR initiatives.

Box 22 - Company mentoring by the Technology Development Foundation of Turkey

Since 1991, TTGV has been co-operating with the experts from universities and research institutes to evaluate and supervise technology development projects in industry. A pool of nearly 1500 experts has been formed who visit companies at a regular interval and, in particular, act as mentors for companies with projects supported by TTGV.

This scheme has increased the interaction between science and industry, and created a common ground for future co-operation. In addition, and to further stimulate co-operation, TTGV shares the cost of service purchased by industry from a university and/or a research centre for the projects it supports.

168 See Innovation Policy Profile: Malta (2003), Volume 2 of this study.

169 Basically, a ccollaborative industrial research programme involving consortiums of research institutes and enterprises; based on experience of similar schemes in Austria, Sweden, etc. For an overview of such schemes see, for instance, the Feasibility Study for the Estonia scheme available at http://www.estag.ee

170 For instance, the Technology Development Project was financed by the Under-Secretariat of Treasury and the World Bank between 1991-1998. It had an annual budget of to €108 million, which was used for facilitating R&D activities of business.

Two main types of initiatives are present in the CC7:

→ Co-operative research programmes providing grant funding for industrial research projects involving both industry and research bodies;
→ Research and technological development related infrastructure (technology parks and centres) jointly developed by the private and academic sectors.

In terms of **grants for industrially-oriented research,** six out of seven countries have one or more schemes which aim to stimulate increased expenditure on R&D by enterprises in the framework of projects with higher education or non-profit research institutes. However, the scale of overall funding and types of projects eligible varies significantly.

Annual budgets for the programmes range from €1.5 million in **Latvia** for *Market oriented research projects* (grants of maximum €20,000); up to €12 million for the RELANSIN[171] programme (not exclusively targeted at ISR) in **Romania**. In **Slovakia,** the Agency for Support of Science and Technology has been operating since July 2001 and applications from SMEs are eligible for financial support. The Agency has a budget of €16 million per year (the share of this for ISR projects is not known)[172]. In both **Bulgaria**[173] and **Lithuania,** annual funding is not assured and has amounted to only €0.3 million in the latter country[174].

In **Turkey,** TUBITAK-TIDEB can increase the amount of grant support for R&D projects to industrial companies by 30% if there is co-operation with a university and/or a research institute. Equally, universities and public research institutes can receive grants up to €100,000 for an R&D project, when they cooperate with an industrial company, in the framework of international programmes, such as 'Eureka'.

Data on how successful these schemes are is limited and only **Turkey** carries out evaluations. According to the results of the first monitoring and evaluation study of Government funded R&D in 1998: 70.8% of the companies with projects supported by TUBITAK-TIDEB; 80.3% of those supported by TTGV but only 14.3% of the companies that did not apply for support have co-operated with a university or a public research institute. The schemes also have a positive impact on the level and quality of co-operation. While the most important area for co-operation for companies that did not apply for support is solution of technical/operational problems (54.4%), it is new product development for companies with projects supported by TTGV and TUBITAK-TIDEB (65.5% and 45.9% respectively).

In **Romania,** under the National Plan for RDI, there has been a large increase in project applications

171 In 2001, 1,425 projects were submitted of which 272 received financing. The RELANSIN programme received financing representing 45% of the total for the National Plan for R&D and Innovation in 2001. See Innovation Policy Profile: Romania. (January 2003). Volume 2 of this study.

172 European Commission (March 2002), Directorate General Enterprise, European Tendchart on Innovation, Slovak Republic Country Report. SKK 700 million = €16 180 964, calculated at the exchange rate SKK 41, 964= €1.

173 In Bulgaria, the Ministry of Education co-finances up to 50% of Co-operative Research Programme. However, lack of funding means the programme does not function effectively according to the Bulgarian report for this study.

174 See Innovation Policy Profile: Lithuania. (January 2003). Volume 2 of this study.

between 1999 and 2001. Approximately 85% of the projects selected for funding included a partnership between R&D institutes and businesses during 2001. However, survey evidence suggests that enterprises in which the value of new and improved products value is over 10% of turnover has fallen from 16% in 1996 to only 3% in 2000. This may be due to an end to search for new commercial opportunities and a stabilisation of activity in 'real innovators'.
A second form of assistance is funding for **technology related infrastructure,** and to some extent services, in technology centres/parks. This is the case in both of the Baltic States where it is considered that such initiatives contribute to establishing links between science and industry. For instance, a project for the development of a Science and Technology Park in **Latvia** is currently planned (see box below). In **Lithuania,** supporting ISR is a relatively new concept and only a few structures already exist (technology parks in Vilnius and Kaunas and a Technology Centre in Kaunas). The Government has approved the Strategy for Technology Parks Development acknowledging the need to further develop these structures.

Box 23 - Science and Technology Park Project in Latvia

Stimulating increased competitiveness of the science and research sector is given particular importance in Latvia. End 2000, the Latvian Development Agency in collaboration with the University of Latvia, Riga Technical University and Riga Stradina (Medical) University initiated a project for the development Science and Technology Park (STP).

The project foresees the creation of science and technology centres as the bases for the development of high-tech companies, facilitating synergies between higher education, science and innovative companies with a view to the effective commercialisation of research results.

Project implementation is planned to be carried out in 6 years from 2001 till 2006 with an estimated total budget of around €158 million being sourced from EU funds (PHARE and Structural Funds) as well as national public, project participants and private sector resources.

Source: Innovation Policy Profile for Latvia. Volume 2 of this study.

In **Romania,** the government also views the creation of the scientific and technological parks as a priority area. The aim is to involve education and research systems, in the creation of innovative, viable and competitive SMEs. Originally plans for seven technology parks were developed with financial support from the 2000 PHARE funding programme. By end 2002, the Ministry of Education and Research (MER) was discussing with five consortia for creating scientific and technological parks.

In **Bulgaria,** there was an active debate in 1999-2000 on the creation of High Technology Parks. However neither a law designed to provide a legal framework for operation nor various private initiatives have come to fruition.

In **Turkey,** an initiative of TUBITAK-TIDEB, launched in 1996, to establish *University-Industry Joint Research Centres* has not been wholly successful[175]. As of August 2002, only three centres had been established out of sixteen project applications[176]. The main reason for the failure of other initiatives was the lack of strategy and long-term commitment by the universities to co-operate with industry. A 1991 *Law on Technology Development Zones* regulates the establishment of technology parks. The law provides incentives for mobility of researchers to work with companies operating in the technology parks and to become the owners of newly created companies.

175 See Innovation Policy Profile: Turkey. (January 2003) Volume 2 of this study.

176 The Ceramics Research Centre in Eskisehir Anadolu University, Textile Research Centre in Ege University and Adana University-Industry Joint Research Centre.

Table 21 – Summary of main schemes for research–industry cooperation in the CC7

Country	Organisation responsible	Objectives	Target public	Funding
Bulgaria	Ministry of Education	Co-operative Research-industry programme	Universities; scientific institutes, industry.	Co-finance up to projects 50% of projects.
Latvia	Ministry of Education and Science	Grants for market-oriented research projects (1993-) To stimulate small science-intensive entrepreneurship	Researchers; SMEs. Financial resources are mainly allocated for practical scientific applications and SMEs established by scientists.	An annual state budget of ~ €1.5 million. The average grant amount is around € 20 000.
Lithuania	Ministry of Economy	Funding of joint research-industry projects	Research institutes and business enterprises.	State co-financing, €300 000 (not annually).
	Ministry of Economy	Promotion of Innovation Rely Centres, which create links between technologies and business.	Business enterprises	State co-financing of consultancy services and demonstration projects.
Malta	No current initiatives supporting research-industry cooperation			
Romania	Ministry for Education and Research	Sub-programme 2 of RELANSIN, aimed at development of complex products and new technologies	R&D units, universities, companies	State Budget, co-financing for the entire programme €12 million in 2001, €90 for the period
Slovakia	Slovak Academy of Sciences Agency For Support of Science and Technology (2001)	Research projects Research programmes	Industrial sectors All sectors	Public Public, €16 680 964 annual budget
Turkey	TTGV	Support for establishment of technoparks in universities	Business enterprises,	Under-Secretariat of Treasury through the World Bank, co-finances 50%
	TUBITAK-TIDEB	Support for industrial R&D projects	Business enterprises and universities cooperating	Maximum €100 000

BOX 24 – Main findings on measures in favour of industry-science relations

→ The intensity of business collaboration with universities and research centres for R&D and innovation in the CC7 is lower than in the CC6. The main explanatory factors include scepticism amongst enterprises as to the value of universities and research centres as sources of knowledge; as well as lack of funds within enterprises to undertake R&D.
→ The Maltese case is different since weak university-industry collaboration can be attributed at least in part to a very limited scientific base.
→ Although the policy response is quite similar (essentially grants for co-operative research and technology infrastructure), certain countries, notably Turkey, appear to be more advanced in improving the linkages between science and industry.
→ Financial resources also vary considerably with Turkey, Romania and Slovakia apparently mobilising the most resources. The development of a major Science and Technology Park in Latvia is planned. Bulgaria, Lithuania and Malta do not yet have fully funded multi-annual programmes to improve industry-science relations.

5.3.2 Are there specific measures to foster New Technology Based Firms?

New technology-based firms (NTBFs) play an important role in innovation. Indeed, in the EU15, small innovative enterprises in the manufacturing sector report a higher rate of innovation intensity (5.1%) than large enterprises (4.7%). The situation is more pronounced in the service sector with 10.2% of turnover devoted to innovation in small enterprises compared to 3.1% in large enterprises[177]. Accordingly, increasing the number of NTBFs and supporting their sustained development has been a priority at European level since the mid-nineties[178]. The European Commission has sponsored various initiatives aimed at creating the best possible environment for innovative enterprises, including: the First European Forum for Innovative Enterprises (1998); and the Pilot Action for Innovative Start–ups (PAXIS)[179]. The latter promotes networking among 'Regions of Excellence' that have a proven track record in creating and developing innovative start-up companies[180]. As part of PAXIS, six larger projects have been launched in 2002 with the specific aim of transferring existing know-how on start-up creation to candidate countries and the development of new concepts and tools.

Statistics on new enterprises in the CC7

Domestic entrepreneurship is a key mechanism for generating managerial and technical innovations. Indeed, creation of new enterprises is an important organisational innovation per se.

177 SMEs in Europe. Competitiveness, innovation and the knowledge-driven society. Data 1996-2001. Eurostat.
178 Commission Communication, Innovation in a Knowledge-Based Economy, COM (2000), 567 final.
179 See: http://www.cordis.lu/paxis/src/home.htm
180 Gate2Growth, launched in 2002, aims to support innovative entrepreneurs by fostering networking and exchange of experience between service providers and innovation professionally. See: http://www.gate2growth.com

In new technologically advanced sectors in candidate countries, new firms formation is the main mechanism of growth. New market opportunities as well as layoffs in State-owned firms have led to an increased rate of new enterprise formation in CEE CCs, which on average have been somewhat higher in CEE CC7 group.

However, the situation is less favourable in the CC7 in terms of survival rates and the proportion of enterprises (of those created the previous year) that invest[181]. So that a large proportion of entrepreneurship is a question of survival rather than new opportunities. Difficulties for small firms to access finance or lack of investment opportunities may explain the decrease of investment active enterprises between 1996-99 and 1999-200 periods. This may be a cyclical phenomenon but could also be a sign of the exhaustion of the initial entrepreneurship opportunities focused on trade and services.

Clear improvements in demand side conditions suggest that the problems for innovators have now shifted to supply side, especially to issues of access to credit, trained workforce, and lack of technology.

Survey data suggest that both, 'old' and 'young' enterprises[182] are facing less significant demand side (notably increased purchasing power and reduction of excessive competition) difficulties. However, young enterprises have experienced somewhat larger improvements in demand conditions than the old enterprises. It is likely that younger firms are better in spotting market trends and areas of demand while old firms have problems in restructuring and adjusting to changing demand.

However, there has not an equally strong improvement in supply side conditions; a number of which have actually worsened. Two trends are present:

→ Differences across countries and across age of firms in access to credit[183], and
→ Worsening in liquidity (non or late paying customers) in all countries for both old and young firms.

Again, relatively speaking, young firms have benefited more from improvements or suffered less from worsening supply side conditions than old firms. For example, liquidity has worsened on average in the majority of the CEE CCs for old firms by 24% percentage points but only by 4.3% for young firms.

Clear improvements in demand side conditions suggest that the problems for innovators and entrepreneurs have now shifted to supply side issues such as access to credit, own funds and

181 Among CEE CCs, only 22% to 47% of new (active) enterprises in 1996-99 period were capable and willing to invest one year after they were founded. However, the proportion of enterprises, which have invested a year after establishment, is 26.6% in the CC7 versus 39.6 in the CC6.

182 'Old' enterprises are those that were established before 1994 and 'young' are those established in 1998.

183 Access to credit for old enterprises has worsened in Latvia, Lithuania, Slovakia, Estonia, and Hungary but improved in Bulgaria, Romania, Slovenia and Czech Republic. For young firms, access to credit has worsened for Latvia, Lithuania, Bulgaria, Estonia and Romania but improved in other countries.

liquidity of clients. In addition, both types of firms are increasingly facing other supply side problems like availability of trained workers and access to technology. This is a quite new phenomenon and suggests a new stage of entrepreneurship where requirements for growth have become more diverse and related less to finance but increasingly to the quality of supply factors (finance, technology support, training, etc.).

Support measures for NTBFs in the CC7

The recognition of specific barriers facing NTBFs is less discernible in the CC7.

In terms framework conditions, it has already been noted that the environment for new enterprises is less friendly in the CC7, than in the CC6 and the EU15. All seven governments have taken measures to support entrepreneurship, however, the recognition of specific barriers (e.g. IPR rules, access to seed capital) facing NTBFs and accompanying support measures is less discernible.

Support instruments for NTBFs can be split into two broad types:
→ Demand side measures: schemes to promote entrepreneurship, specialised incubator facilities.
→ Supply-side measures: creation of infrastructure, direct or indirect support for venture (early-stage) capital funds.

A focus on 'generic' business incubators and somewhat more recently on high-tech incubators and/or technology parks.

Government or other stakeholders in all seven countries have focused on the creation of 'generic' business incubators and somewhat more recently on high-tech incubators and/or technology parks. The level of innovation and technology-related service provision, as opposed to provision of 'managed-workspace', to enterprises established in these structures is however difficult to discern.

Table 22 – Summary of initiatives taken in favour of NTBFs

Country	Organisation responsible	Objectives	Target public	Funding
Bulgaria	Encouragement Bank	Increasing the competitiveness of the Bulgarian production	For new technologies or technology lines	Loans with 4 to 10 years duration. Minimum amount lent is €20,000 and maximum is €1,000,000.
Latvia	Ministry of Education and Science	Funding for pilot projects and by promoting activities of technology centres and parks	SMEs	Co-financing: 50% from the state budget, 50% from a private business partner. Total funding: 10% of state budget for research.
	Ministry of Economy	Amendments to the law on "Company Income Tax"	Enterprises of 7 *high-tech* sectors	Regulation on the list of *high-tech* and software products (30% tax exemptions of the company income. tax).
	Latvian Development Agency	Project: Strategy for Knowledge-based business development in Latvia"	Municipalities; regional development agencies; universities; enterprises; branch associations	Total €520 thousand, incl. 75% from EU and 25% from the Latvian government and project participants.
Lithuania	Government	High Technology Development Programme	Technology parks	Public and private funds.
Malta	No formal programmes supporting NTBFS/ Start-ups			
Romania	Ministry of Industry	Governmental Decision no.65/2001 regarding industrial parks provides tax incentives to investors	Technology-based companies	State Budget, co-financing.
	Ministry of Telecommunication and Information Technology	Preferential tax payments on software and information technology specialists' salaries	IT and Software companies	State Budget, co-financing
Slovakia	Government	Creation of industrial parks. Regulatory framework in support for business	Municipalities All sectors	Private / Public.
Turkey	KOSGEB	Establishment of NTBFs	Entrepreneurs	Infrastructure and administrative support, mentoring; plus €25,000 soft loan for R&D related equipments and €35,000 grant for procurement, consultancy services.
	TTGV	Establishment of venture capital funds to support NTBFs	Potential investors of venture capital to support NTBFs	Capital investment in venture capital companies up to 30% of total investment (up to €4.5 M) (Total amount available €7.9 M).
	Koc Holding	Support for infrastructure in the incubator, and acting as a business angel	Entrepreneurs (invests especially in innovative e-business ideas)	Private (Koc Holding's) resources

In **Bulgaria,** there is very limited support for NTBFs. Several business incubators exist but most are not technology specific. However, the "Business Innovation Centre IZOT" ("BIC-IZOT") which grew out of the Central Institute of Computing Technique and Technologies (CICTT) was established in 2000. It activities include consultancy, training, information services for start-up and existing companies in the field of the electronics, computing technique, information services and telecommunications. It also provides engineering, marketing, and design of systems, prototyping, etc. In addition, funding from the EU PHARE programme was planned during 2002 in the field of high tech parks and incubators. Although a previous study funded by PHARE on the establishment of university based science parks generated no concrete actions.

The Latvian Government is more focused on SMEs in general rather than on NTBFs.

In **Latvia,** Government initiatives have focused on traditional SME policy rather than supporting the creation of NTBFs. However, the creation of a favourable environment for NTBFs is a key plank in future policy plans. For instance, an amendment to the Law on Company Income Tax provides that enterprises from seven high-tech sectors will enjoy 30% tax exemptions. Aside from such measures, NTBFs and spin–off firms are essentially supported through the existing incubators (LTC, etc.) and centres linked with scientific institutes or universities. The establishment of NTBFs is thus left almost entirely to private initiative.

In **Lithuania,** the High Technology Development Programme has identified priority areas in high-tech sectors (like biotechnology, laser technologies, mechatronics and information technologies), based on a study of growing and internationally competitive companies in the country. In parallel, the Government's 'Concept of Technology Parks' aims to create a favourable infrastructure, which could promote sustainable growth of firms in these priority areas.

For the time being, business incubators and the science and technology parks support the development of NTBFs through workspace and research facilities and advice on marketing and management activities. The most successful incubator is the Kaunas Technology Centre, established in 1998 which hosts more than 20 firms in the IT, consulting and other knowledge intensive industries. It is the only specialised incubator amongst the six supported by the Government.

In Malta, the Kordin Business Incubation Centre is responsible for assisting high-tech start-ups.

In **Malta,** the **Kordin Business Incubation Centre** (KBIC), founded in October 1999, is responsible for assisting high–tech start–ups. KBIC, which currently hosts 12 tenants, was set up to identify, attract and nurture start–up projects in the sectors of information and communications technology, design and development of equipment systems, product design, renewable energy technologies, biotechnology and other innovative projects that are seen to have some uniqueness for the country.

In **Romania,** the 'Medium Term Strategic Orientation of the Research Development and Innovation Activities' identified two main obstacles hindering the development of innovative firms and NTBFs. One obstacle is internal to the R&D system, namely insufficient public funds, outdated infrastructure and the lack of specialized human resources. The other concerns the reduced capacity of enterprises to absorb new technologies and know-how and the low level of expenditure of enterprises on R&D activities. To address these shortcomings, the Government intends to encourage investments through the establishment of an Investments Fund for Technology Transfer and Development. Other proposed initiatives to stimulate start-ups and NTBFs, notably those for the creation of incubators and research networks, are not yet operational.

In Slovakia, the situation is more complex because SMEs are not playing a central role in economic development.

In **Slovakia,** the situation is more complex, because SMEs are not playing a central role in economic development. More precisely, both the size of this segment and its structure are not well adapted for such mission, which would guarantee sustainable economic growth. There is only a small, but growing group, of SMEs, which has a more reliable economic and technological base, namely suppliers and sub-contractors for large foreign owned companies.

In 2001, the government specified and clarified the procedure for the submission of applications, in the framework of the Assistance for the Establishment of Industrial Parks. Currently, six industrial parks are under preparation along with several industrial zones. The Government has adopted several support programmes, mainly within the framework of industrial parks.

Box 25 - Private business incubators in Turkey

Turkey is the only example across the CC7, where multinational firms support private incubators activity. These private incubators and/or investors include: Ericsson Crea–World, Siemens Business Accelerator and Koc Holding's IT Group have assisted nearly 75 NTBFs by providing infrastructure, mentoring and/or financial support.

In Turkey, there are no specific measures to encourage the creation of NTBFs

In **Turkey,** although in the Science and Technology Policy includes as a priority actions for the creation and growth of innovative enterprises, there are no specific measures taken to encourage NTBFs. Nevertheless, since 1991, KOSGEB has assisted some 200 firms through its 11 Technology Development Centres (incubators) established jointly with universities. A new initiative aimed in part at support NTBFs, notably research spin-offs, is the Technology Development Zones Law.

Financing NTBFs

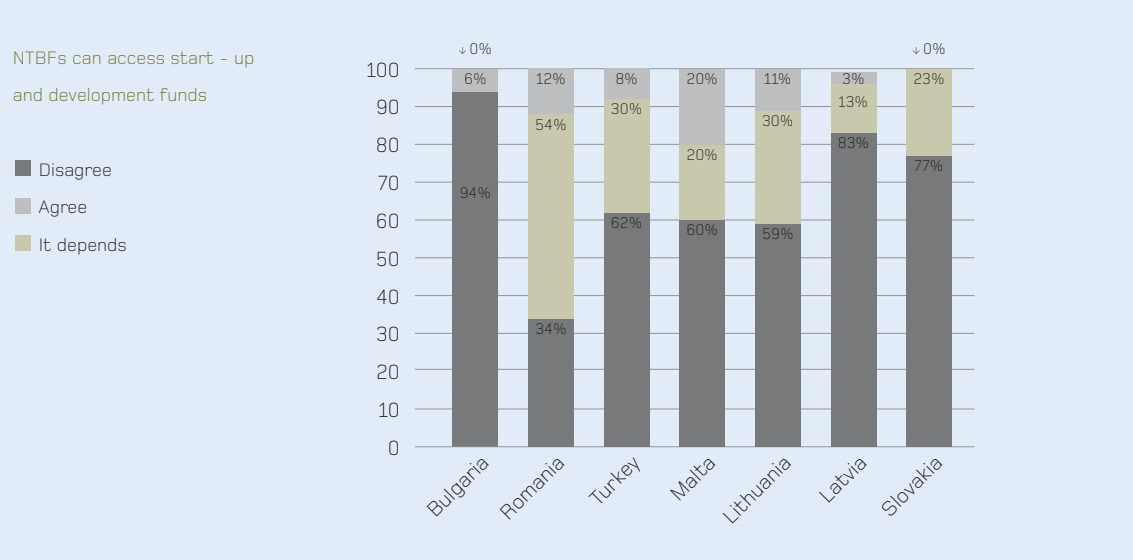
A major obstacle for NTBFs and Start-up creation, characteristic in the CC7, is the low presence of private funding mechanisms.

One of the most important obstacles for NTBFs in the CC7 is the low level of seed and early-stage private equity. Most countries are characterised by the incomplete or inefficient legislative frameworks for the creation and operation of venture capitals funds. Nevertheless, the creation of new financial instruments for NTBFs is on the drawing-boards of most of the CC7 Government.

On average 67% of survey respondents considered that NTBFs do not have adequate access to finance. The situation is least favourable in Bulgaria, Latvia and Slovakia.

In **Bulgaria,** the pressing lack of investment funds for new enterprises have led to schemes such as the loans granted by the Encouragement Bank, introduced with the aim of promoting entrepreneurship for investment in new technologies. The major reasons for the low activity of venture capital funds are: ongoing sector restructuring, low market capitalisation of companies, differences between national and international accounting standards; heavy tax regime for this type of investment[184].

184 Centre for Economic Development (2001), Working Paper-Analysis of the Bulgarian Technology Development, pp. 51.



Although in **Latvia** there are some active venture capital funds, innovative enterprises have hardly any access to appropriate capital since almost all funds are directed at development capital for existing firms. To date, the Government has not taken any initiative to foster seed or early-stage capital but some pilot actions are underway.

An increased supply of capital to NTBFs is foreseen under the High Technology Development Programme (2002) of **Lithuania,** through a combination of State, private funds and available international resources for the creation of venture capital funds. Moreover, the establishment of an Innovation Support Fund is planned in the White paper programme that should be implemented during 2003-2004. However, end 2002, both these incentives were still under discussion by the Government.

In **Malta,** the first technology-oriented Fund, namely the Technology Venture Fund was set–up during 2002. Its mains tasks will be to finance new technological initiatives and support the development and innovation within SMEs. Similarly in **Romania,** serious difficulties faced by start-ups in accessing finance have been recognised and investment in innovative firms and NTBFs is to be encouraged through the establishment of an Investment Fund for Technology Transfer and Development.

Turkey reformed its legislative framework on venture capital funds in 1998, however, it is still not considered favourable. As a result, the market for venture and seed capital funds remains

poorly developed. At present, there are four venture capital funds that support early-stage firms with a total amount of €40 million available.

Box 26- Main findings on promoting new-technology based firms

- → NTBFs in the CC7 face a particularly difficult environment in terms of legal and administrative procedures and lack of access to seed and early state-capital.
- → All seven countries place promoting spin-offs and start-ups high on their list of political priorities but, the main efforts in terms of supporting NTBFs are essentially infrastructure/real-state based initiatives such as incubators and technology parks.
- → There is little recognition of the need for specialised consultancy, advice and technical services for NTBFs in order to foster and sustain their development.
- → In terms of access to innovation finance, the legislative framework for venture capital is not always favourable. The development of seed or early-stage funding initiatives, which by definition almost always requires public support, is at a very early stage with only a few funds or pilot actions, notably in Turkey. The small size of the economies of a number of the CCs may make it difficult to create viable national early-stage funds.

5.3.3 Business networks for innovation

Supporting the development of business network for innovation is a relatively new concept not only in the CC7 but also in the CC6.

Supporting the development of business networks, such as clusters[185], as a means of fostering innovation is a relatively new concept in the CC13. According to the findings of the previous study on the CC6, Hungary and the Czech Republic have been pioneers in designing such policy instruments. The available information suggests that the CC7 can be split into two broad groups in terms of initiatives to support business networking, generally, and innovative clusters, more specifically:

- → Latvia, Lithuania, Slovakia and Turkey where initial steps have been taken to support sectoral groups of enterprises;
- → Bulgaria, Malta and Romania where to date no significant initiative are identifiable.

The country reports highlighted numerous business associations operating at national, regional or sectoral levels. However, many of these organisations have only limited activities[186] and the vast majority of concrete initiatives are related to general business support or export promotion. In

185 Defined by Michael Porter (1998) as "Geographic concentrations of inter-connected companies and institutions in a particular field". An alternative definition is "networks of interdependent firms, knowledge-producing institutions (universities, research institutes, technology providing-firms, bridging institutions (e.g. providers of technical or consultancy services) and customers, linked in a value-added creating production chain. OECD (2002), Dynamising National Innovation Systems.

186 As an example, according to an official of the Latvian Development Agency only about 10 associations out of 70 in Latvia were undertaking concrete activities in 2001. See Innovation Policy Profile Latvia. Volume 2 of this study.

the right circumstance, these may be a first step to creating an environment for clustering.

The Support to Industrial Cluster Restructuring project in Latvian aims to improve inter-firm and science-industry relations in four key sectors.

In terms of concrete projects, the **Latvian** Government is the first among the CC7 to launch, with the support of PHARE funds, a project on Support to Industrial Cluster Restructuring (see box 14). The overall objective is to improve industrial competitiveness by encouraging the development of clusters; and in particular, strengthening cooperation between enterprises, research institutes and higher education establishments. The project aimed to support the creation of fourclusters in the fields of: information systems, wood industry, composite materials, and engineering[187].

In Lithuania a first study on the role of the State in supporting cluster development launched in 2002.

In **Lithuania,** a study on companies operating in the priority areas, such as mechatronics, biotechnologies, IT and laser technologies was carried out, in the framework of High Technology Development Programme. In the second half of 2002, the Ministry of Economy appointed a study team to identify the role of the State in cluster development. In addition, during 2002, two regional projects were started in order to enhance development of local business clusters[188].

In Turkey, a number of governmental and business initiatives support networking and development of clusters.

Government initiatives for inter-firm co-operation in **Turkey** are focused on strengthening export potential of SMEs. Starting in 1996 the Under-Secretariat of Foreign trade has supported **"Sectoral Foreign Trade Companies"** (SFTCs) with the goal of fostering a co-operative environment within which SMEs form new joint companies able to compete on global markets.

187 See Innovation Policy Profile Latvia. Volume 2 of this study.
188 See Innovation Policy Profile Lithuania. Volume 2 of this study.

Table 23 – Summary of main initiatives in favour of business networks for innovation

Country	Organisation responsible	Objectives	Target public	Funding
Bulgaria	No direct initiatives supporting business networks			
Latvia	Ministry of Economy	Project "Support to Industrial Cluster Re-structuring", popularising company cluster concept	Sectors of: information systems; wood industry; composite materials; engineering	PHARE (2000-2001) Ministries; LITTA (ICT)
Lithuania	Lithuanian Development Agency	Establishing international business contacts and promotion of cooperation between companies	General business sector	Public
	Lithuanian Innovation Centre	Creating platform for cooperation of Lithuanian and foreign companies	Innovative companies	Public
Malta	The Institute for the Promotion of Small Enterprise	Assists in the formation of new start-up ventures, conducts "Sectoral Analysis Reports"	Business sector	Public
Romania	Ministry for SMEs and Cooperatives	Network of Business Support to evaluate needs for information and training of trainers in different fields	200 NGOs, Chamber of Commerce and business organisations	Public
Slovakia	Federation of Employers' Associations	Support of participation in international activities	Associations and their members	Private
Turkey	UFT	Establishment of "sectoral foreign trade companies" by SMEs using jointly innovative capacity to produce and export	SMEs in any sectors that aim to export	No funding is provided but the status of SFTC is granted by the UFT
	TTGV	Technology service centres for industrial R&D, metrology, testing, training and consultancy	There are four centres active in biotechnology, advanced materials, software and electronics that serve companies	Soft loan up to 50% of the project budget (not more than €2.3 M)

Moreover, with the support of KOSGEB, the Association of Automotive Parts and Components Manufactures (TAYSAD) is establishing an industrial zone, which will have common facilities and centres for R&D. KOSGEB is in the process of starting a project to facilitate networking between firms to incite them to innovate. It is planned that business innovation centres, centres for shoe making, textile and clothing, and automotive parts will be established, under the programme with a budget of €14 Million[189].

There are also active networks established by business sectors. In 2001, TOFAS, representing one of the biggest automotive manufactures in Turkey, established the "Target" network with 63 members both large companies and SMEs. "Teknorama" was set up as a private initiative in 2002 with the aim to carry out specific studies of common interest to the 100 network members.

In **Slovakia,** there is no explicit cluster policy and a sectoral approach is more apparent. There is a 'bottom-up' effort to build business networks from non-governmental associations such as the Federation of Employers' Associations, Industrial Institute of the Slovak Republic, and the Slovak Chamber of Commerce and Industry. However, their impact on promoting innovation appear still to be limited, as their core activity is related to international linkages for Slovak enterprises and hence mainly on exporting firms. In addition, with the growing inflow of FDI at the end of 1990s, foreign and local firms have formed operational networks, although there are no studies enabling a view to be formed on the innovation content of such networks[190]. Some work has been done on studying geographic concentration in manufacturing activity and the potential for developing clusters, for instance in the automotive sector[191].

In Malta, clustering is hindered by a fear that the counterparts will take advantage over the competitive position.

In the three other countries, no major initiatives were identified in the country reports. In **Bulgaria,** the only mechanism for co-operation currently is through chambers and business associations. Some organisations such as the Bulgarian Association of Regional Development Agencies and Business Centres (BARDA) have begun to take steps to organise local initiatives. In **Malta,** the concept of developing business networks is absent and there is no government funding for such initiatives. Only the IPSE is active in encouraging business networks, notably through Sectoral Analysis Reports, which examine opportunities and threat for specific sectors of industry. The creation of a furniture network, as a result of such a report, is perhaps a first move towards clusters. However, entrepreneurs are sceptical about joining forces, as they fear that counterparts will gain a competitive advantage if they share know-how.

189 See Innovation Policy Profile Turkey. Volume 2 of this study.

190 See Innovation Policy Profile for Slovakia. Volume 2 of this study.

191 Presentation on Industry Clustering and internalisation in Slovakia. East-West Cluster Conference of the OECD LEED programme in October 2002. http://www.oecd.org

In **Romania,** the economic and institutional situation does not yet seem favourable to more sophisticated policy tools such as clusters. There is a fairly extensive network of business service providers, created mainly with funding from foreign donors since the beginning of 1990s[192]. However, the financial sustainability of these organisations has been questioned in recent studies[193] and they are doing little to foster networking between SMEs. The National Council of SME Private Enterprises in Romania[194], created in 1992, is the main organisation representing SMEs, but it does not have specific activities related to clustering.

BOX 27 - Main findings on support for business networking

→ The development of business networks for innovation is a relatively new policy concept in the Candidate Countries. Amongst, the CC6, Hungary and Slovenia have taken the most initiative in this direction. In the CC7, Latvia, Lithuania, Slovakia and Turkey are currently preparing programmes aimed at supporting the creation and sustainable development of clusters.

→ In the three Mediterranean CC, promoting inter-firm cooperation has proved difficult due to conservative family owned business structures.

192 A recent EBRD/OECD report identified 46 business support centres established with funding from international donors.

193 See Entrepreneurship and Enterprise Development Romania: March 2002. OECD, EBRD and Ministry for SMEs and Co-operatives, Romania.

194 CNIPMMR. See: http://www.sme.ro/en/

CHAPTER 6 What should be done to improve innovation performance?

Enterprises are the key agents of the innovation process. Hence, it is vital that the design and implementation of innovation policy begins from the level of the enterprise and works upwards. In this spirit, the key conclusions of this report are summarised in a way that we hope is relevant to both enterprises and policy-makers in the seven candidate countries (CC7).

The conclusions in section 6.1 are set out as a series of questions that an entrepreneur might ask herself when considering what her enterprise should be doing to increase the innovation content or improve the production process of its goods or delivery of its services in mid-2004 (i.e. just after the accession of the first 10 candidate countries).

6.1 What are the challenges for innovators in the candidate countries ?

Conversation with a would-be innovator !

Q. I keep reading in the business newspapers about how a study funded by the European Union says that enterprises in my country don't innovate enough. But, I don't have the time, staff or money to invest in research and development. Moreover, I don't see the need to invest in R&D. So what does innovation have to do with my firm?

→ Indeed on average enterprises in the candidate countries (CCs) fail to invest enough in innovation. But in fact, we **know very little about innovative behaviour of enterprises in the CCs.** Only four countries have carried out an innovation survey. Such surveys allows us to understand not only how much is being spent by enterprises on R&D but more importantly about the processes of innovation and the barriers and drivers for enterprises to innovate. So governments, in consultation with business organisations and other 'stakeholders', **need to carry out more systematic surveys of innovation activities in enterprises** if they are to design 'better policy'.

→ This said, you are **wrong about innovation only being research or high-technology.** But you are not alone! Many observers, enterprises and policy-makers in the candidate countries are still making this mistake. In the survey we carried out in the CC7, 54% of people equated innovation with a scientific invention, 67% with advanced technology, but only 44% with the introduction of changes in management or organisation of work. Yet, the latter type of innovation can be more important economically for enterprises than pure research. So there is a need to change the mind-set of both enterprises and policy-makers in the candidate countries about what innovation means.

→ You say that you don't have the time, qualified staff or money to invest in innovation. You're also not alone! Our analysis shows that in the CC7, the average small to medium-sized enterprise (SME):

– Is usually run by a manager with only second-level (vocational) education qualifications, who has a good chance of recruiting workers with similar qualifications but much more difficulty in finding qualified personnel with third-level education in science or engineering disciplines;

– Invests little in training, making upgrading and assimilation of new technologies and knowledge much more problematic;

– Spends much less on R&D than their counterparts in the six other candidate countries (CC6) and in the EU15 (the best performers amongst the candidate countries are level with Greece and Portugal);

– When it is an innovator, spends most money on acquiring machinery and equipment with R&D and intangibles (purchase of technology licences and patents) being marginal investments;

– When it wants to innovate, seeks useful information and partners essentially from clients, suppliers or other market and sectoral sources (fairs, etc.); and very rarely with universities or research centres;

– Has a low rate of quality certification which can be taken as a proxy for the capability to achieve best practice levels of production efficiency and conquer export markets;

– Has a competitive disadvantage in terms of access to and application of new information and communication technologies.

In summary, if you see the problem in this light you may appreciate how much your business has to do with innovation.

Q. Ok fine, in principle. But let's get back to my day-to-day problems and tell me how innovation can help me! My EU based competitors are able to supply our clients in half the time that I am, yet I have bought the latest production technology available in the world. I just can't seem to raise our productivity to their levels; and labour costs, which are my main competitive advantage, are rising all the time!

→ Raising productivity is your biggest challenge! Manufacturing enterprises in the candidate countries have rates of labour productivity that are in most cases less than 40% of the EU average! The source of this gap is partly structural, i.e. due to differences in shares of low and high tech sectors, but evidence suggests that the majority of the productivity gap comes from differences in technology, management and organisation rather than the industrial structure of your country.

→ Two key drivers of productivity growth are the capabilities and capacities of your workforce to adapt to changing production methods; and the potential to integrate and exploit new information and communication technologies (ICT). In both these areas which are vital to the development of a "knowledge-based economy', the measures taken by candidate countries are insufficient:

– There are no schemes in favour of innovation management related training nor mobility between research organisations and industry aimed at knowledge transfer, except in Romania. There are also no major initiatives aimed at promoting science and engineering careers despite a decline in R&D personnel in all countries, except Turkey;

– Only 14% of respondents to our opinion survey considered that Governments were doing enough to support the integration of ICT in enterprises. Turkish, Romanian and Latvian enterprises have somewhat more chance to be supported for ICT development or diffusion. The focus of action programmes is essentially e-Government, which at best has indirect effects on enterprises (through facilitating administrative formalities).

Q. The Government says it is going to invest millions of Euro in research and development to meet yet another target set by the EU. What benefits can this bring my company, we have never co-operated with a university or research centre up to now and frankly they don't speak the same language!

→ You're right of course, only a small fraction of companies in the candidate counties co-operate directly with universities or research organisations. This is true as well in the EU but even more so in the candidate countries. Our analysis highlights that the research systems of the CC7 are relatively 'unproductive' (per full-time equivalent researcher) in terms of patents and scientific papers compared to the CC6. However, the research systems of the CCs are on average more technology (patents) orientated and less science (papers) orientated than the three EU 'Cohesion countries' (Greece, Spain and Portugal). So the starting point for industry-science relations in the CCs is on paper more positive.

→ Unfortunately, there remain many barriers to co-operation which are due to the sizeable restructuring and downscaling of the research system from the supply-side; and various enterprise related issues including lack of in-house engineers to act as gate-keepers. Our study has only brushed the surface of this wide topic, **which deserves more attention in further studies on innovation in the candidate countries.**

Government's in the candidate countries have so far done very little to reduce barriers or foster co-operation between industry and science. Our report suggests that Turkey, once more, is ahead of the others with some interesting schemes and developing co-operation but even here there have been failures notably to develop joint industry-academic research centres. Funding in other countries is very limited and essentially focused on 'real-estate' solutions (technology parks). We think that the governments should do much more in fostering exchange of people between university and industry, via initiatives such as the Teaching Company scheme (UK).

Q. My brother-in-law in is a researcher at the local university; he keeps telling me that I should invest with him in creating a new firm to exploit the results of his research. Yet frankly, if producing the standard product I do is not always easy, given the economic and bureaucratic obstacles an entrepreneur has to face, then creating a firm based on a new and unproven technology seems to me like madness!

→ It may not help to be a lunatic but it certainly takes courage! Governments in the candidate countries have taken many steps to improve the business environment and simplify business legislation and administrative procedures. The EU is helping them to compare (or benchmark) progress in this field through an initiative called BEST, another acronym ! The latest report on the implementation of the European Charter for Small Enterprises in the candidate countries entrepreneurship (January 2003) highlights the improvements made over the last few years. But, our analysis suggests that **acknowledgement of the specific problems faced by so-called new-technology-based firms is much rarer.**

→ Firstly, he has to get through all the paperwork required to set up a company, and here our study emphasises that the legal and administrative environment in the CC7 is still less favourable than in the CC6. Moreover, according to Eurostat, the problems faced by entrepreneurs are shifting from demand-side issues (reduction of excessive competition, etc.), to **specific supply side issues notably access to credit, trained workforce and integration of new technologies.**

→ For instance, when he starts looking for funding to develop a demonstrable prototype or trial production run, the real problems begin. **Early-stage venture capital is almost non-existent in the CC7.** Our survey highlights that 67% of people consider that new technology-based firms (NTBFs) do not have adequate access to finance. If Turkey seems better placed than the others, the funds available are relatively small given the size of the country. Considering how to adapt models of private equity finance and government support schemes that work in Germany or Finland to the financial systems of the candidate countries, merits more in-depth study.

→ And of course, to complicate matters, your brother-in-law really needs to make sure that the ideas contained in his research, or the 'intellectual property rights', are protected in order to be able to exploit it commercially. The legal framework for IPR is largely in place in the candidate countries but analysis suggests that IPR protection is weaker, on average, in the CC7 than in the CC6.

→ Still, more positively, he should not have too much trouble finding a 'business incubator" to house his new firm, and if he manages to grow his business will no doubt be able to expand in a technology park in two or three years time. But he is likely to be disappointed with the quality and range of services related to innovation proposed by most of these technology parks, business support centres, incubators and innovation centres. These tend to be general business services while he will likely need specialised technology and market specific support.

Q. A consultant told me recently that I should be getting involved in a 'cluster' with other companies from my sector and a technology centre to work together on innovation. Another crazy idea, sure I'm going to let my competitors know all about how I manage to survive!

→ Well you're right to be cautious but the idea is not as crazy as it sounds. Think about it, you've told me that by yourself you don't have the money to invest in research, that you have trouble supplying your clients according to their technical or quality specifications, and that you don't have time to work on designing or promoting your products. Don't you think your competitors and other companies supplying the big multinational enterprises, which have invested in your region, have the same problem? You may benefit by sharing knowledge of markets and technology with your competitors as well as by suppliers and buyers within your value chain.

→ Moreover, the innovation surveys carried out in the candidate countries confirm, what is already known in the EU, that enterprises consider competitors, clients, and other sources of information in their business sector or supply chain as the most important for their innovative activities. Unfortunately, Government policy in the seven candidate countries largely ignores the specific characteristics and processes of innovation in different industrial sectors. The Turks have taken some steps in this direction and in Latvia they have launched a first project to create industrial clusters. In Hungary, there has been a long-standing effort made to 'integrate' foreign direct investment companies but also domestic firms with their potential suppliers (Integrator programme). **A lot more could be done to encourage co-operation between enterprises, in partnership with appropriate research or technology centres, to put together technology development and diffusion programmes.**

Q. Ok you've convinced me, I need to innovate. But who is going to help me? We don't have the know-how to do it all ourselves. And I don't trust all these government sponsored organisations agencies !

→ Good for you! Now for the bad news! **Government funding for inciting businesses to innovate is practically absent.** If you are a Turkish entrepreneur you stand a better chance of getting some funding and related advice; sine their Government has been developing technology and innovation policy for over two decades and has the most sophisticated policy framework. Romania has put in place some spending programmes which are more research oriented but do involve enterprises. But if you are Bulgarian, Latvian, Lithuanian, Maltese or Slovakian entrepreneur then you will have a hard time getting Government support for your innovation project! Across the board, it seems that limited government budgets and other more pressing short-term priorities (privatisation, unemployment) have diverted governments from implementing numerous policy documents produced concerning R&D, technology and, more recently, innovation.

→ Of course, it is not just about finding the money in the Government budget ! First of all, the Government has to have designed and put in place a coherent innovation policy. Two-thirds of people surveyed by our study team declared that **an innovation policy does not exist in the seven candidate countries.** In these circumstances, ad-hoc programmes or one-off projects will only have very marginal impact on innovative performance of the candidate countries.

→ Also I am not sure which government agencies you are talking about, because **except for *Turkey*, none of the seven candidate countries have any specialised government departments or agencies for designing or delivering funding for innovation.** This requires some serious 'policy-learning' to be done – here there are many tools and possibilities for Government's to learn, such as the EU's Trend Chart project or making use of available pre-accession funding to learn from other countries. For instance, Estonia has modelled its' technology agency on the Finnish TEKES agency.

→ To make matters worse, even if the Government provides the human and financial resources for innovation support (additional EU Structural ('regional') Funds will be available for those countries who become members in 2004), you will certainly need some support in finding a partner, preparing a proposal, putting together co-financing, etc. before starting a project. Experience suggests that **candidate countries lack a layer of innovation intermediaries who are able to counsel and support enterprises.** These people, working in technology/innovation centres but also in the private sector, can act as "salesmen" or "programme promoters" and

ensure that funds made available reach more quickly and effectively enterprises. Without such intermediaries and a programme of awareness raising and competence building in enterprises about innovation, funding is likely to stay in the Government's coffers!

→ Unfortunately our analysis suggests that up to now, in the seven candidate countries, **policy efforts have focused on "real-estate" or "infrastructure" aspects like technology parks, etc. and little attention has been paid to raising awareness of innovation, improving innovation management capacities in companies,** and ensuring that companies have access to competent advisory services in a range of innovation topics. So Government's really have to start re-engineering their policy delivery processes – create first the awareness of the need in enterprises through information and training; then build the competence in enterprises or in supporting organisation to manage innovation projects. Supply (in this case, new programmes or initiatives) without demand is a sure fire recipe for inefficient use of resources!

Q. So you are telling me that it is a lost cause to want to be an innovator in the candidate countries ?

→ Not at all ! There are many examples of innovative enterprises in the candidate countries. Our study did not have the resources to identify and highlight them but we do give some examples. Somebody once said that *"the most successful innovators are the creative imitators"* – **all those interested in innovation in the candidate countries should put more effort into identifying and championing successful examples of local innovative companies.** Business plan competitions, innovation fairs and awards, weekly articles in the business press, all help to build an innovative and entrepreneurial culture and do not cost millions of Euros. At the end of the day it is about self-belief, about wanting to create entrepreneurial value out of an innovative idea or technology. The Americans and Japanese like to pretend they have all the best ideas, it is up to us all in an Enlarged EU to show them that our diversity of cultures and peoples can be a hot-bed for innovation as well! Innovation drives productivity which in turn offers greater scope for job and wealth creation essential to building a more balanced development of an enlarged EU.

6.2 What should the policy-makers response be?

The average policy-maker is not an academic or theoretician, but a civil servant running a busy government department or agency. He needs to give clear and simple proposals to his Minister that can be implemented effectively in a relatively short-time period, at minimum cost with maximum political impact. To design good policy, he needs access to reliable data on the problem and have some idea of what has worked or not in the past from evaluations or assessment. He also needs to take into account the priorities and capabilities to implement policy of various stakeholders, notably the business sector but also (non-profit) organisations support innovation and the research & development sector (research centres and universities).

It is in this spirit that the policy options arising from the conclusions to this study are framed. Moreover, the stakeholders in the four candidate countries, covered by this study, likely to accede to the EU on 1 May 2004 need to take into account the need to maximise the effectiveness with which they will use EU funds made available through pre-accession support (PHARE) or post-accession Structural Funds in order to support innovation.

Dialogue with an 'enlightened' policy-maker !

Q. Look, I've read your study, it summarises for me a lot I knew about my country and helps me to put that in the context of other countries. But now, the hard bit, I have to explain to my Minister why your conclusions are so negative! How do I calm her down ?!

→ First of all, not everything is negative. **Each country has its strengths and weaknesses both in terms of innovation capabilities and policy design and delivery mechanisms.** Initial conditions at the start of the transition or accession process count for a lot. As we explained, macro-economic stability is almost a pre-condition for innovation policy. There is not much time left for worrying about fostering new technologies and innovation when the immediate priority is restructure the industrial base, put in place legislation for a market economy and reduce unemployment and inflation. Turkey which has developed the most sophisticated innovation policy has had to face up to economic turbulence; while other countries who have now a favourable macro-economic climate have yet to build an innovation policy.

→ A key message is the need to change from accession orientated economic policies, to policies that focus on knowledge-based development. **The gap between the innovation capabilities of the candidate countries and the EU15 is large and trend data suggests that it is growing!** The "cohesion gap" of an enlarged EU will not be closed if CCs do not improve their innovation capabilities at a much faster rate than at present. Of course, this is easy to say and much harder to do! Significant Structural Fund support for R&D and innovation in the EU Cohesion Countries has not always led to the results hoped for in terms of raising business innovation because too much has been invested in creating long-term capacity in applied research and not enough on technology and knowledge diffusion. It is essential that Structural Funds are used for knowledge based activities which include not only R&D in high-tech firms but also diffusion and application of technologies in all enterprises.

Q. Yes, you're right, every expert or consultant I talk to tells me the same thing! But, we face budgetary and human resource constraints. Picking priorities is not easy and designing and implementing programmes even harder. So where should I start ?

→ Start by trying to **understand better where the real barriers and drivers to innovation lie in the enterprises of your country!** How can you design policy if you have no robust data or studies on business innovation activities?! The marginal cost of conducting a regular survey such as the Community Innovation Survey (CIS) is negligible compared to the benefits in terms of information gained. Eurostat and other countries who have done a CIS, can help you to design and implement such a survey. Take a look at what has been done in Estonia with their recent innovation survey, where they produced not only a detailed summary publication aimed at key stakeholders and experts but also a professionally produced short information booklet distributed to all enterprises who participated. You kill two birds with one stone, increase your knowledge and raise awareness about innovation !

→ Then think about what you are doing already. Take the time to assess your existing schemes. **Ask for an independent evaluation** (the Turks have done this and learnt from it) and draw conclusions. **Appraise where the gaps are in your 'innovation system",** what sort of organisations or skills and competencies need to be improved. **Get involved in policy learning mechanisms.** The EU Trend Chart is one, but nothing stops you from using some of your own money to co-finance along with pre-accession funds from the EU, policy development and pilot action projects.

→ Now about priorities! Today and for the foreseeable future, **THE challenge for the candidate countries is to increase productivity.** Our recommendation is that Governments in the

candidate countries need to find a better balance between a longer-term 'high-tech' race (how many government strategies don't mention biotechnology, information technology or advanced materials?) based on formal R&D and its commercialisation; and **increasing productivity in existing enterprises and sectors through a broader more holistic approach to innovation:** covering acquisition and integration of new technologies and knowledge, improved innovation management and organisational processes and design and other forms of 'presentational innovation' (innovation in design and marketing).

Q. Ok. I understand what you are saying but we can't do all this by ourselves and I don't want to reinvent the wheel. Surely the EU can help here to ensure we learn from best practice – test some ideas through pilot actions, build up our management capacity for innovation policy, etc.

→ Yes, you're right. EU funding is not a panacea but we are recommending to the Commission that they should extend and reinforce their current range of actions in favour of innovation policy development in the candidate countries. The 'Regional Innovation Strategy' model has proved successful in the EU and has been extended under the Innovation Programme of the Enterprise DG to candidate countries. But experience from the EU shows that in the less-favoured regions (the so-called Objective 1 regions), it takes several rounds of this 'seed-capital' funding for an innovation policy community to develop and for concrete projects to emerge.

→ **The Commission should make available additional funding for pilot actions in the candidate countries,** along the lines of the Regional Innovative Actions Programme of the ERDF. EU funding of €2-3 million over a 24-month period per programme would represent considerable additional financial resources for these countries. This funding should be targeted at the soft-side of the innovation system – building human capacities and new methods and not be allocated to research infrastructure, etc.. Possible priorities include:

- Creating networks of innovation or technology diffusion organisations bringing together existing intermediaries and providing them with training and methodologies;

- Developing manufacturing productivity services, including prototyping, product design and innovation management techniques;

- Testing new forms of innovation financing mechanisms;

– Establishment of new-forms of enterprise co-operation for innovation, notably based around specific sectors, including studies of innovation processes,

– Funding of pilot actions in the field of industry-science relations to transfer and test new methods for commercialisation of research results.

A suitable mechanism for ensuring exchange of experience could be envisaged through extending networking actions already available under various EU programmes (Enterprise and Regional Policy).

Annexes

ANNEX 1 FURTHER READING AND REFERENCES

Working papers (Volume 2 of this study)

Innovation Policy Profile: Bulgaria, Final Report, January 2003.
Innovation Policy Profile: Latvia, Final Report, January 2003.
Innovation Policy Profile: Lithuania, Final Report, January 2003.
Innovation Policy Profile: Malta, Final Report, January 2003.
Innovation Policy Profile: Romania, Final Report, January 2003.
Innovation Policy Profile: Slovak Republic, Final Report, January 2003.
Innovation Policy Profile: Turkey, Final Report, January 2003.
Radosevic Slavo and Tomasz Mickiewicz (2002), Innovation Capabilities of the Seven EU Candidate Countries, January 2003.

Useful sources of further information

EUROPEAN UNION

- Further information on recent and forthcoming studies in Innovation Policy Series, including the previous report on Innovation Policy in Six Candidate Countries, can be found at: http://www.cordis.lu/innovation-policy/studies/
- Recent publications and news about developments in the field of Enterprise policy can be found on the web site of DG Enterprise: http://www.europa.eu.int/comm/enterprise/index_en.htm

- All Regular Reports on Progress to Accession and other up to date information on the accession negotiations can be found on the web site of DG Enlargement: http://www.europa.eu.int/comm/enlargement/
- Publications and regular updates on statistics for both the European Union Member States and Candidate Countries are available from Eurostat: http://europa.eu.int/comm/eurostat

NATIONAL GOVERNMENT WEB SITES

Bulgaria: http://www.government.bg
Latvia: http://www.am.gov.lv/en/
Lithunia: http://www.lrvk.lt
Malta: http://www.gov.mt
Romania: http://www.gov.ro
Slovakia: http://www.government.gov.sk
Turkey: http://www.mfa.gov.tr

SELECTED ENTERPRISE SUPPORT OR INNOVATION RELATED ORGANISATIONS IN THE CC7

Bulgarian Agency for Small and Medium-Sized Enterprises: http://www.asme.bg.en/default.htm
Latvian Innovation Support Structures:
http://www.innovation.lv
Lithuania: Lithuanian Development Agency:
http://www.svv.lt/index.php
Malta - Institute for the Promotion of Small Enterprise -
http://www.ipse.org.mt/
Romania : The National Council of Small and Medium Sized Private Enterprises (CNIPMMR) -
http://www.sme.ro/en/.
Slovakia: BIC Bratislava: http://www.bic.sk/about.shtml
Turkey: TTGV http://www.ttgv.org.tr/eng/eng_main.html

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ANNEX 3 INNOVATION SCOREBOARD – DEFINITIONS

N°	Short description of indicator[195]
1.	**Human resources**
1.1	New Science & Engineering graduates as a ‰ of the 20 - 29 year old population (ISACCD classes 5a and above in ISC 42, 44, 46, 48, 52, 54, 58).
1.2	Percent of working age population (25-64) with a tertiary education (ISACCD 5 to 7 inclusive).
1.3	Percent working age population in education or training (life-long learning).
1.4	Percent of total employment in medium-high and hi-tech manufacturing (NAC 24, 30-35).
1.5	Percent of total employment in high-tech services (NAC 64, 72-73).
2.	**Knowledge creation**
2.1	Public R&D funding as % of GDP (public funding relates to governments and higher education institutions).
2.2	Business expenditures on R&D as a percentage of GDP (business sector relates to manufacturing and services).
2.3a	All EPO patent applications (per million population)
2.3b	Number of USPTO patent applications in high tech classes per million population (pharmaceuticals, biotechnology, information technology and aerospace).
3.	**Transmission and application of knowledge**
3.1	Percent of manufacturing SMEs that innovate in-house or in combination with other.
3.2	Percent of manufacturing SMEs involved in co-operative innovation.
3.3	Total innovation expenditures in the manufacturing sector as a percent of total turnover.
4.	**Innovation finance, output and markets**
4.1	Venture capital investment in technology firms as a percent of GDP.
4.2	New capital raised on stock markets as a percent of GDP
4.3	Sales share of products 'new to the market' in the manufacturing sector.
4.4a	Internet access (% of population)
4.5	Share of ICT markets as a percent of GDP (total expenditure on ICT as a % of GDP).
4.6a	Stock of inward FDI (% of GDP)

195 This Scoreboard is modified version of the one for the EU countries. Alternative indicators are used for indicators 2.3a, 44a, and for 4.6a. For full explanations see EC (2002a).