Strategic Evaluation on Innovation and the Knowledge Based Economy in relation to the Structural and Cohesion Funds, for the programming period 2007-2013

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Executive Summary

Romania has made a strong commitment to meet the objectives of the Lisbon Strategy, but there still are important steps to be taken in order to establish innovation as a horizontal policy. The last six years have been characterised by a positive economic trend, which reflects the dynamic growth of the Romanian economy in the preparation for the EU accession. However, there are significant development disparities between urban and rural zones, with the former growing much faster than the latter. Nevertheless, inter-regional disparities are less significant than intra-regional disparities. The major drivers for innovation at the regional level are the most developed and prestigious Romanian university centres, i.e. Bucharest, Cluj-Napoca, Timisoara and Iasi. Moreover, Bucharest-Ilfov (Capital) region is leading in terms of key macroeconomic indicators, but firms are dominated to a very large extent by non-innovative companies, most of them being SMEs. The links between the business sector and academia are still very weak, in spite of very few successful cases in some regions (e.g. West and North-West Regions).

The institutional context is characterised by weak capacity of regional planning, innovation and knowledge policies and measures. A significant policy development is the commitment of the Romanian government to develop for the first time a National RDI strategy based on a foresight exercise, which is expected to end in 2006. The national innovation financing schemes consist of several programmes that focus more on R&D than on innovation, and have little effectiveness in improving the innovation capacity of the country.

The Economic and Social Cohesion component of the 2004-2006 Phare programme includes several measures that partially address innovation and the knowledge economy, especially those related to the development of business infrastructures, human capital and SME development.

The regional potential for innovation is most significant in the reputed university centres. Moreover, the higher development of the Bucharest-Ilfov, West, North-West and Centre regions proves a higher capacity for absorbing the innovation funds. However, there other regions have also the potential of absorbing such funds which could be directed to potential innovation poles.

Therefore, it can be stated that the current Economic and Social Cohesion component of 2004-2006 Phare programme addresses innovation and knowledge only to a limited extent, and the measures focusing on innovation and knowledge should increased not only in number, but also in scope. In addition, there is a need to revise the measures proposed in the Draft Competitiveness and the Development of Human Resources Operational Programmes, as well as the Regional Operational Programme, with a view to increasing the amounts allocated to innovation and knowledge measures and to identifying new measures that could be financed.

Recommendation 1: Increasing the financial allocation and measures with support for innovation and knowledge.

One of the recommendations of the Aho report is that the Structural Funds should act as key means for creating a knowledge economy. Therefore the allocation for innovation and R&D must be increased and better oriented towards the Lisbon Strategy goals taking into account the absorption capacity as well. The Structural

Funds could be used for creating value rather than for supporting important infrastructure projects, which could be financed through the Cohesion Funds or the Public Private Partnerships. The programmes developed by Enterprise Ireland could be taken as a model for investing in R&D and innovation.

Recommendation 2: Focus the Structural Funds intervention on developing innovative SMEs

A selective approach to Structural Fund support focused more on supporting technology diffusion, innovation awareness and targeted funding for industrial level innovation should be favoured over a policy focus on further support for still over fragmented R&D sector. The type of grants, which could be financed through the Competitiveness Operational Programme include:

- Productivity improvement grants for companies in order to receive funding for capital assets, technology acquisition and training/management development, that will lead to productivity improvements.
- Industry Networks in order to support networks or groups of companies who wish to undertake collaborative projects that have the potential to deliver measurable innovative benefits to the companies involved and to the wider economy.
- Funding for company expansion through supporting activities outlined in an expanding company business plan, e.g. investment in capital equipment, job creation, recruitment of key managers, training/management development and R&D.

Recommendation 3: Elaboration of measures to support the identification and creation of innovation poles

A national programme fostering regional critical mass around specific technologies, market or thematic potential could be a solution to developing a stronger regional partnership based on developing critical mass in specific fields. The Operational Programmes should include measures to support the creation of the innovation poles. Some of the activities, which could be financed include:

- Development of scientific and technological activities of enterprises aiming at linking research to production and at promoting innovation.
- Strengthening of innovative activities of SMEs, through know-how/technology transfer assistance mechanisms.
- Strengthening-expansion of public research and technological infrastructures in areas of regional interest.
- Education and training in areas related to the selected technological priorities of the specific Region and education training on research, technology and innovation issues, aimed at meeting regional needs.
- Establishment of Regional Innovation Poles identity and enhancement of the international visibility of organisations in the Region
- Formulation of the strategy for development and organisation of the Regional Innovation Poles, and for its foresight and evaluation activities.
- Activities in preparation of assistance to research units in connection with the standardisation and commercial exploitation of research results. Identification and utilisation of research results through the establishment of new enterprises (spin-offs).

Recommendation 4: Improving the regional innovation system in terms of knowledge and foresight

The capacity to manage innovation measures and undertake regional foresight must be improved through training and technical assistance type projects at the regional level. Therefore, RDAs could play an important role in designing and managing regional specific innovation and knowledge measures and also to mobilise regional actors for the measures. Moreover, RDAs should increase the cooperation with the regional stakeholders more stakeholders. On the other hand, there is a need for identifying financing sources for the priorities of the Regional Innovation Strategy (RIS).

Recommendations 5: Increase the involvement of regional actors in the implementation of the Operational programmes

There is a need to increase the visibility of sectoral operational programmes at the regional level, which will have a direct effect on the absorption capacity. Therefore, RDAs could be more involved in the regional management of the Sectoral Operational Programmes. The RDAs already gain experience by managing Phare national programmes grants. However, improvements of the management function of some of them are still needed.

1 Introduction

In March 2000, the EU Heads of State and government launched an ambitious political initiative for the European Union to become "the most competitive, dynamic, knowledge-based economy by year 2010". The agenda, which has become known as the 'Lisbon Strategy', has included a broad range of policies and regulatory measures to achieve this goal.

At the 2005 Spring Council of European Union, Heads of State and government concluded that all appropriate national and Community resources, including those of Cohesion Policy, should be mobilised in order to renew the basis of Europe's competitiveness, increase its growth potential and its productivity and strengthen social cohesion, placing the main emphasis on knowledge, innovation and the optimisation of human capital. In short, the Council recognised that while some progress has been made since 2000 in moving towards the goals enshrined in the Lisbon Strategy there remains a need to create "a new partnership for growth and jobs"[1]

In launching the discussion on the priorities for the new generation of cohesion policy programmes, the Commission published on 6 July 2005 draft Community Strategic Guidelines entitled "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013". One of the specific guideline is to improve the knowledge and innovation for growth. More specific areas of interventions, which are proposed by the Commission, include: improve and increase investment in RTD, facilitate innovation and promote entrepreneurship, promote the information society for all, and improve access to finance.[2]

Innovation is an important factor in releasing the potential of the Lisbon agenda. The knowledge captured in new technologies and processes can drive growth and competitiveness and create new jobs. But knowledge must be treated as part of a wider framework in which business grow and operate. Developing knowledge-based economy requires adequate levels of investment in R&D, education, and ICT as well as creating a favourable environment for innovation.

Less developed areas of the Union also are confronted with this new competitiveness challenge. Increasing cohesion leads to improvements in living standards and the reduction of economic and social disparities, which depend to an important extent on increases in productivity. Increasing competitiveness implies economic change through the introduction of new technologies and new methods of production as well as the development of new skills. Innovation is at the heart of this process. Technological and organisational change and new demands generated by rising income levels and factors which create new economic opportunities and therefore, contribute to the growth potential of these countries.

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[1] Communication to the Spring European Council (2005) "Working together for growth and jobs: A new start for the Lisbon Strategy", COM(2005) 141. Available at: http://www.europa.eu.int/growthandjobs/key/index_en.htm.

[2] Communication from the Commission (2005) "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013", COM(2005) 0299. Available at: http://www.europa.eu.int/comm/regional_policy/sources/docoffic/2007/osc/index_en.htm.

Structural Funds are the main Community instruments to promote economic and social cohesion. In the past and current programmes, they have contributed to enhance the research potential and innovation in businesses and to develop the information society, particularly in the less developed areas. Cohesion policy has also promoted the development of regional innovation strategies and other similar initiatives in the field of the information society.

The overall objective of the strategic evaluation study, as set out in the terms of reference, is that the study should provide conclusions and recommendations for the future of Structural Fund and Cohesion policy. In particular, the Strategic Evaluation will be used to prepare the negotiations with the Member States for 2007-13, to prepare the next operational programmes and to provide input into the 4th Economic and Social Cohesion Report.

In line with the tender specifications, this country report addresses the following issues:

- An analysis of the current situation in the field of innovation and the knowledge-based economy at national and regional level. For the national level, performance is compared to the average performance for the EU25 Member States plus Romania and Bulgaria; and at regional level, where possible given available statistics, compared to a typology of EU regions;
- Lessons from the past and current experience of implementing innovation and knowledge economy measures in the Structural Funds, both in terms of priorities and strategic approaches; as well as in terms of operational implementation;
- Main needs and potential for innovation in the eligible regions drawing on available studies, strategy development and future and foresight studies; and
- Recommendations on main investment priorities for Structural Funds over the programming period 2007-2013 and their implications for regional development.

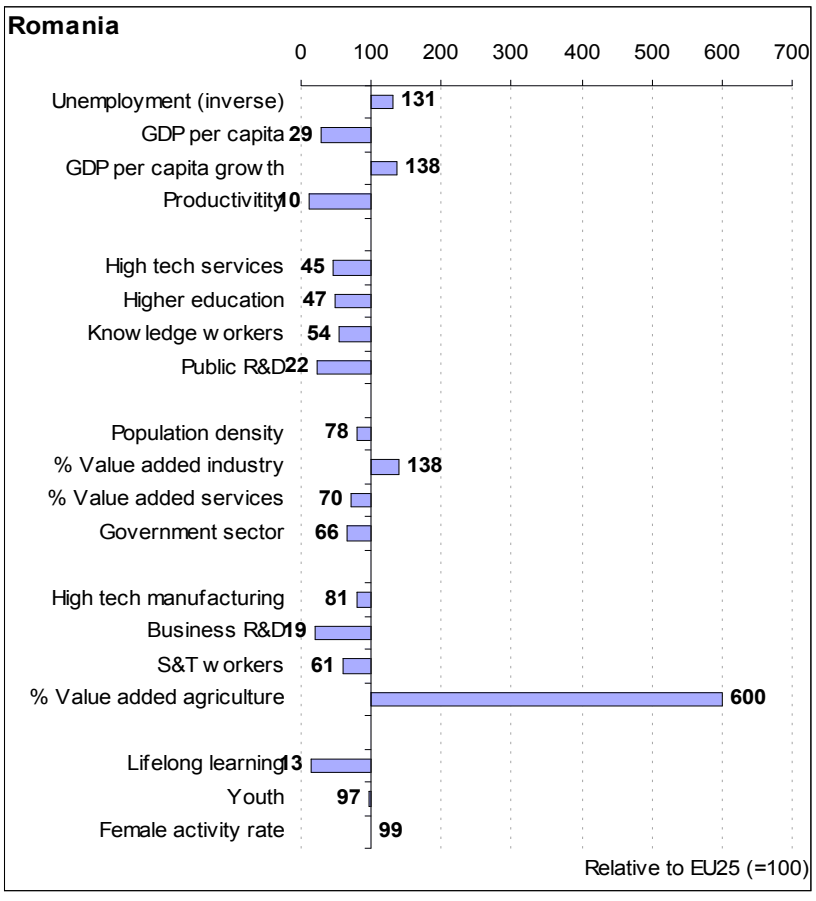
2 Investing in innovation and knowledge: a comparative overview of regional performance

This section provides a synthetic overview of the relative performance of the country, and where relevant, main regions, with respect to the EU25 average for a number of selected key structural indicators of innovation and knowledge. The analysis aims to identify **main disparities and needs** at national, and wherever possible, regional level with a view to supporting the definition of priorities for future Structural Funds interventions (see sections 5 and 6 of this report).

2.1 Country overview: innovation and the knowledge economy

Exhibit 1 below provides a snapshot picture of the relative position of Romania compared to the EU-25 average for a series of key knowledge economy indicators. Some of these indicators will be briefly discussed below.

Exhibit 1: Relative country performance for key knowledge economy indicators



Source: calculations of MERIT based on available Eurostat and national data from 2002-2003 depending on indicator. Detailed definitions and data for each indicator are provided in Appendix B.

The positive values of the **GDP per capita** reflect Romania's economic performance over 2000-2005. The GDP per capita in PPS (EU25=100) recorded a notable growth from 24.9 percent in 2000 to 32.9 percent in 2005, with a real growth rate of 8.3 percent in 2004 and 4.1 percent in 2005, due to the negative impact of floods. Much of the GDP growth was due to the increasing internal demand and the foreign direct investment, significantly boosted by the reduction of personal and company income taxes in 2005, once with the introduction of the flat tax of 16%.

The **foreign direct investment** flows increased from 1.4 percent in 2000 to 1.7 percent in 2003, reflecting a growing interest of foreign partners for Romania. For instance, since 2004, FDI flows have more than doubled compared to 2003.

Labour productivity per person employed also marked a positive trend, from 27.9 percent in 2000 to 36.6 percent in 2005, as a result of non-inflationist reform measures adopted as of 2001, downsizing and investment in modern technologies, especially in industry. Despite this, the labour productivity values still remain very low compared to the EU average, accounting for only 35.3 % of the EU25 average in 2004.

The **unemployment rate** increased, from 6.8 percent in 2000 to 7.7 percent in 2005, and was mainly caused by restructuring and downsizing in industry and migration of rural workers to urban regions, especially towards the services sector. In 2004, a significant rise of 6.2% was recorded in services employment, especially in trade, tourism and services provided to companies (including real estates), as well as in constructions.

The **unemployment rate** has decreased from 8.4 percent in 2002 to 5.9 percent in 2005. Also, **inflation** has significantly decreased over the past six years, from 45.7% in 2000 to 8.6% in 2005, the lowest level since the beginning of the transition. This trend also continues in 2006. The projected inflation target is set for 6.6% for 2006 and 4% for 2007. . In spite of the notable declining trend of inflation in recent years, Romania continues to record, next to Turkey, the highest inflation rate among EU members and candidate countries. This is the consequence of a complex mix of internal and external factors, notably the soaring prices of imported raw materials (oil, natural gas, wheat) with direct effects on consumption prices (energy, fuel, transport), early application in 2005 of modified excise taxes agreed with the EU, strong variations on the agro-food market as a result of floods and bad weather conditions.

With regard to **public R&D,** the picture can be looked at from different perspectives:
- The level of **R&D expenditure** in Romania depends on the execution sector (enterprise, government, tertiary education, private non-profit sector) and the funding source (economic units, public funds, university public funds, higher education units, non-lucrative institutions). In absolute numbers, the total R&D expenditure grew over 2000-2003, both by funding source and by execution sector. By funding source, the R&D expenditure provided by public funds and by economic units were relatively similar, while other funding sources like university public funds or non-lucrative purpose institutions recorded very low figures. By execution sector, the R&D expenditure in the enterprise sector largely outweighed other sectors like the government or the higher education sectors.

In terms of GDP weights, the total R&D expenditure recorded a slight growth from 2001 to 2003. By execution sector, the GDP weight of R&D expenditure in the enterprise sector was higher than in other execution sectors, like the government and higher education sectors, while, by funding source, the GDP weights of economic units and public funds were relatively similar. In 2003-2005, the public R&D expenditure recorded a slight growth from 0.22 percent of the GDP in 2003 to 0.26 percent of the GDP in 2005. For 2005-2010, the GDP share of R&D expenditure is projected to grow from 0.26 percent in 2005 to 1 percent in 2010 (with intermediate estimated shares of 0.38 percent in 2006, 0.56 percent in 2007, 0.75 percent in 2008 and 0.93 percent in 2009), as part of the national efforts to diminish the gap to EU countries in terms of R&D funding, and in order to meet the Lisbon Strategy requirements for 3 percent of GDP (1 percent from public funds and 2 percent from economic units).

- R&D personnel – the total number of R&D personnel amounted in 2004 to 57,725, of which 27,253 researchers (including 8,421 PhDs) (National Institute of Statistics, 2006), accounting for about a half of the R&D personnel in the early 1990s. The average number of researchers/1000 employees was 3.13 in 2003, compared to 5.4 in the EU, while the average number of R&D personnel/1000 civil occupied persons was 4.81, compared to the EU average of 13.8 (Ministry of Education and Research, 2006). After a dramatic decline throughout the 1990s, the total number of R&D personnel started to grow again 2001-2004. The breakdown of the total number of R&D personnel by performing sector, scientific field and group age different criteria shows some significant trends:

- *By performing execution sector:* the highest concentration of R&D personnel is remarked in the enterprise sector, followed by the government and the tertiary education sector;
- *By scientific field:* the highest concentration of R&D personnel is remarked in the engineering and technological sciences, followed at great distance by the natural and exact sciences, and agricultural sciences, social sciences and humanities. This reflects the predominantly applied character of R&D in the country and the comparatively lower focus on agricultural and socio-humanistic research.
- *By age group:* a significant decline in the number of researchers in all age groups over 1995-2000 and a slight growth over 2001-2003, which suggests that the declining trend in the share of researchers in the total active population has come to an end. This is a positive development that will hopefully compensate the dramatic decline in the share of young researchers and the worrying process of brain drain and ageing of the R&D personnel, which has been accelerated by the internal economic conditions (low wages, outdated and often inappropriate research equipment), as well as the opportunities for professional advancement offered by Western countries, especially the US.

- Innovative profile of Romanian companies – this is characterised by an overwhelming majority of non-innovator firms (about 83%), the highest percentage of non-innovator firms among all countries examined. About 10% of firms are intermittent innovators, about 3% are strategic innovators and a very small percentage of firms are adopters and modifiers (European Innovation Scoreboard 2005). These indicators show a very low innovative capacity of the country, explained by the early

development stage of innovation infrastructure and diffusion mechanisms that slows down considerably the pace of economic development. Similarly, the 2003 Innovation Survey carried out by the Romanian National Institute of Statistics for the 2000-2004 period according to the Eurostat methodology (CIS 3) revealed that innovative firms account for 17% of the total number of active firms in the country, about 16% of the workforce and about 42% of the total turnover of active firms. Innovative firms are predominantly SMEs (83.4%) and operate mainly in industry (73%), while the rest are active in services (trade, real estate, transport and communications). The survey also highlighted a very low level of public funding of innovation, with only 10% of innovative firms receiving funding, and very low levels of innovation expenditures – around 3% of innovative firms' turnover. Equipment acquisition accounted for the highest share in innovation expenditure - about 53.4%, followed by R&D activities - about 24.5%. The highest concentration of innovating firms was found in the Bucharest Region (848 firms). These figures show that, although significant progress has been made in order to foster innovation culture and consolidate the innovation framework, further measures are needed to increase application of R&D results by business and to turn innovation into a driver of national competitiveness.

The picture provided by these key knowledge economy indicators reflects several weaknesses that need to be addressed in order to improve the national innovation system:

- Insufficient financing of R&D and innovation;
- Outdated R&D Infrastructure;
- Few links between research and business;
- Insufficiently developed R&D and innovation infrastructure and technology transfer services;
- Declining numbers of skilled R&D personnel, due to low salaries and poor level of infrastructure;
- Lack of innovative companies;
- Low international scientific collaboration; and
- Low supply of S&E graduates.

A key point to note is that the Structural Funds operational programmes have been elaborated before the approval of the National RDI strategy, which is expected to be ready by the end of 2006.

2.2 Regional disparities and recent trends

In order to analyse and describe the knowledge economies at regional level in the EU, the approach adopted was to reduce and condense all relevant statistical information available for as many regions as possible. The approach involved firstly reducing the information from a list of selected variables into a small number of factors by means of factor analysis. These factors are:

- Public Knowledge (F1): human resources in science and technology combined with public R&D expenditures and employment in knowledge intensive services is the most important or common variables in this factor. Regions with large universities will rank high on this factor.
- Urban Services (F2): The most important variables for this factor are value-added share of services, employment in government administrations and population density. A key observation is that academic centres do not necessary co-locate with administration centres.
- Private Technology (F3): This factor is most strongly influenced by business R&D, occupation in S&T activities, and employment in high- and medium-high-tech manufacturing industries.
- Learning Families (F4). The most important variable in this factor is the share of the population below the age of 10. The Learning Families factor could also be interpreted as an institutional factor indicating a child-, learning- and participation- friendly environment, or even a 'knowledge-society-life-style' based on behavioural norms and values that are beneficial to a knowledge economy.

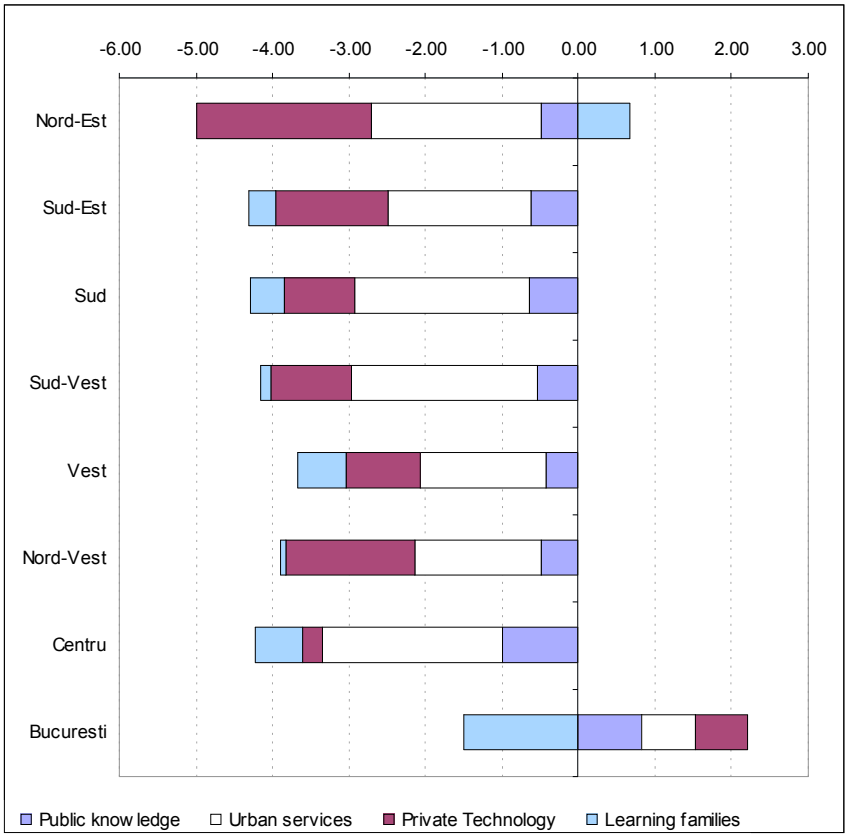
In a second step, the 200 plus EU27 regions were grouped into 11 types of regions (see appendix A) displaying similar characteristics by means of a cluster analysis.

The cluster analysis was applied to the eight Romanian development regions illustrated below: North–East, South–East, South–Muntenia, South-West Oltenia, West–Romania, North–West, Centre and Bucharest–Ilfov (Capital). Each region includes up to seven counties, associated on a voluntary basis (the total number of counties is 41, plus Bucharest municipality, corresponding to the NUTS 3 level). The regions are territorial units defined for the formulation and implementation of regional development policies and more efficient use of financial and human resources, and do not have administrative status.

The survey classified the eight Romanian regions into two distinct categories, based on 2001-2003 Eurostat figures:

- **Bucharest-Ilfov (the Capital region)** showed a number of distinctive features compared to the other Romanian regions and was included in the "**Aging Academia**" cluster, next to some East-Germany and Spain regions and also the capital of Bulgaria. This cluster is characterised by a strong Public Knowledge factor, which is mostly based on the high share of people with tertiary education. In addition, it presents a low score on the Learning Family factor, due to little lifelong learning and hosting relatively few children.
- The other seven Romanian regions have been included in the "**Rural industries**" cluster, which is characterised by a low GDP per capita, and low scores on both Urban Services and Private Technology factors. Population density is very low as well. The service sector is often very small, while agriculture, in particular, but also manufacturing industries are relatively large sectors.

Exhibit 2: Regional factor scores per region



Source: MERIT. The bars are stapled factor-scores showing the deviation (1=standard deviation) per factor from the average of 215 EU regions (0.00). The longer the bar, the bigger is deviation. Detailed regional scorecards can be found in Appendix B.

The inclusion of the latter seven Romanian regions into one single cluster performed in the EU clustering based on the four factors does not reflect their inter- and intra-regional disparities, differentiated economic trends and potentials, arising mainly from the regional economic structure. These regional disparities are important, especially as they intensified over recent years, compared to the beginning of the transition period, when Romania had a low level of regional disparities compared to the EU countries or other Accession and Candidate Countries.

Intra-regional disparities are still very important in all development regions, displaying a 'mosaic structure' that suggests a low regional integration of economic mechanisms. Intra-regional disparities have deepened in recent years due to economic restructuring and unemployment generated by the closing down of loss-making state enterprises, particularly in mono-industrial zones, as well as a result of inappropriate fiscal policies.

Inter-regional disparities are rather low compared to the EU in absolute terms, while in relative terms they are comparable to those in Portugal and the Netherlands. In terms of inter-regional disparities, the much more dynamic economic growth of the Bucharest-Ilfov (Capital Region) compared to the other regions makes one of the most striking features of Romania's regional development over the last ten years. Similar developments have taken place in other transition countries, but the gap

between the capital and the other development regions in Romania is much higher, given the larger population and territory of the country. Bucharest accounts for 5.4% of the country's population, 21% of the GDP, 51.1% of FDI and 20% of domestic SMEs, and provides the best opportunities for R&D. As a result of the low regional economic integration, the development opportunities of the Bucharest-Ilfov region have not been significantly extended in the neighbouring areas, the capital being surrounded by some of the most underdeveloped counties of the country.

Similarly, few economic links exist between other urban centres and neighbouring areas, although Romania has a dense urban area network which could provide potential poles of regional economic growth. The lack of correlation between development models of the respective urban and surrounding areas, as well as the poor transport infrastructure have contributed to these disparities. As result, the regional labour market is almost inexistent, which explains the migration of laid-off workers from mono-industrial towns towards rural areas of the same county or to Bucharest, and much less towards other urban areas of the same region. Local labour markets have only started to develop recently as consequence of increasing specialisation of processing industries, and have increased the demand for professional training and sustained monitoring to assess possible regional effects. In fact, it appears that the economic growth has evolved on a West-East direction, driven by the proximity to Western markets, so that the most under-developed areas are concentrated on the North - East and South border. Underdevelopment is strictly correlated with unemployment and predominance of rural areas, the incapacity to attract FDI and inappropriate fiscal policy mechanisms, and has deepened over the recent years due to the dramatic decline of public expenditure for infrastructure and basic public utilities.

Given the significant regional disparities, a more in-depth analysis is required to identify regional needs and development potentials. To this end, the eight Romanian development regions will be divided into the following four categories that will be discussed in detail below:

- **Capital Region**
- **Leading Knowledge Regions**
- **Industrial Region**
- **Lagging Behind Regions**

The Capital Region (Bucharest-Ilfov) ranks first with respect to all key knowledge economy indicators. It contributed 21 percent to the national GDP in 2002 and attracted 53 percent of FDI flows in Romania until 2003. The Capital Region hosts more than double of SMEs in per capita. The regional economy is dominated by the service sector, which accounted for 66.4 percent in 2004. The Capital Region is the most important industrial agglomeration in Romania. The restructuring in this sector resulted in a migration of the labour force over 1995-2003 to the services sector. One of the main features of the region is the high development of the ICT and financial sector, and one IT cluster was created by grouping several IT firms. The human capital is generally well qualified. Bucharest is the largest University Centre in Romania, supplying an important number of S&E graduates. The capital region hosts about 40 percent of the R&D institutions and 51 percent of R&D personnel in Romania (National Institute of Statistics, 2004). The Capital Region is characterised by a low level of unemployment. The poor performance in the "Learning Families"

can be explained by a lower percentage of young population compared with the other regions.

The Leading Knowledge Regions consist of the West and North West Regions. They are characterised by a relatively good innovation and knowledge potential and a more dynamic economic sector than the five remaining regions. The regional contribution to national GDP in 2002 was 12% for the North West and 10% for the West Region. Moreover, the North West regional indicator has improved since 2004 when high FDI-driven growth in Cluj County started to boost the regional economy. After Bucharest-Ilfov, the West Region is leading in terms of attracting FDI. The North-West Region has increased the rate of attracting FDI over the past three years. The number of SMEs per capita is above the Romanian average in both regions and the value of this indicator has increased over the period 1998-2003.

The economic structure of these two regional economies is dominated by Machinery and Electrical equipments; Chemical industry; Wood and furniture industry; ICT; Food industry and Textile industry. Steel industry is present in the West Region in the less developed counties. However, the service sector provides a higher contribution to regional GDP than the industrial sector. The population engaged in agriculture is higher in the North West than in the West Region.

Besides Bucharest, Cluj-Napoca and Timisoara are the main university centres in Romania and the major knowledge cities in North-West and West Regions, respectively. The regions are characterised by the second largest graduates supply after Bucharest, with an important number of well-qualified S&E graduates, particularly from the Timisoara and Cluj university centres. This group of regions has an important number of research institutions and very good quality of human capital. While the collaboration between academia and business works well in Cluj-Napoca and Timisoara with foreign companies, the same does not apply for domestic SMEs. Both Timisoara and Cluj-Napoca University towns are currently hosting IT clusters, and a solar energy cluster is about to be created in Cluj-Napoca.

In terms of innovation and knowledge infrastructure, the regions lag behind Bucharest in terms of Business Incubators and Science and Technology Parks. While the number of industrial parks increased, S&T Parks are in an incipient phase. This group of regions has a relatively high potential for R&D and innovation in the Romanian context.

The Industrial Region or Centre Region is characterised by a complex industrial structure, a regional industrial tradition and qualified labour force in industry. Moreover, FDI is one of the main factors of the regional development. The region had the highest contribution to the national GDP in 2002 after Bucharest-Ilfov with 13 percent, and contributed in the same extent to the GDP per capita. In 2000 the Centre Region ranked third in Romania in terms of FDI per capita after Bucharest-Ilfov and the West Region. The SMEs per head indicator is above the Romanian average and presents a positive trend over the recent years.

The majority of regional population works in industry and services. The main industrial regional branches are metal and machinery industry, chemical and pharmaceutical, aeronautical, construction materials, textile, wood and furniture, and

food industry. The Centre Region has the highest number of industrial parks in Romania, created by the transformation of former industrial platforms into industrial parks and not by creation of new infrastructures.

The main difference between the Centre Region and the Leading Knowledge Regions is the lack of prestigious university centres, with the exception of a good University of Medicine and Pharmacy in Targu Mures and a well-known Forestry Faculty and Technical Faculty in Brasov, The lower supply of S&E graduates causes a limited potential for R&D and innovation in the region.

The Lagging Behind Regions include the South, South-East, South West and North-East Regions. These regions are characterised by a high proportion of the active population working in agriculture and a low SME per capita indicator. The regional contribution to the national GDP in 2002 ranged between 9 percent in the South West Region and 12 percent in the South and North-East Regions, with an 11 percent contribution of the South-East. The GDP per capita values in 2002 reflect the lower development of these regions compared to those discussed above. The GDP per capita was only 9% in the North-East Region and the 10% in the other remaining three regions in this group, and the trend persisted over the recent years.

In 2004, the industrial production recorded higher growth rates in the South and South-West regions compared to the other regions. Nevertheless, important FDI investment is concentrated in a small number of cities such as Constanta, Pitesti and Craiova. The lower entrepreneurship spirit of those regions is explained by a low percentage of SMEs per head, which is the lowest in the North-East Region (In 2003, 65,9% of the average in Romania). The South and South-West regions are relatively similar with around 70% of SMEs per head of the Romanian average. In this group of regions, the South East region leads concerning this indicator but with only 94,2 % of the Romanian average. Another feature also is the negative trend regarding SMEs per head in this group of regions.

Although agriculture accounts for an important share of the regional economy, industry has also an important role in various cities. However, the economic profile varies across the regions of this group. The North-East region is characterised by the presence of manufacturing industries, such as furniture, wood, textile and machinery. In addition, Iasi, the main city of the region, hosts the fourth largest university centre in Romania, after Bucharest, Cluj-Napoca and Timisoara, which ensures a good supply of S&E graduates. The South-East region is characterised by heavy industry, which managed to stop its decline due to large FDI inflows, wood, textile industry and oil processing, with a positive impact on the regional economy. In addition, the South-East Region also has an important tourism sector, particularly on the Black Sea Coast. The South region is divided between the Industrialised North and the South, which includes the poorest counties in Romania. The Northern part of this region is characterised by the chemical and oil industries, as well as machinery and equipments, construction materials, textile and food industry. The industrial poles of the region are concentrated in Ploiesti, Pitesti and Târgoviste cities. In the South-West region the industrial poles are located in Craiova, and the main regional industry is represented by machinery, chemical and energy production.

The table below highlights some recent trends underlying the classification of the Romanian regions.

Exhibit 3: Recent trends per region in key indicators

Regions	Region Code	Unemployment 1996-2003 %-pnt ch.	Per capita GDP 1996-2002 % growth	Industry share 1996-2002 %-pnt ch.	Agriculture share 1996-2002 %-pnt ch.	Population density 1996-2002 % growth	Tertiary education 1999-2002 %-pnt ch.	R&D intensity 1996-2002 %-pnt ch.
EU25		--	--	--	--	--	--	--
Romania		1,40	6,56	-4,12	-7,52	-3,48	1,27	--
North-East	RO01	-0,10	3,78	-3,90	-3,77	-1,17	1,26	--
South-East	RO02	1,70	2,63	-1,05	-5,77	-2,79	0,59	--
South	RO03	2,10	4,89	-2,78	-8,24	-3,83	0,93	--
South-West	RO04	0,70	3,46	0,57	-10,78	-3,61	0,65	--
West	RO05	0,00	8,30	-1,66	-9,34	-5,86	0,56	--
North-West	RO06	1,30	6,18	-2,61	-8,98	-4,04	1,38	--
Centre	RO07	0,60	7,01	-3,15	-6,68	-4,35	1,01	--
Bucharest	RO08	5,50	13,00	-10,95	-1,38	-4,48	3,86	--

Source: MERIT based on Eurostat data for the indicated period.

It can be noted is remarked that the highest economic growth over 1996-2002 emerged in the Bucharest-Ilfov Region, followed by the West, Centre and North-West Region, while the Lagging Behind regions recorded much lower GDP growth rates. The industrial sector has a negative trend in all the regions with the exception of South-West Region, which can be explained by a restructuring process in the industrial areas in the whole country. The region most affected by the restructuring is the North-East Region. The Centre region also experienced a strong decline of the industrial sector, but that was balanced with an increase in the construction and services, which was not the case in the North East region. The population employed in agriculture decreased over the period 1996-2002 in all Romanian regions. Population density has a negative trend due to the immigration process, which was more intense in the West part of Romania and Bucharest.

2.3 Conclusions: innovation and knowledge performance

Exhibit 4: Summary of key disparities and needs per region

Region/group of regions	Key factors explaining disparity of performance (weaknesses)	Key needs in terms of innovation and the knowledge economy
The Leading Capital Region (Bucharest-Ilfov)	• Poor performance in the "Learning Families" • High concentration of R&D units in a large number of domains	• Incentives for increasing the number of S&E graduates • Focusing on fewer R&D fields where it could be created a critical mass
The Leading Knowledge Regions (West Region and North West Region)	• Lack of innovation infrastructures; • Lower public expenditure on R&D	• Incentives for strengthening the cooperation between businesses and between business sector and research institutions • Improving the knowledge for attracting more public R&D funding
The Industrial Region (Centre Region)	• Lack of S&E graduates supply • Lack of cooperation between large companies and SME	• Incentives for strengthening the cooperation between business sector and regional universities on one hand with the famous universities from Timisoara and Cluj-Napoca on the other hand. • Incentives for creating clusters
Lagging behind regions (South, South-East, South-West and North-East)	• High percentage of agriculture sector • Concentration of industries in few towns	• Diversification of agriculture and tourism towards more value added rich activities • Improving innovation and knowledge around Iasi University Centre • Incentives for creation of networks of suppliers for the large companies

3 Innovation and knowledge: institutional context and policy mix at national and regional levels

Structural Fund support for innovation and knowledge is contingent on and seeks to strengthen the existing national (and/or regional) innovation system in each Member State. In particular, institutional, legal and financial factors in the innovation system can limit the potential for certain types of intervention. Moreover, within the framework of the EU's "Lisbon objectives", Structural Fund interventions are expected to complement and provide added value to national (or regional) policy framework. In some Member States, Structural Fund interventions in favour of innovation and knowledge are marginal with respect to the national investment and policy effort, in others Structural Funds provide a main source of funding for such interventions. In both cases, there is a need to identify relevant national and EU policies that can have an impact on decisions on funding priorities.

3.1 Institutional and legal framework for innovation and the knowledge economy

This section of the report appraises two broad factors that condition the potential for coordinated intervention of EU and national (regional) policies in favour of innovation and knowledge:

- The first concerns the organisational structures of public and semi-public bodies responsible for the design, implementation and monitoring of innovation and knowledge economy policies. In particular, the analysis considers the responsibilities for funding or managing specific types of measures liable to be considered for support under the Structural Funds;
- The second concerns the institutional, legal and financial frameworks, which condition the linkage of national (regional) financing with EU financing.

The RTDI governance is centralised and a correlation of national polices with the re-launched Lisbon Strategy is ensured by a secretary of state within the Ministry of European Integration. The regional institutions involved in RTDI are more advanced in the famous university centres and with a lower extent in the other regions.

The main institution in charge with designing, implementing, monitoring and evaluation of R&D and Innovation policy is the Ministry of Education and Research (MER), through the National Authority for Scientific Research (NASR), headed by a president who also is a secretary of state. Its main objective is to harmonise national R&D and innovation policy with the EU trends and in particular with the Lisbon Strategy. The NASR also is responsible for the elaboration of the National RDI Plan. It also assumes a role of coordinator since it chairs the Inter-ministerial Council for STI, which ensures the correlation of RTDI policies with other government strategies and programmes.

Currently, the National Scientific Research Council of Higher Education (NSRCHE) and the Executive Agency for Higher Education and Research Funding (EAHERF) coordinate the National RDI Strategy for the period 2007-2013 within the National Foresight Exercise. The project is scheduled to be finished by the end of 2006. The coordination of the National Reforms Programmes for the Lisbon Strategy is ensured by the Ministry of European Integration through a Secretary of State. Moreover, there are two consultative committees for the elaboration of RTDI policy. The former, the

National Council for Science and Technology Policy has the main mission to establish the National Strategy on Scientific Research and Technological Development and to create the legislative framework for implementing RDI activities by leading broad consultation and cooperation between the main stakeholders involved in formulating and implementing RDI policies. It is headed by the Prime Minister and it is composed of eight ministers and the President of the Romanian Academy. The latter, the Inter-ministerial Council for STI ensures the correlation of RTDI policies with other government strategies and programmes.

The process of formulation, elaboration and implementation of RTDI programmes is supported by the consultative body to the Ministry of Education and Research. The Advisory Board for R&D and Innovation includes the most representative personalities of the S&T community (R&D institutes, universities, industry, services), The National Scientific Research Council of Higher Education is composed of Higher Education representatives involved in research having six committees divided by specialised fields. It is a consultative body of the Ministry of Education and Research and ensures the liaison with the Higher University Research Community in the process of allocation of R&D funds for universities as well as evaluation of research performance and the Social Dialog commission which ensures the consultation with the association of employees and companies from the R&D sector.

The Romanian Academy has a special role in taking strategic decisions, the design and implementation of R&D policies as well as the national R&D programmes. The academy of science and the specialised agencies coordinates a network of 65 research institutes and centres and conducts its own research programmes. Under the supervision of several Ministries, there are different categories of public research institutions**:** National R&D Institutes in 15 research fields, coordinated by 8 different ministries, 18 of which are co-ordinated by the MER-Research; Academy of Medical Sciences: 23 institutes and research centres; Academy of Agriculture and Forestry Sciences 25 institutes and research centres; National Agency for Atomic Energy; Romanian Space Agency (ROSA); Universities (56 public, 18 private universities).

Within the Ministry of Education and Research, there are two bodies with role of funding agencies: the National Centre for Programme Management in order to co-ordinate and optimise the management of RDI programmes and projects. It currently manages three programmes of the National RDI Plan (i.e. CORINT, BIOTECH and INFOSOC) and the Executive Agency for Higher Education and Research Funding, which finance R&D university, programmes.

Concerning the regional and local level, the institution, which have the attributes to be involved in the regional RTDI policy are the Regional Development Agency, the County and Local Council. However, only the RDAs have modest capacities to input to the development of innovation and knowledge policies. This is due to the legal framework which is not in favour of developing regional policies and the lack of support for strengthening the regional programming capacity.

The main public R&D and innovation funds providers are the Ministry of Education and Research through the National Agency for Scientific Research and the National Scientific Research Council of Higher Education. In addition to this, the Romanian Academy finance research programmes in mainly in natural, exact and socio-humanistic sciences.

Exhibit 5: Main organisations per policy area

	Type of organisation	
Policy objectives	**National (and/or regional) public authorities and agencies**	**Key private or non-profit organisations**
Improving governance of innovation and knowledge policies	• National Agency for Scientific Research (Ministry of Education and Research) • Romanian Academy • Secretary of State in charge with the Lisbon Strategy (Ministry of European Integration) • Ministry of European Integration • Ministry of Economy and Commerce • Ministry of Finance • Ministry of Communication and Information Technology	• Regional Development Agencies • Chambers of Commerce
Innovation friendly environment	• National Agency for Scientific Research (Ministry of Education and Research) • Ministry of European Integration • National Agency for Small and Medium Sized Enterprises and Co-operatives • Ministry of Labour, Social Solidarity and Family • Ministry of Communication and Information Technology	• Apart from the commercial banks, there are no major venture capital or seed capital organisations supported via public policy • Four private venture capital organisations are listed as members of the EVCA.
Knowledge transfer and technology diffusion to enterprises	• National Agency for Scientific Research (Ministry of Education and Research) • National Agency for the Partnership between Universities and Socio-Economic Environment (Ministry of Education and Research) • National Agency for Small and Medium Sized Enterprises and Co-operatives	• 7 S&T Parks in different regions of the country. • 10 Technology Transfer Centres (e.g. SC TT&I Centre SA Iasi, CENTI Cluj-Napoca, CENTAISIM Timisoara, ICPE-CA Bucharest, CTT-AVANMAT Bucharest, CTT-Baneasa Bucharest) • 9 Technology & Business Incubators • 4 Technology Information centres (e.g. CENTIREM Bucharest). • Over 50 Business Innovation Centres – initiated and funded by MER as 'Business Incubators centres' and subsequently widened based on private funding in support of regional development. • The Innovation Relay Centres Network. (two IRCs co-ordinated by the Ministry of Education and Research and six regional partners which provide information to SMEs, universities and research organisations). • Industrial Liaison Offices established with PHARE assistance in the framework of the "S&T Restructuring System" Programme that stimulates technology transfer and quality management
Innovation poles and clusters	• National Agency for Scientific Research (Ministry of Education and Research)	• There are no institutions within this area

	Type of organisation	
Policy objectives	**National (and/or regional) public authorities and agencies**	**Key private or non-profit organisations**
Support to creation and growth of innovative enterprises	• National Agency for Scientific Research (Ministry of Education and Research) • National Agency for Small and Medium Sized Enterprises and Co-operatives	• 7 functional S&T Parks in different regions of the country (e.g. Software Park Galati, Softex Braila, CyberLAB Slobozia, Software Park Brasov, Minatech-Ro Bucharest). • 9 Technology & Business Incubators (e.g. SC IPA SA - CIFATT Craiova, CETI-ITA UPB Electronic Centre Bucharest) • Over 50 Business Innovation Centres – initiated and funded by MER as 'Business Incubators centres' and subsequently widened based on private funding in support of regional development.
Boosting applied research and product development	• National Agency for Scientific Research (Ministry of Education and Research) • Romanian Academy	• 34 National R&D Institutes in 15 research fields co-ordinated by eight ministries. About 72% of the R&D organisations are specialised in technological research in nearly all the processing industries, while about 28% are specialised in scientific research. • 227 public research institutions, subordinated to MER, other ministries, the Romanian Academy and the Academy for Agricultural and Forestry Sciences • 15 R&D institutes operating on the basis of the Government Decision 100/1991 which are in a re-organising process according to the legal norms in force; • 310 joint-stock public or private companies having R&D as main object of activity

Source: Study team based on national/regional policy documents, TrendChart reports, OECD reports, etc. See appendix C for a detailed definition of the policy categories.

3.2 Policy mix assessment

This section provides a summary overview and analysis of the national and regional policy mix in favour of innovation and knowledge in which the Structural Fund interventions take place. The analysis is conducted with respect to seven broad categories of objectives of innovation and knowledge policies (see appendix C for an explanation of each category).

Measures identified per category of the policy objectives are then further sub-divided in terms of the direct beneficiaries of funding (or legislative) action. To simplify, the report adopts three broad types of organisation as targets of policy intervention:

- Policies supporting academic and non-profit knowledge creating institutions;
- Policies supporting intermediary/bridging organisations involved in innovation support, technology transfer, innovation finance, etc.;
- Policies supporting directly innovation activities in private sector.

The matrix below summarises the current policy mix in at national level. A simplified coding system is used with intensity of support (financial or political priority) for different policy areas and targets indicated by a colour coding system.

Exhibit 6: Policy mix for innovation and knowledge

	Target of policy action		
Policy objectives	**Academic /non-profit knowledge institutions**	**Intermediaries/bridging organisations**	**Private enterprises**
Improving governance of innovation and knowledge policies			
Innovation friendly environment			
Knowledge transfer and technology diffusion to enterprises			
Innovation poles and clusters			
Support to creation and growth of innovative enterprises			
Boosting applied research and product development			

Legend:

Top policy priority	**Secondary priority**	**Low priority**

Source: calculations of study team based on national/regional policy documents, TrendChart reports, OECD reports, etc.

Improving governance of innovation and knowledge policies.

The only policy objective identified within this area is the "Strengthening the Institutional Capacity "of the public institutions which have a role in designing and implementing the R&D and innovation policy. This objective is clearly mentioned in Chapter 6 dedicated to R&D and Innovation policy within the **Government Programme 2005-2008**. At the regional level there are not any policy objectives linked with this area due to the lack of understanding of regional politicians of R&D and innovation policy.

Hence, the National Agency for Scientific Research (Ministry of Education and Research) appointed a consortium in order to elaborate the **National Strategy for R&D and Innovation over the period 2007-2013** which is expected to be ready by the end of 2006. On the other hand, the West Regional Development Agency has already elaborated a Regional Innovation Strategy (RIS). However, there are no budgetary means available to finance the measure identified in the strategy. The RIS for the other regions with the exception of Centre and South-West regions are currently in the process of elaboration. The National Strategy for R&D and Innovation should become, if well elaborated, a very useful document for measure identification. The financing priorities in the Operational Programmes for the period 2007-2013 are already identified. However, it seems that the measures and priorities are identified before the elaboration of the strategy, which is a contradictory process.

Innovation friendly environment

The main policy objective in this policy area is the *encouragement of the private sector involvement in R&D.* This objective is included in the 2005-2008 Government programme, and several measures have been defined to this purpose, such as:

- Implementation of co-operation mechanisms between regional technology transfer centres, entrepreneurial management centres and business incubators to facilitate the dissemination of information on research and innovation and the technological transfer to economy, especially to SMEs;
- Implementation of a programme for the development of a National Risk Capital Fund for R&D and Innovation. The fund will be initially based on state capital from the state and will be further developed with private funds;
- Evaluation of private sector RDI needs in order to facilitate thematic planning at national level;
- Consideration of RDI expenditure as fiscally deductible expenditure.

However, very little progress has been marked towards the implementation of these measures and in the overall business environment, there are few actions that contribute to improving the innovation friendly environment.

The 2005-2008 "Research of Excellence" Programme adopted in May 2005 by MER aims at supporting collaboration between R&D units, universities and firms, especially on "Human resources development for training, mobility of researchers and increasing attractiveness of research carriers". Moreover, two other programmes of the National RDI Plan, i.e. CALIST National Programme for Quality and Standardisation (Services) and INFRAS National Programme aim to consolidate the standardisation and quality infrastructures (Infrastructures). ICT diffusion is promoted through several projects monitored by the Ministry of Communications and Information Technology, especially in the area of e-government. Advanced e-business

and e-government applications are developed through the "Knowledge-Based Economy" project financed by the World Bank loan.

The Multi-annual funding programmes for SMEs 2002-2005 provide a general framework for several entrepreneurship and enterprise creation promotion programmes (not innovation related), namely targeting young people and SMEs and micro-enterprises. PHARE project 'Support Services for Business Development' launched on 24 October 2005 aims to facilitate access for Romanian SMEs to consultancy services in order to help them increase their competitiveness in view of the country's accession to the EU.

Knowledge transfer and technology diffusion to enterprises

The main policy focus within this policy area is *to stimulate the technology transfer from public and academic R&D centres towards enterprises*. The objective was also included in the 2005-2008 Government Programme and several measures have been defined for its implementation, including:

- Evaluation of economic strengths and weaknesses based on a competitive advantage model, in order to define basic and applied research priorities. In this respect, RDI project assessment will take into account the development of regional industrial clusters and development needs;
- Correlation of Romania' s RDI policy with industrial policy;
- Setting up a national network for the dissemination of RDI results and stimulation of technology transfer. In a first stage, regional centres of technology transfer in the private sector (through NGOs) will be created, followed, in a second stage, by technology transfer centres within Universities, subject to the structure of non-profit organizations;
- Implementation of an advanced technologies programme, to encourage research and technology transfer in the respective areas and to increase their international competitiveness;
- Diversification of RDI funding mechanisms, by setting up a special National Fund for RDI credit guarantee, and an investment fund for R&D oriented SMEs.
- Setting up S&T Parks in traditional University centres with R&D infrastructure

The main funding instrument in this area is MER's INFRATECH Programme for the development of innovation and technology transfer infrastructure approved in February 2004. It consists of two sub-programmes: one for the development of technology transfer centres, technology information centres, Industry Liaison Offices, etc. and another one for the development of S&T Parks and Technology and Business incubators. In addition, the Industrial and Software Parks Programme (2002-2005) led to the creation of five Industrial and Software Parks. The programme is an attempt to stimulate regional and local development by attracting companies able to generate high added value involved in software development products. However, the programme had a limited impact in achieving its objectives.

Innovation poles and clusters

The main policy objective within this policy area is also *the stimulation of technology transfer*, having as main policy measure the evaluation of the existence and evolution of industrial clusters, as well as of their development needs. Another policy measure, under the policy objective *Strengthening the Institutional Capacity Building*, is the

creation of consortia between university/research institutions and private companies, which is addressed in MER's recent programme Excellence Research.

Support to creation and growth of innovative enterprises

This objective is addressed by the National Agency for SMEs and Co-operation, which provides funding for SMEs' investments in priority sectors through the National Programme 2002-2004 for supporting investment realised by start-ups and SMEs investment in new technologies. However, the programme does not focus exclusively on innovative companies. TransIno Programme provides technical assistance for development of innovative companies and training for the creators of "innovative companies". Infratech programme also provides funding for the creation of business incubators.

Boosting applied research and product development

Another policy measure, under the policy objective *Strengthening the Institutional Capacity Building,* is the creation of consortia between university/research institutions and private companies. This policy measure can be seen as a way of boosting applied research and product development. The funding for this policy area is ensured through the programme Excellence Research. The National RDI Plan, launched in 1997 and extended until 2006, includes 14 programmes of which several technology programmes in key technology areas. To that can be added the new "SECURITY Research, techniques and security and defence systems" Programme. Moreover, the "Sectoral R&D Programmes", launched at the end of 2003 are complementing the National RDI Plan with the purpose to support RDI objectives related to the development of sectoral technologies and are managed by different ministries such as Ministry of Economy and Commerce. The CORINT National RDI Programme aims to boost the Co-operation and International Partnership and the participation within FP6.

3.3 Conclusions: the national innovation system and policy mix

The major player of the Romanian National Innovation System is the National Agency for Scientific Research (NASR) within the Ministry of Education and Research (MER), which has the mission to implement the Government Programme in the area of R&D and Innovation by designing, implementing, monitoring and evaluating R&D and innovation policies. In the pursuit of its mission, MER collaborates with a wide range of government agencies or government-subordinated agencies and is supported by various advisory bodies. Most notable is the recent measure to ensure correlation of national RDI policies with the Lisbon Strategy by appointing a Secretary of state in charge with the Lisbon Strategy for the National Reform Programme.

Concerning the public R&D and innovation funding, the major role is played again by the MER and to a lower extent, the Romanian Academy. MER finances several national R&D and innovation programmes included in the National Plan for R&D and Innovation, as well as a few other programmes focusing on different areas of concern for the national RDI capacities. The grants provided by the Romanian Academy cover primarily human sciences agronomy, physics, chemistry, etc.

Exhibit 7: Key opportunities and constraints for investment by the Structural Funds

Policy objectives	Opportunities for Community funding (national priorities)	Constraints or bottlenecks (factors limiting Community funding)
Improving governance of innovation and knowledge policies	• Use the current National Foresight experience to develop Regional Foresight exercises as an integral part of planning. • Include more private actors within the National Foresight exercise for the elaboration of the National R&D and Innovation Strategy • Systematic use of evaluations at various stages of policy planning. • Improve planning and management capacity at the regional level	• Lack of a national strategy for innovation and lack of forward thinking attitudes • Lack of evaluation structures and culture • Bureaucratic management procedures • Low planning capacity of regional authorities. RTDI remains marginal in Regional Policy • Low level of specialisation in the RTDI policy and management.
Innovation friendly environment	• Development of more market driven funding mechanisms such as venture capital, guarantees or loans. • Improve the awareness for using the Credit Guarantee fund • Increase the efficiency and quality of public services by increased usage of ICT • Build entrepreneurship friendly attitudes in schools and universities	• Regulatory environment still considered insufficient. • Introduction of ICT requires an adjustment reengineering of public services • Low awareness and interest of the banking system in co-financing RDI projects
Knowledge transfer and technology diffusion to enterprises	• Enhance technology transfer infrastructure and create mechanisms to commercialise R&D results • Increase funding and staffing in technology transfer institutions and improve quality of provided services. • Promote innovation in processes, services and products through ICT.	• Lack of coherent and professional strategy regarding technology transfer mechanisms. • Low R&D demand by firms • Low management capabilities in SMEs • Lack of qualified personnel • Low visibility of the existing technology transfer organisations
Innovation poles and clusters	• Develop critical mass in sectors active in the poles (e.g. ICT) • Support the alignment of SMEs in supplier networks of big corporations (including multinational companies).	• Low R&D demand by enterprises • Lack of capability of management structures
Support to creation and growth of innovative enterprises	• Facilitate access of newly established firms to business services. • Support organisational and business innovations. • Increasing application of ICT in enterprises.	• Lack of international perspective in SMEs and weak management capabilities. • Due to the transversal nature of most measures they do not sufficiently promote the establishment of new business activities in high value added sectors. • State aid rules are a barrier in providing fiscal incentives to innovative companies
Boosting applied research and product development	• Substantial increase of R&D funding; • Increase public research and business collaboration • Increase international collaborations. • Exploitation of opportunities offered by 7th FP	• Low R&D demand by firms • Low visibility of current funding opportunities in the regions and in particular among SMEs

Concerning the current policy mix, the conclusion is that the policy areas with low priority are Innovation poles and clusters and Support to the creation and growth of innovative enterprises. There are few programmes that support the development of those areas. In general, the current policy mix does not address the major disparities in the national and regional innovation system. However, the elaboration of the National Strategy on RDI 2007-2013 might help in better dealing with these needs.

In addition to this, one major and persistent problem is the lack of correlation between R&D and innovation policy and the industrial and fiscal policy. Therefore, there is an urgent need for correlating these policies by strengthening the cooperation between the institutions involved in their design.

4 Pre-accession European funding to boost innovation and create a knowledge economy: 2000-2006

This section of the report provides an analysis of the patterns of Pre-accession Funds expenditures in the fields of innovation and knowledge-based economy during the current programming period (2000-2006 for EU-15 or 2004-2006 for the new Member States). It examines the patterns from both a strategic point of view (the policy mix pursued by the PHARE programmes) and at an operational level (consumption of funds, management of innovation measures, indications of relative effectiveness of measures, case studies of 'good' practice).

4.1 Strategic framework of PHARE for supporting innovation and knowledge

4.1.1 Strategic approach to innovation & knowledge in PHARE Programme

During 1992-1999, the financial assistance received by Romania from the EU amounted to approx. EUR 1.2 billion. Starting with 2000, the European Council doubled the financial assistance to candidate countries in order to help them reach the pre-accession strategic objectives, and crated new specific instruments to this purpose – the pre-accession structural instruments PHARE, ISPA and SAPARD. During 2000-2003 Romania received an increasing amount of financial assistance, ranging from approx. EUR500 million in 2000 to EUR660 million in 2003. Since 2004, following the European Commission proposal to substantially increase the financial assistance to candidate countries in order to boost accession preparations, Romania has received additional funds of up to 40% in 2006, so that the total funding channelled through the three instruments over 2004-2006 will amount to approx. EUR2.8 billion.

Over 2000-2003 Romania received over EUR 1 billion PHARE funds, allocated through three major channels: (i) National programmes; (ii) Cross-border co-operation (CBC) programmes; and (iii) Specific programmes.

PHARE funds also cover part of Romania's financial contribution for participation in EU programmes and agencies. In 2001, Romania participated in 8 community programmes and paid a total contribution of EUR 35.6 mil., of which over EUR 20 mil. came from the state budget and the rest came from the PHARE funds. In 2002, Romania participated in 16 community programmes and paid EUR38.5 mil., of which EUR 21 mil. came from the state budget and the rest from PHARE funds. In 2003, EUR 18.4 mil. from PHARE funds were paid for participation in commmunity programmes, and in 2004 this amount exceeded EUR 19 mil. (Ministry of Public Finance, 2005).

The Economic and Social Cohesion component of PHARE 2004-2006 will be discussed further, as it is most relevant for the strategic approach to innovation and knowledge in PHARE Programme. Its implementation in Romania is based on the **PHARE ESC Programming Document (PPD) 2004-2006,** prepared by the Romanian government, which promotes a multi-annual regional development policy for the first time since Romania benefited from PHARE funds. The document is based

on the horizontal (regional and sectoral) priorities and measures that were identified in the 2004-2006 National Development Plan (NDP). PPD 2004-2006 was also drawn up in close correlation with the process of the state budget elaboration for 2004 and the budget guidelines for 2005-2006, as well as with the ISPA and SAPARD programmes in order to ensure the coherence and avoid overlapping with the national investment programmes. Therefore, the PPD priorities and measures address the need for a more efficient distribution of the national and EU resources.

The overall *objectives* of PPD 2004-2006 are oriented on three main directions:
(i) To address the regional disparities through investment support in different economic and social fields;
(ii) To support the management and efficient implementation of the 2004 – 2006 PHARE assistance for Economic and Social Cohesion under EDIS;
(iii) To support the development of institutional capacity of the future structures to effectively manage Structural Funds, after accession.

PPD 2004-2006 took into account the rationale and the objectives of the NPD and, on this basis, established the *priorities and measures* to be co-financed under PHARE ESC, as illustrated in the table below:

Priorities PPD 2004-2006	Measures
Priority A: **Improving regional infrastructure to support economic development**	Measure a: Regional and local transport and business infrastructure
Priority B: **Human Resource Development**	Measure a: Tackling structural unemployment Measure b: Improving long term labour market adaptability Measure c: Actively combating social exclusion Measure d; Improving access to education and region specific technical and vocational education and training system
Priority C: **Development of the productive sector through support to SMEs**	Measure a: Support to SMEs, business start-ups and micro-enterprises
Priority D: **Environmental protection at regional level**	Measure a: Improving environmental protection at local and regional level Measure b: SAMTID
Priority E: (horizontal IB) **Building the institutional structures in order to achieve, upon accession, sound and efficient management of EU Structural Funds, and efficient management of programmes under EDIS requirements**	Measure a: Development of administrative capacities for Structural Funds management, out of which: - Support to CSF Managing Authority - Horizontal training for MAs -Expanding the Single Management Information System - Coordination, management and implementation of regional programmes - Support to MET to prepare as Managing Authority - Support to MTCT to prepare as Managing Authority - Support to MoLSSF to prepare as Managing Authority - Support to MEWM to prepare as Managing Authority - Ex-ante evaluation of Operational Programmes

Source: based on 2004-2006 PHARE Programming Document for Social and Economic Cohesion, p. 12

The five priorities and associated measures described above target different needs of the Romanian society, and innovation and knowledge are underlying dimensions in all of them.

Priority A - "**Regional infrastructure to support economic development**" aims to support the decentralization of decision-making and service delivery from the national administration to the local governments. It will put a greater emphasis on the public investment component and on the overall improvement of the business environment in the regions. Investment in local transport infrastructure in particular is expected to capitalize on the opportunities opened by the Trans European Networks and increased international trade. This priority in fact is expected to represent one of the multi annual financing frameworks for local government investment, but avoiding overlapping with ISPA and SAPARD. Investing in business infrastructure will improve the basic conditions enterprises operate in by improving or building new facilities for SMEs, including rehabilitation of degraded industrial sites. The following sectoral priorities are addressed in this priority:

- Rehabilitation of touristic sites for increasing attractiveness of touristic areas
- Improvement of regional transport infrastructure
- Improvement of environment of industrial sites
- Improvement of business infrastructures and communication infrastructure in order to permit better access to services and markets of SMEs for strengthening their competitiveness.

Priority B – "Human Resource Development" aims to invest in the human resources as a way to increase employability and fight social exclusion, by: (i) tackling structural unemployment and reducing the consequences of economic restructuring on the labour market; (ii) improving long-term adaptability of the labour market by investing in the knowledge economy and addressing the increasing demand for computer skills, (iii) fighting against exclusion from the labour market of Roma population and other vulnerable groups; and (iv) improving access to education and to the region-specific technical and vocational training system, especially in rural areas confronted with increasing dropout rates. Within this priority, Measure b: "Improving long term labour market adaptability" finances two subprojects: "Grant schemes promoting Life-Long Learning (LLL) for qualification and re-qualification of the work force" and "Technical Assistance to the National Authority for Qualifications (NAQ) establishment". Measure d: "Improving access to education and region specific technical and vocational education and training system" supports the sub-projects "Improving region specific technical and vocational education and training system" and "Developing continuing training for pre-university education staff".

Priority C – "Development of the productive sector through support to SMEs" aims to improve SMEs' access to funding and promote technological innovation through grant schemes correlated with industrial policy priorities and possibly implemented in synergy with R&D measures. A certain extent of regionally based intervention is envisaged by providing grants and credit support to some categories of SMEs only (e.g. micro enterprises, start ups) through a national scheme allocated on regionally predetermined quotas. The scheme aims to promote SME clustering and to support first entrants in specific industries for diversifying the regional production basis and increase the likelihood of successful market niches. SME grants and credit

scheme will be implemented together with a grant scheme for soft measures devised for SMEs specifically investing in new technologies or entering the international markets. Technological priorities will be established in the sectors with significant research expertise, and in those sectors identified as particular opportunities. Special attention will then be given to investments related to environmental compliance. In order to diversify the country's production basis and foster possible imitation phenomena, preference will be given to enterprises entering into new sectors and to technological spin-offs.

This priority aims to increase the number of SMEs, especially those active in manufacturing and high value-added services, and diversify their range of activities. The support for SMEs also addresses the need for job creation, growth and diversification of the SMEs sector. In particular, the number of entrepreneurs is still low and the number of start-ups is significantly lower than in other transition economies. Insufficient access to finance is a problem for the SME sector in general, but is particularly worrying for micro-enterprises (< 10 employees) and the innovative green-field initiatives. On top of that, most SMEs are still severely undercapitalized and would face difficulties in meeting the new environment standards without affecting their competitiveness. The insufficient and poorly diversified entrepreneurial base poses serious problems for the economic development of the country, especially in certain regions and areas that are lagging behind in terms of economic development. The mortality of business start-ups is very high in the first year of their life, mainly because of a shortage of finance, lack of business support services, limited entrepreneurial skills and experience and insufficient knowledge of how to enter markets.

The only measure associated to this priority "Support to SMEs, business start-ups and micro-enterprises" provides funding for several projects: "Support to the institutional, human resources and technical capacity of NASMEC to introduce and develop e-governance and to foster use of ICT by innovative SME", "Technical Assistance for Improving Business Support Services for SMEs" and "Improving the access to finance of SME start-ups, and micro-enterprises". The projects within this measure are technical assistance type of projects.

Priority D - "Environmental protection at regional level" aims to provide primarily short-term investment in improving waste management and later on will extend to all environmental sectors, as prerequisites for attract private investment and improve accessibility and communication.

The main delivery mechanisms for priorities A-D include: Investment support (grant schemes similar to the 'measures' used in Structural Funds), Technical assistance (support in identifying beneficiaries, establishing eligibility criteria, financing delivery mechanisms, promotion and information, selection and monitoring of projects), Institution building and Project Preparation and Supervision.

The allocations corresponding to each priority are presented in Exhibit 8 below:

Exhibit 8: Funding priorities of the PHARE Economic & Social Cohesion programme 2004-2006 (in million EUR)

YEAR	INDICATIVE EU SUPPORT			NATIONAL	TOTAL
2004-2006	INVESTMENT SUPPORT	INSTITUTION BUILDING	TOTAL EU	CO-FINANCING	
Priority A. Improving regional infrastructure to support economic development Measure a**:** Regional and local transport and business infrastructure	152,425		152,425	50,808	203,233
Priority B. Human Resource Development					
Measure a: Tackling structural unemployment	14,830	3,150	17,980	4,940	22,920
Measure b: Improving long term labour market adaptability	21,630	4,670	26,300	7,210	33,510
Measure c: Actively combating social exclusion	19,000	5,450	24,450	6,340	30,790
Measure d: Improving access to education and region specific technical and vocational education and training system	73,085	9,765	82,850	24,362	107,212
Priority C. Development of the productive sector through support to SMEs. Measure a: Support to SMEs, business start-up and micro-enterprises	32,900	10,200	43,100	10,980	54,080
Priority D. Environmental protection at regional level Measure a: Improving environmental protection at local and regional level Measure b: SAMTID	88,000	2,500	90,500	29,340	119,840
Priority E. Building the institutional structures in order to achieve, upon accession, sound and efficient management of EU SF, and efficient management of programmes under EDIS requirements	4,890	74,050	78,940	1,910	80,850
Total	**406,760**	**109,785**	**516,545**	**135,890**	**652,435**

Source: PHARE Programming Document for Social and Economic Cohesion 2004-2006

4.1.2 Specific measures in favour of innovation and knowledge

The correlation between the priorities and measures established in PPD 2004-2006 and the Policy areas (appendix B.3) is illustrated in Exhibit 9 below. We remark that the policy areas 'Innovation friendly environment' and 'Support to creation and growth of innovative enterprises' are the only covered areas, in the framework of the PPD 2004-2006. Nonetheless, it is very important to underline that Priority C Measure a: Support to SMEs, business start-up and micro-enterprises finances only technical assistance projects.

Exhibit 9: Key innovation & knowledge measures

Policy area	Number of identified measures (all programmes)	Approximate share of total funding for innovation & knowledge measures	Types of measures funded (possibly indicating importance)
Improving governance of innovation and knowledge policies	-	-	-
Innovation friendly environment	3	29.9%	**Priority B** Measure b: Improving long term labour market adaptability Measure d: Improving access to education and region specific technical and vocational education and training system **Priority C** Measure a: Support to SMEs, business start-up and micro-enterprises
Knowledge transfer and technology diffusion to enterprises	-	-	-
Innovation poles and clusters	-	-	-
Support to creation and growth of innovative enterprises	1	7.8%	**Priority A** Measure a**:** Regional and local transport and business infrastructure
Boosting applied research and product development	-	-	-

4.2 Learning from experience: pre-accession funding and innovation since 2000

4.2.1 Management and coordination of innovation & knowledge measures

This section reviews the overall management of PHARE schemes in favour of innovation and knowledge during the current period. It examines the role of key organisations or partnerships in implementing PHARE measures for innovation and knowledge, and the financial absorption and additionality of the funds allocated to innovation and knowledge.

The main implementing agencies and authorities of PHARE schemes in favour of innovation and knowledge discussed above are summarised in Exhibit 10.

Exhibit 10: Implementing agencies and authorities for PHARE ESC Programme

Exhibit 10: Implementing agencies and authorities for PHARE ESC Programme

IMPLEMENTING AGENCIES		
Responsibility or Task	***Bodies Concerned (Implementing Agency)***	***Remarks on Organisation, resources required***
Overall Responsibility for Priorities Implementation	**I. Priorities A, B (measure d), C, D:** - Ministry of European Integration for all investment projects - Ministry of European Integration for classical Technical Assistance, including Project Preparation Facility - Ministry of European Integration for site supervision and subproject 4, component G of Priority E - Central Financing and Contracting Unit for twinning projects **II. Priority B measures a, b and c:** - Ministry of Labour, Social Solidarity and Family for Technical Assistance and investment projects - Central Financing and Contracting Unit for twinning **III. Priority E** - Central Financing and Contracting Unit, excepting for sub-project 4, component G, which is financed from national co-financing budget of Priorities A and D. Priority A implementation arrangements applies for this component.	
IMPLEMENTING AUTHORITIES		
	Implementing Authority and Intermediate Bodies	***Remarks on Organisation, resources required***
Priority A: Improving regional infrastructure to support economic development **Measure a** Regional and local transport and business infrastructure	Regional Development Agencies (RDAs) Regional Development Boards and National Board for Regional Development approve the list of projects Ministry of European Integration (MIE) for site supervision and for Regional development agencies monitoring contracts, sub-project 4, component G, of Priority E	Programme Implementation Units (PIUs) will be established within beneficiary local authorities Infrastructure Steering Subcommittee, chaired by MIE

Priority B: Human Resource Development **Measure a** Tackling structural unemployment **Measure b** Improving long term labour market adaptability **Measure c** Actively combating social exclusion **Measure d** Improving access to education and region-specific technical and vocational education and training system	National Agency for Employment, PIUs at regional level for investment MoLSSF for TA and corresponding supply contract National Training Board for TA and for the corresponding supply contract National Agency for Employment, PIUIs at regional level for investment MoLSSF for TA and corresponding supply contract National Agency for Employment, PIUs at regional level for social inclusion investment MoLSSF for National Training Board for TA and corresponding supply contract for social inclusion Specialized directorate within MoLSSF for social services – for TA; investment component will work through National Agency for Employment PIUs at regional level RDAs for works contracts MEI for site supervision Ministry of Education, Research and Youth, National Centre for Vocational education and training for TA and IT equipment supply National Centre for pre-university education staff Training for sub-project 2	Set-up and staffing of Programme Coordination Unit (PCU) and PIUs are under MoLSSF responsibility; Regional Consortia are the partnership structures, with HRD policy responsibility at regional level Regional Consortia provide the forum for human resources strategies and action plans development and monitoring HRD Steering Sub-committee, chaired by MoLSSF
Priority C: Development of the productive sector through support to SMEs **Measure a** SMEs support	Regional Development Agencies (RDAs) for grant and credit schemes National Agency for SMEs and Co-operation (NASMEC) for TA and IT supply components	NASMEC will provide technical support SMEs Steering Sub-committee, chaired by MEI
Priority D: Environmental protection at regional level **Measure a** Improving environmental protection at local and regional level **Measure b** SAMTID	Regional Development Agencies (RDAs) and Regional Environmental Protection Agencies (REPAs) Ministry of Environment and Water Management (MEWM) for TA components Ministry of European Integration	MEWM will provide technical support If the case, RDA will conclude co-operation protocol with REPA PIUs will be established within beneficiary local authorities SAMTID Steering Committee will approve the projects
Priority E: (IB) Building the institutional structures in order to achieve, upon accession sound and efficient management of EU SF, and efficient management of programmes under	Overall coordination by Ministry of Public Finances (MPF)	National Steering Committee for Co-ordination of preparation for Structural Funds, chaired by MPF

under EDIS **Measure a** Development of administrative capacities for Structural Funds management	Ministry of Public Finances, Ministry of European Integration, RDAs, Ministry of Economy and Trade, Ministry of Transport, Constructions and Tourism, Ministry of Labour, Social Solidarity and Family, Ministry of Environment and Water Management	

Source: PHARE Programming Document for Social and Economic Cohesion 2004-2006, p. 198-199

The implementing agencies have acquired good knowledge in managing EU funds through the implementation of the PHARE programme. Over the last few years, implementing structures have started to gain know-how on Structural Funds programming from the pre-accession funds. At the regional level, the Regional Development Agencies have still limited capacity to manage future innovation and knowledge related Structural Fund measures.

A recent study developed by the European Institute of Romania (Oprescu, Constantin, Pislaru, Ilie, 2005[3]) shows that the administrative capacity of absorbing the post-accession EU funds is still insufficient, due to many significant weaknesses, which must be tackled in the period of time before accession The methodology used in this study is the one designed by the European Commission at the beginning of 2002 for evaluating the administrative absorption capacity of the then candidate countries. The evaluation of components that define the administrative capacity of absorption in programming field focused on certain design-related elements, at the level of management authorities as well as of intermediate bodies. The evaluation methodology applied to the *design* stage defined in terms of: *structure* - quality of existing partnerships, *human resources* – programme elaboration capacity, quality- and quantity-wise, *systems and instruments*- existence of programming guides/manuals. The results indicate a strong absorption capacity only in terms of management structure, while for programming and implementation, human resources, and systems and instruments, the absorption capacity was insufficient for administrating Structural Funds.

Evaluation of the absorption administrative capacity in Romania

	Design			**Total**
	Structure	**Human resources**	**Systems and instruments**	
Management	**A** *(95%)*	**C** *(54%)*	**C** *(50%)*	**C** *(72%)*
Programming	**C** *(50%)*	**C** *(50%)*	**C** *(60%)*	**C** *(52%)*
Implementation	**C** *(69%)*	**D** *(49%)*	**D** *(36%)*	**C** *(53%)*
Total	**B** *(76%)*	**C** *(51%)*	**D** *(45%)*	

Note:
A: Strong capacity: system ready for the Structural Funds (at least 90%);
B: Sufficient capacity, but weak points should be addressed (75-90% of max. score);
C: Capacity not sufficient yet, serious weaknesses must be addressed (50-75%);
D: Insufficient capacity, there is no base for administrating the Structural Funds.
Source: Evaluation by Oprescu et al. (2005).

[3] Oprescu, G., Constantin, D.L., Pislaru, D., Ilie, F., (2005), "Analysis of the Absorption Capacity of Community Funds in Romania", Study no.1, Pre-Accession Impact Studies III Series, the European Institute of Romania, Bucharest, www.ier.ro.

4.2.2 Effects and added value of PHARE schemes support for innovation and knowledge

In view of implementing the priorities identified in the 2004-2006 National Development Plan ties and completing the preparation for Structural Funds, the 2004-2006 ESC PHARE assistance focuses on the following objectives:

• To develop and implement multi-annual policies and programmes for economic and social cohesion, through investment projects in priority sectors, in line with the provisions of the National Development Plan (NDP), to support the overall national and regional economic growth, in order to increase the overall potential of the country and of each of the eight development regions, as well as to diminish the economic and social disparities between them;

• To strengthen the institutional capacity of central ministries, the eight Regional Development Agencies and relevant local authorities, to prepare for the implementation of investment support to be provided, in line with provisions regarding the Extended Decentralised Implementation Systems (EDIS) in candidate countries.

• To build the institutional, administrative, programming and implementation structures necessary to effectively manage EU Structural Funds after accession, in order to make significant progress in the achievement of commitments made on Chapter 21 of the General Acquis communautaire "Regional Policy and the Coordination of Structural Instruments".

These measures are not aimed specifically at increasing innovation neither at national nor at regional level. There are no explicit measures to support innovative enterprises technically or financially through the PHARE programme and business support grant schemes remain very limited in terms of their share in the total PHARE expenditure. The effects of the lifelong learning and vocational training actions supported through the 2004-2006 Phare ESC on improving specific weaknesses in technological skills or boosting the number of science and engineering graduate are impossible to appraise at this stage.

4.3. Conclusions: PHARE interventions in favour of innovation and knowledge

In conclusion, the PHARE programme is only marginally contributing to increasing innovation and knowledge. The majority of measures provide funding for technical assistance with few allocations for grant schemes directly supporting enterprises. PHARE programme aimed to strengthen the national public administrations and institutions with limited focus on the local/county public institutions. On the other hand, the absorption capacity of the PHARE funds has improved over the last years.

5 Regional potential for innovation: a prospective analysis

This section of the report seeks to summarise and draw conclusions from the analysis of the preceding sections, available studies and interviews and focus groups carried out for this study in order to provide an analysis of the regional innovation potential. In doing so, the aim is to provide a framework for orientations in terms of future Structural Fund investments in innovation and knowledge.

5.1 Factors influencing regional innovation potential

The **Leading Capital Region (Bucharest-Ilfov Region)** concentrates more than a half of R&D public expenditures in R&D units that are active in various areas. However, the wide diversification of R&D domains results in the absence of critical mass in some areas and the redundancy of some institutes in others. Although academic research has increased over the recent years, the collaboration between business and academia is still weak. The business sector with the highest growth is the ICT sector, which is the engine for innovation in this region. Moreover, Bucharest supplies highly qualified ICT graduates who are immediately absorbed by the business sector. The brain drain in the ICT sector is significant, and marked a slight improvement only after introducing incentives for ICT graduates. However, these incentives will come to an end when Romania joins the EU, which calls for measures to increase the supply of ICT graduates in order to meet with the labour demand in this sector in the short and medium term. The large number of SMEs per capita favours a competitive market for innovation. The Capital region is also characterised by a declining importance of the industrial sector as contributor to the regional GDP and an increasing contribution of the service sector.

The **Leading Knowledge Regions** (The West and North-West Regions) are characterised by two important university poles, Timisoara and Cluj-Napoca, respectively. Both university cities provide an important number of highly qualified S&E graduates. Cluj-Napoca is the second largest university centres and Timisoara the third after Bucharest, in terms of students. There are important links between University and foreign companies (e.g. Alcatel and Technical University in Timisoara or Technical University Cluj-Napoca and Volkswagen). In 2004, the Research activities of Technical University of Cluj amounted to 2 MEUR form contracts with foreign companies. However, the regional R&D public expenditure is lower than in Bucharest, even though the potential for innovation is relatively similar. One of the major difficulties is the lack of visibility of National R&D programmes at the regional level and bureaucracy in terms of funding applications.

Both in Cluj-Napoca and in Timisoara, the ICT sector shows a significant growth, with formation of ICT clusters. In addition, the textile industry has known a fast development in the West Region due to large Italian investments. The banking sector functions well in both regions and provides a diversity of banking products. This is an advantage and a step forward in supporting co-financing for future Structural Funds. Cluj-Napoca is active in the area of solar energy research and it is possible that a cluster will be created in this sector. The number of researchers involved in this sector is still limited, but there is an opportunity for increasing this potential by

attracting other researchers from the institutes that were closed down. Moreover, the number of companies active in the renewable energy area has increased.

The Centre Region has attracted important FDI flows in various sectors. Regional R&D units recorded important losses of qualified personnel over the recent years due to the low wages and outdated infrastructure, which places them in a weak position to meet the marked needs. One of the assets of the region is the primary education system in three languages Romanian, Hungarian and German due to the concentration of those communities in the region. These factors explain the important FDI attracted from Germany and Hungary. In terms of business infrastructure, one key feature is the transformation of old industrial areas into industrial parks. The existence of suppliers for the automotive industry in Sibiu and Brasov provides opportunities for creating an automotive cluster.

The rest of the regions are characterised by predominance of rural areas and the primary sector. However, the North-East Region hosts one of the most important university centres in Romania – Iasi - which became an attractive location for ICT due to the prestige of the Technical University. The South-East Region is characterised by important Shipping and Tourism sectors, given the vicinity with the Black Sea and the Danube Delta. The South Region hosts the headquarters of the Renault car manufacturer who invested in the national Dacia. That might be a good opportunity for creating an automotive cluster for stimulating the interaction with the local sub-contractors and stimulate diffusion of technical know-how. Moreover, IPA SA Craiova, which is an automotive engineering company, could lead the RTDI activities development and in the Region South-West.

Exhibit 9: Factors influencing innovation potential by type of region

Region/type of region	Main factors influencing future innovation potential
The Leading Capital Region (Bucharest-Ilfov Region)	• Large concentration of public R&D expenditure; • Qualified human capital, particularly in the ICT sector; • The largest university centre in Romania in terms of student numbers ; • Better access to national R&D funding; • Large number of R&D units covering a broad range fields; • The highest level of SMEs per head in Romania; • Strengths in the ICT sector;
The Leading Knowledge Regions (West Region and North West Region)	• Cluj-Napoca and Timisoara are leading university towns in Romania; • Qualified human capital, S&E graduates, especially in the ICT sector; • Lower level of R&D public expenditure than Bucharest; • Co-operation between foreign firms and universities; • Lower access to national R&D funding; • Strengths in ICT, food industry, textile and solar energy sector;
The Industrial Region (Centre Region)	• Lower innovation potential of regional R&D units; • Industrial agglomeration and tradition; • High level of FDI and industrial parks; • Strengths in numerous industrial branches,
Lagging behind regions (South, South-East, South-West and North-East)	• Iasi has a university tradition but low level of SME development and the lowest SME per head indicator; • Large Areas of these regions are heavily dependent on agriculture; • Strengths in chemistry sector, oil/energy, tourism, automotive (Renault factory) and heavy industry;

5.2 A prospective SWOT appraisal of regional innovation potential

The analysis of this section will provide an overall appraisal of the innovation potential of the Romanian regions, although the lack of data at the regional level does not allow an in-depth SWOT analysis of the innovation potential.

As the Leading Capital Region, Bucharest-Ilfov has a high potential for becoming an innovative and knowledge region. It accounts for more than half of R&D public expenditures (GERD) in Romania, which has strengthened the R&D capabilities of the region and made it able to contribute significantly to innovation and knowledge. One of the sectors with a high potential is ICT. Moreover, the relatively large number of technology transfer centres, compared with other regions, gives Bucharest a significant advantage in terms of business services support. Although the potential to become an innovative region exists, the process is significantly slowed down by the weak co-operation between business and R&D institutions, which could provide innovative products, services and processes. R&D activities have a relatively low capacity to meet market needs and, because of fragmentation and high diversification over a large number of fields and institutes, lack the critical mass for producing high-quality research at EU standards. In addition, the weakness of business-science links, and public-private partnerships in general, determines a low potential for defining a Regional Innovation Strategy. This is, however, a common problem to all Romanian Regions, and to a smaller extent in the West Region.

The Leading Knowledge Regions (West and North-West Regions) also have a high potential of becoming innovative and knowledge-based regions due to two prestigious university centres Cluj-Napoca and Timisoara. The co-operation between technical universities and business sector functions well, in particular with large foreign companies, but there is still a need for public support of such linkages. The regions have an ICT cluster and an incipient cluster in solar energy. Previous studies identified a clustering potential in textile industry in the West Region. The regional economy has a good potential for cluster formation, but the process needs to be accelerated by support from the Structural Funds. Moreover, there is a regional necessity to foster the creation of business infrastructures such as business incubators Science and Technology Parks and increasing the number of technology transfer centres. Moreover, it is suggested that a support for acquiring new equipments and technologies in order not to alter the regional potential.

In the Centre Region, technology transfer can act as driver for the development of the regional industries. The region also has a potential for cluster formation and an asset for SME internationalises and FDI by hosting two major minorities, German and Hungarian, respectively. This is one of the reasons of FDI investments from those countries in the region. The main regional obstacle for becoming an innovative region is the lack of famous universities – the two existing universities in the region have only a weak capacity to supply highly qualified S&E graduates. Moreover, the R&D units have been affected by the loss of qualified personnel due to the low wages and outdated research infrastructure. However, there is potential of strengthening the cooperation between regional universalities and business with the R&D units in Leading Knowledge Regions and in the Capital Region. The other Romanian regions are predominantly agricultural regions. However, there are certain areas and cities that have the potential of concentrating innovative companies and research institutions. In this group of regions, the only well-known university town is Iasi. ICT investment has increased over the recent years in this region, but the entrepreneurial initiative is very

low. This region recorded the lowest number of SMEs per head in Romania. On the other hand, Constanta could develop clusters in the shipping industry, while in Pitesti Renault factory could become a nucleus for an automotive cluster. Moreover, IPA SA Craiova could strengthen the technology transfer in the South-West Region. The weak potential to become innovative and knowledge-based regions on the medium term might be compensated by the potential for developing innovative tourism services and the orientation towards the production of raw materials for bio-fuel and bio-diesel.

Exhibit 10: Innovation and Knowledge SWOT

Leading Capital Region (Bucharest-Ilfov)	**Opportunities**	**Threats**
Strengths	Large concentration of public R&D expenditure. Numerous Technology Transfer Centres. Opportunity to became a science and innovation centre.	Large diversification of R&D units, which prevents the formation of a critical mass of competencies.
Weaknesses	High potential for boosting innovation and knowledge capacities provided that mechanisms for cooperation between business sector and research institutions is strengthened.	Low potential for developing a Regional Innovation Strategy, due to weak links between innovation actors.
Leading Knowledge Regions (West and North West Region)	**Opportunities**	**Threats**
Strengths	High potential of developing ICT and Renewable energy sectors due to highly qualified HR and S&E graduates and very good research institutions. The West Region is the only region that elaborated a Regional Innovation Strategy in Romania.	Still insufficient business infrastructure and services support (S&T and Technology Parks, Business Incubators, Technology Transfer Centre). Obsolete R&D and technologies in most cases
Weaknesses	High potential for developing clusters and innovation poles provided that there is a support through the Structural Funds	Low potential for financing the priorities identified in the RIS elaborated by Region West. Low potential for elaborating the RIS in the Region North West.
The Industrial Region	**Opportunities**	**Threats**
Strengths	High potential for technology transfer to a large number of regional industrial sectors.	Potential of developing R&D institutions but the lack of qualified HR and supply of S&E graduates by the regional universities is an obstacle.
Weaknesses	Good potential for creating clusters around the FDI investment.	Lower potential of becoming soon innovation and knowledge region due to the lack of prestigious regional universities

Lagging behind regions (South, South East, South West and North East)	Opportunities	Threats
Strengths	High potential of few cities in becoming innovation and knowledge poles (e.g. Iasi in the Region North-East).	Good potential of developing clusters around FDI investments, but lack of qualified HR could be an obstacle.
Weaknesses	Good potential of developing innovative tourism services and the use of agricultural land for producing bio fuels and bio diesel, provided that there is support for acquiring the technology.	Low potential of becoming innovation and knowledge regions in the near future

5.3 Conclusions: regional innovation potential

Policy headline 1: Potential for networking and internationalisation of SMEs

The increase in FDI investment over the recent years is an advantage for the Romanian economy. The foreign capital penetrated into all industry sectors (e.g. Automotive, Food Industry, ICT etc) and facilitated the creation of international networks and the access to international markets. This advantage could be exploited by local firms becoming part of the supply chain of the major regional companies, which could substantially accelerate technological and non-technological innovation. Moreover, domestic companies in the regions with higher concentrations of FDI have better opportunities for internationalisation by increasing quality, productivity and redesigning the business models.

Relevant regions: Regions and areas with large SMEs per head, i.e. Leading Capital Region, Leading Knowledge Regions, Industrial Region and some areas in the Lagging Behind Regions.

Policy headline 2: Potential for creating innovation poles

In Romania, the concentration of R&D expenditure in Bucharest accounts for more than 50% of total expenditure, which calls for a more even distribution of R&D funds, especially in Cluj and Timisoara, two major university centres of the country with very good knowledge institutions. Similarly, Iasi has a relatively good R&D capacity, but the lowest number of SMEs per capita is a threat for becoming an innovation pole. Although the cooperation between universities and foreign companies has increased, with very good examples in Bucharest, Cluj and Timisoara, there is still a strong need for public support for strengthening the cooperation between research institutions and domestic companies.

Relevant regions: Leading Capital Region and Leading Knowledge Regions and with some extent Iasi city in the North-East Region.

Policy headline 3: Potential for focusing on R&D and Innovation in ICT

The ICT sector is one of the most active sectors in the Romanian economy and has a highly qualified human capital. The sector has been boosted over the recent years by large FDI flows, which stimulated the creation of a large number of local IT companies and the creation of clusters. All these developments show a very high potential for focusing on R&D and innovation in this field. IT clusters have been created in the Leading Capital Region as well as in the Leading Knowledge Region.

Relevant regions: Leading Capital Region, Leading Knowledge Regions.

Policy headline 4: Potential for focusing on innovation in the agri-food and agro-products sector

Although a large share of the Romanian population is involved in agriculture, the productivity in this sector is very low and contribution of this sector to national GDP did not exceed 13%. However, Romania has a tradition in agriculture research. Moreover, there is a high potential for increasing bio-diesel and bio-fuels industries in rural areas, provided that concerted effort is made to increase collaboration between R&D, industry and agricultural sectors.

Relevant regions: Lagging behind Regions

6 Future priorities for Structural Fund support for innovation and knowledge: options for intervention

6.1 Strategic orientations for Structural Fund investments in innovation and knowledge

Key conclusion 1: The measures and financial allocation in favour of the innovation and knowledge economy are marginal in the programming period 2007-2013.

The evidence provided by the focus group, interviews and analysis of draft operational programmes suggests that the likely financial allocation to innovation and knowledge measures proposed through different operational programmes will be less than 5% of total Structural Funds. On the other hand, a large amount of approx. 3.5 EUR billion will be allocated to the Operational Programme for the Development of Human Resources.

Recommendation 1: Increasing the financial allocation and measures with support for innovation and knowledge.

One of the recommendations of the Aho report is that the Structural Funds should act as key means for creating a knowledge economy. Therefore the allocation for innovation and R&D must be increased and better oriented towards the Lisbon Strategy goals taking into account the absorption capacity as well. The Structural Funds could be used for creating value rather than for supporting important infrastructure projects, which could be financed through the Cohesion Funds or the Public Private Partnerships. The programmes developed by Enterprise Ireland could be taken as a model for investing in R&D and innovation.

Key conclusion 2: The weak capacity of SMEs to innovate

SMEs account for an overwhelming majority in the total firm population in Romania - 95.5%. Most of them have a weak innovative capacity. According to the European Innovation Scoreboard (2005) and the Romanian National Institute of Statistics 2000-2002 Survey, Romanian SMEs' comparative advantage remains today largely based on low wages. Up to now R&D policy at national level has been mainly focused on the supply side (strengthening R&D infrastructure, centres, etc.) with few links to enterprise/innovation or regional development priorities (where the main issue is upgrading low technology capacities of small firms plus in some areas supporting linkages of local sub-contractors to FDI). This situation is likely to continue during 2007-2013 based on current plans.

Recommendation 2: Focus the Structural Funds intervention on developing innovative SMEs

A selective approach to Structural Fund support focused more on supporting technology diffusion, innovation awareness and targeted funding for industrial level

innovation should be favoured over a policy focus on further support for still over fragmented R&D sector. The type of grants, which could be financed through the Competitiveness Operational Programme include:

- Productivity improvement grants for companies in order to receive funding for capital assets, technology acquisition and training/management development, that will lead to productivity improvements.
- Industry Networks in order to support networks or groups of companies who wish to undertake collaborative projects that have the potential to deliver measurable innovative benefits to the companies involved and to the wider economy.
- Funding for company expansion through supporting activities outlined in an expanding company business plan, e.g. investment in capital equipment, job creation, recruitment of key managers, training/management development and R&D.

Key Conclusion 3: There is a potential for the creation of regional innovation poles

Regional innovation potential varies widely within two to three regions with higher potential than others, along with some regional urban/university centres in the other regions. At this stage there is a certain potential for poles or clusters, but this line of policy has only very recently been addressed in one of the Ministry of Education and Research programmes – 'Excellence Research'.

Recommendation 3: Elaboration of measures to support the identification and creation of innovation poles

A national programme fostering regional critical mass around specific technologies, market or thematic potential could be a solution to developing a stronger regional partnership based on developing critical mass in specific fields. The Operational Programmes should include measures to support the creation of the innovation poles. Some of the activities, which could be financed include:

- Development of scientific and technological activities of enterprises aiming at linking research to production and at promoting innovation.
- Strengthening of innovative activities of SMEs, through know-how/technology transfer assistance mechanisms.
- Strengthening-expansion of public research and technological infrastructures in areas of regional interest.
- Education and training in areas related to the selected technological priorities of the specific Region and education training on research, technology and innovation issues, aimed at meeting regional needs.
- Establishment of Regional Innovation Poles identity and enhancement of the international visibility of organisations in the Region
- Formulation of the strategy for development and organisation of the Regional Innovation Poles, and for its foresight and evaluation activities.
- Activities in preparation of assistance to research units in connection with the standardisation and commercial exploitation of research results. Identification and utilisation of research results through the establishment of new enterprises (spin-offs).

6.2 Operational orientations for SF investments in innovation and knowledge

Key conclusion 4: Lack of regional foresight and strategic planning capacity

Regional institutions are lagging behind in terms of regional foresight exercise and Regional Innovation Strategies. Generally, the capacity of Regional Development Agencies (RDAs) in terms of designing and managing measures in favour of innovation and knowledge lags behind national institutions. However, some of RDAs have developed their Regional Innovation Strategy (RIS) such as the West Region, and other regions, with the exception of Centre and South-West are currently elaborating their RIS. The involvement of RDAs in designing the Regional Development Strategy has increased their capacity in programming.

Recommendation 4: Improving the regional innovation system in terms of knowledge and foresight

The capacity to manage innovation measures and undertake regional foresight must be improved through training and technical assistance type projects at the regional level. Therefore, RDAs could play an important role in designing and managing regional specific innovation and knowledge measures and also to mobilise regional actors for the measures. Moreover, RDAs should increase the cooperation with the regional stakeholders more stakeholders. On the other hand, there is a need for identifying financing sources for the priorities of the Regional Innovation Strategy (RIS).

Key conclusions 5: There is a lack of regional contact points for Sectoral Operational Programmes

The RDAs will be involved in the regional management of the "Regional Operational Programme" which will finance the development of local and regional business environment. For the sectoral operational programme each Managing Authority will create separate bodies at the regional level. Moreover, innovation and knowledge measures are included in the sectoral programmes Competitiveness Operational Programmes and Human Resources Operational Programme. The risk is that the newly established bodies at the regional level will lack trained human resources.

Recommendations 5: Increase the involvement of regional actors in the implementation of the Operational programmes

There is a need to increase the visibility of sectoral operational programmes at the regional level, which will have a direct effect on the absorption capacity. Therefore, RDAs could be more involved in the regional management of the Sectoral Operational Programmes. The RDAs already gain experience by managing Phare national programmes grants even though there is still room for improving the management function of some of them.

Appendix A Methodological annex

A.1 Quantitative analysis of key knowledge economy indicators

A 1.1 Factor analysis

In order to analyse and describe the knowledge economies at regional level in the EU, the approach adopted was to reduce and condense all relevant statistical information available for a majority of regions. The approach involved firstly reducing the information from a list of selected variables (Table 1) into a small number of factors by means of factor analysis.

Table 1. Reduction of the dataset (215 EU-25 regions) into four factors by means of factor analysis

	The 4 factors			
	F1 'Public Knowledge'	F2 'Urban Services'	F3 'Private Technology'	F4 'Learning Families'
Higher education (HRSTE), 2003	**.839**	.151	.190	.184
Knowledge workers (HRSTC, core), 2003	**.831**	.164	.267	.327
High-tech services employment, 2003	**.575**	.367	.428	.323
Public R&D expenditures (HERD+GOVERD), 2002	**.543**	.431	.275	-.195
Value-added share services, 2002	.323	**.869**	.002	.121
Value-added share industry, 2002	-.265	**-.814**	.386	-.061
Employment government administration, 2003	-.217	**.745**	.124	-.175
Population density, 2002	.380	**.402**	.043	.038
High and Medium/high-tech manufacturing employment, 2003	-.073	-.331	**.873**	-.089
Value-added share agriculture, 2002	-.222	-.350	**-.672**	-.198
Business R&D expenditures, 2002	.335	-.050	**.664**	.267
S&T workers (HRSTO, occupation), 2003	.560	.178	**.589**	.382
Population share under 10 years of age, 2001	-.237	.060	-.015	**.868**
Life-long learning, 2003	.472	-.009	.165	**.703**
Activity rate females, 2003	.418	-.227	.281	**.620**

Note: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization, a Rotation converged in 9 iterations. Main factor loadings are highlighted in bold. Source: MERIT, based on Eurostat data, mostly referring to 2002 or 2003

Based on the variable with the highest factor loadings we can characterise and interpret the four factors and give them a short symbolic name:

Public Knowledge (F1)

Human resources in Science and Technology (education as well as core) combined with public R&D expenditures and employment in knowledge intensive services is the most important or common factor hidden in the dataset. The most important

variables in Public Knowledge are the education and human resource variables (HR S&T education and core). Cities with large universities will rank high on this factor. One interesting conclusion is that public and private knowledge are two different factors (F1 and F3 respectively), which for instance has implications for policy issues regarding Science-Industry linkages. Public R&D and higher education seems especially related to high-tech services, whereas Business R&D especially serves high- and medium-high-tech manufacturing.

Urban Services (F2)

This second factor contains information on the structure of the economy. It is well known that industrial economies are quite different from services based economies. It is not a matter of development per se, because in the European regions the variety of economic structure is very large and for a large part based on endowments and path dependent developments like the extent to which government administration is located in a region or not. This factor takes into account the differences between an industrial area and a service-based area including the public administration services of the government. Another observation is that there are two different 'urban' factors, indicating that academic centres not necessary co-locate with administration centres. What may not be surprising is that the Urban Services factor is not associated with R&D, since R&D is more relevant for innovation in manufacturing than for service industries.

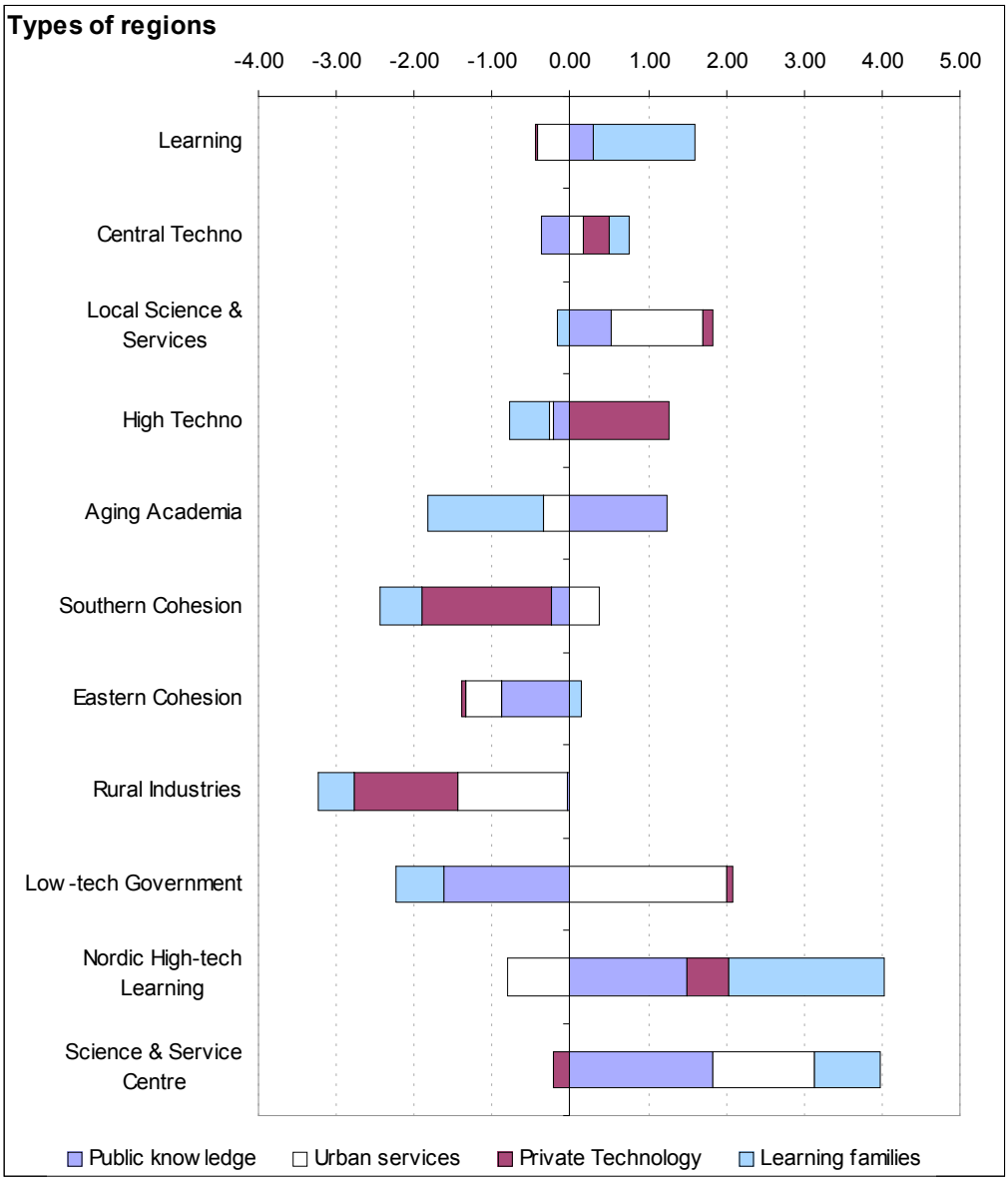
Private Technology (F3)

This factor contains business R&D, occupation in S&T activities, and employment in high- and medium-high-tech manufacturing industries. A countervailing power is the existence of agriculture in the region. One interpretation could be that agricultural land-use goes at the cost of possibilities of production sites. Another interpretation is that agriculture is not an R&D intensive sector.

Learning Families (F4)

The most important variable in this factor is the share of the population below the age of 10. Locations with relatively larges shares of children are places that are attractive to start a family. Possibilities for Life Long Learning in a region seems associated with the lively labour participation of the mothers of these youngsters. The Learning Families factor could also be interpreted as an institutional factor indicating a child-, learning- and participation- friendly environment, or even a 'knowledge-society-life-style' based on behavioural norms and values that are beneficial to a knowledge economy.

A 1.2 Description of the 11 types of EU regions



1. Learning

The Learning regions are first of all characterised by the high score on the factor 'Learning Families', and the three main components of this factor: life-long-learning, youth and female activity rate. On the other factors the regions are close to the regional average. Unemployment is on average the lowest compared to the other EU regions. Employment in the government sector is limited. GDP per capita is rather high. The regions are located in Austria, Ireland, the Netherlands, Sweden and the UK. There are many similarities with the Nordic High-tech Learning regions, but the business sector in the Nordic version invest more in R&D.

2 Central Techno

This is a rather large group of regions located mostly in Germany and France with close to average characteristic, but the share of High-tech manufacturing is rather high. The factor-scores as well as GDP-per head is slightly above the regional average, except for the Public Knowledge factor which is slightly lower.

3 Local Science & Services

This group of regions with diverse nationality consist mainly of capital cities, such as Madrid, Warsaw, Lisbon, Budapest and Athens. These urban area's serve as national centres for business services, government administration, public research institutes and universities. Urban Services and Public knowledge are therefore the strongest factors for this type of region. GDP per capita is on average slightly below the EU25 average, but growing. The low score on life-long-learning is a weakness in most Local Science & Services regions, especially compared to the more wealthy and advanced Science & Service Centres.

4 High Techno

The High Techno regions host many high-tech manufacturing industries. They are mostly located in Germany (e.g. Bayern and Baden-Wurtemberg), some in Italy (e.g. Lombardia and Veneto) and two French regions. This type is very strong in Private Technology and has a high level of GDP per capita. The factors Public Knowledge and especially the Learning Family factor shows a relative weakness, e.g. in life-long-learning. Growth in terms of GDP per capita has been low and unemployment didn't improve much in the previous years.

5 Aging Academia

This group of regions is mostly located in East Germany and Spain and also includes the capital regions of Bulgaria and Romania. The strength in the Public Knowledge factor is mostly based on the high share of people with tertiary education. The low score on the Learning Family factor is due to little life-long-learning and hosting relatively few children. The unemployment situation has improved, but is still very high.

6 Services Cohesion

Services cohesion regions are located in Southern Europe, consisting of many Greek, some Spanish and two Portuguese regions. The low score on the Private Technology factor is striking. There is hardly any high-tech manufacturing nor business R&D. Services is the most important sector, but also agriculture is still a rather large sector. The share of manufacturing industry in value added is very limited. Population density is low, but on average it has been increasing.

7 Manufacturing Cohesion

Manufacturing industries is the dominant sector, whereas services and agriculture are rather small sectors. This type of region is mostly located in Poland, Czech Republic, Hungary and Slovak Republic. Two Portuguese regions are also included. The Public Knowledge factor is the main weakness of this type of regions. However, the score on the Private Technology factor is close to average, which means that it is much stronger in this respect than the Services Cohesion regions. Unemployment is high, even compared to Rural Industries and Services Cohesion regions.

8 Rural Industries

Besides a low per capita GDP, Rural Industries regions have in common a low score on both the factors Urban Services and Private Technology. Population density is very low. The service sector is often very small. Especially agriculture but also manufacturing industries are relatively large sectors. Besides regions in Bulgaria and Romania

9 Low-tech Government

This type of region, mostly located in southern Italy is characterised by a very low score on Public Knowledge combined with a high share of employment in the Government sector. Unemployment is severe, on average comparable to Manufacturing cohesion regions. GDP per capita is however close to the regional average.

10 Nordic High-tech Learning

The Nordic version of the learning regions are typically strong in the Learning Family factor, but this type also has by far the highest business R&D intensity. In contrast with the popular characterisation of Nordic societies, the size of the government administration is the lowest of all the types. The low score on Urban Services is also due to the low population density. A rather unique feature of this type of regional knowledge economy is the combined strength in both the Public Knowledge and the Private Technology factor.

11 Science & Service Centre

The main characteristics of this urban group of regions are the high scores on the Public Knowledge and Urban Services factors. Population density is very high. This type also has the highest GDP per capita and productivity. The variables that are captured by the factor Learning Families also show a score above the regional average, but disappointing is the relatively low presence of high and medium-high-tech manufacturing and the business R&D intensity.

A.2 Qualitative analysis and preparation of country reports

In summary, the country reports were prepared in the following stages:

A first country document was prepared by the core study team in the form of a **template country report**. It contained overall guidance to the country experts and included a number of pre-filled tables, graphs and analysis sections based on information available at EU level.

Next, the core team members and the national experts who were involved in the pilot phase of the project commented completed elements of the templates. Drafted elements and templates were completed and compiled into **first country briefings (draft pilot reports)** by the national experts involved in the pilot phase of the project. These pilot country reports were prepared by experts for Belgium, Greece, Italy, France, and Poland.

Once the five first country briefings were completed, a **final set of guidelines** was prepared by the core team. These guidelines were agreed with the Commission services responsible for this evaluation. Prior to this, all first country briefings were reviewed during the January 2006 and presented to a first meeting of the scientific committee.

The work during the **country analysis phase** included:

- Undertaking a series of key interviews (KI) with policy decision makers;
- Organising a focus group (FG) with key national or regional RDTI stakeholders;
- Collecting additional information and finalising short case studies; and
- Preparing the synthesis notes of these various activities.

The above-mentioned work served as qualitative data and allowed the national experts to compile the draft **country reports**. All reports were subsequently reviewed, checked and finalised by the core team and the consortium members. Once this first check was completed, the core team organised a final peer reading of the document to verify its overall consistency and to ensure a final English language editing of the document. The core team then completed the final editing and layout of the document with a view to publication.

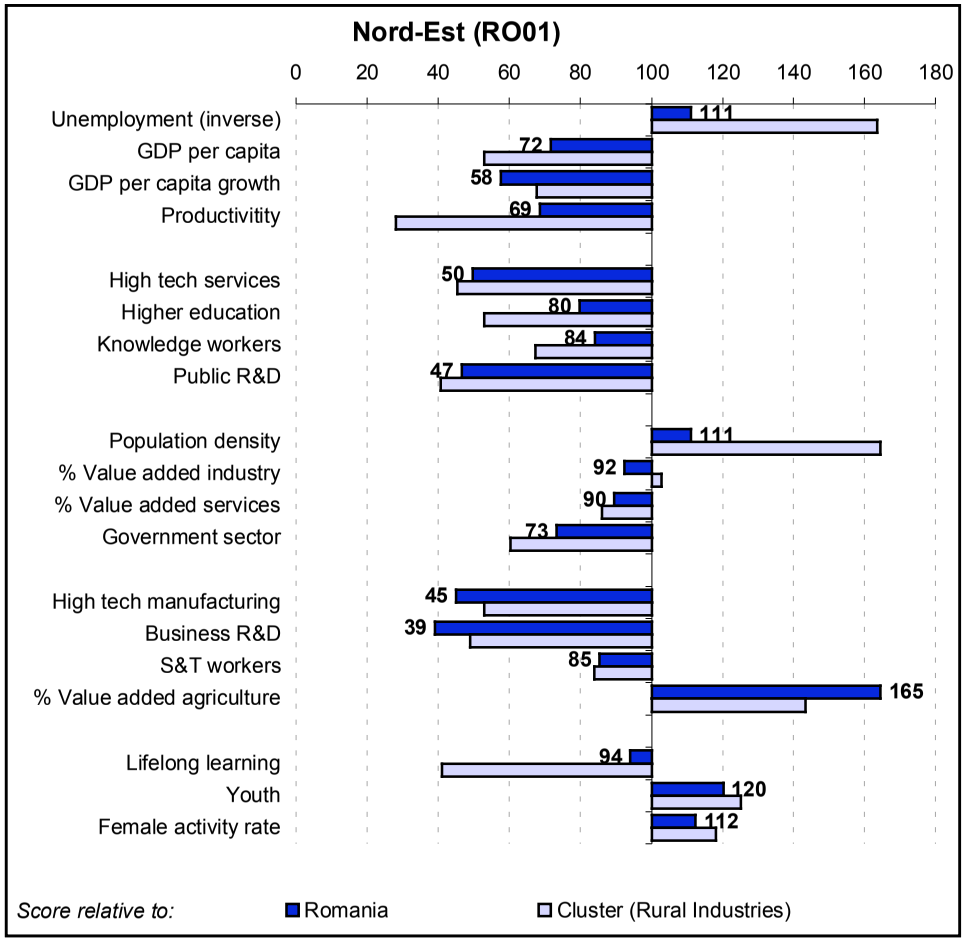
An overall synthesis report of all has been prepared and will be published by the European Commission providing an overview of the issues addressed in each of the 27 country reports produced by the evaluation team.

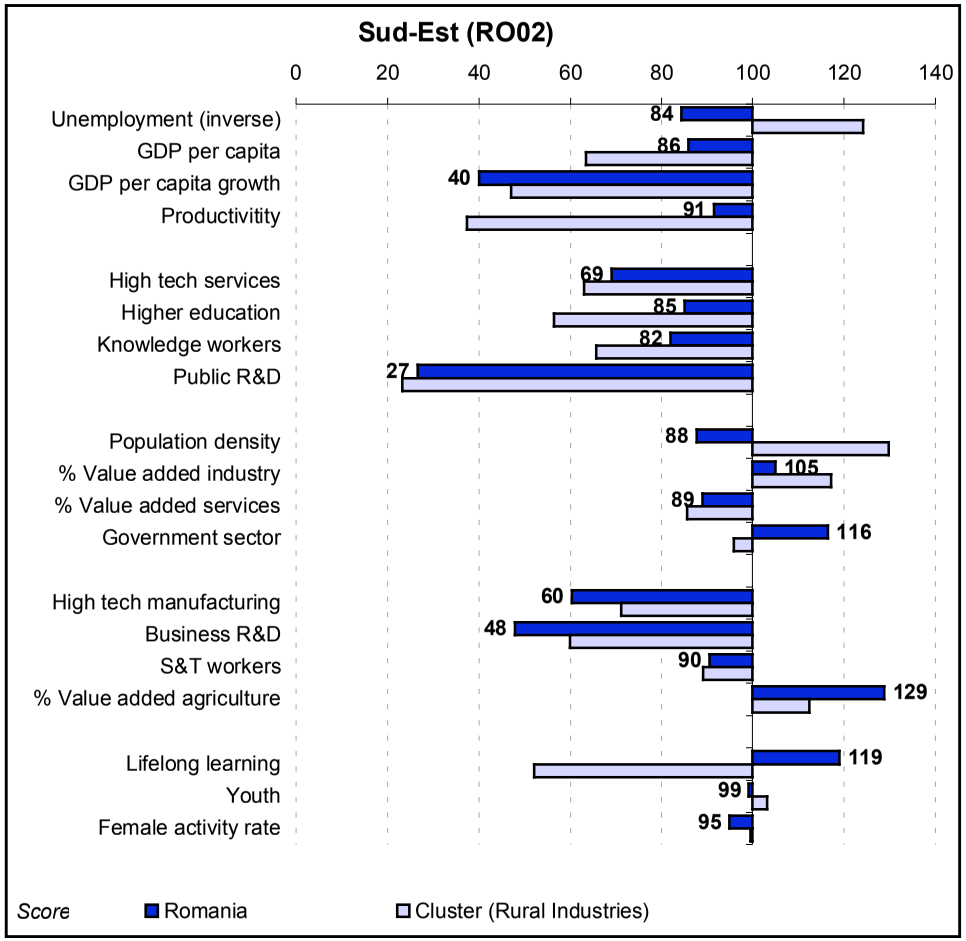
Appendix B Statistical tables and regional scorecards

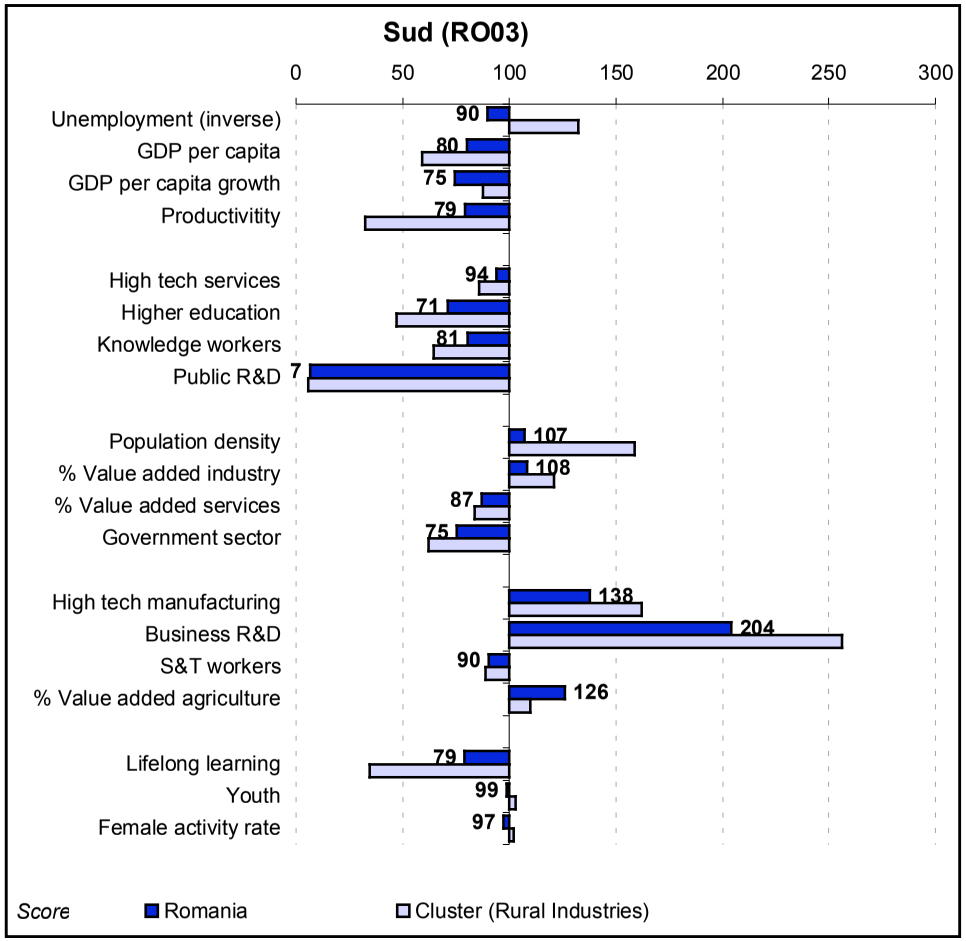
B.1 Overall quantitative analysis per region

			Economic performance				Public knowledge				Urban services				Private technology				Learning families		
		Cluster	Unemployment	GDP per capita	GDP per capita growth 1996-2002	Productivity	High tech services	Higher education	Knowledge workers	Public R&D	Population density	% Value added industry	% Value added services	Government sector	High tech manufacturing	Business R&D	S&T workers	% Value added agriculture	Lifelong learning	Youth	Female activity rate
			2003	2002	2002	2002	2003	2003	2003	2002	2002	2002	2002	2003	2003	2002	2003	2002	2003	2001	2003
EU25			9.2	21170	4.8	4556	3.2	20.7	11.6	0.69	117	27.0	70.9	7.5	6.6	1.24	20.7	2.1	8.7	10.8	48.3
Regional average			9.4	18882	4.8	3914	2.8	18.9	10.7	0.49	294	28.9	66.6	7.6	6.5	0.80	19.5	4.3	7.1	10.5	47.2
Romania	RO		7.0	6058	6.6	458	1.5	9.8	6.3	0.15	92	37.4	50.0	4.9	5.3	0.23	12.7	12.6	1.1	10.5	47.6
Relative to EU25			131	29	138	10	45	47	54	22	78	138	70	66	81	19	61	600	13	97	99
Nord-Est	RO01	8	6.3	4337	3.8	314	0.7	7.8	5.3	0.07	102	34.5	44.7	3.6	2.4	0.09	10.8	20.7	1.1	12.6	53.5
Sud-Est	RO02	8	8.3	5199	2.6	418	1.0	8.4	5.1	0.04	80	39.3	44.4	5.7	3.2	0.11	11.5	16.2	1.4	10.4	45.1
Sud	RO03	8	7.8	4853	4.9	362	1.4	7.0	5.0	0.01	98	40.6	43.5	3.7	7.3	0.47	11.4	15.9	0.9	10.4	46.2
Sud-Vest	RO04	8	6.0	4867	3.5	334	0.8	8.4	5.7	0.06	80	44.1	43.2	3.7	5.2	0.10	11.2	12.8	0.8	10.7	52.9
Vest	RO05	8	5.9	6594	8.3	510	1.7	10.1	6.4	0.08	61	36.4	48.8	5.4	6.6	0.10	13.5	14.9	1.2	9.9	43.9
Nord-Vest	RO06	8	6.0	5726	6.2	432	1.3	8.4	5.2	0.16	81	34.6	49.3	4.6	3.1	0.07	10.8	16.1	1.0	11.0	48.1
Centru	RO07	8	7.2	6547	7.0	516	0.9	7.5	4.5	0.01	75	44.3	42.8	3.9	10.6	0.21	11.6	12.9	1.0	10.4	44.4
Bucuresti	RO08	5	8.6	12565	13.0	993	5.0	23.9	14.5	0.45	1214	31.3	67.9	11.2	6.3	0.41	22.9	0.7	1.9	7.2	44.4

B.2 Regional Scorecards




Sud-Est (RO02)
0
20
40
60
80
100
120
140
Unemployment (inverse)
GDP per capita
GDP per capita growth
Productivitity
High tech services
Higher education
Knowledge workers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T workers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
84
86
40
91
69
85
82
27
88
105
89
116
60
48
90
129
119
99
95
Score
Romania
Cluster (Rural Industries)


Sud (RO03)
0
50
100
150
200
250
300
Unemployment (inverse)
GDP per capita
GDP per capita growth
Productivitity
High tech services
Higher education
Knowledge workers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T workers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
90
80
75
79
94
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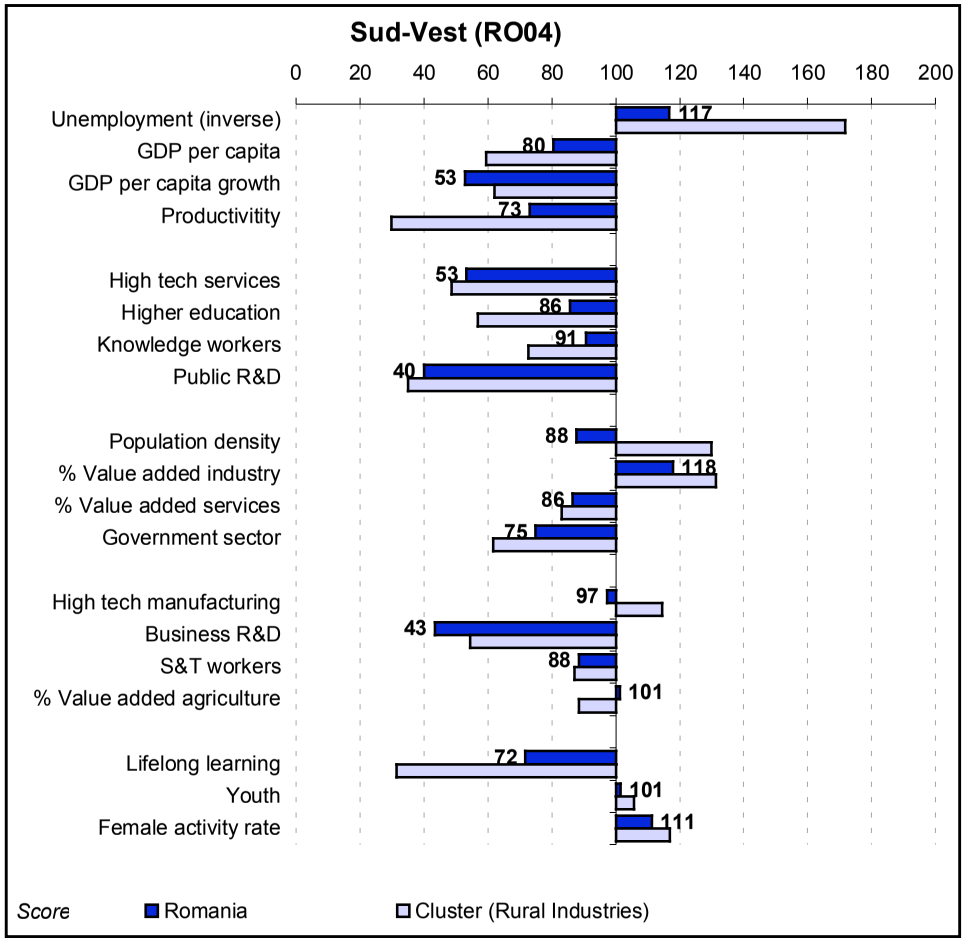
108
87
75
138
204
90
126
79
99
97
Score
Romania
Cluster (Rural Industries)


Sud-Vest (RO04)
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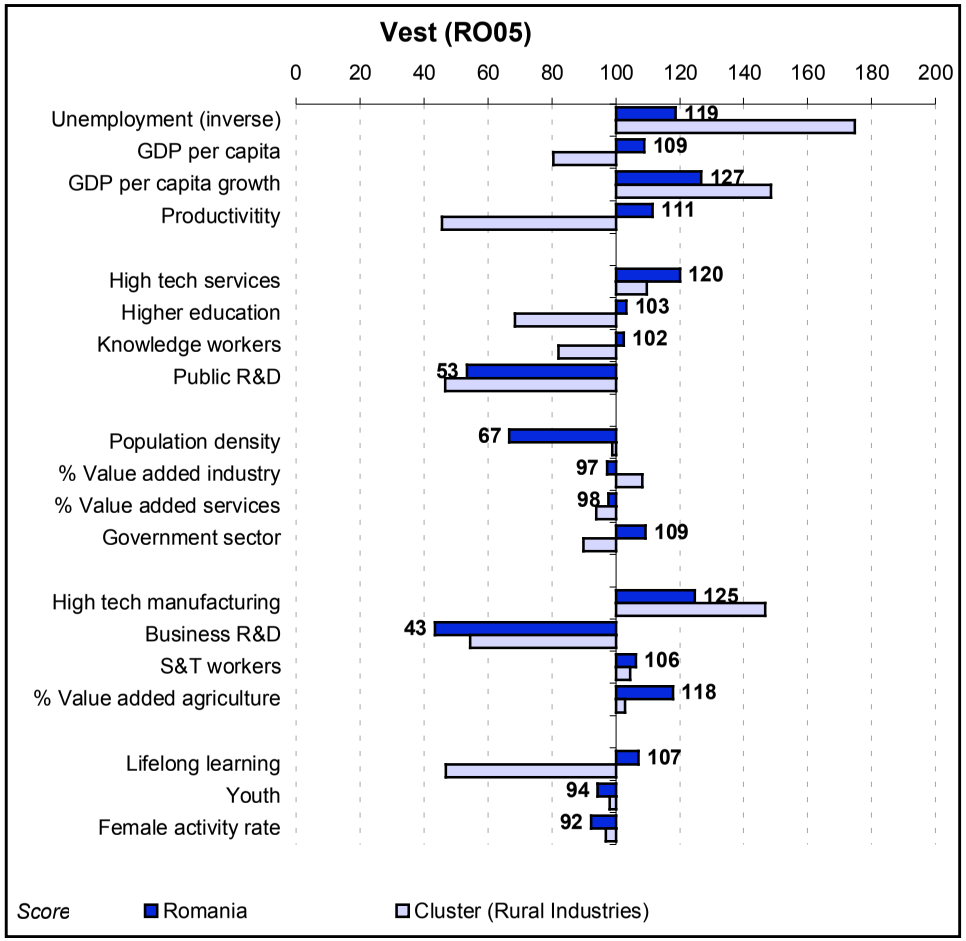
20
40
60
80
100
120
140
160
180
200
Unemployment (inverse)
GDP per capita
GDP per capita growth
Productivitity
High tech services
Higher education
Knowledge workers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T workers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
117
80
53
73
53
86
91
40
88
118
86
75
97
43
88
101
72
101
111
Score
Romania
Cluster (Rural Industries)


Vest (RO05)
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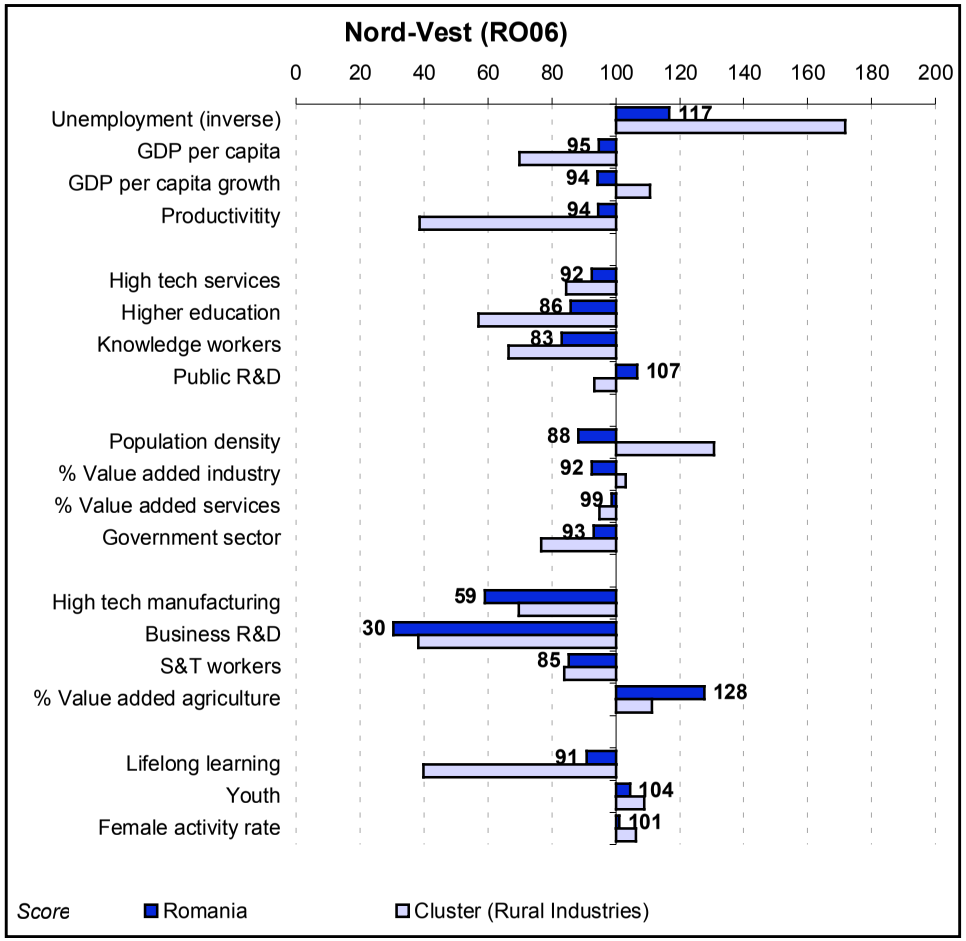
20
40
60
80
100
120
140
160
180
200
Unemployment (inverse)
GDP per capita
GDP per capita growth
Productivitity
High tech services
Higher education
Knowledge workers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T workers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
119
109
127
111
120
103
102
53
67
97
98
109
125
43
106
118
107
94
92
Score
Romania
Cluster (Rural Industries)


Nord-Vest (RO06)
0
20
40
60
80
100
120
140
160
180
200
Unemployment (inverse)
GDP per capita
GDP per capita growth
Productivitity
High tech services
Higher education
Knowledge workers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T workers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
117
95
94
94
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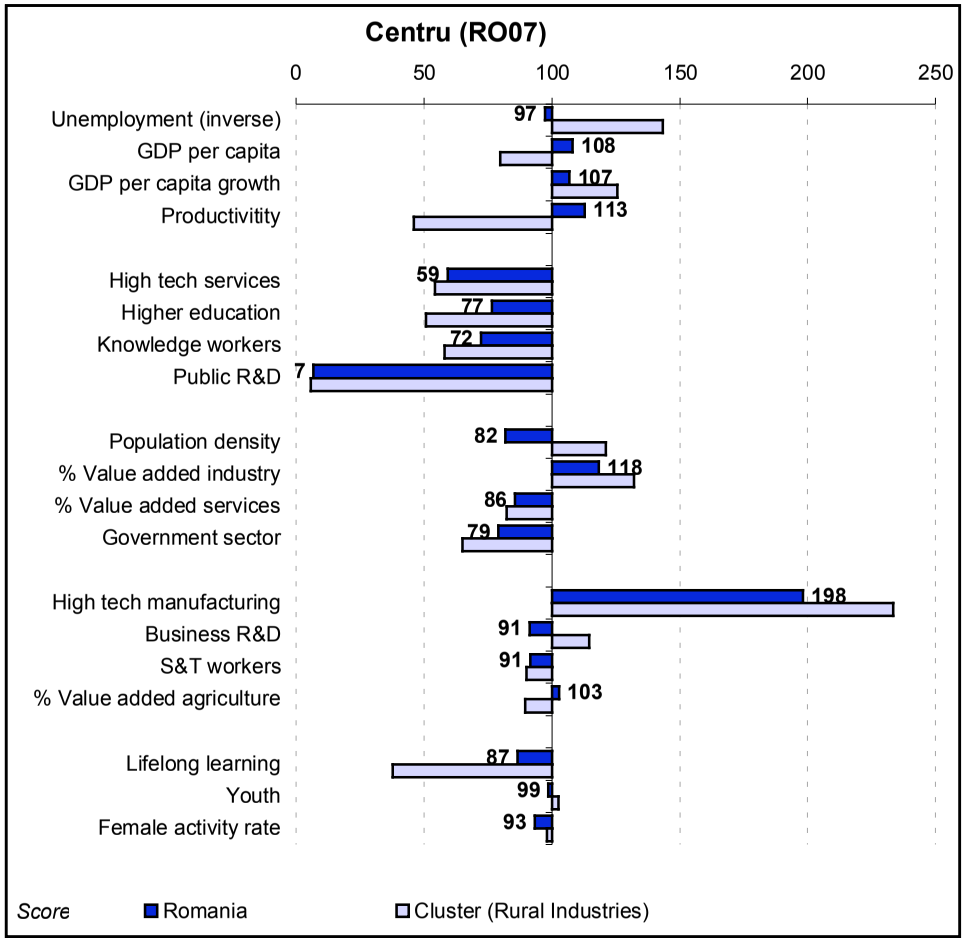
92
99
93
59
30
85
128
91
104
101
Score
Romania
Cluster (Rural Industries)


Centru (RO07)
0
50
100
150
200
250
Unemployment (inverse)
GDP per capita
GDP per capita growth
Productivitity
High tech services
Higher education
Knowledge workers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T workers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
97
108
107
113
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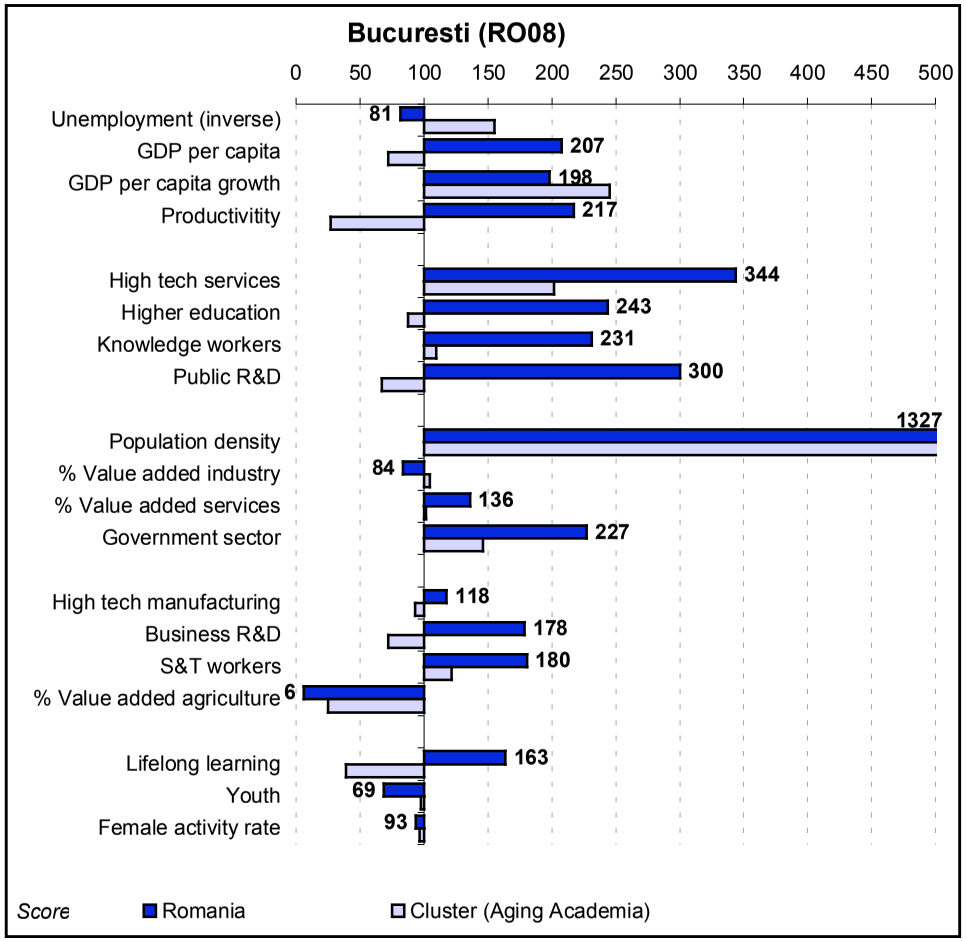
118
86
79
198
91
91
103
87
99
93
Score
Romania
Cluster (Rural Industries)


Bucuresti (RO08)
0
50
100
150
200
250
300
350
400
450
500
Unemployment (inverse)
81
GDP per capita
207
GDP per capita growth
198
Productivitity
217
High tech services
344
Higher education
243
Knowledge workers
231
Public R&D
300
Population density
1327
% Value added industry
84
% Value added services
136
Government sector
227
High tech manufacturing
118
Business R&D
178
S&T workers
180
% Value added agriculture
6
Lifelong learning
163
Youth
69
Female activity rate
93
Score
Romania
Cluster (Aging Academia)

B.3 Classification of policy areas

Policy area	Short description
Improving governance capacities for innovation and knowledge policies	Technical assistance type funding used by public authorities, regional agencies and public-private partnerships in developing and improving policies and strategies in support of innovation and knowledge. This could include past ERDF innovative action programmes as well as support for instance for regional foresight, etc.
Innovation friendly environment;	This category covers a range of actions which seek to improve the overall environment in which enterprises innovate, and notably three sub groups: innovation financing (in terms of establishing financial engineering schemes, etc.); regulatory improvements and innovative approaches to public services and procurement (this category could notably capture certain e-government investments related to provision of services to enterprises) ; Developing human capital for the knowledge economy. This category will be limited to projects in higher education aimed at developing industry orientated courses and post-graduate courses; training of researchers in enterprises or research centres[4];
Knowledge transfer and technology diffusion to enterprises	Direct or indirect support for knowledge and technology transfer: direct support: aid scheme for utilising technology-related services or for implementing technology transfer projects, notably environmentally friendly technologies and ITC; indirect support: delivered through funding of infrastructure and services of technology parks, innovation centres, university liaison and transfer offices, etc.
Innovation poles and clusters	Direct or indirect support for creation of poles (involving public and non-profit organisations as well as enterprises) and clusters of companies direct support: funding for enterprise level cluster activities, etc. indirect support through funding for regrouping R&D infrastructure in poles, infrastructure for clusters, etc.
Support to creation and growth of innovative enterprises	Direct or indirect support for creation and growth of innovative firms: direct support: specific financial schemes for spin-offs and innovative start-ups, grants to SMEs related to improving innovation management, marketing, industrial design, etc.; indirect support through funding of incubators, training related to entrepreneurship, etc.

[4] This is part of the wider area of in-house training, but in the present study only the interventions targeted to researchers or research functions will be analysed.

Policy area	Short description
Boosting applied research and product development	Funding of "Pre-competitive development" and "Industrial research" projects and related infrastructure. Policy instruments include: aid schemes for single beneficiary or groups of beneficiaries (including IPR protection and exploitation); research infrastructures for non-profit/public organisations and higher education sector directly related to universities.

B.4 Classification of Beneficiaries:

Beneficiaries	Short description
Public sectors	• Universities • National research institutions and other national and local public bodies (innovation agencies, BIC, Chambers of Commerce, etc.) • Public companies
Private sectors	• Enterprises • Private research centres
Networks	• Cooperation between research, universities and businesses • Cooperation between businesses (clusters of SMEs) • Other forms of cooperation among different actors

B.5 Classification of instruments:

Instruments	Short description
Infrastructures and facilities	Building and equipment for laboratories or facilities for university or research centres, Telecommunication infrastructures, Building and equipment for incubators and parks for innovative enterprises
Aid schemes	Grants and loans for RTDI projects Innovative finance (venture capital, equity finance, special bonds, etc.) for innovative enterprises
Education and training	Graduate and post-graduate University courses Training of researchers

Appendix C Further reading

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Draft Technical Assistance Operational Programme (January 2006)

Draft Development of Human Resources Sectoral Operational Programme

Draft Economic Competitiveness Sectoral Operational Programme (February, 2006)

Sectoral Operational Programme for ENVIRONMENT (February, 2006)

Sectoral Operational Programme Transport (January 2006)

Appendix D Stakeholders consulted

First Name	Surname	Position	Organisation
Anton	Anton	Secretary of State / President	National Authority for Scientific Research within Ministry of Education and Research
Adrian	Curaj	President	UEFISCU -Executive Unit of Higher Education and Scientific University Research Funding - Ministry of Education and Research
Radu	Munteanu	Vice-President and Rector	National Council for Scientific Research of the University Education / Technical University Cluj-Napoca
George	Bala	Director	National Authority for Scientific Research within the Ministry of Education and Research
Dana	Gheorghe	Director	National Authority for Scientific Research within the Ministry of Education and Research
Rolanda	Predescu	Director	National Authority for Scientific Research within the Ministry of Education and Research
Eugen	Scarlat	Advisor	National Authority for Scientific Research within the Ministry of Education and Research
Elena	Toma	Advisor	National Authority for Scientific Research within the Ministry of Education and Research
Narcisa	Tanase	Advisor	National Authority for Scientific Research within the Ministry of Education and Research
Ion	Ivan	Technology Transfer Centre	ICPE CA
Alexandru	Marin	Director	Technical University Bucharest- CETI ITA
Dan	Badea	Director	National R&D Institute for Radioactive Materials
Radu	Piticescu	Centre for Technology Transfer for Advanced Materials	IMNR
Ileana	Cernica	Head of Laboratory	Centre for Technology Transfer for Microtechnologies - IMT Bucharest
Carmen	Moldovan	Centre for Technology Transfer for Microtechnologies	IMT Bucharest
Cornelia	Muraru-Ionel	Head of Department	Technological and Business Incubator - Bucharest
Gheorghe	Gheorghe	Director	Centre for Technology Transfer- INCDMF
Ion	Piturescu	Business Incubator	ICTCM
Domnica	Cotet	Managing Director	Business Incubator - ICTCM
Eugen	Lenkievici	Technology Transfer Centre	Master SA
Bogdan	Ciocanel	Manager	IRECSON- Technology Information Centre
Silviu	Covaliov	Technology Information Centre	INCDDD

Alexandra	Caramizoiu	Technology Transfer Centre	Optoelectronica SA
Liviu	Jalba	Business and Technology Incubator	INTESA
Florin	Tudorache	Information Technology Centre	ICPE SA
Gabriel	Vladut	Director	Business and Technology Incubator-IPA Craiova
Virginia	Matei	Engineer	Business and Technology Incubator-IPA Craiova
Constantin	Popovici	Advisor	Ministry of Economy and Commerce- Industrial Policy
Adriana	Milandru	Head of International Projects	Institute for Studies and Projects in the Energy sector
Ovidiu	Tataru	Research Director	Technical University Cluj-Napoca
Viorel	Gavrea	General Manager	High Tech Industrial Park Cluj-Napoca
Ovidiu	Silaghi	Member of Parliament	Romanian Parliament/ European Parliament
Tiberiu	Barbuletiu	Member of Parliament	Romanian Parliament/ European Parliament
Calin	Racoti	Advisor	Ministry of Administration and Interior
Lidia	Ene	Director	Intermediary Body- Competitiveness Operational Programme-Ministry of Communication and Information Technology
Dana	Onofrei	Advisor	Ministry of Transport, Construction and Tourism
Pompilia	Idu	Head of unit	Ministry of European Integration
Vasile	Tura	Professor	Faculty of Physics, "Al. I. Cuza" University of Iasi
Cosmin	Stoica	Director	Ministry in charge with the implementation of International Funding Programmes
Cristian	Moisoiu	Advisor	Ministry in charge with the implementation of International Funding Programmes
Razvan	Cotovelea	General Director	Ministry of Finance
Gabriela	Frent	Director	Ministry of European Integration
Sorin	Maxim	Director	West Regional Development Agency
Cristian	David	Minister	Ministry in charge with the implementation of International Funding Programmes
Cristian	Stanica	Vice-President	National Statistical Institute
Varujan	Vosganian	Member of Parliament	Romanian Parliament
Adrian	Ciocanea	Secretary of State in charge with Lisbon Strategy	Ministry of European Integration
Claudiu	Cosier	Director	North West Regional Development Agency