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

Contract n° 2005 CE.16.0.AT.015

A report to:

The European Commission
Directorate-General Regional Policy
Evaluation and additionality

Country Report: HUNGARY

Version: Final

Report produced by:
IQ-TANOK bt

TECHNOPOLIS

In association with

ISMERI EUROPA

LACAVE, ALLEMAND & ASSOCIES CONSULTANTS

LOGO TECH Innovation & Development

7 July 2006

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Executive Summary

The key challenge for Hungary is to devise and implement a sound cohesion strategy for being able to improve quality of life. To do so, international competitiveness should be significantly enhanced, and then maintained for the long-term, i.e. it cannot be based merely on low production costs. Innovation, therefore, is a must for a successful strategy.

For a large number of innovation performance indicators Hungary is lagging considerably behind the EU25 average. On the input side, the most worrisome feature is the very low spending of businesses on R&D: 0.33% of GDP in 2004. There is a significant gap in terms of human resources for R&D and innovation, too. The most recent available survey results suggest that 28.8% of manufacturing firms are innovative in Hungary, compared to 47% in the EU industry. (CIS3 survey) Important innovation output data, such as the share of new products in sales or export revenues, or data on the effects of innovations have not been published in Hungary.

Currently data are only collected systematically on the regional distribution of R&D activities. Regional differences in innovation performance can therefore not be assessed. Central Hungary is the leading region in terms of R&D personnel and expenditures. The regional distribution of scientists and engineers, as well as that of the R&D expenditures is skewed to such an extent, that the difference among the six "Manufacturing cohesion" regions is dwarfed by the huge gap between Central Hungary and any other region.

A significant policy problem might arise, if decision-makers do not realise the close links between domestic R&D efforts and innovation, on the one hand, and economic performance, on the other. Economic development can indeed be maintained, or even accelerated, without indigenous R&D and innovation efforts in the short run thanks to foreign direct investment. Yet, a country opting for this 'development' path becomes not only overly dependent on foreign technologies but most probably would lose its attractiveness, too.

An apparently appropriate decision-making mechanism has been put in place in Hungary in the form of two high-level bodies and a government agency responsible for R&D and innovation programmes. The Science and Technology Policy Council, headed by the Prime Minister, co-ordinates STI policy measures. The Research and Technological Innovation Council – consisting of seven high-ranking officials of interested ministries, and eight representatives of the business and STI communities – guides the activities of the National Office of Research and Technology. Yet, policy co-ordination is fragmented in practice. No policy reviews (white papers or parliamentary debates) have been produced so far, nor has a systematic international comparative policy analysis been used to assess Hungarian innovation policy.

Some of the former weaknesses of the national innovation governance system have been addressed by new pieces of legislation since September 2004 – not in practice, though. Most notably, the importance of devising and implementing a coherent RTDI strategy has been recognised in the Law on Research and Technological Innovation.

Yet, it has not been devised. Evaluation of RTDI policy measures has become compulsory since 2005 (due to the same Act) – but only one policy programme has been evaluated so far. Other useful methods preparing policy decisions, such as systematic data collection and analyses of techno-economic issues, technology assessment or technology foresight, however, have not been included in this legislation.

A large number of challenges are identified, and the current mix of measures tackles the ones that can be tackled by RTDI policy schemes. In that respect, there is a sensible 'division of labour' between the measures co-funded by the EU Structural Funds and the nationally funded ones.

A number of other, rather fundamental challenges, however, cannot be tackled by policy measures at all, or only indirectly, i.e. no immediate impact should be expected, only gradual improvements/ changes, occurring in a longer period of time. For instance, the weak demand for new products, services, and hence the faint perceived role of RTDI by firms, leading to low BERD, cannot be changed overnight by RTDI policy measures. Another example is the way of thinking of policy-makers, i.e. the way in which they (do not) include RTDI when devising overall socio-economic development strategies; the lack of a coherent RTDI strategy; the lack of use of modern policy-making methods. A third one is the dominant role of MNCs in shaping the volume, direction and types of economic activities (e.g. knowledge-intensive tasks vs. simple assembly jobs) in Hungary, as well as the location of their RTDI projects (whether in Hungary or other countries).

Certainly, there are a number of options open to policy-makers, but those are beyond the scope of RTDI policies, on the one hand, and cannot deliver spectacular, rapid developments, on the other. Potential actions include the application of competition policies; using public procurement, environmental regulation and health policies intelligently [to boost the demand for innovative products, services and solutions, and thus promote RTDI]; introducing appropriate curricula at higher education; providing better training for policy-makers, and regular re-training for them; pooling together the intellectual and financial resources of industrial and regional development policies, etc.. These examples all point to the crucial importance of policy co-ordination – one of the major weaknesses of Hungary, despite the fact of having a number of government bodies charged with this task.

The Structural Funds measures are not the main instrument for supporting innovation (creating, diffusing and exploiting knowledge) in Hungary. They provide, nonetheless, a significant extra funding for RTDI, which cannot be sought from national sources. Also, the methodological requirements – e.g. ex-ante and ex-post evaluation, project monitoring, regular discussions with EC officials, peer-review in the frame of open method of co-ordination – 'attached' to them are likely to have a major impact in terms of policy learning.

The taxonomy of regions developed for this project does not seem to be appropriate for guiding policies. Six Hungarian regions – out of seven – are classified as "Manufacturing cohesion" regions, suggesting that similar policies should be devised for them. Yet, there are huge differences among them in terms of their current performance – their GDP per capita varies quite significantly, that is, between €7902-

12870, i.e. the gap is 62.8%! –, economic structure, and prospects. Another warning sign is 'sounded' by unemployment data. In two Hungarian "Manufacturing cohesion" regions unemployment was 4.6% in 2003, below the national and EU25 averages (5.9% vs. 9.2%), and also below the average of High Techno (6.1%), Nordic High-tech Learning (6.4%) and Science & Service Centre regions (6.1%).

Ten recommendations are identified in this report:

1. Provide technical assistance and funding for the regular use of participatory decision-making methods
2. Promote the use a broad concept of RTDI in policy-making processes, paying attention to non-technological innovations, and taking into account the systemic features of innovation
3. Promote business investments both in R&D and innovation by creating innovation-friendly environment and boosting demand for innovative products and services
4. Develop human capital for RTDI
5. Strengthen indigenous SMEs, including their innovation capabilities
6. Strengthen academia-industry co-operation
7. Promote start-up and spin-off businesses
8. Align major policies affecting RTDI activities, and ultimately economic performance and quality life
9. Promote the use modern decision-preparatory tools to arrive at evidence-based policies; establish STI Observatory
10. Keep the number individual policy schemes low, and their mix simple, easy to understand

Given the nature of the challenges to be tackled, several recommendations concern both the national authorities (rationale of policies, mindsets of policy-makers, policy-planning tools, actual policy schemes), as well as options for SF interventions. These major needs cannot be separated along administrative lines, but when the actual recommendations are discussed, a distinction is maintained between the responsibilities of, and options open for, the national authorities and SF tools.

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 are also 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

[11] 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.

income levels and factors which create new economic opportunities and therefore, contribute to the growth potential of these countries.

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.

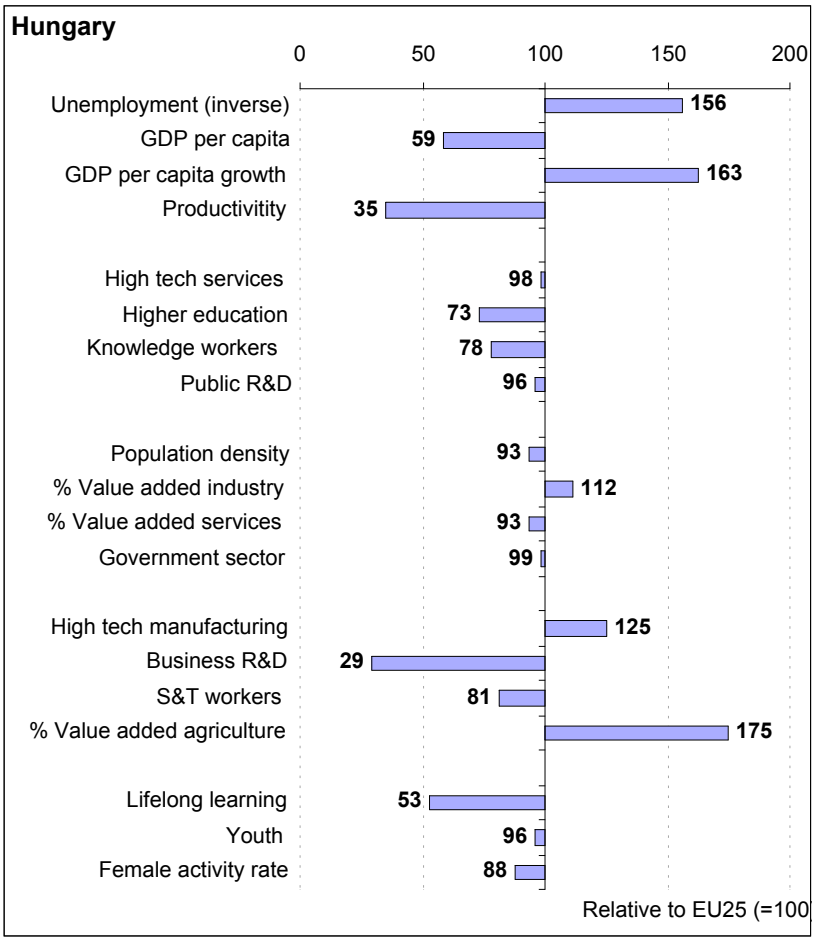
2 Investing in innovation and knowledge: a comparative overview of regional performance

This section provides a synthetic overview of the relative performance of Hungary, 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 Hungary compared to the EU25 average for a series of key knowledge economy indicators.

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.

Since 1997, economic growth has been impressive for a number of years, with the Hungarian economy recording growth rates of 4.3-5.2% a year.[3] GDP grew by 4.1% in 2005, and forecasts for 2006 suggest that this pace is to be kept (4.3%). Thus, substantial real convergence has been achieved: GDP per capita has increased from 53% of EU25 average in 2000 to 61.9% in 2005. The major factors behind the relatively high growth rates, namely investments and exports, have picked up since 2003. Labour productivity – measured as GDP in PPS per person employed – has significantly improved: standing at 60.6% of the EU25 average in 2000 it reached 70.5% in 2005.

Unemployment has stabilised at around 7% in recent years (7.2% in 2005), remaining well below the EU25 average of 8.7%. The employment rate has improved – yet, it is still 6 percentage points below the EU25 average (57% vs. 63%), and far away from the original Lisbon target (70% by 2010). This low employment rate poses a big burden on the central budget, both in terms of a 'slim' revenues base and in terms of social security expenditures.

Hungary is showing mixed performance in terms of meeting the Maastricht criteria. Government deficit reached 6.1% of the GDP in 2005, and forecasts for 2006 range between 8-10%. It has prompted severe austerity measures in June 2006 (increased taxes and social security contributions; higher gas and electricity prices; 20-25% of government-financed organisations to be closed down or fundamentally reorganised, and 10% of civil servants to be dismissed by the end of 2006). Inflation rate has been brought down from 28% in 1995 to 3.6% ten years later. Yet, due to the recent austerity measures, it is likely to reach 5% in 2007. General government gross debt has steadily increased in recent years, amounting to 58.4% of GDP in 2005, and it is likely to exceed the 60% threshold in 2007. All these developments question if Hungary can join the euro zone in 2010.

Hungary is a small open economy, with a very high trade integration rate of 54% in 2003 (in terms of goods). Trade is, therefore, of primary importance to economic performance. The economies of Hungary and the EU are increasingly integrated. Hungary's exports share in total EU15 imports started at 1.7% in 1990, and reached 3.9% in 2003,[4] that is, the year before joining the EU. The share of Hungarian exports to, and imports from, the EU15 varied between 72-76%, and 55-64% of total Hungarian exports and imports, respectively, in 1997-2003.[5] The top 5 exported goods in 2004, accounting for 56% of total exports, were telecommunications and sound recording equipment (19%), electrical machinery (11%), power generating machinery (11%), followed by road vehicles (8%), and finally office and automatic data processing machinery (7%).[6]

Both export and import volumes have almost tripled since 1989. This dynamic increase in exports can be attributed mainly to multinational companies establishing manufacturing plants in Hungary. These plants imported much of their input from abroad, also causing a dynamic increase in imports. Foreign-owned companies play a

[3] This sub-section relies on a number of sources: GKM [2005], EC [2006], Central Statistical Office (CSO), National Bank of Hungary and Eurostat data, as well as recent press reports.
[4] Own calculations based on CSO data (www.ksh.hu)
[5] Own calculations based on CSO and Eurostat data (www.ksh.hu; http://epp.eurostat.cec.eu.int)
[6] Own calculations based on CSO data (www.ksh.hu)

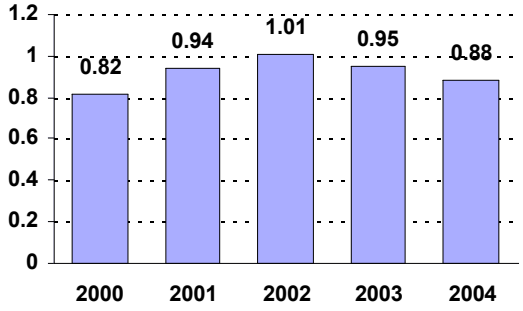
dominant role in the Hungarian economy: their share in total manufacturing revenues was 71.6% in 2002, surpassed only by Ireland (79.5% in 2001) among the OECD countries. (OECD [2005]) The stock of foreign direct investment (FDI) per capita in Hungary is still the highest among the Central and Eastern European economies. FDI picked up again in 2004, amounting to 3.3 bln EUR (from 1.1 bln EUR in 2003), and 2005 saw an even larger inflow of capital, that is, 5.1 bln EUR.

Industrial production has accounted for roughly one quarter of the gross added value in the Hungarian economy in the years 2000-2005, and in recent years its growth exceeded that of the GDP-growth rate (6-9% vs. 3-4%). An overwhelming share of industrial output (93%) is accounted for by manufacturing, and the most important sectors are machinery and automotive industries, that attracted most of the aforementioned FDI. As to the other main sectors of the economy, agriculture has, in line with the bulk of advanced countries, steadily been losing share in GDP (from 5.9% in 1995 to 3.3% in 2004) despite the rapid growth in its added value rate. There are significant regional differences in this respect, though: its share in the total gross added value varies between 0.9% (Közép-Magyarország) and 9% (Dél-Alföld). The services sector reached its peak at 66% of GDP, but it has remained consistently above the 60% margin throughout the period. This is somewhat lower than the EU average, which can be explained by large foreign investments in manufacturing industries.

From a different angle, Hungary continues to suffer from a dual economy syndrome: a highly productive and technologically intensive FDI firm sector, on the one hand, and fragile, financially and technologically weak indigenous SMEs, on the other, characterised by highly labour-intensive production and low capital endowment. Even though these enterprises employ about 60% of the working population (74% of those employed by businesses) and account for almost 40% of the economy's total added value, their positions in terms of turnover and income potential have been deteriorating. A telling figure is that 80% of the indigenous SMEs has been operating without any external financial resources, as opposed to 15-20% of firms in the advanced countries. (GKM [2005b], p. 17]) The overwhelmingly foreign-owned large enterprises produce almost half of the total gross added value, and account for more than four-fifth of total exports. The 50 biggest companies, most of which are foreign-owned, record almost 70% of all exports.

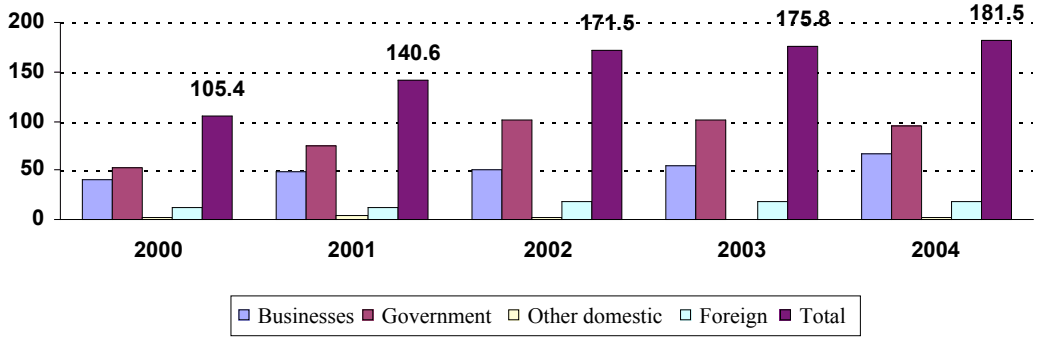
Hungary's innovation performance is lagging considerably behind the EU25 average. On the input side, the most worrisome feature is the very low business spending on R&D: 0.33% of GDP (in 2004), which is less than one third of the EU25 average. Public R&D expenditures – measured as a percentage of GDP – are close to the EU25. The ratio between public and private R&D efforts, however, is 2:1, i.e. the opposite as it is desired by the Lisbon process. Thus, gross R&D expenditures are way below the Lisbon targets, and public R&D expenditures have been shrinking. (Figure 1) Given the macroeconomic pressures to comply with the Maastricht criteria, a pre-requisite to join the euro zone, it is questionable that the country would make any significant progress in this respect in the coming years. However, forecasts or plans on R&D expenditures are not publicly available.

Figure 1: GERD/GDP (per cent)



Source: Central Statistical Office

Figure 2: Composition of GERD by funding sources (current bln HUF)



Source: Central Statistical Office

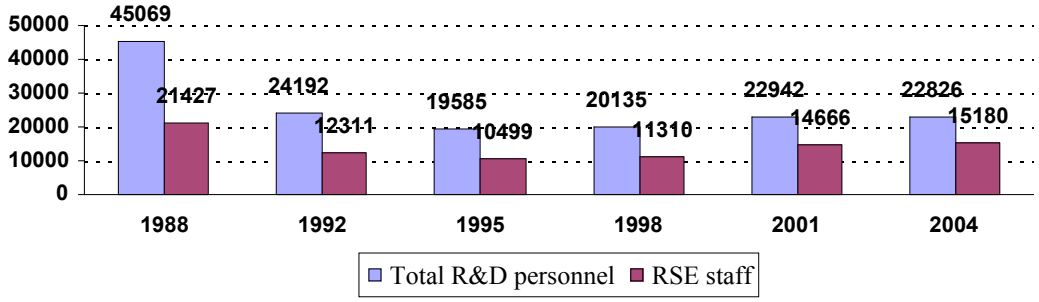
The most recent available survey results suggest that only 28.8% of Hungarian manufacturing firms are innovative (the Hungarian CIS3 survey, covering the period of 1999-2001), compared to 47% in the EU industry (CIS3, 1998-2000). Neither important innovation input data, e.g. innovation expenditures, nor innovation output data, such as the share of new products in sales or export revenues, and effects of innovations, are published in Hungary.

There is a significant gap in terms of human resources for R&D and innovation: the ratio of science and engineering graduates among people aged between 20 and 29 was 4.8‰, which is a mere 39% of the EU25 average and leaves Hungary in 21st position in the EU25. Yet, the low share of S&E graduates might be regarded as a rational reaction if it is seen in its wider historical perspective. R&D personnel had been cut drastically up until 1995, by 56.5 percent compared to 1988.[7] Since then, a slight increase can be observed. Yet, the 2004 total was still 49.3% lower than the 1988 one, while for scientists and engineers the gap is 29.1%. (Figure 3) Moreover, the number of university personnel is still being cut, in spite of the 'exploding' number of students.[8] Against this background, it is quite understandable that young talents opt for other career paths.

[7] The first few years of the transition process, i.e. 1990-92, were especially harsh in this respect.

[8] For an overview of planned redundancies at a number of universities and colleges, see, e.g. Népszabadság, 19 February 2005.

Figure 3: R&D personnel in Hungary, 1988-2004, full-time equivalent



Source: Central Statistical Office

Another important indicator on human resources for innovations, namely the share of working age population with tertiary education shows a considerably smaller gap: 16.7% (HU) vs. 21.9% (EU25) in 2004. A further warning is signalled, however, by the low participation in life-long learning: 4.6% (HU) of the population aged 24-65 years, as opposed to 9.9% (EU25) in 2004.[9]

An apparently very good Hungarian performance is suggested by four indicators: employment in high-tech manufacturing and services was 125% and 98% of the EU25 average, respectively (in 2003), while the ratio of high-tech products in total exports was 122% of the EU25 average (2003), and the share of value added stemming from high-tech manufacturing stood at 126 percent of the EU25 average (in 2002). Yet, a number of factors should be considered when appraising these figures from a policy point of view. First, one should keep in mind the very high share of FDI in Hungarian manufacturing, coupled with the weight of foreign-owned firms active in sectors that are classified as high-tech ones by the OECD, given their R&D intensity. Second, although these sectors are regarded as 'engines of growth', a number of recent theoretical and empirical analyses refute this widely held, uncritically accepted view. (Hirsch-Kreinsen *et al.* [2005]; Sandven *et al.* [2005]; Smith [2002], [2003]; von Tunzelmann and Acha [2004]) Third, R&D-intensive industries (or services), as classified by the OECD, are not necessarily R&D-intensive ones in all countries. In fact, R&D intensities of the so-called ICT high-tech industries were way below the OECD high-tech threshold in 1995-2000 in a large number of OECD member states, including all the four Central European member states, as well as Denmark, Italy, Korea, Mexico, Portugal and Spain. What is even more striking, the R&D intensity of the high-tech ICT sectors was below the average R&D intensity of manufacturing industry in the four Central European countries. (Srholec [2006]) Thus, it would be a gross mistake to regard these sectors as 'technology leaders' – with all the assumed positive impacts on growth and competitiveness – in these countries.

[9] It should be added, however, that there is no unequivocally accepted indicator that could provide us with meaningful and comparable measurement of this phenomenon.

2.2 Regional disparities and recent trends

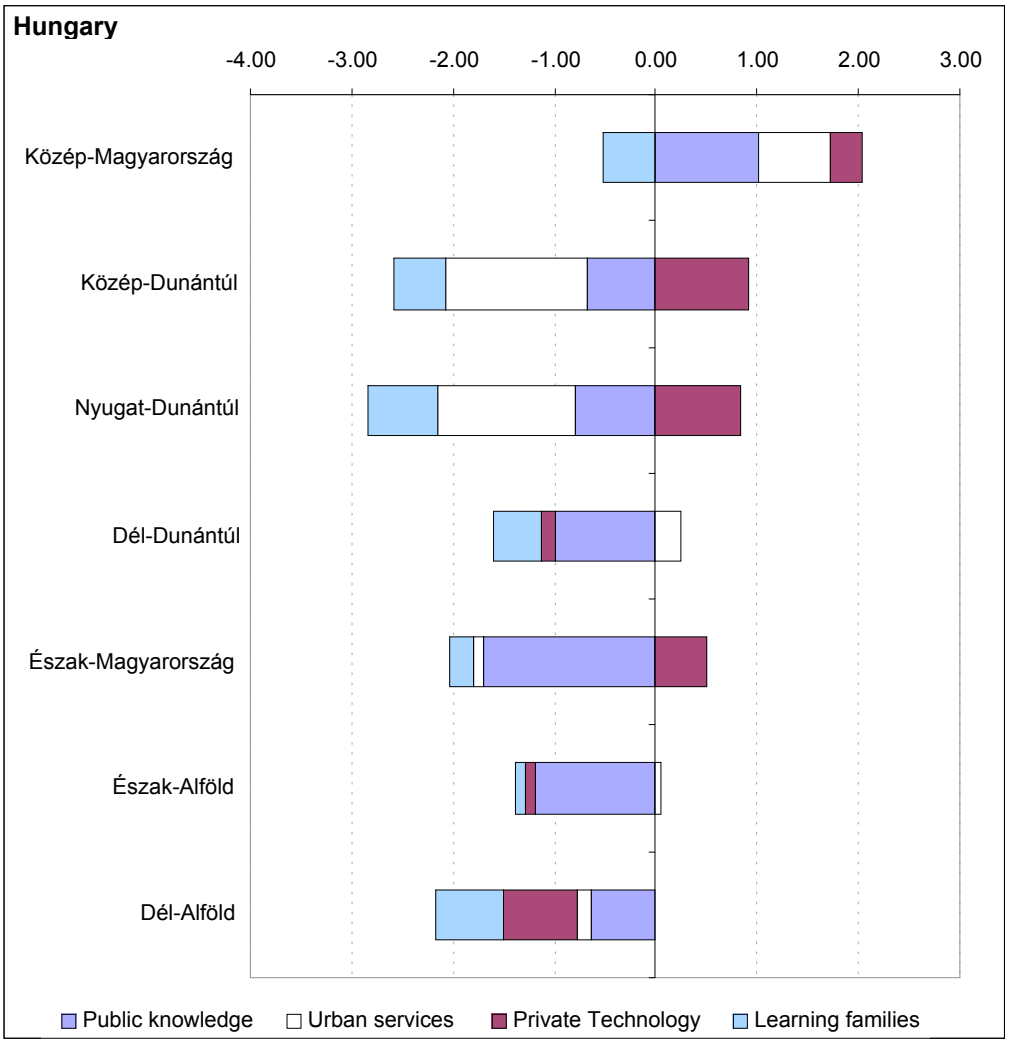
In order to analyse and describe the knowledge economies at regional level in the EU, the approach adopted was to reduce and condense all relevant statistical information available for a majority of regions. The approach involved firstly reducing the information from a list of selected variables into 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. In the case of Hungary the regions are grouped as follows:

- Közép-Magyarország (the region consisting of Budapest and a county around it, called Pest county) stands out from the other Hungarian regions as a member of the cluster "Local sciences & services".
- The other 6 Hungarian regions are classified as "Manufacturing cohesion".

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.

Hungary is a highly centralised country in all respects, including economic activities: a very high share of GDP is produced in Budapest (34.6% of national GDP in 2004, or 205% in terms of Hungarian GDP per capita) and thus the weight of the region of Közép-Magyarország (Central Hungary) is excessively strong: 44.5% of national GDP, 161% [CSO 2003 – more recent data not available] of Hungarian GDP per capita. Despite being the smallest region in terms of area, it is the biggest in terms of population. To take a different angle to compare, this region is at the level of the EU25 average with its GDP per capita being just 4% below the EU25 average. (in 2003; Eurostat) Roughly 40% of all, and 60% of foreign-owned, businesses are located in the region.

The unique structure of the economy in Budapest is dominated by the services sector, accounting for some 80% of gross added value. The highest share of investments was, in recent years, also attracted by this sector, especially the development of transport and logistics services, telecommunication, but also commerce, business services, and

real estate. Outside Budapest, the region's economy is dominated by industry and agriculture, although trade, catering and various services also play an important role. The dynamically growing manufacturing industry accounts for 80% of industrial products, with mechanical engineering, food, textile and clothing industries performing particularly well, but chemicals, timber, paper and printing industries have also achieved outstanding results both in terms of profitability and growth rate. Tellingly, 60% of all Hungarian R&D workers are employed in the region, and two thirds of the financial resources spent on R&D are used here. Thanks to the 59 higher education institutes (40% of Hungary's higher education) operating here, the region has an exceptionally high proportion of university and college graduates. Not surprisingly, unemployment levels are 2 percentage points lower, while average salaries are 10-15 percent higher than the national average.

An overwhelming majority of Hungarian businesses do not engage in R&D activities, and this *low level of BERD* is one of the key factors behind the threats to competitiveness. Central Hungary, despite its relative advantages, is no exception. Though income levels and thus purchasing power are significantly higher than elsewhere, the demand for new products is still weak. Further, export-oriented businesses are mainly foreign-owned, and rely on the R&D results of their parent companies, achieved at the central labs. For these two reasons, the incentives – or pressures, from a different angle – to spend on R&D are insufficient. The intensity of academia-industry co-operation is also lagging behind the advanced EU regions. These are the most important issues to be addressed. Given these key weaknesses, it is this region that is most severely threatened by brain-drain and the negative effects of a possible rapid loss of competitiveness. Namely, despite its level of development, which almost reaches the EU25 average, and the relatively low unemployment figures, already some of the competing regions in the neighbouring countries show signs of taking over as regional economic centres. To avoid this scenario, co-ordinated policy efforts and adequate development strategies are needed in order to keep the highly qualified workforce in the region. The main objective should be to increase local knowledge-content across sectors; promote the integration of indigenous SMEs into the regional production networks; and 'anchor' foreign-owned firms into the region by offering opportunities for mutually beneficial joint R&D projects, conducted together with strong, flexible and business-minded academic partners.

Data and available reports clearly suggest the major regional disparity difference lies between Közép-Magyarország and the other six regions. As mentioned before, the economic structure of Central Hungary (and Budapest, in particular) is overwhelmingly dominated by the services sector, whereas it accounts for less than 50 percent in the other regions. Furthermore, the difference in terms of BERD among the six Hungarian "Manufacturing cohesion" regions is less pronounced than in other respects. Data on S&T workers, as well as on higher education confirm this observation: the difference is not dramatic across the "Manufacturing cohesion" regions, it is more pronounced between Central Hungary and these regions – with the national average below the EU25 average (16.9 vs. 20.7 for S&T workers, and 15.2 vs. 20.7 for higher education; see Appendix B).

However, it would be a gross simplification not to distinguish within the remaining six regions. Their GDP per capita varies quite significantly, that is, between €7,902

and €12,870, i.e. the gap is 62.8%. The two poorest regions (Észak-Magyarország [Northern Hungary] and Észak-Alföld [Northern Great Plain]) are among the ten poorest ones in the EU. Major foreign-owned firms, however, are located outside the central region, too, especially in Nyugat-Dunántúl (Western Transdanubia) and Közép-Dunántúl (Central Transdanubia), and thus their GDP per capita is €12,870, and €10,967, respectively. Also, there are more job opportunities, and hence unemployment was 4.6% in these two regions (in 2003), below the national and EU25 averages (5.9% vs. 9.2%), and also below the average of High Techno (6.1%), Nordic High-tech Learning (6.4%) and Science & Service Centre regions (6.1%). (Appendix B) The clustering exercise, therefore, can only be used for deriving policy conclusions with quite a large pinch of salt. The unemployment rate is the highest in the poorest region: 9.7%, just above the EU25 average. In sum, for the six Hungarian "Manufacturing cohesion" regions the general characterisation – claiming that "Unemployment is high, even compared to Rural Industries and Services Cohesion regions" – does not hold.

The most consequential distinction, with serious analytical as well as practical implications, can be made on grounds of the role played by FDI in the respective regions. This is the basic approach employed in this section, as well as in 2.3.[10]

Two regions, Nyugat-Dunántúl (Western Transdanubia) and Közép-Dunántúl (Central Transdanubia) can be classified as "Manufacturing cohesion regions with dominant role of FDI". Both attract roughly 10-12 percent of the total, while the other group, labelled "Manufacturing cohesion regions with dominant role of declining industries or agricultural activities" are far less attractive to foreign investors, receiving only 2-5% of FDI. (GKM [2005c])

The economic structure of the more advantageously located regions (basically along the "Budapest-Vienna axis") is dominated by the industry: it accounts for 46-54% of gross added value. These regions have attracted investments most notably in the automotive and electronics components industries, primarily given their vicinity to the EU15 markets and their relatively developed physical infrastructure. However, these investments have entailed primarily assembly and other tasks with low local knowledge content, seeking to take advantage of the relatively low wages and flexible labour regulations in Hungary. Despite the available qualified and disciplined workforce (a legacy of the industrial traditions of the region), the employment of highly educated workers only picks up gradually. Also, business expenditures on R&D are even lower than in the Central Hungary region, with the otherwise prospering Western Transdanubia ranking third-lowest on BERD figures (see Appendix B2). This can be as a major threat to future competitiveness even in the mid-term. Multinational firms only reluctantly relocate some of their R&D from their headquarters. In the meantime, indigenous SMEs – struggling with day-to-day survival as opposed to strategic behaviour with a longer time-horizon – are not in the (financial) position to consider such activities, and they lack both the incentives/pressures to introduce new products and production processes, and are devoid of the necessary technological and managerial skills to take part in international production and innovation networks. In other words, a substantial finding is that the impressive FDI does not automatically lead to fast growth in R&D

[10] Central-Hungary clearly stands out with its share of about two-thirds of the FDI stock.

expenditures. As emphasised in the previous section, the presence of 'high-tech' enterprises in the region does not at all automatically leads to sufficient levels of BERD, which is clearly indicated in the discrepancies between the over-EU25-average "high-tech manufacturing", and the below-average "S&T workers" and "BERD" figures for Nyugat-Dunántúl (Appendix B2). A clear policy implication is that this region, in particular, should focus on fostering knowledge-intensive activities across all sectors and among as many firms as possible, as opposed to focusing on achieving an 'optimal' structure of sectors. It is strongly recommended, therefore, to avoid the trap of attracting 'high-tech' firms at any rate, just because the weight of high-tech sectors is a commonly (mis)used benchmark. This misplaced policy would only reinforce the current structure: a deceptively high proportion of seemingly leading, technologically advanced, sectors, which in fact are composed of firms performing low knowledge-intensive activities, hence paying low wages, and ready to leave at any time, whenever cheaper locations and/or more subsidies become available. A particular challenge for the other region in this group, namely Közép-Dunántúl is the lack of sufficient knowledge infrastructure; In contrast to both Közép-Magyarország and Nyugat-Dunántúl, there are no relevant institutes of higher education in this region.

Closely connected to the problem discussed above, namely that the economy suffers from a *"dual economy syndrome"*, it can be observed that multinational companies often rely on their long-established (foreign) suppliers for their production activities in Hungary. This has led to a growth in imports for various parts and components (as evidenced by the deteriorating trade balance), but the impact for the region and for the national economy has been more serious: the 'weight' of Hungarian businesses (mostly SMEs) has remained low in these supplier networks. More recently, however, foreign-owned firms located in these regions are increasingly relying on local suppliers in their vicinity, as well as establishing links with nearby higher education institutes. It is reflected in the higher BERD figures for some of the more advanced regions. (Appendix B) Boosting this process could be the most important growth potential in the region, particularly if, in addition, a better understanding of the role of RTDI in enhancing competitiveness could be achieved, and fostered by mutually beneficial co-operation between MNCs, indigenous businesses and academia.

The four "manufacturing cohesion regions with dominant role of declining industries or agricultural activities" (Dél-Dunántúl, Észak-Magyarország, Észak-Alföld, Dél-Alföld) are not surprisingly below the national average on most key economic indicators: the poorest one, Észak-Magyarország,[11] with its €7,900 GDP per capita is not only 65% below that of Nyugat-Dunántúl, but ranks near the bottom of all EU25 regions. (Appendix B) Compared to the more advanced Hungarian regions (see above), industry accounts for a much smaller share of gross added value: a mere 27-33%, whereas agriculture still plays an important role (8%) Also, the unemployment rate (9.7%) is more than double that of FDI-dominated regions, even though this latter figure is still modest compared to some crisis-struck regions in the EU. These "Manufacturing cohesion regions with dominant role of declining industries or agricultural activities" are, nevertheless, seriously threatened by permanent

[11] Észak-Magyarország is a 'borderline' case: it used to be a stronghold of heavy industries – now declining or even wiped out –, but more recently it is becoming attractive for green-field FDI projects.

backwardness, which is indicated by the fact that their relative positions (measured as % of the national average GDP/capita) have, despite the efforts, been deteriorating in recent years, not least because their poor physical infrastructure. This particular need is one of the key priorities to be addressed in the National Development Plan II (2007-2013). Furthermore, even though some of the regional centres (e.g. Szeged and Debrecen) possess prestigious universities, which should, in principle, facilitate R&D co-operation with businesses and thus attract industry financed research projects, there is a striking mismatch between the knowledge infrastructure provided by these R&D institutes, on the one hand, and businesses' needs for RTDI, on the other. This divergence certainly needs to be addressed by pursuing policies that create incentives to match the supply and the demand of the knowledge infrastructure (see section 3.2).

Exhibit 3: Recent trends per region in key indicators

		Unemployment	Per capita GDP	Industry share	Agriculture share	Population density	Tertiary education	R&D intensity
		1996-2003	1996-2002	1996-2002	1996-2002	1996-2002	1999-2002	1996-2002
		%-pnt ch.	% growth	%-pnt ch.	%-pnt ch.	% growth	%-pnt ch.	%-pnt ch.
Hungary		-3.70	7.76	-0.34	-2.96	-0.36	-0.27	0.37
Közép-Magyarország	HU1	-3.10	9.76	-1.31	-0.56	-2.06	-0.56	0.53
Közép-Dunántúl	HU21	-3.70	7.09	-0.08	-2.83	0.40	-1.01	0.24
Nyugat-Dunántúl	HU22	-1.60	7.55	1.58	-3.22	0.56	-0.28	0.11
Dél-Dunántúl	HU23	-2.20	6.16	0.21	-4.32	-0.14	0.55	0.19
Észak-Magyarország	HU31	-4.60	6.31	1.91	-3.11	0.00	-0.50	0.09
Észak-Alföld	HU32	-5.50	6.19	2.10	-5.75	1.04	0.00	0.24
Dél-Alföld	HU33	-1.00	4.86	0.31	-5.86	0.13	0.24	0.28

Source: MERIT based on Eurostat data for period indicated

2.3 Conclusions: innovation and knowledge performance

For a large number of innovation indicators Hungary is lagging considerably behind the EU25 average. The observed performance gaps, however, are not a major issue in political circles or media, except for occasional articles by leading scientists, mainly focussing on the poor conditions of R&D, and rarely shedding light on the non-linear, complex relationships between (domestic) R&D efforts, innovation, competitiveness, and thus improved chances for catching up. A potential explanation might be that exports data can also be used as a 'proxy' variable of innovation performance, and this 'lens' shows a somewhat rosy picture: a quick restructuring both in terms of export markets and exported goods. These developments are mainly due to the strong presence of foreign-owned firms and the thorough restructuring of their indigenous suppliers.

The picture, however, is further complicated by the fact that impressive volumes of FDI and enhanced R&D do not necessarily go hand in hand, as clearly evidenced by the examples of the "outlier" region of Central Hungary, as well as the two "Manufacturing cohesion regions with dominant role of FDI". To draw policy conclusions, one should clearly understand the distinction between (locally conducted) R&D and innovation. Fierce competition, in both export markets and the open, liberalised domestic one, compels Hungarian firms to innovate. Indeed, they

introduce new products and/or production processes, otherwise they would not have survived, but in most cases these innovations are not based on domestic R&D projects. Quite often they rely on technologies provided by parent companies or other foreign partners, e.g. under a subcontracting agreement. Foreign firms are also encouraging their Hungarian suppliers to introduce new managerial techniques and other organisational innovations. Domestic innovative activities outside the domain of formal R&D do play an important role, too, e.g. engineering and re-designing to adjust to local needs and production facilities, as well as upgrading production equipment and tooling up to increase efficiency and/or to introduce new products and processes.

From a longer-term perspective, it must be seen as a threat if decision-makers do not realise the close links between domestic R&D efforts, innovation and economic performance. Economic development can indeed be maintained, or even accelerated, without indigenous R&D and innovation efforts in the short run thanks to foreign direct investment. Yet, a country opting for this 'development' path becomes not only overly dependent on foreign technologies but would most probably also lose its attractiveness. At best, it might become the 'dumping site' for outdated technologies; at worst, it might even be abandoned by foreign manufacturing firms altogether because there are always cheaper locations for simple assembly-line jobs.

Currently data are only collected systematically on the regional distribution of R&D activities. Regional differences in innovation performance can therefore not be assessed. Central Hungary is the leading region in terms of R&D personnel and expenditures. The regional distribution of scientists and engineers, as well as that of the R&D expenditures is skewed to such an extent, that the difference among the six "Manufacturing cohesion" regions is dwarfed by the huge gap between Central Hungary and any other region. Nevertheless, the differing basic needs, and their concomitant policy implications, substantiate a further split within the "manufacturing cohesion" group, as done in the previous sections and in Exhibit 4 below. Key differences are related to central elements of the overall socio-economic setting, most notably the dispersion of qualified workforce, hence the huge gaps in GDP per capita, average income and unemployment figures. These deviations can be explained partly by the geographical location of the respective regions, but the decisive role of structural factors, such as the conditions of the physical infrastructure, the weight and role of foreign direct investment or path-dependent legacies of the industrial/agricultural structures must not be neglected.

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
General considerations, valid for all the seven regions in Hungary	Weak domestic demand for new products/ services ⇒ ▪ 'pale' perceived role of R&D by firms; ▪ low business expenditures on R&D; ▪ weak academia-industry co-operation.	▪ Stronger pressure is needed from domestic demand for innovative products and services ⇒ Better understanding of the role of RTDI in enhancing competitiveness, and thus increased BERD by indigenous firms ▪ More business-friendly attitudes at universities and R&D institutes should be introduced (re-aligned research directions, taking into businesses' needs; improved co-operation and RTDI project management skills) ⇒ More intense, mutually beneficial academia-industry co-operation
Közép-Magyarország	▪ GDP per capita close to EU25 average; but low level of BERD ⇒ threat of deteriorating competitiveness in the mid-term	▪ Investors need to be attracted, that create knowledge intensive jobs, exploiting the region's knowledge infrastructure ▪ Services of the region's knowledge infrastructure should be made easily available for companies located in other regions ▪ Knowledge-intensive start-up companies should be promoted more efficiently
"Manufacturing cohesion" regions with dominant role of FDI (Közép-Dunántúl, Nyugat-Dunántúl)	▪ The dominant foreign firms rely on R&D results achieved at their central labs (outside Hungary) ⇒ BERD second lowest in the otherwise prospering Western Transdanubia ▪ Weaker knowledge infrastructure than in Central Hungary (especially in Közép-Dunántúl) ▪ Improving, but still low weight of indigenous firms in supplier networks – threat of foot-loose investments ▪ Low intensity of innovation co-operation between foreign and indigenous firms (with some exceptions)	▪ RTDI capabilities of indigenous firms should be significantly improved ⇒ more strategic role of indigenous firms in international production networks; higher local knowledge content ▪ The regional knowledge infrastructure should be strengthened (together with more intense co-operation with universities and R&D institutes located in other regions) ⇒ stronger, mutually beneficial academia-industry co-operation ▪ Production, innovation, managerial, and networking (co-operation) capabilities of local suppliers need to be developed
"Manufacturing cohesion" regions with dominant role of declining industries or agricultural activities (Dél-Dunántúl, Észak-Magyarország,* Észak-Alföld, Dél-Alföld)	▪ Dominant weight of non-innovative (industrial or agricultural) indigenous SMEs ▪ Poor physical infrastructure ▪ Mismatch between the supply of regional knowledge infrastructure (universities and R&D institutes) and industrial structure/ industry needs for RTDI	▪ Technological and managerial capabilities of indigenous SMEs need to be strengthened to exploit existing business opportunities and create new ones; longer time horizon should be introduced in their decisions (shifting emphasis from day-to-day survival to strategic thinking) ▪ Upgraded physical infrastructure is needed to attract investors, offering easier, faster physical access to markets ▪ Research strategies of these regions' universities and R&D institutes should be re-aligned, taking into businesses' RTDI needs; coupled with improved co-operation and RTDI project management skills, and more open, more business-friendly attitudes, geared towards (joint) commercialisation of R&D results ▪ Stronger businesses are needed, ones that are able to exploit R&D results produced by universities and R&D institutes

* Észak-Magyarország is a 'borderline' case: it used to be a stronghold of heavy industries – now declining or even wiped out –, but more recently it is becoming attractive for green-field FDI projects.

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 generate strengthen the existing national (and/or regional) innovation system[12] 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, which 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.

3.1.1 The national innovation policy governance system

Hungary has all the major elements of a potentially successful national innovation system: a fully fledged education system; internationally recognized research units; an increasing number of R&D units; a number of bodies engaged in RTDI policy-making; a functioning capital market complete with some VC funds.

An apparently appropriate mechanism exists for policy co-ordination in the form of high-level bodies, namely the *Science and Technology Policy Council (STPC)*, and the *Research and Technological Innovation Council (RTIC)*. The STPC's mandate is to: i) discuss decision-preparatory documents prepared for the Government on STI policy issues; ii) discuss current STI policy issues; and iii) co-ordinate Government STI policy measures. It is headed by the Prime Minister, and the three Vice-Chairs are

[12] The network of organisations, individuals and institutions, located within or active within national or regional boundaries, that determine and shape the generation, diffusion and use of technology and other knowledge, which, in turn, explain the pattern, pace and rate of innovation and the economic success of innovation.

the Education Minister, the Economic and Transport Minister and the President of the Hungarian Academy of Sciences. However, STPC only meets once a year, on average, and thus cannot fulfil the role of thorough and comprehensive policy co-ordination.

The main responsibility of the RTIC is to make strategic decisions concerning the use of the Research and Technological Innovation Fund: what sorts of technology policy schemes to be launched, and how much funding to be allocated to the specific schemes. The Council consists of 7 high-ranking government officials (secretaries or under-secretaries of state) nominated by various ministers (those of Agriculture and Rural Development; Economy and Transport; Education; Environment Protection and Water Management; Health; Information Technology and Telecommunications; Prime Minister's Office) and 8 members representing the business and STI communities (at least 4 of these 8 members should be business people).[13] Given the nature of the innovation process and the concomitant need to co-ordinate the resources of various ministries as well private efforts, it seems to be an appropriate organisational framework for making strategic decisions.

The *Ministry of Economy and Transport* operates a number of innovation policy measures and supervises the government offices responsible for quality management, intellectual property, standardisation, metrology, energy and consumer protection. The *Minister of Economy and Transport* (not the ministry) is responsible on behalf of the Government to supervise the activities of the *National Office of Research and Technology* (NORT),[14] which is responsible for the government's RTDI policies, submits strategic proposals to RTIC, and implements the Council's decisions together with the Agency for Research Fund Management and Research Exploitation. This latter agency is the accredited implementing organisation of the Research, Development and Innovation priority within the Economic Competitiveness Operational Programme, using the EU Structural Funds and national co-financing. Besides, it is also responsible for managing domestic calls for proposals financed by the Research and Technological Innovation Fund (RTI Fund).

Interview evidence and press reports suggest that proper policy co-ordination is severely hampered by the way in which decisions are prepared, and presented to RTIC, by the NORT. Several important decisions have been 'rushed through': Council members have not received sound, detailed decision-preparatory studies, and thus not been able to conduct thorough discussions in a number of cases.[15] It should

[13] Formally, it is a highly prestigious body: the members are appointed by the prime minister (for 3 years, and their term can be extended for another 3 years).

[14] At the time of writing, a fundamental reshuffling of the government takes place following the general elections held in April 2006. Though the same coalition, headed by the same PM stays in office, most portfolios are experiencing substantial changes in their responsibility areas as a part of the dual task of centralising and streamlining the public administration. Although not all the details are known yet, one important change has been that the Minister of Economy and Transport takes over the supervising responsibilities of NORT from the Minister of Education.

[15] For a more detailed description and evidence, see: European Trend Chart on Innovation [2005]: Annual Innovation Policy Trends and Appraisal Report: Hungary, 2004-2005, http://www.trendchart.cordis.lu/
One possible explanation is that both NORT and the Council were (re-)established in 2004, and thus NORT was 'racing against time': had they prepared in-depth decision-making preparatory documents – which is undoubtedly a time-consuming activity –, and had the Council rejected some of the proposals

also be noted that no strategy on the use of the RTI Fund has been approved, although it is stipulated in the legislation on the responsibilities of the Council.

Without having appropriate pieces and amount of information in time, those members of the Council, who represent various ministries, could not possibly perform their co-ordination task between NORT and their own organisations. Policies of these government bodies affecting RTDI processes and those of NORT, therefore, cannot be concerted.

The *Ministry of Education* plays a key role in the formation and implementation of science and education policies. The *National Development Office* has been responsible for developing the Hungarian National Developments Plans (Community Support Frameworks) until June 2006,[16] including RTDI priorities, in co-operation with the NORT, for the latter priorities.

Further ministries. All ministries have some role in science, technology and innovation in their remit, financing R&D institutes, RTDI programmes, or education and training projects. Some ministries (Ministry of Agriculture and Rural Development, Ministry of Environment Protection and Water Management, Ministry of Health) also carry out considerable R&D and innovation tasks. Some ministries supervise their own research institutes.

Some of the former weaknesses of the national innovation governance system have been addressed by new pieces of legislation since September 2004 – not in practice, though. Most notably, the importance of devising and implementing a coherent RTDI strategy has been recognised in the Law on Research and Technological Innovation. Yet, it has not been devised. Evaluation of RTDI policy measures has become compulsory since 2005 (due to the same Act) – but only one policy programme has been evaluated so far. Other useful methods preparing policy decisions, such as systematic data collection and analyses of techno-economic issues, technology assessment or technology foresight, however, have not been included in this legislation.

Enterprise promotion agencies obviously play a role in building innovation systems (at the national and regional levels), too, albeit indirectly, as innovation and

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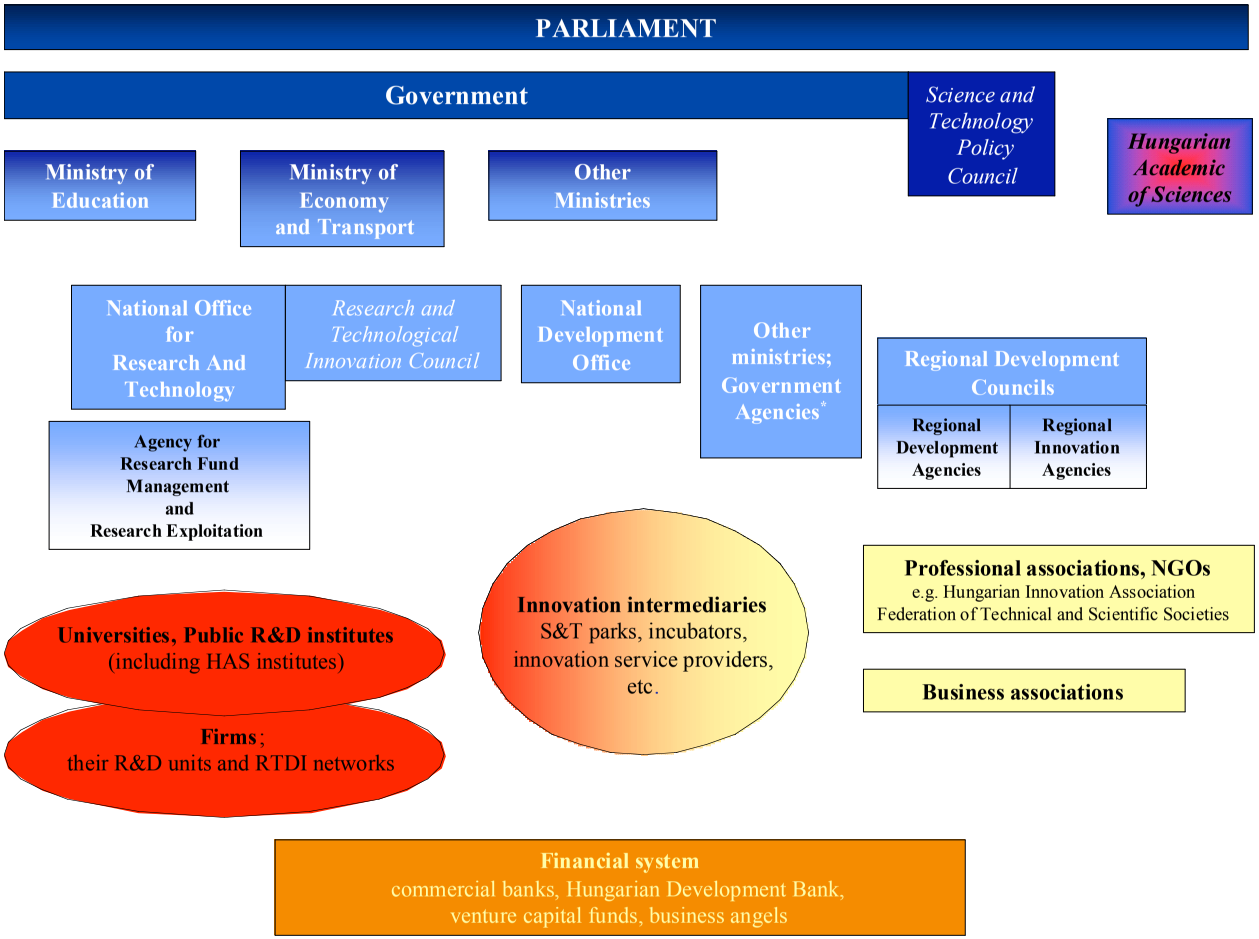
in their first versions, it would have not been possible to launch calls for project proposals in time to spend the available funds in 2004. Another factor might have been a 'cultural difference', noted by a senior NORT staff member: Council members and the NORT seem to have a different understanding of the role of the Council in the decision-making process, and thus the amount of information needed by the members to fulfil their role.

[16] The new government structure will entail significant changes in this area as well, probably meaning the establishment of a new agency as part of the Prime Minister's Office. The details are not known, as yet.

innovation systems are not the focus of their activities. The most important of these agencies is the Hungarian Foundation for Enterprise Promotion (HFEP), established in 1990. Its main task is to implement the small and medium-sized enterprise development programme of the government. HFEP's Local Enterprise Agency (LEA) network operates 140 offices nation-wide. Local authorities, business associations and local chambers of commerce have created these LEA offices.

Figure 4: Main actors of the Hungarian national innovation system



* For a short list of the most important agencies, see the text above

The Hungarian Academy of Sciences has several responsibilities: prepares policy documents on its own; reports to the Parliament on the state of science; its President is a member of the Science and Technology Policy Council; runs its own research institutes.

See also Exhibit 5 below.

3.1.2 The regional innovation policy governance system

Following the current reforms of the government structure, the Ministry of Local Government and Regional Development (the successor of Ministry of the Interior) has been made responsible for the supervision of all regional and rural development tasks in order to centralise and more efficiently co-ordinate the previously fragmented efforts. The main priority is the reduction of regional disparities. A Deputy State Secretary will be responsible for regional development tasks. A further novelty of the new government structure is the appointment of a so-called "Development Policy Government Commissioner" designated to oversee the National Development Agency and to co-ordinate the application process of the Structural and Cohesion Funds.

Further ministries and government agencies are also active in this field to a varying extent, e.g. the Ministry of Economy and Transport, the National Development Agency, and the National Office for Research and Technology.[17]

Another major change is intended by the new government, namely to give more decision-making competences to the seven regions – at the 'expense' of the long-established counties, or even abolishing this latter governance layer.[18] At the time of writing it is not known yet if the opposition parties would back these changes (without their consent the fundamental laws cannot be amended), and if these moves would mean genuine devolution or these apparently stronger regions would act as efficient outposts of the central government.

RTDI policies have been far less pronounced at a regional level in Hungary than at the national one. Regional RTDI policy-making bodies, per se, have not existed. The main reason for this is the centralised regulatory structure of public R&D performers.[19] Yet, as regional innovation strategies are cornerstones of the broader regional development strategies, and thus are supported by the EU RIS projects, these strategies have been devised in all the seven Hungarian regions.

Seven Regional Development Councils (RDCs), and their operational and co-ordinating organisations, Regional Development Agencies (RDA), have been set up recently, as stipulated by the Law on regional development and planning (passed in 1996, and then amended in 1999), to devise and implement regional development strategies, including a "chapter" on innovation issues. In more detail, their responsibilities include regional development, co-ordination of socio-economic development, and reconciliation of central and regional interests. So far, the regions have serve as statistical-planning units, and thus the RDCs have not replaced or supervised the County Regional Development Councils.[20] Rather, in implementing the development strategies, they have co-operated with these county-level councils, as

[17] Once more, the still evolving new government structure might bring about further changes in tis respect, too.

[18] There are 19 counties, plus the capital enjoying the same status.

[19] Universities are regulated by the Ministry of Education and Culture, while institutes of HAS are controlled by the headquarters of HAS.

[20] Again, the impacts of the currently devised government reforms cannot be known – or even speculated – in this respect.

well as with the so-called Regional Development Councils, the local public administrative organisations participating directly or indirectly in the development of the region, and the local economic chambers. Financial resources for the operation of the RDCs are secured annually by the central budget. However, the above Law permits the collection of revenues from other sources, e.g. membership fees paid by member organisations and grants obtained from national and EU support schemes.[21]

RDCs have two principle sources of funding for RTDI projects at this stage: a contribution from the central government budget, as well as 25% of the Research and Technological Innovation Fund, to be spent on promoting RTDI activities at the regional level.

A new Vice-President of the NORT was appointed in 2004 to oversee all the office's activities related to regional innovation issues. The managing authority of the Regional Development Operational Programme (RDOP, Fifth Operational Programme of the National Development Plan) has been set up as unit of the National Territorial and Regional Development Office.[22]

Exhibit 5: Main organisations per policy area

	Type of organisation	
Policy objectives	**National (&/or regional) public authorities and agencies**	**Key private or non-profit organisations**
Improving governance of innovation and knowledge policies	▪ Education and Science Committee of the Parliament ▪ Science and Technology Policy Council ▪ Research and Technological Innovation Council ▪ Ministry of Economy and Transport ▪ National Office for Research and Technology	▪ Hungarian Association for Innovation (MISZ, in a consultative role) ▪ Hungarian Chamber of Commerce and Industry (MKIK, in a consultative role) ▪ Confederation of Hungarian Employers and Industrialists (MGYOSZ, in a consultative role)
Innovation friendly environment	▪ Education and Science Committee of the Parliament ▪ Science and Technology Policy Council ▪ Research and Technological Innovation Council ▪ Ministry of Finance ▪ Hungarian Competition Authority ▪ Regional Development Agencies	▪ Hungarian Association for Innovation (MISZ, in a consultative role) ▪ Hungarian Chamber of Commerce and Industry (MKIK, in a consultative role) ▪ Confederation of Hungarian Employers and Industrialists (MGYOSZ, in a consultative role)
Knowledge transfer and technology diffusion to enterprises	▪ Science and Technology Policy Council ▪ Research and Technological Innovation Council ▪ National Office for Research and	▪ Hungarian Association for Innovation (MISZ, in a consultative role) ▪ Hungarian Chamber of Commerce and Industry (MKIK, in a

[21] RDCs are not entitled to levy any taxes.

[22] The RDOP aims at developing economically and socially underdeveloped areas in Hungary. This Operational Programme intends to i) improve the income generation capacity of tourism; ii) develop regional infrastructure and the communal environment, including rehabilitating settlements and improving the environmental management activities, and iii) strengthen the regional dimension of human resource development, in order to improve – among other things – the administrative capacity of regional and local bodies. Its 2004-2006 budget is about HUF80 billion (€ 320 million). The programme is co-financed by the European Regional Development Fund.

	Technology ▪ Regional Development Agencies ▪ Regional Innovation Agencies	consultative role) ▪ Confederation of Hungarian Employers and Industrialists (MGYOSZ, in a consultative role)
Innovation poles and clusters	▪ Science and Technology Policy Council ▪ Research and Technological Innovation Council ▪ National Office for Research and Technology ▪ Ministry of Economy and Transport ▪ Regional Development Agencies ▪ Regional Innovation Agencies	▪ Hungarian Association for Innovation (MISZ, in a consultative role) ▪ Hungarian Chamber of Commerce and Industry (MKIK, in a consultative role) ▪ Confederation of Hungarian Employers and Industrialists (MGYOSZ, in a consultative role)
Support to creation and growth of innovative enterprises	▪ Science and Technology Policy Council ▪ Research and Technological Innovation Council ▪ Ministry of Economy and Transport ▪ National Office for Research and Technology ▪ Regional Development Agencies ▪ Regional Innovation Agencies	▪ Hungarian Association for Innovation (MISZ, in a consultative role) ▪ Hungarian Chamber of Commerce and Industry (MKIK, in a consultative role) ▪ Confederation of Hungarian Employers and Industrialists (MGYOSZ, in a consultative role)
Boosting applied research and product development	▪ Science and Technology Policy Council ▪ Research and Technological Innovation Council ▪ Ministry of Economy and Transport ▪ National Office for Research and Technology	▪ Hungarian Association for Innovation (MISZ, in a consultative role) ▪ Hungarian Chamber of Commerce and Industry (MKIK, in a consultative role) ▪ Confederation of Hungarian Employers and Industrialists (MGYOSZ, in a consultative role)
Investment in basic research capacities	▪ Education and Science Committee of the Parliament ▪ Science and Technology Policy Council ▪ Ministry of Education ▪ Hungarian Scientific Research Fund (OTKA)	▪ Private foundations donating prizes to individual researchers for outstanding R&D results

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. Those schemes which are co-financed by the Structural Funds will be dealt with in Section 4.2.1. 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 at the 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	These policies target government bodies themselves, i.e. cannot be described by this classification of target groups.	These policies target government bodies themselves, i.e. cannot be described by this classification of target groups.	These policies target government bodies themselves, i.e. cannot be described by this classification of target groups.
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			
Increased investment in basic research capacities			
Legend			
Top policy priority			
Secondary priority			
Low priority			

Sources: national/regional policy documents, TrendChart reports, OECD reports, etc.

The template for this report requires using the above categories to characterise existing policy measures. The short descriptions below shall reveal, however, that the actual policy measures cut across these categories, e.g. promoting academia-industry co-operation (the closest to this policy goal is "innovation poles and clusters" in the template's categories) has become a focal policy priority in Hungary, and thus other schemes, e.g. the ones devised to boost applied research and product development also put a strong emphasis on this goal, occasionally making it even compulsory. These categories, therefore, should be understood in this context. Further, while several schemes could be mentioned under various headings, given their multiple objectives, they are listed only once.

Improving governance of innovation and knowledge policies

The first *Hungarian Technology Foresight Programme (TEP)* was completed in 2001, providing policy conclusions on 7 fields at a national level. Thus, no immediate conclusions can be drawn for regional development. Some regions, however, relied on the methods and results of the national foresight programme when devising their own strategic documents.

A number of steps have been taken to improve the governance of innovation since 2003. All the major RTDI policy bodies have been reorganised, and new ones have also been introduced: (i) the Science and Technology Policy Council (STPC) was reorganised by a government decree issued in April 2003; (ii) the Agency for Research Fund Management and Research Exploitation, the implementing body administrating calls and proposals, was established by a law passed in August 2003; (iii) the Research and Technological Innovation Council was set up in 2004 (as a successor of the Council of the National Committee for Technological Development); (iv) the National Office of Research and Technology (NORT) responsible for the government's RTD(I) policies was established in January 2004 (as a successor of R&D Division, Ministry of Education [2000-2003] and the National Committee for Technological Development [1965-1999]); (v) the Law on Research and Technological Innovation (Act CXXXIV of 2004) became effective on 1 January 2005, and it made RTDI policy programme evaluation mandatory; (vi) seven Regional Innovation Agencies[23] were set up in 2005 to facilitate regional cohesion and strengthen regions' competitiveness. Regional innovation strategies have been devised with the financial support of the EC.

Innovation friendly environment

The Act XC of 2003 on the "Research and Technological Innovation Fund" was approved by the Hungarian Parliament on November 10, 2003, with the aim of creating a stable and reliable financial ground for research, technological development and innovation activities. This Act set up the Research and Technological Innovation Fund. The two most important revenue sources of the Fund are the central budget, and the contribution paid by medium-sized and large enterprises[24]. There are two major features of the Fund: i) it helps re-orienting private sector resources towards innovative activities, assisted by matching public funds; and ii) contributions to the Fund do not disappear in the state budget: instead, their use in the transparent, dedicated RTDI Fund can be monitored, and should directly or indirectly benefit the private sector, as stipulated in the legislation creating the Fund.

Tax incentives have been introduced to promote R&D activities of companies: they can deduct 200% of their R&D expenditures from their taxable income. Moreover, a 300% RTD tax allowance is applicable from 2004 if a company lab is located at a site of university or public research institute.

A number of schemes promote developing human capital, which include SF co-financing (see 4.2.1). A specific national measure in this area, called "Employment of PhD, MSc or MBA students", is aimed at cutting the costs of conducting R&D by

[23] All the policy measures are recorded in the TrendChart database, and thus further details can be found there, e.g. funding, eligible activities and organisations.

[24] This innovation contribution is charged on the basis of the adjusted net revenues of the previous year: 0.2% of that amount in 2004, and the rate is gradually increasing to 0,3% by 2006. (Micro-enterprises with less than 10 employees are exempt of this levy altogether. For small companies, favourable rules were applied in 2004 (their contribution was 0.05% of their adjusted net revenues), and their contribution has been waived since 2005) As an incentive to conduct R&D activities, the contribution to the Fund should be reduced with the amount of direct costs of in-house R&D activities, as well as those commissioned from a public research unit or from a non-profit research organisation, financed by own sources.

making the employment of PhD, MSc or MBA students tax-free in the field of educational and research activities, up to the level of the official minimum wage.

Knowledge transfer and technology diffusion to enterprises

"INNOCSEKK" (Innovation voucher) promotes the demand for innovation services by providing a voucher to micro- and small enterprises that need these services.

Innovation poles and clusters

"Asbóth Oszkár Innovation Programme for Cutting-edge Industries"[25] aims at accelerating the evolution of the following cutting-edge industries: the health sector, bio-technology, and agriculture-based renewable energy-resources; by promoting the establishment of technology platforms and innovation clusters.

"Pázmány Péter" Programme (Regional Knowledge Centres at Universities): The main aim of this scheme is to foster the creation of research and technological innovation centres at universities. These Regional Knowledge Centres are supposed to closely co-operate with businesses, speed up the given region's technological and economic development.

"Irinyi János" Programme (INTEG2006) is aimed at developing innovation capabilities of SMEs in order to prepare them to become long-term suppliers and strategic innovation partners of large firms in machinery, automotive, electronics and precision engineering (instruments) industries.

"Baross Gábor" Programme, Supporting regional innovation networks: The overall goal of the Regional Innovation Agencies (RIU, mentioned above) is to enhance the competitiveness of their regions by improving the local innovation potential. Since the RIUs have formulated their own programmes according to the specific needs and priorities of their regions, the individual calls under the Baross Gabor Programme differ substantially. Generally, the following main themes are targeted: (i) support for the transfer of technology and knowledge; (ii) support for product and service innovation; (iii) creation of regional innovation clusters; (iv) support for SMEs and spin-off companies; (v) development of R&D and innovation infrastructure.

Support to creation and growth of innovative enterprises

"Kozma László" Programme aims to strengthen R&D activities at innovative enterprises (micro, small, medium-sized and large ones alike) by providing support for the employment of researchers. The Programme facilitates that the required human capacities are available for the companies for their research and development projects and that researchers can find employment in the industrial sector.

"IPR protection for SMEs abroad" supports R&D and innovation activities of micro, small and medium-sized enterprises by providing funding for SMEs to obtain IPR protection abroad and to increase sales of their products on foreign markets.

[25] Despite their somewhat confusing official names, the "Programmes" described in this section are par excellence policy measures.

"BIOINKUB" provides support for investments, which aim to create incubator centres for small- or medium size enterprises in the field of biotechnology. The centres shall be able to operate independently and they must offer favourable conditions for the R&D activities and the growth of the hosted enterprises.

Boosting applied research and product development

"Jedlik Ányos" Programme is an integrated scheme to promote long-term economic development in Hungary by providing funding for projects meeting thematic priorities (see below) and aiming at (among others) (a) improving the competitiveness of the Hungarian economy; (b) achieving breakthrough in certain fields of research; (c) strengthening the co-operation of Hungarian public R&D units and businesses; (d) engaging young graduates (PhD students and postdocs) in research and encourage them to pursue careers in S&T; (e) promoting the mobility of researchers; as well as encourage the return of successful Hungarian researchers living abroad. The thematic priorities are as follows: life sciences; information and communications technologies; environmental protection; agri-food industries and biotechnology; materials sciences; social challenges of technological changes (analyses, concepts).

"Irinyi János" Programme, Sub-programme "B" (5LET 2005) promotes the application of individual inventors' R&D results and innovative ideas, including the development of marketable products, technologies and services and their utilisation for business purposes.

"Large international R&D projects" supports large, interdisciplinary R&D projects, conducted by bi- or multilateral co-operation, including NoEs or IPs financed by the EU RTD FP. The thematic priorities of this scheme are as follows: (i) information and communications technologies; (ii) environmental protection and materials sciences; (iii) industrial and technological solutions of new energy production processes, using large R&D facilities; (iv) agri-food industries and biotechnology; (v) interdisciplinary R&D projects on the above fields.

"Nanotechnology Research Laboratory" funds the establishment and operation of an internationally recognised nanotechnology research laboratory.

"Déri Miksa" Programme supports international R&D co-operation with the aim of (i) strengthening firms' competitiveness, especially that of SMEs; (ii) facilitating international innovation co-operation; (iii) strengthening Hungarian participation in the ERA via more intense participation in EUREKA projects; (iv) improving academia-industry co-operation; (v) improving the chances of Hungarian exploitation of R&D results.

"Agri-food RTDI projects": the main goals of this scheme is to promote the development of (1) new, competitive, high-value agri-food products; (2) new plants and production processes to improve competitiveness; (3) new agri-food technologies for increased compliance with regulation, as well as better measurement methods and techniques; (4) of new agri-food technologies for sustainable development.

"Mobile Communications R&D and Innovation Centre" has supported the establishment of a Mobile Communications R&D and Innovation Centre and testbed for future mobile communications technologies (3G, 4G).

Increased investment in basic research capacities

"Öveges József" Programme supports the development of human resources via funding advanced education and research activities in the fields of medicine, natural sciences, engineering and agriculture. It focuses on four objectives, namely to: (i) increase the quality of performance of academic staff; (ii) support post-doctoral scholarships; (iii) attract students to the fields of medicine, natural sciences, engineering and agriculture by supporting research performed in the Scientific Student Association; (iv) support young and talented researchers to conduct basic research abroad.

"Polányi Mihály" Programme provides funding for basic research performed by young PhD graduates and their research teams who have attracted foreign funding.

"Hungarian Scientific Research Fund" (OTKA) provides support for the personal and material costs of basic research projects that have a high potential to generate outstanding results, for scientific schools and workshops led by internationally recognised researchers and for young researchers.

"Bolyai János" Research Scholarship provides financial support for young researchers (under the age of 45 years) for the duration of 1-3 years in order to create more favourable conditions for R&D and to provide motivation and acknowledgement for outstanding research activities.

"Social conditions of technological development (MEC)" provides support to individuals or organisations to (i) participate at conferences abroad; (ii) organise conferences in Hungary to disseminate S&T results; (iii) pay institutional membership fees in international organisations; (iv) popularise S&T results.

Further schemes

"Regional information and consultancy services on EU 6th Framework Programme" supports regionally organised, non-profit, information and consultancy services on EU FP6 in order to promote the participation of Hungarian partners in FP6 projects.

3.3 Conclusions: the national innovation system and policy mix

As a general conclusion, it can be inferred that there is a broad range of relevant RTDI policy measures in place to tackle the identified challenges. They support the development of new products, services and processes; provide incentives to increase business R&D and innovation expenditures; aim at fostering academia-industry co-operation, improving physical infrastructure at public, private non-profit and business R&D establishments, strengthening innovation capabilities of SMEs, slowing down brain drain, providing human resources for RTDI; developing the national and regional innovation and innovation governance systems, and promoting international co-operation in R&D and innovation. Given these goals, the number of policy measures is also impressive. In fact, there are perhaps already too many policy schemes, sometimes with overlapping objectives.[26] Furthermore, these frequently

[26] For example, it is quite difficult to see any major difference between the measures "S&T co-operation of the business sector and the publicly financed research units" (originally launched in 1999, re-launched in January 2004 when schemes had to be re-designed given SF funding), and "Regional

changing and sometimes confusingly similar schemes require significant (administrative and other) resources from businesses, many of whom (especially SMEs) are in no position to efficiently monitor newly launched schemes and calls. Thus it would probably make sense to merge certain measures or cut the number of policy schemes in any other ways; this, however, would require sound evaluations to be carried out first, and then proper policy discussions, involving all the major stakeholders.

Regarding the institutional framework of the national and regional innovation system, two major conclusions should be noted. One is the centralised structure of the governance system, which corresponds to other areas of the state administration. Regional RTDI policy-making bodies are non-existent, although various agencies at the county and regional levels deal with RTDI issues as part of the overall regional socio-economic planning process. Secondly, the frequently changing (organisational and political) status of the two foremost bodies and the practice of yearly sessions of the STPC severely hampers their co-ordination efforts. These are potentially adequate bodies and agencies for this task – yet, fail to fulfil their roles as effective policy co-ordinating bodies. More frequent meetings of the STPC should be pursued, providing an opportunity to discuss the broad range of policies, which are relevant for RTDI performance, in detail. Further, constant changes in the structure and responsibilities/decision-making powers of the RTIC (inevitably preventing organisational learning, the institutionalisation of involving key stakeholders as partners, and thus the establishment of good practices in policy co-ordination) should be avoided.

The importance of devising and implementing a coherent RTDI strategy has been recognised in the Law on Research and Technological Innovation. Yet, it has not been completed by the time of writing this report – although the original deadline to devise it was May 2005. Thus, this strategy document cannot be used as a sound, widely accepted basis for policy-co-ordination.

The inadequate co-ordination practice (primarily between RTDI and economic policies) goes hand in hand with insufficient evaluation of both the overall strategy and the specific policy measures. The prevalent weak evaluation culture often results in 'rushed through' decisions and ad hoc policies, whose rationale can be questionable and this goes a long way in explaining the large number of (sometimes overlapping) schemes and the practice of frequent changes. Further, no policy reviews (white papers or parliamentary debates) have been produced so far, nor has a systematic international comparative policy analysis been used to assess Hungarian RTDI policies. The application of useful methods preparing policy decisions, such as systematic data collection and analyses of techno-economic issues, technology assessment or technology foresight, however, have not been included in the Law on Research and Technological Innovation – although suggested by independent experts on several occasions when the draft legislation had been discussed.

Knowledge Centres at Universities" (introduced in October 2004). Of course, the latter emphasises regional co-operation. Both universities and firms, however, are located in the same territorial space, and not surprisingly, most Co-operative Research Centres (CRC) tend to incorporate firms located near the 'core' university of a given CRC.

The lack of proper evaluation is tightly related to the problem of inadequate planning of schemes, but, perhaps more importantly, overall strategies. RTDI policies are no exception to the practice of not sufficiently transparent policy-making procedures. In sum, strategic decisions are made in an opaque way, and the decision-preparatory and decision-making processes can be characterised by the following features: Documents are prepared by small groups of civil servants, occasionally involving external experts; Lobbies can, therefore, significantly influence policy-making processes without adequate societal control in place, while proper policy dialogues and discussions are exceptions. Policy dialogues and discussions are often mistaken for collecting written opinions of various organisations on 'advanced' version of policy documents, when major changes are not possible any more, either due to the lack of time or because the basic structures, underlying principles are already 'carved in stone' by the document to be discussed. The preparation of the NDP II is a case in point. The strategy, which is currently being drafted mostly by the apparatus of the NDO and interested ministries, is not based on proper background-analyses and has been drafted without meaningful dialogue with the relevant stakeholders and experts, and clearly reflects a mix of various lobby interests, which have been considered during the drafting procedure behind closed doors.

With regard to the employed policy mix, there are a number of options open to policy-makers, but those are beyond the scope of RTDI policies, on the one hand, and cannot deliver spectacular, rapid developments, on the other. Potential actions include the application of competition policies; using public procurement, environmental regulation and health policies intelligently [to boost the demand for innovative products, services and solutions, and thus promote RTDI]; introducing appropriate curricula at higher education; providing better training for policy-makers, and regular re-training for them; pooling together the intellectual and financial resources of industrial and regional development policies, etc.. Once again, these examples all point to the crucial importance of policy co-ordination – one of the major weaknesses of Hungary, despite the fact of having a number of government bodies charged with this task.

As to the low BERD figures, it must be made clear that the state's (and the SF's) room for manoeuvre is substantially limited by the fact that the MNCs' own strategies defines to a great extent where RTDI activities are located. For Hungary, this means that even in regions where FDI plays a key role (resulting in high GDP, low unemployment etc.), the presence of "high-tech" enterprises do not necessarily lead to sufficient levels of BERD. Even though we have no available regional data for innovation, it seems straightforward that even the more advanced regions lack the desired number of innovative businesses, especially indigenous SMEs. Since state or community funding cannot directly raise the level of BERD, focus should be put on measures making highly qualified Hungarian human capital for RTDI attractive for MNCs (e.g. by making the attitudes of universities and R&D units more business-oriented, improving their RTDI project management and co-operation capabilities, fine-tuning the already existing tax incentives), on the one hand, and by attracting students and young researchers to RTDI activities by providing funds for scholarships, 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	▪ Support technology foresight and technology assessment exercises (the former one both at national and regional levels) ▪ Develop policy programme evaluation culture ▪ Strengthen evidence-based policy-making by diffusing good practices, organising peer-review and offering training for policy-makers and/or their future trainers (policy analysts and methodological experts)	▪ Lack of co-ordination between major policies (economic and RTDI policies) ▪ Lack of coherent innovation policy ▪ Reluctance to use modern policy-preparatory tools; insufficient supply of RTDI policy experts (national and regional levels) ▪ Regional policy-making is in its 'infancy'
Innovation friendly environment	▪ Promote lead markets at an EU-level, thus strengthen demand for innovative products and services, and hence increase BERD in countries with appropriate conditions to attract business R&D projects and joint academia-industry projects ▪ Develop human capital for RTDI e.g. by funding post-doc positions and mobility schemes (between public and private R&D facilities; among member states and with third countries)	▪ Major role of MNCs; their own strategy defines where to locate RTDI activities ▪ Low perceived role of (local) RTDI ⇒ low BERD & low, stagnating public expenditures on R&D (in absolute terms) ⇒ weak demand for scientists and research engineers ⇒ low share of RSE students
Knowledge transfer and technology diffusion to enterprises	▪ Promote demand for services – legal, strategic management, marketing, etc. – required for successful innovation projects by voucher schemes (not by funding service providers)	▪ Low absorption capacities of SMEs, inc. management capacities ▪ Insufficient supply of innovation services by skilled, trustworthy service providers
Innovation poles and clusters	▪ Strengthen academia-industry co-operation by co-funding joint RTDI projects; strengthening innovation management capabilities of public R&D units; and training them to become more open-minded towards business needs and flexible ▪ Develop innovation clusters in all sectors (not only in 'high-tech' sectors!) by co-financing preparatory/ feasibility studies and networking events; offering vouchers to attend innovation management training; co-funding RTDI projects for the members of existing/ potential clusters; strengthening regional innovation governance systems	▪ Governance and management issues of poles and clusters are not properly understood; the required skills are in short supply
Support to creation and	▪ Support start-up and spin-off	▪ Unclear IPR and equity issues and too rigid labour code prevent the

growth of innovative enterprises	companies ▪ Continue the support schemes to existing incubators by promoting demand for their services	establishment of academic spin-off firms ▪ Lack of experience in setting up and managing incubators; insufficient supply of trustworthy service providers
Boosting applied research and product development	▪ Evaluate the current sector/ technology specific, as well as 'generic' schemes to boost applied research and product development; modify them, if evaluation results show that is necessary; and continue them in those modified forms	▪ Insufficient supply of skilled innovation project managers ▪ Aging physical infrastructure
Investment in basic research capacities	▪ Make RTDI jobs more attractive by improving the physical infrastructure of public R&D units; and thus attract young talents to pursue a research career	▪ Lack of co-operation among policy-makers charged with different aspects of RTDI policies

4 Structural Funds interventions to boost innovation and create a knowledge economy: 2004-2006

This section of the reports provides an analysis the patterns of Structural Fund 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 Structural Funds 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 for Structural Fund support to innovation and knowledge

4.1.1 Strategic approach to innovation & knowledge in Structural Fund programmes

The Community Support Framework (*CSF; or the first National Development Plan*) document identifies the following major goals and priorities in terms of competitiveness: i) convergence with the level of the socio-economic development of the EU; ii) meeting the convergence criteria for socio-economic development, a sustained period of high growth in the economy is required by creating a more competitive economy; iii) improving both the business environment, providing the conditions for businesses to expand, and support investments to modernise businesses; iii) increasing use of modern technologies, including information and communication technologies; iv) improving the application of entrepreneurial and scientific knowledge in support of innovation in order to increase competitiveness; v) the development of small and medium sized enterprises will get particular attention in the CSF.

The other three specific objectives of the CSF, relevant for this report, are: i) improving the use of human resources; ii) better environment and basic infrastructure; iii) a more balanced regional development.

The Community Support Framework is implemented through *five operational programmes, one of which is the Economic Competitiveness Operational Programme (ECOP)*. ECOP has set strategic goals in four fields (ECOP, pp. 10-11):

- *Investment promotion*: embedding foreign companies into the Hungarian economy by strengthening supplier relations and encouraging companies to develop existing operations in Hungary through re-investments of their profits and new investments in higher value-added activities.
- *SME strategy:* promoting technological modernisation of growth oriented SMEs and their competitiveness; assisting new enterprises in entering the market; facilitating the development of company management, technical culture and entrepreneurial skills.

- *Research & development, innovation strategy:* support of strategically important research and technology developments in co-operation between R&D organisations and the corporate sector.
- *Information society strategy:* the promotion of IT-based business solutions (resources management planning, subcontracting and supply chain management, marketing tools and web-based e-economy applications) for SMEs.

As for promoting R&D and innovation, actions are organised into three sets of measures:

1) Support of application-oriented co-operative research and technology development activities.

2) Improvement of the conditions of research, technology transfer and co-operation at publicly financed and non-profit research facilities.

3) Reinforcement of corporate R&D capacities and innovation skills.

The actual schemes co-funded by the Structural Funds (ERDF/ESF) are described in the following sub-section. These programmes cover all the seven regions in Hungary.

Taking into account the current state and strategic needs of the Hungarian economy, the above SF objectives are highly relevant. They give importance to innovation, and thus draw the attention of policy-makers to the crucial link between local RTDI efforts and long-term socio-economic development. One of the traps of transition economies is that policy-makers tend to devote all the intellectual and financial resources to tackle "burning" issues, such as budget and trade deficits, inflation, unemployment, and thus they neglect long-term issues, such as RTDI, albeit these matters have fundamental repercussions on economic performance and quality of life. Most Hungarian policy-makers understand that international competitiveness should be significantly enhanced. The rest of the 'equation', however, is shared in a far narrower circle: competitiveness needs to be maintained in the long run, and thus it cannot be based on temporary factors, such as low production costs. Innovation, therefore, is a must for a successful cohesion strategy.

SF funding has been designed with national objectives in mind, and thus there has been no direct and immediate interaction between the SF co-financed schemes and other Community driven initiatives, e.g. RIS and RITTs.

The calculations presented below in the two exhibits below are based on the allocation of Structural Fund budgets based on the intervention code classification. For practical purposes, the calculation of financial resources allocated to innovation and knowledge has been limited to the RTDI codes:

- 181 Research projects based in universities and research institutes
- 182 Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes
- 183 RTDI Infrastructure
- 184 Training for researchers.

Using this narrow definition, the financial weight of innovation and knowledge measures during the 2004-2006 period is 7.22%.

Additional calculations based on broader definitions of innovation are presented in Appendix D1.

Exhibit 8: Overall allocation of resources at an objective 1 and 2 level (planned figures in Euro)

Objective	Total cost	SF			National funds	
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	192,645,173	144,143,703	144,143,703	0	48,501,470	0
TOTAL COHESION POLICY						
Objective 1	2,701,943,371	1,995,717,160	1,239,381,188	439,117,222	700,495,293	5,730,918

Source: programming documents and financial data provided by DG REGIO

Exhibit 9: Regional allocation of resources (Euro)

Programs	RTDI INTERVENTIONS			TOTAL		
	Total SF	ERDF	ESF	Total SF	ERDF	ESF
OBJECTIVE 1						
Economic Competitiveness	98,672,578	98,672,578	0	429,009,213	429,009,213	0
Environmental Protection and Infrastructure	0	0	0	327,245,758	327,245,758	0
Human Resources Development	0	0	0	562,822,687	177,381,752	385,440,935
Agriculture and Rural Development	0	0	0	317,218,750	0	0
Regional Development	45,471,125	45,471,125	0	359,420,752	305,744,465	53,676,287
Total Multiregional OPs	**144,143,703**	**144,143,703**	**0**	**1,995,717,160**	**1,239,381,188**	**439,117,222**

Source: programming documents and financial data provided by DG REGIO

Public national RTDI efforts – measured here as public GERD, see Exhibit 3 – amounted to €373,684,838 in 2004.[27] Compared this figure to 144.1 MEUR, i.e. Structural Fund support for RTDI for 2.5 years, one can conclude that SF support for RTDI is not negligible, but national pubic funding is more significant: 6-7 times higher a year. From a different angle, extra funds for RTDI cannot be realistically envisaged from national sources, given the severe budget deficit, and the current austerity measures.

[27] The average exchange rate in that year, that is, HUF251.68, is used for this calculation.

4.1.2 Specific measures in favour of innovation and knowledge

Most of the policy objectives defined by template for this country report were supported by SF schemes in 2004-2006 in Hungary. Again, some schemes, given their multiple objectives, can be classified under various headings, but these ones are mentioned only once below. For the same reason, some overlaps – or "double-counting" – cannot be avoided in Exhibit 10.

Innovation friendly environment

Two of SF co-financed schemes promote developing human capital. *"Promoting long life learning and adaptability"* aims at improving the efficiency of the education and training systems through the provision of more effective and responsive initial and continuing vocational training. Through support for training of employees and entrepreneurs, it seeks to foster skills development in line with the knowledge-based economy, including in particular the development of skills required by the information society. It consists of 5 elements, of which 3 are relevant to innovation: (a) promoting the development of skills and competences necessary for lifelong learning; (b) developing the content, methodology and structure of vocational training; (c) developing the structure and content of the higher education.

"Developing the infrastructure of education and training" aims at improving the infrastructure of education and training so as to reduce the territorial disparities in this respect, through the development of the infrastructure of (i) the integrated regional vocational training centres in order to ensure an appropriate environment for practice-oriented and modular training; and (ii) higher education institutes to facilitate high quality mass-education.

Knowledge transfer and technology diffusion to enterprises

"Innovation and research activities of SMEs" aims at promoting the introduction of new, improved products, technologies and services; supporting the development of absorptive and innovation capabilities of SMEs; supporting RTDI activities of SMEs; promoting academia-industry co-operation.

Innovation poles and clusters

"S&T co-operation of businesses and publicly financed research units" is aimed at promoting scientific and technological co-operation of the business sector and the publicly financed research units; integration of education, economic and social target-oriented RTD co-operation for strategic purposes by supporting the establishment of new Co-operative Research Centres.

Support to creation and growth of innovative enterprises

"New, technology and knowledge-intensive micro-enterprises and spin-off companies" aims at improving competitiveness by strengthened RTDI capabilities of SMEs. Specifically, to promote the establishment of innovative, technology-based micro firms; commercialise RTD results by setting up spin-off companies; improve the quality of RTD activities of firms.

Boosting applied research and product development

"Application-oriented co-operative RTD activity" supports projects in the following fields: (i) material sciences, nanotechnology and manufacturing technologies; (b) biotechnology; (c) electronics, measurement, control technologies; (d) energy technologies; (e) information and communication technologies; (f) environmental technologies; (g) transport technologies, logistics. Academia-industry co-operation is given a priority.

"Development of corporate research infrastructure" is aimed at providing incentives to increase both BERD and the share of business RSE in total R&D employment. New R&D jobs supported by this scheme have to be maintained at least for 5 years. The scheme improves the quality of firms' RTD activities and helps developing skills required to commercialise RTD results by upgrading their RTD infrastructure.

Increased investment in basic research capacities

"Development of the research infrastructure of publicly financed and non-profit research facilities" provides funding to upgrade equipment at public R&D institutes and thus lower the average age of R&D infrastructure.

Exhibit 10: Key innovation & knowledge measures

Policy area	Number of identified measures	Approximate share (as % of ECOP Priority 3)	Approximate share (as % of ECOP total)	Types of measures funded
Improving governance of innovation and knowledge policies	None	None	None	None
Innovation friendly environment	2	Not applicable	Not applicable	Human resource development: promoting life-long learning; developing the infrastructure of education and training
Knowledge transfer and technology diffusion to enterprises	2	29.6%	7.2%	Grants to promote the introduction of new, or improved products, technologies and services; support the development of absorptive and innovation capabilities of SMEs; support RTDI activities of SMEs; promote academia-industry co-operation.
Innovation poles and clusters	1	11.8%	2.9%	Grants to promote academia-industry co-operation
Support to creation and growth of innovative enterprises	2	26.4%	6.4%	Grants for start-up and spin-off firms, as well as creating RTD jobs at private firms
Boosting applied research and product development	5	91%	22.2%	Grants for applied RTD projects; promoting academia-industry co-operation; modernising public and private RTD infrastructure, promoting innovative SMEs
Investment in basic research capacities	1	18%	4.4%	Grants for modernising public RTD infrastructure

As already pointed out in Section 3.2, a large number of challenges are identified in various documents (e.g. the CSF documents, TC country reports, scientific publications), as well as policy discussions (and on these bases, in Sections 2 and 3 of this report, too). The current mix of measures tackles the ones that can be tackled by policy schemes. In that respect, as Sections 3 and 4 suggest, there is a sensible 'division of labour' between the measures co-funded by the EU Structural Funds and national resources, on the one hand, and the nationally funded ones, on the other.

A number of other, rather fundamental challenges, however, cannot be tackled by policy measures at all, or only indirectly, i.e. no immediate impact should be expected, only gradual improvements/ changes, occurring in a longer period of time. For instance, the weak demand for new products, services, and hence the faint perceived role of RTDI by firms, leading to low BERD, cannot be changed overnight by RTDI policy measures. Another example is the way of thinking of policy-makers, i.e. the perceived role of RTDI in overall socio-economic development; the lack of a coherent RTDI strategy; the lack of use of modern policy-making methods. A third one is the dominant role of MNCs in shaping the volume, direction and types of economic activities (e.g. knowledge-intensive tasks vs. simple assembly jobs) in Hungary, as well as the location of their RTDI projects (whether in Hungary or other countries). As mentioned in the previous sections, these shortcomings should be addressed by indirect measures, such as schemes which make local RTDI manpower more attractive to MNCs.

Section 3 has already pointed out that policy-makers can, and should, also use measures that are beyond the scope of RTDI policies, such as competition policies; public procurement, environmental regulation and health policies intelligently [to boost the demand for innovative products, services and solutions, and thus promote RTDI]; education policies [appropriate curricula at higher education]; training and regular re-training for policy-makers; pooling together the intellectual and financial resources of industrial and regional development policies, etc..

To indicate the significance of the community resources in RTDI, we first have to consider the following caveat. Joining the EU has had major repercussions on the Hungarian RTDI policy schemes. EU rules on public subsidies have to be followed. One of them is that schemes cannot be "doubled": a given objective/ activity can only be supported by one scheme, either by a purely national one, or by a jointly financed one. Therefore, the ones eligible for co-funding from the European Regional Development Fund (ERDF) had to be clearly separated from the ones supported by purely national sources before May 2004, when Hungary joined the EU. A large number of the former schemes had rather direct impacts on competitiveness, and thus those have become part of the Community Support Framework, under the heading of Economic Competitiveness Operational Programme (ECOP), Priority 3, Research, Development and Innovation. These schemes had been devised by the National Office for Research and Technology, in close co-operation with the experts of the Ministry of Economy and Transport as the Managing Authority of ECOP was set up as part of the ministry. Seen from this perspective, the figures show that the contribution of the Structural Funds adds up to no more than 10-15 percent of the total RTDI expenditures.

As already concluded in Section 4.1.1, the Structural Funds measures are not the main instrument for supporting innovation (creating, diffusing and exploiting knowledge). They provide, nonetheless, a significant extra funding for RTDI, which cannot be sought from national sources. Also, the methodological requirements – e.g. ex-ante and ex-post evaluation, project monitoring, regular discussions with EC officials, peer-review in the frame of open method of co-ordination – 'attached' to them are likely to have a major impact in terms of policy learning.

In sum, the RTDI priorities of the first Hungarian NDP (2004-2006) were carefully considered, jointly by the EC and national policy-makers, and thus the SF strategic objectives have strengthened and complemented the national RTDI policy measures, as revealed by Sections 3.2, 3.3, and 4.1. The SF supported measures are also relevant and coherent with the key disparities and needs identified in section 2. (see conclusions in 2.3)

4.2 Learning from experience: the Structural Funds and innovation since 2004

4.2.1 Management and coordination of innovation & knowledge measures

This section reviews the overall management of Structural Fund interventions in favour of innovation and knowledge during the current period. It examines the coherence the role of key organisations or partnerships in implementing Structural Funds measures for innovation and knowledge, the linkages between Structural Fund interventions and other Community policies (e.g. the RTD Framework Programme) and the financial absorption and additionality of the funds allocated to innovation and knowledge.

The implementation of Structural Fund measures in favour of innovation have led to the creation of 5 new organisations: one Managing Authority for each Operative Programme. All these new organisations have been supervised by existing ones; the Managing Authority of Economic Competitiveness Operative Programme – the most relevant one for this report – by the Ministry of Economy and Transport.

Projects have been selected via competitive tenders: calls for projects have been published, project proposals evaluated by experts, and then negotiated with the Managing Authority. As for the ECOP calls, all the five schemes targeting the business sector have mobilised co-funding from private companies. (Table 1) Projects have been monitored and followed up by the respective Managing Authorities, following the methods required by the EC, including the use of a common software package, translated into Hungarian. It is called EMIR (the Hungarian abbreviation of Unified Monitoring Information System), and it is publicly accessible via the website of the National Development Office.[28]

[28] As already mentioned, NDO is being reorganised at the time of writing, and possibly will be renamed as National Development Agency.

Table 1: Mobilisation of private sector funding, ECOP RTDI Priority

	Co-funded by private sector
Application-oriented co-operative RTD activity (ECOP 3.1.1)	Yes
Development of the infrastructure of publicly financed and non-profit research units (ECOP 3.2.1)	Not applicable
Scientific and technological co-operation of the business sector and the publicly financed research units (ECOP 3.2.2)	Yes
Support to new, technology and knowledge-intensive micro-enterprises and spin-off companies (ECOP 3.3.1)	Yes
Development of corporate research infrastructure related to the creation of new RTD jobs (ECOP 3.3.2)	Yes
Innovation and research activities of SMEs (ECOP 3.3.3)	Yes

Source: Calls for project proposals

No specific public-private partnerships have been established in the field of innovation and knowledge measures to implement the schemes supported through the Structural Funds.

Specific 'top-down' efforts have been made to ensure that maximum synergies are obtained from EU funding at national levels. Notably, the key player has been the Development Policy Co-ordination Inter-ministry Committee, set up in 1999. The Committee plays a key role in co-ordinating the activities of the ministries and other relevant bodies taking part in the operation of the development schemes system, and has also been a central player in the co-ordination of the planning and evaluation processes of the two National Development Plans (and the five Operational Programmes of the first one).

All the ECOP programmes are available in all seven regions in Hungary – in other words, those are national, rather than regional ones – and thus no difference can be observed between the absorption rates of regional and multi-regional programmes.

By 2006, there has been no major problem in terms of expenditure/absorption capacity of innovation and knowledge measures, although initially it had seemed to be the case, as suggested by Exhibits 11-12. The most recent (June 2006) figures suggest a completely different picture. (Table 2)

Exhibit 11: Absorption capacity of RTDI interventions

Objectives	Allocated SF	Disbursed total SF	Expenditure capacity
Objective 1	144,143,703.00	4,494,354.11	3.1%

Provided by ISMERI

Exhibit 12: Absorption capacity by field of intervention

Codes	Allocated SF	Disbursed SF	Expenditure capacity
Objective 1			
181	22,548,030.50	0.00	0.0%
182	48,248,795.50	354,794.77	0.7%
183	73,346,877.00	4,139,559.34	5.6%
Total objective 1	**144,143,703.00**	**4,494,354.11**	**3.1%**

Provided by ISMERI

Codes:
181: Research projects based in universities and research institutes
182: Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes
183: RTDI infrastructure

The total funds for the Economic Competitiveness Operative Programme (2004-2006) amounted to 606 MEUR (429 MEUR of which being contributed by the ERDF, with the rest from national public sources), and was intended to be complemented with the investment of about the same amount of private capital. The available resources for the RTDI-related measures within the ECOP (Priority 3) were 135 MEUR, or 22 percent of the total ECOP budget.

Official statistics (provided by EMIR, the Unified Monitoring Information System of the first NDP, operated by the NDP) are in the national currency, and thus these figures are used here, especially in Table 2, to characterise the relevance of the specific schemes, as well as administrative and expenditure capacities of the Managing Authority.

At an aggregate level, all ECOP funds have been committed by June 2006, and this observation is valid in the case of the RTDI priority, too. In several cases, however, some budget lines have been re-allocated, and thus the approved grants are higher than the amount originally earmarked for a specific scheme. For one scheme, this re-allocation of funds has meant that the amount of approved grants is below the initial fund (63%). (Table 2)

Table 2: ECOP statistics (as of 23 June 2006)

	Projects submitted	Grants applied for (bln HUF)	Projects approved	Grants approved (bln HUF)	Grants approved as % of total funds	Contracts signed	Contracted grants (bln HUF)	Grants disbursed (bln HUF)
ECOP (total)	20,824	325.1	9,901	156.6	100	7,074	118.3	48.3
RTDI Priority (ECOP 3)	2,046	78.9	938	38.2	100	876	36.4	10.5
Application-oriented co-operative RTD activity (ECOP 3.1.1)	556	30.5	274	15.3*	100	269	14.9	3.1
Development of the infrastructure of publicly financed and non-profit research units (ECOP 3.2.1)	424	11.9	244	6.9*	100	243	6.9	3.9
Scientific and technological co-operation of the business sector and the publicly financed research units (ECOP 3.2.2)	22	6.4	14	4.5*	100	14	4.5	1.1
Support to new, technology and knowledge-intensive micro-enterprises and spin-off companies (ECOP 3.3.1)	326	6.9	155	3.3*	100	150	3.2	0.9
Development of corporate research infrastructure related to the creation of new RTD jobs (ECOP 3.3.2)	33	1.6	24	1.3	63%	23	1.3	0.4
Innovation and research activities of SMEs (ECOP 3.3.3)**	685	21.5	227	6.8	Cannot be calculated	185	5.6	0.9
Promoting life-long learning and adaptability (HRDOP 3)	3,068	125.4	1,292	53.7	88.4	201	38.4	14.5
Developing the infrastructure of education and training (HRDOP 4.1)	83	74.7	31	23.6	n.a.	31	23.6	5.8

Source: www.nfh.hu, and author's calculation

Notes: * The approved grants are higher than the amount originally earmarked for a specific scheme.

** Project proposals submitted for the most recent (fourth) call have not yet been assessed.

Table 2 clearly suggests that the SF measures have been planned adequately: the high number of project proposals submitted shows that the measures addressed germane, genuine needs. By June 2006 the National Development Office officially reported that all the available funds had been committed. This means, furthermore, that in terms of absorption capacity, no specific difference can be observed among the various measures. Nevertheless, due to the general principle of ex-post financing, these on-going projects have realised a relatively low level of disbursement: 30.8% for ECOP as a whole, and 27.5% for the RTDI priority. Besides this feature of the SF-supported schemes, no major implementation bottlenecks have been identified.

Info Days have been organised to draw attention to other Community supported programmes or mechanisms (such as venture capital from Multi-annual programme for enterprises, EIB loans). Available qualitative information (e.g. assessment by innovative SMEs representatives) suggests that these other mechanisms have not had any major impact yet in Hungary. One of the major obstacles is the huge gap between intended project volumes: the size of projects developed by Hungarian entrepreneurs is way below the size of projects targeted by the EIB.

4.2.2 Effects and added value of Structural Fund support for innovation and knowledge

This section of the report analyses the effects and added value of the Structural Fund interventions in favour of innovation and knowledge during the current programming period. The analysis is based on two main sources, namely: available evaluation reports or studies concerning Structural Fund interventions; b) interviews and additional research carried out for this study. Accordingly, this section does not pretend to provide an exhaustive overview of the effects or added value[29] of Structural Fund interventions but rather is based on the examination of a limited number of cases of good practice. These good practice cases can may concern the influence of the Structural Funds on innovation and knowledge economy policies (introduction of new approaches, influence on policy development, etc.), integration of Structural Funds with national policy priorities, promoting innovative approaches to delivery (partnerships), or measures which have had a particularly important impact in terms of boosting innovation potential, jobs and growth.

As Hungary joined the EU only in May 2004, it would be too early to attempt to establish the main impacts of Structural Fund interventions on innovation and economic performance, either at a national, or a regional level. There are several obstacles to prevent this sort of assessment. Only a small portion (approx. 31%) of the total ECOP subsidies has been disbursed yet (Table 2, as of June 2006), although the available funds are already committed. Thus, we are talking about on-going projects, and it is a well-known law in economics of innovation that impacts on economic performance at best can be measured when a few years have already elapsed since the completion of RTD projects. Well substantiated assessments are further hampered by the fact that the most recent available data on R&D performance is from the period before structural funding commenced (i.e. 2004), whereas innovation data (collected by the CIS3 survey) covers the period 1999-2001.[30] Finally, as already mentioned, policy programmes are rarely evaluated in Hungary – although it is compulsory since 2005.

For the same reasons, it cannot be established, either, to what extent the measures have attained their expected impact.

Measures supporting academia-industry co-operation and strengthening innovation capabilities of SMEs appear most likely to speed up the rate and scope of innovation. As for the former, it is a promising development that several national and SF RTDI schemes support this objective, either as a 'primary' one (e.g. ECOP 3.2.2, see the box below, and also Appendix E), or as 'secondary' one, i.e. when the prime objective is a different one, but academia-industry co-operation is either a must, or a preferred way to conduct RTDI activities (see Appendix D for SF schemes, and Section 3 for the national ones; further details can be found in the specific policy measure fiches of the TrendChart database).

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[29] A good definition is "The economic and non-economic benefit derived from conducting interventions at the Community level rather than at the regional and/or national level". See Evaluation of the Added Value and Costs of the European Structural Funds in the UK. December 2003. (Available at : www.dti.gov.uk/europe/structural.html)

[30] The CIS4 survey results will be available in October 2006.

As for the latter, “Innovation and research activities of SMEs” (ECOP 3.3.3) seems to be a good practice case. It promotes the introduction of new, improved products, technologies and services and academia-industry co-operation.; supports the development of absorptive and innovation capabilities of SMEs and RTDI activities of SMEs. This is a ‘new-to-the-country’ type policy innovation: stronger emphasis has been put on strengthening innovation capabilities of SMEs, as opposed to the more ‘traditional’, more widely used approach of focussing on the so-called new technology based firms, or high-tech sectors. Its strategic relevance is this very focus on the need to tackle the ‘dual economy’ symptom in Hungary.

Given the ex-post nature of funding, applicable across SF schemes, i.e. not only for the RTDI ones, none of the specific instruments has led to easier access to finance for innovative enterprises.

Before making any decision either on potential further expansion of support to certain types of measure, or introducing new types of schemes (in terms of objectives, eligible costs/ activities, target groups, types of aid [grant, favourable loan, etc.]), thorough evaluations should be conducted. Without having these evaluation results at hand, one can only conclude that all the current SF RTDI schemes are aimed at tackling relevant needs and shortcomings of the Hungarian innovation system. In other words, these schemes address the challenges identified at a national level, not at a regional level. Of course, all the national-level needs manifest themselves in all the seven Hungarian regions.

Further funding without (or before) performing sound programme evaluations could be even regarded as exactly the wrong signal to Hungarian policy-makers: instead of establishing an evaluation culture – as part of applying the modern, appropriate policy-planning tool box – it would encourage them to spend public money, be it national and EU funds, without due diligence.

Good practice cases, however, can be identified at this stage, at least as a preliminary analysis, in other words, as a kind of “ex-ante” evaluation. More precisely, what is possible is to juxtapose the identified policy needs, on the one hand, and the rationale, aims and tools of various policy measures co-financed by the EU Structural Funds, on the other. The box below provides a brief overview of a good practice case; a more detailed description can be found in Appendix E.

Good practice: Co-operation Research Centres, CRC

Academia-industry co-operation – a key factor underpinning a competitive economy with innovative businesses – has been weak in Hungary. This measure (3.2.2. of the ECOP, a successor of a similar scheme originally launched in 1999) addresses this issue. Thus, the rationale and the objective of this measure are appropriate in the Hungarian context, and also the tools seem to be adequate to address the challenges.

As a key component of the 2004-6 NDP, Priority 3, this measure is aimed at promoting scientific and technological co-operation of the business sector and publicly financed research organisations and integration of education, economic and social target-oriented RTD co-operation for strategic purposes by supporting the establishment of new Co-operative Research Centres. The overall budget for this period is roughly 12 MEUR euros.

The success of the measure is indicated by the fact that five CRCs were set up in the framework of the original scheme (by 2004), and further 14 CRCs have been supported by the current scheme, either at universities or at research institutes, covering different fields of S&T. Now each region has at least one CRC.

22 project proposals have been submitted; requesting 6.4 billion HUF as grants in total. The 14 approved projects requested 4.5 billion HUF as grants.

Even though only the – very similar -'predecessor' scheme has been evaluated as of yet, evidence suggests that it has had a positive effect on the innovation activities of the participating companies, the number of PhD students and their employment prospects and the professional performance of the hosting higher education institutes. The results suggest that the budget of the programme has been used in an efficient way.

4.3 Conclusions: Structural Funds interventions in favour of innovation and knowledge

The Structural Funds measures are not the main instrument for supporting innovation (creating, diffusing and exploiting knowledge) in Hungary. They provide, nonetheless, a significant extra funding for RTDI, which cannot be sought from national sources. Also, the methodological requirements – e.g. ex-ante and ex-post evaluation, project monitoring, regular discussions with EC officials, peer-review in the frame of open method of co-ordination – 'attached' to them are likely to have a major impact in terms of policy learning.

The policy measures co-financed by the EU Structural Funds were only launched in 2004. Their actual impacts on innovation and economic performance, therefore, cannot be established yet for several reasons. First, only a relatively small portion of the RTDI subsidies has been disbursed until June 2006 (Table 2), and thus these are effectively *on-going* projects. One would need to wait for several years to assess the impacts of *completed* RTDI projects. Second, R&D input and output data at a national level are only available for 2004 as of now – while ECOP commenced in May 2004. Furthermore, the CIS 3 dataset, providing information on innovation activities, covers the period 1999-2001; again, that period precedes the one we are interested here (2004-2006). One cannot see, therefore, even at an aggregated (national) level if there has been any changes since 2004, let alone to establish if these changes are due to the introduction of SF measures.

The high number of project proposals submitted (Table 2) do suggest, however, that these measures have targeted genuine needs, i.e. the most pertinent challenges of the Hungarian national innovation system.

Similarly, only highly subjective judgements can be formulated on the outcomes of the EU SF measures promoting innovation in terms of capability and added value. However, it is already clear that one of the major challenges to planning adequate policy measures is precisely the lack of evaluation culture in Hungary. Various schemes are set up on an ad hoc basis without sufficient evaluation of the impact of existing policies. Tellingly, despite the fact that evaluation of RTDI policy measures has become compulsory since 2005, only one policy programme has been evaluated so far. Thus, it cannot be established if public money is spent in an effective and efficient way, to achieve the desired objectives.

As PHARE funds have not been used in Hungary to support RTDI activities, experiences gained concerning those funds cannot be used here.

Exhibit 13: main outcomes of innovation and knowledge measures

Measure	Capability	Added value
Application-oriented co-operative RTD activity (ECOP 3.1.1)	Good absorption and management performance	This scheme is reinforcing national priorities by supporting application-oriented RTD activities in various S&T fields, while academia-industry co-operation is given a priority, and thus strengthening the Hungarian NIS.
Development of the infrastructure of publicly financed and non-profit research units (ECOP 3.2.1)	Good absorption and management performance	This scheme is reinforcing national priorities by funding the modernisation of equipment at public R&D institutes. An important element of the NIS is strengthened in this way, preparing these units for co-operation with businesses.
Scientific and technological co-operation of the business sector and the publicly financed research units (ECOP 3.2.2)	Good absorption and management performance	This scheme is reinforcing national priorities by promoting academia-industry co-operation by supporting the establishment of new Co-operative Research Centres, and thus reinforcing the NIS. Evaluation of a very similar 'predecessor' scheme suggests that it has had a positive effect on the innovation activities of the participating companies, the number of PhD students and their employment prospects and the professional performance of the hosting higher education institutes.
Support to new, technology and knowledge-intensive micro-enterprises and spin-off companies (ECOP 3.3.1)	Good absorption and management performance	This scheme is reinforcing national priorities by fostering the commercialisation of innovative ideas and R&D results via supporting start-up and spin-off firms.
Development of corporate research infrastructure related to the creation of new RTD jobs (ECOP 3.3.2)	Significantly lower absorption than in the case of other schemes	This scheme is reinforcing national priorities by providing incentives to increase both BERD and the share of business RSE in total R&D employment.
Innovation and research activities of SMEs (ECOP 3.3.3)	Good absorption and management performance	This scheme is reinforcing national priorities by (i) promoting the introduction of new, improved products, technologies and services; (ii) supporting the development of absorptive and innovation capabilities of SMEs; (iii) supporting RTDI activities of SMEs; promoting academia-industry co-operation. It is an innovative policy approach in Hungary as the scheme puts stronger emphasis on strengthening innovation capabilities of SMEs, as opposed to the more 'traditional' approach of focussing on the so-called new technology based firms, or high-tech sectors. Its strategic relevance is this very focus on the need to tackle the 'dual economy' symptom in Hungary.
Promoting life-long learning and adaptability (HRDOP 3)	Slightly lower absorption than in the case of other schemes	This scheme is reinforcing national priorities by improving the efficiency of the education and training systems through the provision of more effective and responsive initial and continuing vocational training. It also represents an innovative policy approach in Hungary where this objective has not been in the forefront, in spite of its crucial importance.
"Developing the infrastructure of education and training" (HRDOP 4.1)	Data are not available on absorption (only at a higher level of aggregation of the priorities)	This scheme is reinforcing national priorities by improving the infrastructure of education and training so as to reduce the territorial disparities in this respect;

Effectiveness → significant results achieved; good absorption and management performance, etc.

Added value of measures → reinforcement of national priorities, innovative approaches and solutions, institution building, etc.

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

There have been some attempts in Hungary to use advanced tools for identifying factors influencing innovation potential at a national level. The final reports of the first Hungarian Technology Foresight Programme (TEP) were published as a series of booklets in 2001. The Steering Group and the seven thematic panels assessed the current situation, outlined different visions for the future, and devised policy proposals.[31] These recommendations did not have any significant effect on the policy framework before May 2002.

The first National Development Plan (2004-2006), however, has heavily relied on the so-called macro visions published in the Steering Group report of TEP (TEP [2001]).[32] Yet, one can observe that this new policy-preparatory culture has not been firmly established in Hungary. A strong indication is that Foresight has not been used to underpin the second National Development Plan (2007-2013).

As for growth prospects, there are two major sectors, in which foreign investors are particularly active in Hungary: automotive and electronics (components) industries. The share of these sectors is rather high in the Hungarian manufacturing industry, either in terms of output, or exports. As already discussed in Section 2, foreign-owned companies play a dominant role in 3 regions, and are becoming major actors in a fourth one, too. Thus, it is of crucial importance to base policies on a sound understanding of the major features of the dominant sectors and their dynamics.

The global movement of capital, the activities of multinational companies (MNCs) and the ever more widening web of international production networks pose either threats to, or opportunities for, economic development, depending on the policies and other capabilities of a given country. Foreign direct investment can be '*foot-loose*',

[31] The thematic panels analysed the key aspects of the following areas: human resources; health and life sciences; information technology, telecommunications and the media; natural and built environments; manufacturing and business processes; agribusiness and the food industry; transport. As for the aims, methods and other details of TEP, see Havas [2003a].

[32] TEP was evaluated by an international panel of experts in 2003-2004. The evaluation report, presented to NORT in May 2004 points to the indirect character of policy impacts: "… [our] analysis indicates *an impact both on the climate of thought in many policy areas and a series of indirect but significant effects on policy in several domains. It seems that TEP created a reservoir of knowledge that entered the policy system in a non-linear fashion*, either through personal networks of participants or simply by having cogent text available when policies were being drafted." (original emphasis) (The full report is available at www.foresight.hu)

i.e. characterised by low local knowledge content, and thus offering low paid jobs. These companies are ready to leave at any moment for cheaper locations. Other types of investors, though, are '*anchored*' into a national system of production and innovation: these are characterised by knowledge-intensive activities, they create highly paid jobs, build close contacts with local R&D and higher education institutes, and develop a strong local supplier base.

Policy-makers need to understand the implications of these different types of investors' strategies, and thus abandon 'blanket' investment promotion policies, which 'sweeten' any investment projects, regardless of the activities to be pursued in Hungary, and the links created with the indigenous firms and local universities. There are some signs of this understanding emerging, but more in press releases than in actual policy documents, be they at a national or regional level, and policy measures.

Recent developments suggest that Hungary can benefit from the globalisation of innovation and production networks. For example, business enterprise R&D expenditures have been increasing in automotive industry in recent years – albeit from a low absolute level, and thus this sector might become *anchored* into the Hungarian economy. (Table 3) In other words, policy-makers actually have opportunities to be grasped and grabbed, by devising appropriate, carefully targeted policy schemes.

Table 3: BERD in three sub-sectors producing automotive products, 2001-2004 (current bln HUF)

Sector (NACE code)	2001	2002	2003	2004
Manufacture of electrical equipment (31.6)	0.6	0.4	1.7	3.5
Manufacture of motor vehicles (34.1)	3.1	0.9	1.3	3.4
Manufacture of parts and accessories for motor vehicles (34.3)	1.6	1.7	4.3	2.3

Source: Central Statistical Office

The main factor behind this is the restructuring of the automotive industry, due to a globally diffusing organisational innovation, often called lean production. One of the most important novel features of lean production, and surely the most relevant one from the point of view of this study, is the new way to arrange and manage the assembler-supplier relationships, based on trust and the realisation of the importance of co-operative efforts. Different forms of financial, managerial and technological assistance are provided by the assembler. Another distinctive feature of the lean supply chain is its pyramid-like structure. First-tier suppliers' tasks include not only manufacturing of certain parts and components but product design as well, either together with their assemblers or on their own. Suppliers' performance is regularly evaluated, using multiple criteria, such as quality, design, delivery and price. Supply quotas, and thus opportunities to make profits, are awarded among suppliers according to the result of these evaluations.

Policy-makers need to understand the dynamics of automotive industry in order to devise appropriate policy schemes to (a) 'nurture' local suppliers, notably improve their innovation capabilities; (b) strengthen clusters of suppliers; (c) promote close co-operation between indigenous suppliers and their potential partners, being either

first-tier components manufacturers or automotive assemblers, based on knowledge-intensive activities of the indigenous suppliers [as opposed to low wages]; and (d) make Hungarian universities and public R&D institutes attractive partners for conducting joint projects with major automotive firms.

A real-life example from the other major, FDI-dominated sector, namely electronics industry, vividly illustrates the threats posed by 'foot-loose' foreign investment projects. This threat is further exacerbated by a widespread policy misconception, what we can call 'high-tech hype'. IBM Storage Products Ltd., a Hungarian subsidiary of the Big Blue belonged undoubtedly to a high-tech sector, namely office, accounting and computing machinery, and its main products – components of hard disks and assembled hard disks – were also high-tech goods.[33] Its manufacturing activities, too, were characteristic to high-tech: performed by people wearing space suits in clean rooms, which were off-limits to any visitor. No doubt, this whole setting was spectacular for the media and politicians. Yet, these activities were not at all knowledge-intensive ones, and hence carried out by semi-skilled workers. In other words, both the production equipment and products were technology intensive in design – and those activities had been performed outside Hungary – but not in use. The local knowledge content, therefore, was quite low, and this firm – just as a number of similar electronics assembly plants – did not provide any opportunity for stable economic growth, secure employment and sustained regional development in Hungary. Indeed, it was closed down at a short notice in October 2002, when IBM re-located a large chunk of its global manufacturing activities in order to cut production costs. As this plant was not integrated into the domestic economy – via highly skilled labour, close academia-industry links and/ or specialised, indispensable local suppliers – the decision was an easy one for the headquarters: based purely on simple cost considerations. Had it been a plant with high local knowledge content, the decision would have been quite different.[34]

The policy implications of these types of, numerous, cases are straightforward: co-ordinated, conscious investment promotion, RTDI, human resource and regional development policies are required to embed foreign investors into the respective regional and national systems of innovation and production. This way, skills can be upgraded, local suppliers' innovation capacities can be improved to boost their competitiveness, and close academia-industry relationships can be nurtured. Otherwise, most of the subsidies would be wasted because the investors would only use a given region/ country as a cheap, temporary production site.

Another, important, source of threat is the excessive concentration of (public and private) R&D activities in Central Hungary, and, in turn, the low level of these

[33] It was the second largest exporting firm in 2001, with a 7.5 percent share in the total Hungarian exports.

[34] It must be stressed that the above case is just an illustrative one. Radosevic (2002), providing a thorough survey of electronics industry in CECs, points out that exactly for the same structural problems, the Scottish electronics industry lost 10,000 jobs in 2001 alone. (p. 43) There have been further plant closures and downsizing in Wales, too. Relocations of electronics assembly activities from CECs to cheaper production sites – further East in the region, e.g. Romania and Ukraine, or to the Far East, namely China – had already started in 2000, i.e. before the IBM case, mentioned above. Besides Hungary, the Czech Republic and Estonia have also experienced the mobility of 'foot-loose' investors.

activities in the other six regions, as already discussed in detail in Section 2.2. Despite the strong presence of foreign owned high-tech businesses in the regions of Western- and Central Transdanubia, the level of BERD is well below the level required for long-term competitiveness.

There are two other trends, which can have significant impacts in several sub-regions, endowed by natural resources for agri-food businesses and tourism. First, demand for specialty food is increasing for a number of reasons. With the rising disposable income of non-negligible consumer groups in the EU25 – and to a smaller extent – in Hungary, more and more people are willing to pay a premium for specialty food products. This trend is also backed by more concern about health, and the aging population.

Second, demand is rising for various branches of premium tourism (eco, health, active, cultural, thermal, etc.), too, also backed by increasing disposable income, the emergence of low-cost airlines, aging population, and the overall trend of paying more attention to health and quality of life.

Intense RTDI activities are a pre-requisite to seize these opportunities. A few examples can illustrate this point: The introduction of advanced ICTs is required for logistics of agri-food products, as well as to promote specialty tourism (by developing dedicated, user-friendly, informative websites to attract guests; introducing software packages to enhance efficiency of running businesses, etc.). Materials technologies offer advanced solutions for packing to preserve food and their unique taste, while life sciences can increase variety and provide crucial inputs to keep food products fresh and tasty.

These all point to the importance of effectively combining technological and non-technological innovations. Further, these observations warn policy-makers not to focus their attention, and more importantly, public support exclusively on glamorous high-tech sectors. In fact, a number of highly successful, innovative firms, exploiting advanced knowledge created externally in distributed knowledge bases[35] and by non-R&D processes internally, are classified as medium low-tech or low-tech ones, just because their R&D expenditures are below the threshold set by the OECD.

Following the considerations pertaining to all or several Hungarian regions, some of the specific features of the types of regions, identified in Section 2, need to be highlighted.[36]

Közép Magyarország clearly stands out with its close-to-EU-average GDP/capita and is the most economically advanced region. The relatively high number of innovative businesses and the presence of several universities contribute to the highly

[35] Smith [2002] defines this term as follows: "A distributed knowledge base is a systematically coherent set of knowledge, maintained across and economically and /or socially integrated set of agents and institutions. (…) the relevant knowledge base for many industries is not internal to the industry, but is distributed across a range of technologies, actors and industries." (p. 19; cf. pp. 20-22)

[36] The main sources are the regional innovation strategies, devised in recent years. As the prime minister announced at a public lecture in June 2006 that the second National Development Plan would be substantially revised in the coming months, the current version of that document is not considered here.

concentrated nature of RTD resources and to the future growth potential in this respect. Though business RTD expenditures are still low on average, local firms are beginning to consider intensifying their RTDI activities by taking advantage of the available support schemes sources and the highly qualified workforce, including S&T human resources. The conditions of quality of life for managers are clearly favourable in Central Hungary, and thus the region is attractive for dynamic businesses, including foreign firms.

The main priorities of the region – set out by its RIS – emphasise the importance of strengthening the co-operation between the three main actors already present, namely the indigenous SMEs, MNCs and the academia by: i) Improving the conditions of the operation of SMEs (e.g. maintaining a business-information system, monitoring and mediating the needs of local MNCs, improving the access of indigenous SMEs to capital, encouraging co-operation, developing clusters, expanding the opportunities of industrial parks); ii) Encouraging product and technology development (e.g. promoting modern product development methods); iii) Raising the level of innovation culture (e.g. synthesising and promoting good practices among SMEs; supporting counselling and educational activities, promoting modern management methods). If these strategic goals do not succeed, the danger of brain-drain, and of losing competitiveness to the benefit of competing capitals/ regions (e.g. Bratislava, Ljubljana, Prague) might become acute. Central Hungary, nonetheless, possesses the necessary ingredients to remain a competitive regional centre. The potentials of start-up and spin-off are most favourable and should thus be promoted through national as well as regional and community resources.

The second group of regions is composed of the two "Manufacturing cohesion regions with significant role of FDI". The high amount of foreign capital, most of which belonging to the so-called 'high-tech' sectors, is not coupled with adequate BERD figures. Business strategies of the MNCs (especially within the automotive and electronic sectors) have for the most part resulted in low(er) knowledge-intensive activities in these regions. 'Anchoring' FDI is especially relevant in these two regions, as the danger of re-locating 'foot-lose' investments is the most pronounced here. The competing regions are not only to be found in neighbouring countries with lower and/or simpler taxes, lower production cost-levels, but, to an increasing degree, locations to the (far) east of the EU's borders. Besides strengthening SMEs, thus making them capable of participating in the supplier networks and product clusters of MNCs within the most important sectors, further potential clusters relevant to RTDI are identified by the RIS: wood-processing, furniture, and food industries and health tourism. International co-operation and clustering is facilitated by one of the regions' optimal geographical location: namely, Nyugat-Dunántúl borders to four neighbouring countries.

Despite the relatively advanced physical infrastructure of these regions, there are huge disparities within them in this regard, too. In line with the large income gaps between counties such as Győr-Moson-Sopron and Zala, the intra-regional transport networks are also show substantial variations.[37] With regard to innovation potentials, the lack of adequate north-south transportation network is emphasised in the RIS, further

[37] This factor clearly demonstrates that intra-regional disparities may severely hamper the potentials of devising well-substantiated and meaningful policies at this level of aggregation.

hampering the prospects of improving the already insufficient level of workforce mobility. This latter feature (characteristic of the Hungarian labour-market as a whole, both across and within regions) is the main reason behind the problematic long-term and geographically concentrated frictional unemployment, which is, again, pronounced in these two regions. As pointed out, the absence of adequate knowledge infrastructure in Közép-Dunántúl is a key disadvantage. Measures would be needed to enhance mobility by making the regions more attractive to motivated and highly qualified workforce and managers alike.

The low R&D intensity of businesses is the most striking in the third group of regions. The relatively high share of agriculture could serve as a potential for the region in case of exploiting the rise in the demand for specialty food. Biotechnology and life sciences (both human and animal) are particularly strong in some regional centres (especially in Szeged, Debrecen, Kaposvár, and Pécs). Notably, a key priority of the two regions of the Hungarian Great Plain is based on their agricultural traditions. The united and co-ordinated development of the region's diversified agricultural potentials containing endemic elements (both product and producing method), the food processing capacity and traditions, and the knowledge base linked to agriculture can lay the foundation of the marketing of agricultural products processed at higher level. There are several factors which can potentially establish the regions' competitiveness. The further development of the existing R&D background relating to agriculture, development of bio- and gene technologies should be fostered by stronger and more efficient co-ordination of the supply and demand of knowledge infrastructure. As a favourable consequence, the profitable application of research results in agriculture, the sector's innovation-orientation connected to marketable products, and an effectively operating and high added-value production chain would be facilitated. On the other hand, in case the discussed mismatch prevails over the long run, the threat of brain-drain and the exploitation of R&D capacities (by 'selling them out' at a low price) may be exacerbated.

Further areas of potential growth include the agro-ecologic sector, viticulture and oenology (with the renowned wine regions such as Eger or Villány) , food and leather industries (especially in Dél-Dunántúl). In this latter region, the conditions for, and the experiences with, renewable energies have been noteworthy in recent years. Combining the available knowledge infrastructure with strong, innovative SMEs could substantially increase the growth potential of the region. Some micro-regions of this rather heterogeneous group should focus on the rising demand for various branches of premium tourism. A particular connection between tourism and viticulture is identified by several RIS documents. Namely, following the examples of several Western European regions, these two are explicitly regarded as mutually reinforcing priorities, as reflected in the strategies tailored for the development of some micro-regions. Strengthening the potentials of "wine-tourism" and the so-called "wine-roads" is thus a key opportunity. Again, the poor physical infrastructure of these regions poses a threat as to the achievement of these goals.

Exhibit 14: Factors influencing innovation potential by type of region

Type of region	Main factors influencing future innovation potential
Közép-Magyarország	• High concentration of RTD resources, and of business activities (high share of GDP) ⇒ o relatively high number of innovative businesses; o improving – but still weak – academia-industry co-operation; o potential for start-up and spin-off companies • Mixed RTDI strategies of foreign-owned firms: some conduct RTDI activities in Hungary (in-house and/or extra-mural projects), while others rely on R&D results achieved outside Hungary
"Manufacturing cohesion" regions with dominant role of FDI (Közép-Dunántúl, Nyugat-Dunántúl)	• Very low business R&D expenditures; low intensity of innovation co-operation between foreign and indigenous firms • RTDI strategies of foreign-owned firms: the dominant ones rely on R&D results achieved outside Hungary • Weaker knowledge infrastructure than in Central Hungary (especially in Közép-Dunántúl) • Improving, but still low weight of indigenous firms in supplier networks – threat of foot-loose investments • Low intensity of innovation co-operation between foreign and indigenous firms • Disparities in physical infrastructure, mismatch in demand and supply of labour
"Manufacturing cohesion" regions with dominant role of declining industries or agricultural activities (Dél-Dunántúl, Észak-Magyarország,* Észak-Alföld, Dél-Alföld)	• Lack of innovative indigenous SMEs • Mismatch between the relatively highly developed knowledge infrastructure (universities and R&D institutes) and the lack of appropriate industrial structure/ industry needs for RTDI • Re-aligned research strategies of universities and R&D institutes, taking into businesses' RTDI needs; coupled with improved co-operation and RTDI project management skills, and more business-friendly attitudes, geared towards (joint) commercialisation of R&D results can boost future innovation activities • Rising demand for specialty food • Rising demand for various branches premium tourism • Experience with renewable energy technologies

* Észak-Magyarország is a 'borderline' case: it used to be a stronghold of heavy industries – now declining or even wiped out –, but more recently it is becoming attractive for green-field FDI projects.

5.2 A prospective SWOT appraisal of regional innovation potential

This sub-section is based on an overall appraisal of innovation potential in the types of regions identified and characterised in the preceding sections. The SWOT matrices aim at pointing out the major strengths, weaknesses, opportunities and threats in terms of innovation and knowledge in each type of regions. Specific economic, sectoral, research or human resource-related factors are considered whether they offer high to low potential.

Exhibit 15: Innovation and Knowledge SWOT

Közép-Magyarország	
Strengths • Strong R&D capacities, highly qualified workforce. • Relatively good physical and knowledge infrastructure • High quality of life for managers (e.g. high quality of cultural services; educational opportunities for their children; job opportunities for spouses)	**Opportunities** • Developing better understanding of the role of RTDI in enhancing competitiveness, and thus increased BERD – longer time-horizon, strategic planning of businesses • Attracting investors, that create knowledge intensive jobs, exploiting the region's knowledge infrastructure • Fostering intense, mutually beneficial academia-industry co-operation • Joining the networks of regional hubs (offering knowledge-intensive activities, especially services) • Developing 'creative' (content) industries • Becoming a 'launching pad' for start-up and spin-off companies
Weaknesses • Short supply of policy planning and implementation capacities • 'Pale' perceived role of RTDI by firms ⇒ Low business expenditures on R&D • Improving, but still weak academia-industry co-operation • Weak RTDI management capabilities at universities and public R&D units	**Threats** • Left behind by more dynamic Central European 'competitor' regions, pursuing adequate development strategies, offering better opportunities (that is, lack of pro-active strategies, and a coherent set of appropriate policies in Közép-Magyarország) • Brain-drain • FDI might leave because of worsening business conditions (relative to 'competitor' CE regions),

"Manufacturing cohesion" regions with dominant role of FDI	
Strengths • Long-established industrial traditions, skilled, experienced, disciplined labour • Relatively good physical infrastructure • Geographical proximity to major Western European markets	**Opportunities** • Embedding foreign firms into regional innovation and production systems • Increasing the share of local knowledge content in business activities • Improving production, innovation, and managerial capabilities of local suppliers • Exploiting geographical advantages for cross-border co-operation and clusters • Developing premium tourism services, backed by knowledge-intensive activities (incl. tailored RTDI projects)
Weaknesses • Short supply of policy planning and implementation capacities, and infant RTDI governance structures	**Threats** • FDI might leave because of ○ worsening business conditions (relative to 'competitor' CE regions)

• Extremely low business expenditures on R&D – despite the strong presence of 'high-tech' enterprises • Insufficient knowledge infrastructure; infant, weak academia-industry co-operation • Improving, but still low weight of indigenous firms in supplier networks • Low intensity of innovation co-operation between foreign and indigenous firms	○ lack of motivated, highly-skilled labour, low level of workers' mobility ○ unevenly dispersed physical and knowledge infrastructure, and ○ weak local suppliers

"Manufacturing cohesion" regions with dominant role of declining industries or agricultural activities	
Strengths • Unique natural resources for tourism • Favourable conditions for certain agri-businesses • Good R&D and higher education capabilities in several large cities	**Opportunities** • Developing knowledge-intensive agri-food businesses, producing specialty products, backed by tailored RTDI projects • Improving capabilities of indigenous SMEs (both technological and managerial ones), extending their time horizon (shifting emphasis from survival to strategic thinking) • Developing premium tourism services • Joining forces: re-aligning public R&D units' strategies towards the needs of businesses, esp. innovative SMEs • Exploiting the potentials of the existing knowledge infrastructure, especially in the area of food industry, and biotechnology • Combining products and services in inter-related businesses (agri-food, tourism, eco-tourism)
Weaknesses • Short supply of policy planning and implementation capacities, and infant RTDI governance structures • Dominant weight of non-innovative (industrial or agricultural) indigenous SMEs • Poor physical infrastructure • Mismatch between knowledge infrastructure (universities and R&D institutes) and industrial structure/ industry needs for RTDI	**Threats** • Brain-drain (to more attractive, more dynamic regions inside and outside Hungary); weakening universities and public R&D institutes • R&D results (e.g. stemming from biotech centres of excellence located in Dél-Alföld) are sold out at low prices; exploited abroad • Left behind by more dynamic Central European 'competitor' regions that pursue adequate development strategies, offer better opportunities (that is, lack of pro-active strategies, and a coherent set of appropriate policies in these "Manufacturing" cohesion regions)

5.3 Conclusions: regional innovation potential

The main opportunities of, as well as threats calling for, regional innovation are highlighted in this sub-section. Despite the regional focus of these considerations, it should be stressed that neither diversity across regions, nor crucial intra-regional differences can be reflected in the format of a few "policy headlines". Sound, evidence-based policy-making requires more input, as well as more detailed reasoning, taking into account a host of societal, technological, economic and institutional factors, with a strong emphasis on the web of interactions among them.

Policy headline 1:
Enhance the innovation capacities of indigenous SMEs, promote start-up and spin-off businesses

This policy option has the most promising potential and is therefore of most relevance for the 'outlier' region of Közép-Magyarország. With the relatively high number of innovative businesses (albeit still insufficient level of BERD on average), good physical and knowledge infrastructure and the presence of MNCs possessing advanced technologies, the opportunities for the growth of knowledge-intensive activities are clearly favourable. The innovative capacities of indigenous firms need to be further strengthened, *inter alia*, by extending the relevant national and SF-funded schemes. Integrating local SMEs into international production and innovation networks, as well as assisting start-up and spin-off firms to introduce their own new products and services into the national and foreign markets, are the key opportunities for enhancing competitiveness and fostering growth in this region.

Policy headline 2:
Align the supply of knowledge infrastructure and the demand of businesses

In some "Manufacturing cohesion regions with significant role of FDI", the lack of adequate knowledge infrastructure hampers the efforts to 'anchor' foreign firms into the local economy. In contrast, some regional centres (notably Szeged or Debrecen) possess high-quality knowledge infrastructures, which, however, do not match the demands of the local businesses, or the local businesses do not have the financial and innovation capabilities to exploit the results of these R&D centres. (One should recall the low share of foreign investments in these regions.) This situation exacerbates the threat of brain-drain and permanent backwardness. Several policies can be pursued when dealing with these challenges:

- Bring potential partners together, e.g. via trustworthy, value-added information services, tailored workshops, and "innovation clubs"
- Support demonstration projects, liaison offices
- Improve governance and RTDI management capabilities at universities and public research institutes e.g. by offering vouchers for training, management consultancy, IPR and marketing services
- Adjust the attitude of academic staff by extending evaluation criteria (co-operation with businesses, good understanding of business logic and practices, achievements in commercialisation of R&D results must be appreciated, i.e. included in the set of evaluation criteria)
- Continue schemes offering grants for academia-industry co-operation
- Continue schemes aimed at fostering mobility of researchers between academia and businesses.

Policy headline 3:
Rising demand for specialty products: Develop knowledge-intensive agri-food businesses, backed by advanced RTDI projects

Specific geographical endowments, e.g. soil and climate, coupled with the appropriate intellectual resources, institutional settings and adequate strategies, offer growth opportunities. Some of the regions, especially within the group labelled "Manufacturing cohesion regions with dominant role of declining industries and agricultural activities", possess excellent potentials for developing knowledge-intensive agri-food businesses, producing specialty products, thanks to their geographical locations and the excellent local knowledge infrastructure. In particular, the availability of expertise (research institutes, universities etc.) within life sciences and biotechnology should be utilised, and these initiatives need to be baked by tailored RTDI projects. The products of these co-operations could be coupled with the opportunities of premium tourism (e.g. wine-tourism), backed by a wide range of skills (differentiating destinations by creative marketing and emphasising local specialities, efficient management, competence in developing and using specific ICT tools, etc.).

Policy headline 4:
Promote knowledge-intensive activities – 'anchor' foreign investments

This policy issue is particularly relevant for the two "Manufacturing regions with dominant role of FDI", characterised by simple assembly activities of MNCs, classified as 'high-tech', but performing little R&D in Hungary. In sum, currently low(er) knowledge-intensive activities are performed in these regions, and most of these firms are not embedded into the regional economies. It is clearly a threat: 'footloose' capital might easily flee to cheaper locations. Indigenous SMEs, as potential suppliers, as well as the local workforce need to be upgraded, as one the means to convince MNCs to relocate knowledge intensive jobs (including RTDI activities) to these regions.

In order to improve the absorption capacities of indigenous SMEs, including overall management capacities, and innovation management capacities, the supply of innovation services by skilled, trustworthy service providers need to be improved significantly by regular training and re-training programmes. Further, support for innovation service providers should be provided via boosting demand for these services, and not by directly supporting the service providers. Thus, competition among service providers – as a major driving force to improve quality and enhance efficiency – is promoted. In short: continue the "Innocsekk" voucher scheme, and extend this 'logic' to other fields of support when it is sensible.

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

This final section draws upon the analysis of the appraisal of national and regional policy mix and the prospective investigation of regional development potential to provide recommendations for steering Structural Funds support. These policy conclusions are yet to be discussed by stakeholders, once the new government structures are in place, partnerships are established, and the new version of the second National Development Plan (2007-2013) is drafted (preferably before it is finalised).

Given the on-going fundamental changes – the whole structure of the government is being reorganised, the major decision-making competences are re-allocated both at a national level and between governance levels [national, regional, county level], while the major strategic decisions, in particular those concerning the use of SF funds are going to be centralised in the form of new bodies, as already mentioned in Section 3 – it cannot be established if the preparatory documents (National Strategic Reference Framework, draft operational programmes, etc.) of the national authorities are in line with the conclusions of this report.

Further, it is not recommended to introduce a differentiated approach to planning SF innovation and knowledge measures per region (or type of regions) for the following reasons:

1. Administrative reasons: Regional Innovation Agencies are already in place, and their activities, as well as strategies devised by these agencies, are supported by national schemes (see Section 3), and following the EC rules, an objective cannot be supported by two types of schemes, i.e. ones funded by national resources, and 'parallel' ones co-funded by national and SF resources.
2. Political reasons: as already mentioned, it is unknown at this stage if regions would gain more decision-making power (at the expense of the central government and the current counties) or become 'outposts' of the central government, charged with the efficient, co-ordinated implementation of the latter's decisions.
3. Macro strategy- and policy-related considerations: Severe austerity measures, as well as major overhaul of the big social systems (education, health, social security) and taxation are currently being planned in Hungary in order to modernise the state and cut the huge budget deficit; a new convergence programme is to be submitted to the EC in September; as the prime minister announced in June, the second National Development Plan (2007-2013) is going to be revised significantly in the next few months; obviously, these changes will have huge implications for RTDI strategies and actual policy measures both at a national and regional level. It is simply not sensible, therefore, to recommend any SF measures in detail at a regional level.
4. RTDI system considerations: There are enough systemic failures – e.g. shortcomings in the decision-making system; on average not sufficiently intense co-operation among the major players – to be tackled at a national level. From a different angle, these major shortcomings have rather similar repercussions at a regional level.

5. RTDI policy considerations: Regional innovation performance cannot be assessed in Hungary, given lack of those data at a regional level. Further, the impacts of the current SF measures on innovation performance cannot be evaluated at a national level, either, as discussed in Section 4. Without having these analytical results, it would not be meaningful to devise new SF measures even at national level (where experience has already accumulated on both sides: applicants and programme administrators alike; and thus it seems to be more sensible to continue without introducing major changes just after 2.5 years, also taking into considerations that the current SF measures tackle relevant needs of the Hungarian NIS; see Section 4); let alone at a regional level.

At this stage, for all the above reasons, it would not be reasonable to provide any indication of the level of resources required.

Given the nature of the needs of the Hungarian NIS, several recommendations concern both the national authorities (rationale of policies, mindsets of policy-makers, policy-planning tools, actual policy schemes), as well as options for SF interventions. These major issues cannot be separated along administrative lines, but when the actual recommendations are discussed, a distinction is maintained between the responsibilities of, and options open for, the national authorities and SF tools.

6.1 Strategic orientations for Structural Fund investments in innovation and knowledge

Key conclusion 1:

Policy-making processes, in general, are not sufficiently transparent in Hungary; RTDI policies are no exception

Decision-preparatory and decision-making processes can be deemed insufficiently transparent due to their methods, the participants, the lack of meaningful dialogues and discussions with stakeholders and experts. There is often no time and/or (formal) occasion for useful comments and suggestions. :

Recommendation 1:

Provide technical assistance and funding for the regular use of participatory decision-making methods, and thus promote the involvement major stakeholders in setting national and regional development goals and identify the related RTDI priorities

Participation of stakeholders in strategic decision-making processes can (i) improve the quality of decisions because they are based on a broader base of knowledge, competences and experiences; (b) increase the chance of effective implementation of strategies as those who are affected share the major goals since they have been involved in taking those decisions. A new SF scheme should be devised to help establishing this decision-making culture, foresight programmes being a core of it.

Key conclusion 2:

There is a strong tendency to 'reduce' RTDI into research in advanced scientific fields, 'equate' R&D with innovation, and neglect the variety of types and sources of knowledge required for successful innovation processes

The terms R&D and innovation are often used as interchangeable ones by politicians and policy-makers, meaning research projects conducted in the fields of biotech, ICT, nanotechnology and the like. The differences between R&D and innovation processes – sources and types of knowledge, dynamics, success factors – are not properly understood. Thus, technologies and sectors, highly relevant for regional development, but in which innovation processes are not based primarily on R&D projects can be easily neglected or eclipsed, together with non-technological innovations and systemic failures. Especially "manufacturing cohesion regions with significant role of FDI" face this problem (Section 2.2) and should avoid the trap of attracting 'high-tech' but not necessarily highly knowledge-intensive activities.

Recommendation 2:

Promote the use of a broad concept of RTDI in policy-making processes, paying attention to non-technological innovations, and taking into account the systemic features of innovation

Realistic policy choices concerning the sectoral composition of economies should be based on the recognition of three interrelated factors: (i) low- and medium-tech industries are sizeable, (ii) they still have significant growth potentials, and (iii) they are knowledge intensive. As a policy implication, the current shift to a knowledge-intensive economy does not necessarily require a high share of industries characterised by high R&D-intensities (defined as a high share of intra-mural R&D expenditures in value added, i.e. neglecting the broader knowledge base of any given sector). The real task for policy-makers is to make sure that there is a well-functioning, efficient knowledge infrastructure supporting technological upgrading in all sectors – as opposed to pouring subsidies only into high-tech industries in an attempt to increase their weight either at regional or national levels. Instead, focus should be put on (direct and indirect) incentives to foster knowledge-intensive activities across all sectors and among as many indigenous firms as possible.

SF funds can be mobilised to bring about this change in policy-makers' mindsets by organising training seminars, workshops to share good practices, and peer-review processes. (see also Recommendation 8)

Key conclusion 3:

Low level of business R&D expenditures, even in the most developed region

Although public R&D expenditures – measured as percentage of GDP – in Hungary are close to the EU25, BERD is way below that level; indeed, the ratio between public and private R&D efforts 2:1, i.e. the opposite as it is desired by the Lisbon process.

Recommendation 3:

Promote business investments both in R&D and innovation by creating innovation-friendly environment and boosting demand for innovative products and services

This is a task mainly for the national government. Policy-makers should understand the logic of MNCs, and thus find ways to 'pull' them into mutually beneficial investment and RTDI projects. The Hungarian NIS should be made attractive for MNCs, in particular by modernising the public R&D infrastructure, develop human resources for RTDI activities, strengthen innovation capabilities of indigenous SMEs as potential partners, as well as promote academia-industry co-operation (see Recommendations 4-6 below). Long-term agreements between national (and regional government(s), on the one hand, and businesses, on the other should be negotiated (e.g. in the form of national and regional RTDI "framework programmes", Hungarian "nodes" of technology platforms, public-private partnerships).

A current SF scheme also supports this broad objective by co-funding the creation of new R&D jobs at firms, including labour and equipment costs (ECOP 3.3.2). This is the only scheme, where the originally earmarked fund is not going to be absorbed (and thus re-allocated to other schemes, see Table 2). Negotiations with the stakeholders are required before making a decision if this SF scheme should be discontinued, continued or even substantially extended with revised conditions.

Key conclusion 4:

The share of RSE students is extremely low: a mere 39% of the EU25 countries

This threatens the supply of the new generations of researchers and thus potentially undermines the position of Hungary in the globalising learning economy.

Recommendation 4:

Develop human capital for RTDI

Two, closely related, major steps are required to change the current, threatening, trends. First, higher education institutes should be modernised in many respects: their physical infrastructure, their organisation and management, and in many cases curricula, too. These changes have already started, but should be speed up significantly. Second, RTDI jobs should be made much more attractive (directly in public research establishments; indirectly at business R&D units). That would increase the share of RSE students, securing the supply of the new generations of researchers. From a different angle, policies devised to remedy the current situation should be based on a thorough understanding of the context, and tackle the root of the problem, as opposed to rushed, superficial steps, e.g. administrative measures to increase the quota of publicly financed RSE students at the expense of other fields of science, or specific scholarships for these students.

Several SF schemes can be devised and some of the current ones continued to support these goals:

- Technical assistance and funding for modernising higher education institutes, in terms of their physical infrastructure, their organisation and management (structures, methods, techniques), and their curricula

One of the current SF schemes, namely ECOP 3.2.1 supports the modernisation of the physical infrastructure of public R&D (and non-profit) institutes; it should be continued.

- Funding post-doc positions, e.g. in the vein of the UK Teaching Company scheme, and thus improve RTDI capabilities of firms, and promotes job creation in the same time ("killing two birds with one stone")
- Funding mobility schemes, especially between public and private R&D facilities, and thus promote more intense academia-industry co-operation in the meantime

Key conclusion 5:

The bulk of indigenous SMEs is struggling for day-to-day survival, not engaged in innovation activities, and thus their prospects are rather gloomy

Vigorous, innovative SMEs can find good market opportunities, either by joining large, often international, production and innovation networks, or by identifying and exploiting niche market for their products and services. Thus, they are the engines of growth, and create jobs. Due to the 'dual economy syndrome', however, indigenous SMEs often lack sufficient financial resources and managerial skills to engage in RTDI activities, and join international production and innovation networks.

Recommendation 5:

Strengthen indigenous SMEs, including their innovation capabilities

Again, a carefully designed set of policies is required to achieve this ambitious goal. It should consist of measures aimed at improving absorption capacities of SMEs, including overall management capacities, and innovation management capacities in particular. Other elements of this package are regular training and re-training programmes to improve the supply of innovation services by skilled, trustworthy service providers. Innovation service providers should be supported via boosting demand for these services, and not by directly supporting the service providers. By doing so, competition among service providers is promoted, ultimately leading to improved quality and enhanced efficiency of these services. (One national scheme, following this logic is already in place; it should be continued and extended to other fields of support whenever it is sensible.) Co-operation among SMEs and large firms – the integrators of production and innovation networks – should also be facilitated via improving the – technological and organisational, managerial – innovation capabilities of SMEs, as well as joint RTDI projects when it is meaningful.

The current national schemes (listed in Section 3) promoting some of the above objectives should be evaluated and then continued, revised as necessary.
One of the current SF measures promotes the development of innovation and research activities of SMEs (ECOP 3.3.3), it should be continued.

Key conclusion 6:

Academia-industry co-operation is improving, but still insufficient

Given nature of innovation processes, different types of knowledge are required, stemming from various sources, and thus close co-operation among these different actors is a pre-requisite of economic success. Recently, a number of schemes have

been introduced in Hungary to promote academia-industry co-operation, but these are only the first steps in the right directions. The intensity of co-operation is still lagging behind the practice of advanced countries.

Recommendation 6:

Strengthen academia-industry co-operation

A number of aligned policy measures are needed to achieve the required progress. Governance practices, as well as RTDI management capabilities should be improved at universities and public research institutes by offering vouchers for training and consultancy services (as already mentioned as part of Recommendation 4). The evaluation criteria for academic staff should be adjusted: establishing mutually beneficial business contacts, accumulating experience relevant for understanding business logic, achievements in commercialisation of R&D results must be appreciated, and thus included in the set of evaluation criteria. Equipment should be upgraded to make universities and public research institutes attractive for joint projects with businesses (see Recommendation 4). Schemes offering grant for academia-industry co-operation, as well as those aimed at fostering mobility of researchers between academia and businesses should be continued. Schemes devised to promote academia-industry co-operation should be based on a good understanding of the different needs of (a) subsidiaries of global firms; (b) medium-sized, technologically advanced companies serving the national and export markets; (c) knowledge- and technology-intensive micro and small ones; (d) actual and potential suppliers of MNCs, who need to upgrade their products, processes, enhance efficiency, and strengthen innovation management capabilities; (e) other SMEs serving the regional and local markets without significant RTDI capabilities, but facing challenges, which would require the introduction of technological innovations, along with managerial and organisational ones. Universities should be assisted to gear their co-operation capabilities and develop services accordingly.

A large part of these objectives should be – and indeed, are – pursued by national schemes (see Section 3).

Two of the current SF schemes – "Application-oriented co-operative RTD activity" (ECOP 3.1.1); "S&T co-operation of businesses and publicly financed research units" (ECOP 3.2.2) – promote some of the above objectives. The first one should be continued, probably with significantly extended funding. The second one should be revised for two reasons. First, a "predecessor" national" scheme, and new one are promoting the establishment of joint R&D units by universities/ public R&D institutes and firms; moreover, several ones, supporting various RTDI objectives, also give priority to academia-industry co-operation. Thus, probably there is not much more opportunities have left to set up new Co-operation Research Centres. Second, the existing CRCs might need further – perhaps reduced – public funding to continue/ extend their activities. A revised scheme, therefore, might promote this latter objective.

Key conclusion 7:

There are strong potentials for start-up and spin-off businesses

Several regions are endowed with excellent public research centres, producing promising R&D results for commercialisation, especially in the field of life sciences, including biotech, and ICT.

Recommendation 7:

Promote start-up and spin-off businesses, especially in regions with strong knowledge infrastructure

New, technology and knowledge-intensive micro-enterprises and spin-off companies are already supported by ECOP 3.3.1; which should be continued. Further means of support could include bringing potential partners together, e.g. via trustworthy, value-added information services, tailored workshops, and "innovation clubs", as well as co-funding demonstration projects, and liaison offices. National and SF measures need to be co-ordinated in order to avoid 'double-funding'.

6.2 Operational guidelines to maximising effectiveness of Structural Fund interventions for innovation and knowledge

Key conclusion 8:

Public support to RTDI is not efficient and effective because the lack of policy co-ordination

An apparently appropriate decision-making mechanism has been put in place in Hungary in the form of two high-level bodies and a government agency responsible for R&D and innovation programmes. The Science and Technology Policy Council, headed by the Prime Minister, co-ordinates STI policy measures, and discusses current STI policy issues. The Research and Technological Innovation Council guides the activities of the National Office of Research and Technology. Yet, policy co-ordination is fragmented, at best, in practice.

Recommendation 8:

Align major policies affecting RTDI activities, and ultimately economic performance and quality life

A large set of policies, such as education, investment promotion, industrial, regional development, competition, trade, monetary, fiscal, labour market, and environmental policies, as well as public procurement practices, standards and other regulations have non-negligible bearings on innovation and diffusion, and should thus be co-ordinated to boost competitiveness, speed up regional development. The existing, and potentially adequate co-ordination and decision-making/advisory bodies should fulfil their responsibilities as stipulated in the respective regulations. In particular, the STPC should meet more frequently – as opposed to its current practice of a single, rather short session a year –, and discuss the interconnections of major policies, and their mutual impacts on each other in light of RTDI issues. The RTIC' standing and

influence on specific policy tools should be strengthened by facilitating its intended day-to-day activities.

This is clearly the responsibility of the national authorities. However, a proposed SF interaction (see Recommendation 9) – albeit indirectly – might have a significant impact in this respect.

Key conclusion 9:

Modern policy-making methods are rarely used; policy schemes are not evaluated

No policy reviews (white papers or parliamentary debates) have been produced so far, in Hungary, nor has a systematic international comparative policy analysis been used to assess RTDI policies. The application of indispensable methods preparing policy decisions, such as systematic data collection and analyses of techno-economic issues, technology assessment or technology foresight, however, have not been included in the Law on Research and Technological Innovation – although suggested by independent experts on several occasions when the draft legislation had been discussed. Evaluation of RTDI policy measures has become compulsory since 2005 – but only one policy programme has been evaluated so far. Thus, it cannot be established if public money is spent in an effective and efficient way, to achieve the desired objectives.

Recommendation 9:

Promote the use modern decision-preparatory tools to arrive at evidence-based policies; establish STI Observatory; evaluate the current policy schemes before devising and launching new ones

The regular, systematic use of modern decision-preparatory tools is of crucial importance – otherwise policies might be influenced by pressure groups and short-term political considerations rather than by a sound understanding of the impacts of foregoing decisions and socio-economic needs.

Again, this is largely the national authorities' responsibility (including the ones at a regional level). SF interventions can assist these efforts, however, in the form of providing technical assistance, co-funding for establishing research, methodological, information and training centres with the following, more specific objectives/ activities in mind:

- Support technology foresight and assessment exercises (the former one both at national and regional levels; as a major tool for participatory decision-making, mentioned in Recommendation 1)
- Offer regular training and re-training for RTDI policy-makers and their colleagues working on policy fields closely related to RTDI
- Develop policy programme evaluation culture
- Strengthen evidence-based policy-making, notably by establishing an STI Observatory, being independent from the government (reporting to the Parliament)

Key conclusion 10:

Policy schemes are changed too frequently and similar or the same objectives are supported by several schemes

Although in most cases goals and measures to deal with them are identified correctly, there are seem to be already too many RTDI policy schemes, sometimes with overlapping objectives. This concerns directly the national policy schemes, but indirectly the SF ones, too, as indicated for example in Recommendation 6. National policy measures are often prepared and launched on an ad hoc basis without proper evaluation of previously existing or similar schemes (Key conclusion 8). This causes not only parallel activities and 'deadweight losses', but is also confusing for businesses.

Recommendation 10:

Keep the number of the individual policy schemes low, and their mix simple, easy to understand

Stability of policy schemes is important for the target groups to keep their administrative costs at a reasonable level, and thus not to exclude a large group of SMEs. Most SMEs cannot afford to devote excessive resources to monitor constantly launched new calls by different policy schemes. For the same reason, it is recommended to avoid having too many schemes, especially duplication of similar schemes.

This recommendation has its direct relevance for national RTDI policy schemes, but indirectly the current and future SF schemes are also affected by the number and objectives of the national ones. No specific SF intervention is required, though, besides assistance in improving policy-making methods (Recommendation 8).

Exhibit 16: Summary of recommendations on investment priorities

Region or group of regions	Strategic focus	Priority measures	Indicative financial resources
National level, plus all regions	Improving governance capacities for innovation and knowledge policies (specifically, application of modern policy-making tools)	Technical assistance for national and regional authorities, national and regional foresight programmes; technology assessment projects; training seminars, workshops for policy-makers; co-funding for establishing research, methodological, information and training centres, including a Parliamentary STI Observatory (Recommendations 1, 8, 9, 10)	A very small chunk of total SF RTDI funding; 8-10 MEUR per year
National level, plus all regions	Boosting applied research and product development	Funding of "Pre-competitive development" and "Industrial research" projects and related infrastructure A revised ECOP 3.2.2 to be continued (Recommendation 3)	Cannot be established at this stage*
Especially the 6 "Manufacturing cohesion" regions	Innovation friendly environment	Developing human capital for RTDI; funding post-doc positions and mobility schemes (between public and private research units) ECOP 3.2.1 should be continued (Recommendation 4)	Cannot be established at this stage*
All regions	Increased investment in basic research capacities	Modernising universities and public research institutes in terms of RTDI project management capabilities, evaluation criteria for their staff, organisation, and overall	Cannot be established at this stage*

		management culture, methods, strengthening business-minded, flexible, co-operative attitude, geared towards commercialisation	
Especially the 6 “Manufacturing cohesion” regions	Knowledge transfer and technology diffusion to enterprises	Improving absorption capacities of SMEs, including overall management capacities, and innovation management capacities in particular ECOP 3.3.3 to be extended Improving the supply of innovation services by skilled, trustworthy service providers. Innovation service providers should be supported via boosting demand for these services, and not by directly supporting the service providers. (A national policy scheme, “Innocsekk” follows this logic already; HU_96 in the TC database.) (Recommendation 5)	Cannot be established at this stage*
All regions	Innovation poles and clusters	Co-operation among SMEs and large firms (the integrators of production and innovation networks); joint RTDI projects of networks of firms ECOP 3.3.3 to be continued (Recommendation 5)	Cannot be established at this stage*
All regions	Boosting applied research and product development	Promoting academia-industry co-operation ECOP 3.1.1 to be continued ECOP 3.2.2 to be revised (Recommendation 6)	Cannot be established at this stage*

Regions with strong knowledge infrastructure: e.g. Közép-Magyarország, Észak-Alföld, Dél-Alföld	Support to creation and growth of innovative enterprises	Support for feasibility studies, strategic and business planning, prototype development, legal, financial and marketing consultancy services, information and networking events (e.g. workshops, "innovation clubs") to bring potential partners together (e.g. researchers as would-be entrepreneurs, entrepreneurs, business angels, VC fund managers, legal, financial, management and marketing service providers); demonstration projects, and liaison offices ECOP 3.3.1 should be continued (Recommendation 7)	Cannot be established at this stage*

* See the reasoning in the introduction of Section 6.

Appendix A Methodological annex

A1 Quantitative analysis of key knowledge economy indicators

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 A1. 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.

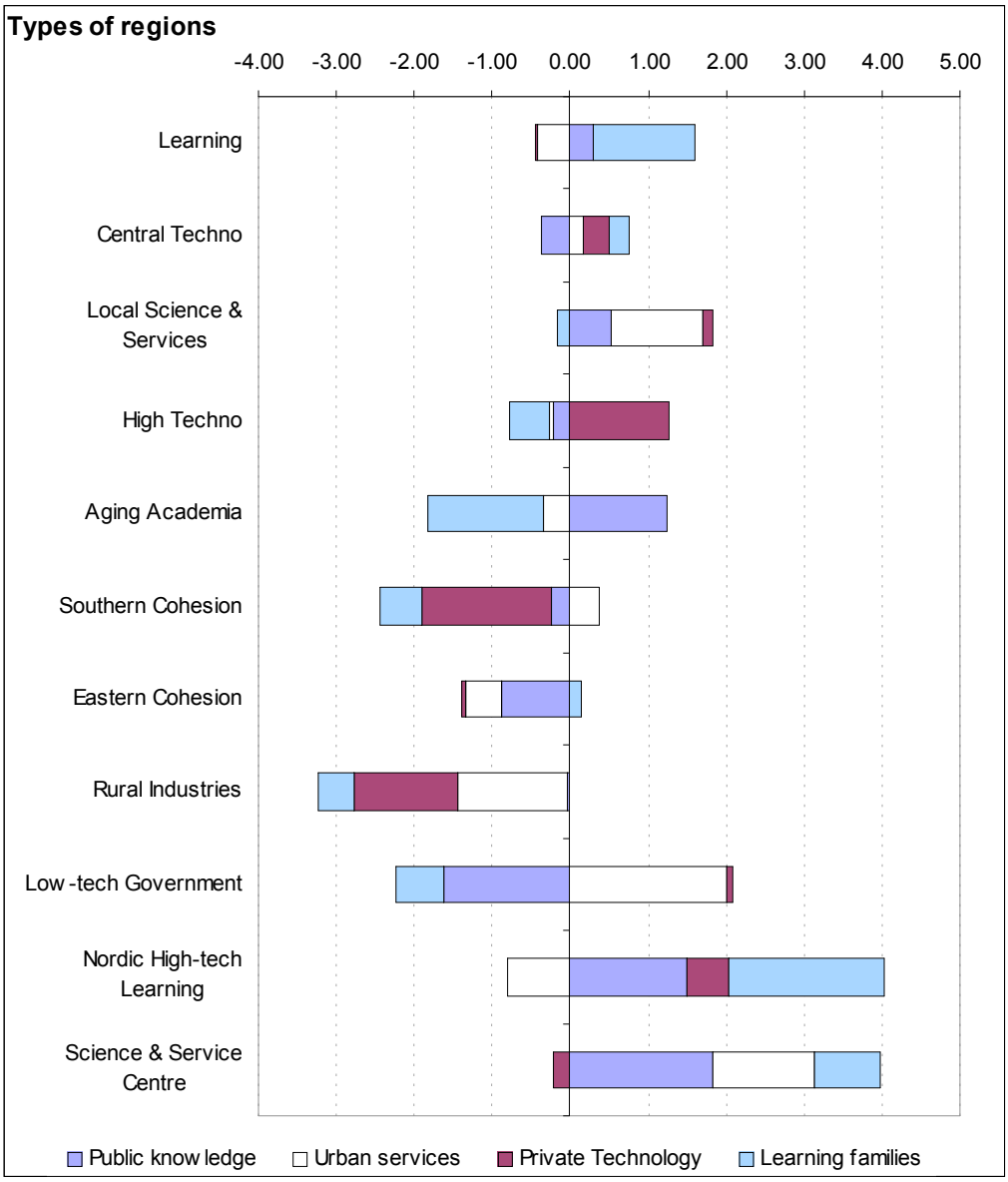
One interesting conclusion is that public and private knowledge are two different factors (F1 and F3 respectively), which for instance has implications for policy issues regarding Science-Industry linkages. Public R&D and higher education seems especially related to high-tech services, whereas Business 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.

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.

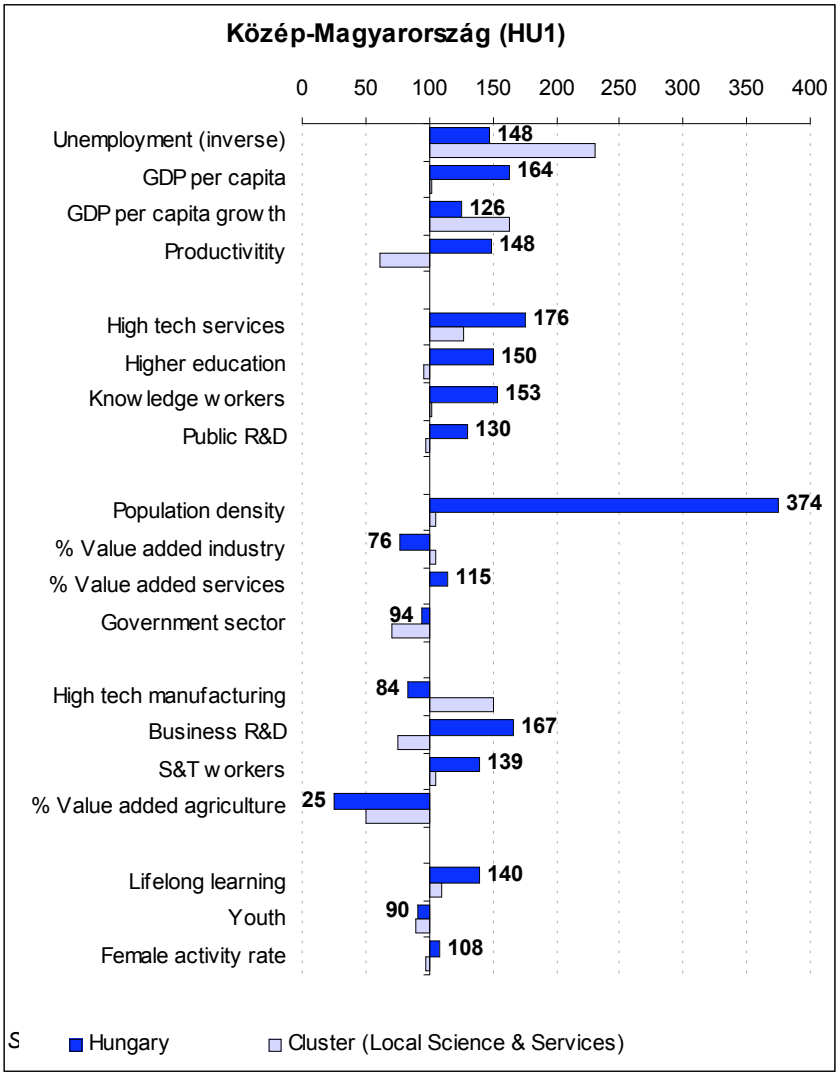
An overall synthesis report of all has been prepared and will be published by the European Commission providing an overview of the issues addressed in each of the 27 country reports produced by the evaluation team.

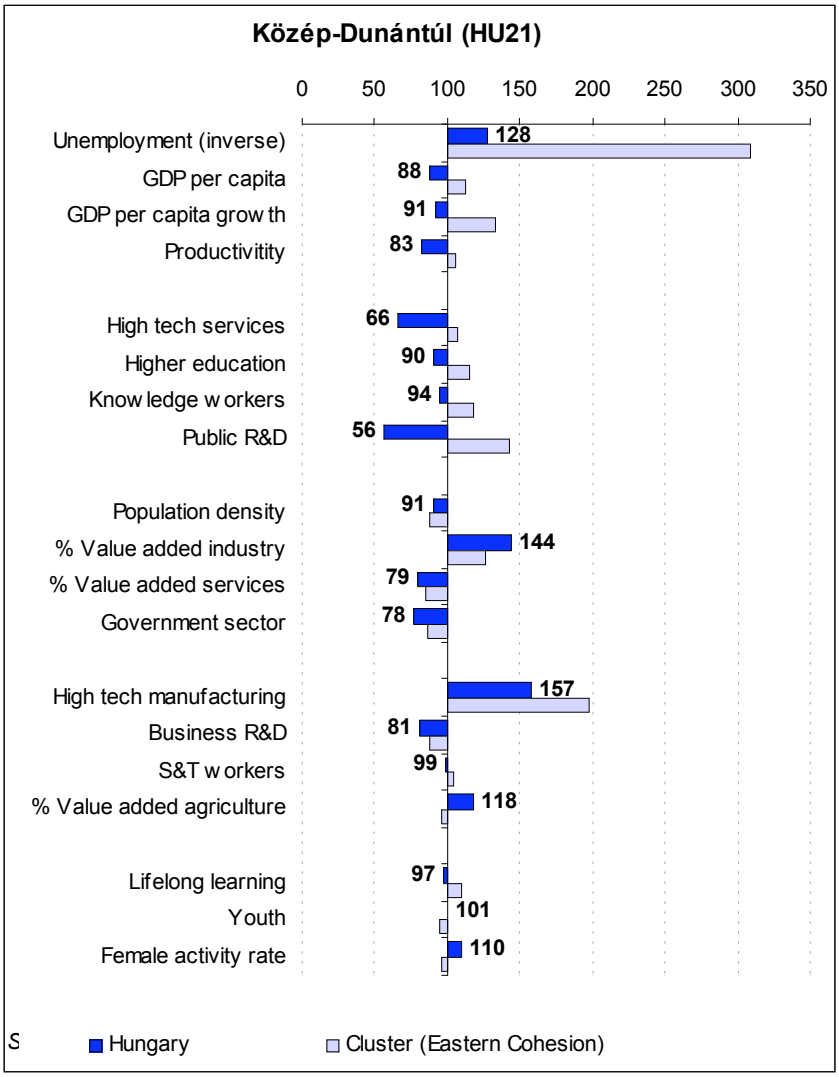
Appendix B Statistical tables and regional scorecards

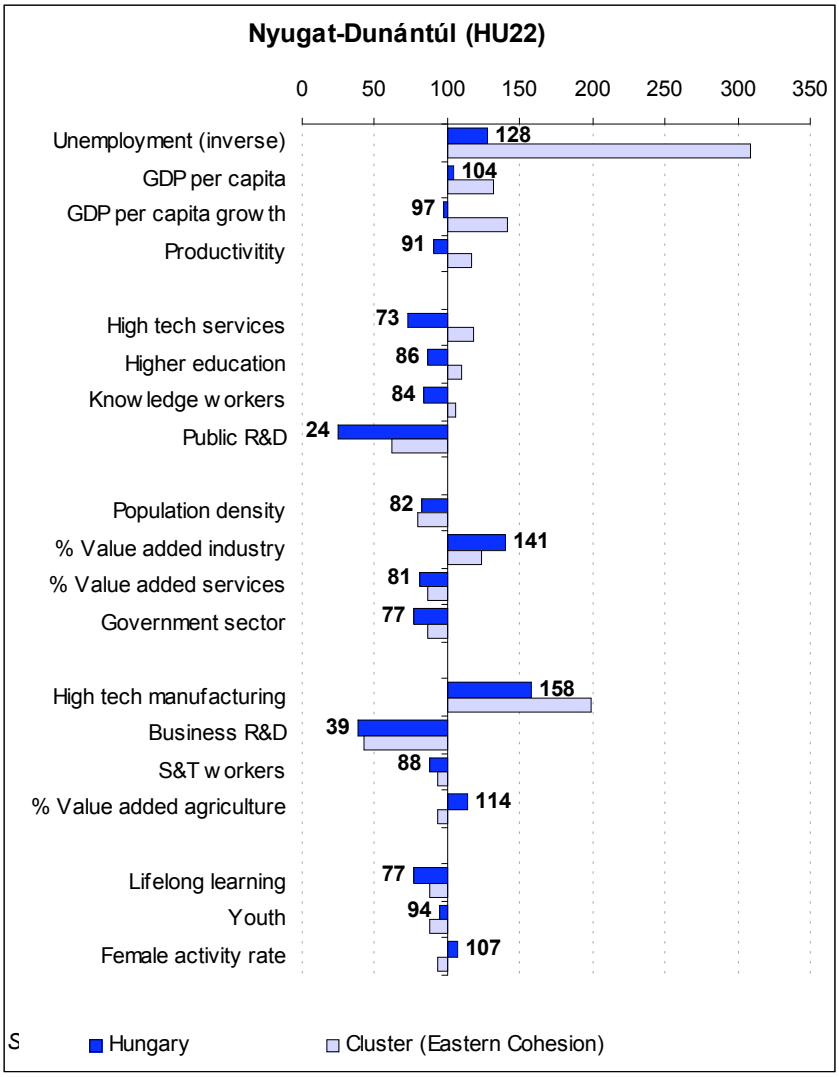
B.1 Overall quantitative analysis per region

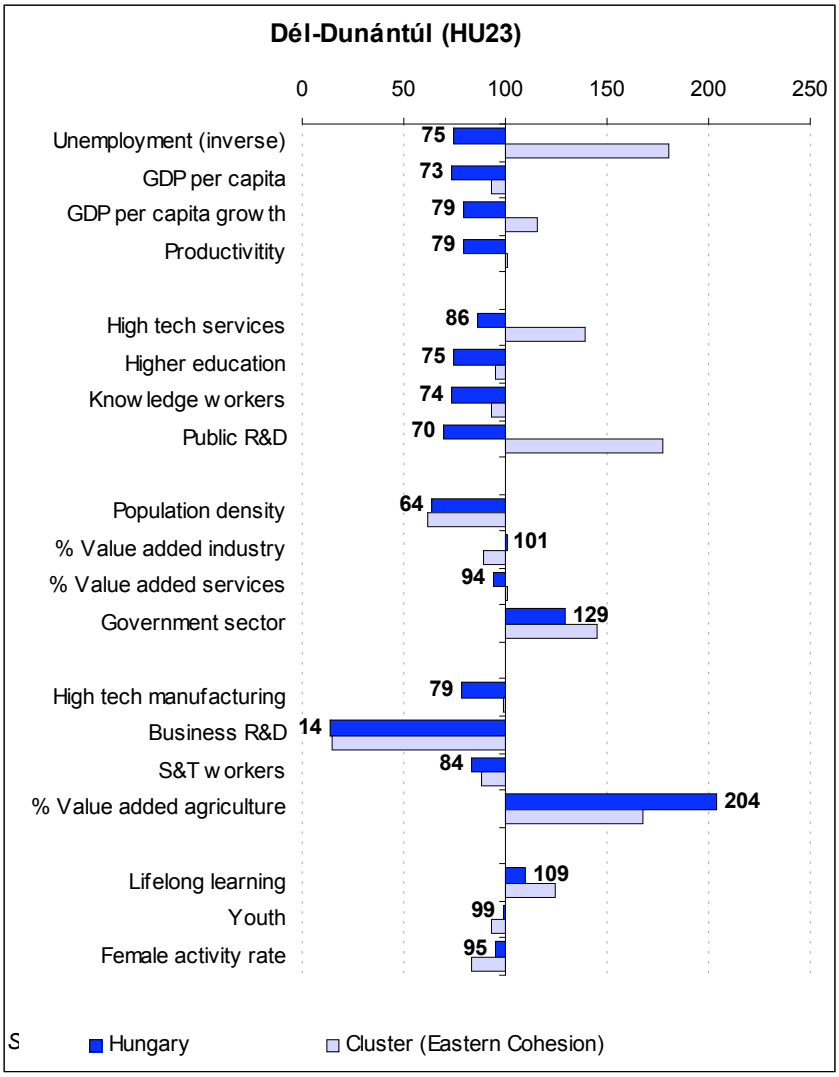
			Economic performance				Public knowledge				Urban services				Private technology				Learning families		
		Cluster	Unemployment	GDP per capita	GDP per capita growth	Productivity	High tech services	Higher education	Knowledge workers	Public R&D	Population density	% Value added industry	% Value added services	Government sector	High tech manufacturing	Business R&D	S&T workers	% Value added agriculture	Lifelong learning	Youth	Femal activit rat
			2003	2002	1996-2002	2002	2003	2003	2003	2002	2002	2002	2002	2003	2003	2002	2003	2002	2003	2001	200
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.
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.
Hungary	HU		5.9	12402	7.8	1575	3.1	15.2	9.1	0.66	109	30.2	66.1	7.4	8.3	0.36	16.9	3.7	4.6	10.4	42.
Relative to EU25			156	59	163	35	98	73	78	96	93	112	93	99	125	29	81	175	53	96	8
Közép-Magyarország	HU1	3	4.0	20329	9.8	2337	5.5	22.8	14.0	0.86	409	23.0	76.1	6.9	6.9	0.60	23.5	0.9	6.5	9.3	45.
Közép-Dunántúl	HU21	7	4.6	10967	7.1	1300	2.1	13.8	8.6	0.37	99	43.4	52.3	5.7	13.0	0.29	16.7	4.3	4.5	10.4	46.
Nyugat-Dunántúl	HU22	7	4.6	12870	7.6	1429	2.3	13.1	7.7	0.16	90	42.5	53.4	5.7	13.1	0.14	14.8	4.2	3.5	9.7	45.
Dél-Dunántúl	HU23	7	7.9	9063	6.2	1247	2.7	11.4	6.7	0.46	70	30.4	62.1	9.5	6.5	0.05	14.1	7.5	5.0	10.2	40.
Észak-Magyarország	HU31	7	9.7	7902	6.3	1148	2.2	11.2	6.1	0.18	96	38.6	57.3	9.4	8.7	0.08	12.4	4.2	3.7	11.2	39.
Észak-Alföld	HU32	7	6.8	7990	6.2	1175	1.8	12.6	7.8	0.43	88	31.8	61.1	8.3	7.3	0.24	14.6	7.1	3.3	11.9	38.
Dél-Alföld	HU33	7	6.5	8549	4.9	1141	1.7	11.0	6.2	0.61	75	29.3	61.7	7.3	4.7	0.16	12.8	9.0	3.6	10.2	39.

B.2 Regional Scorecards




Közép-Dunántúl (HU21)
0
50
100
150
200
250
300
350
Unemployment (inverse)
128
GDP per capita
88
GDP per capita grow th
91
Productivitity
83
High tech services
66
Higher education
90
Know ledge w orkers
94
Public R&D
56
Population density
91
% Value added industry
144
% Value added services
79
Government sector
78
High tech manufacturing
157
Business R&D
81
S&T w orkers
99
% Value added agriculture
118
Lifelong learning
97
Youth
101
Female activity rate
110
Hungary
Cluster (Eastern Cohesion)


Nyugat-Dunántúl (HU22)
0
50
100
150
200
250
300
350
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
128
104
97
91
73
86
84
24
82
141
81
77
158
39
88
114
77
94
107
Hungary
Cluster (Eastern Cohesion)


Dél-Dunántúl (HU23)
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50
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150
200
250
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
75
73
79
79
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101
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129
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14
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204
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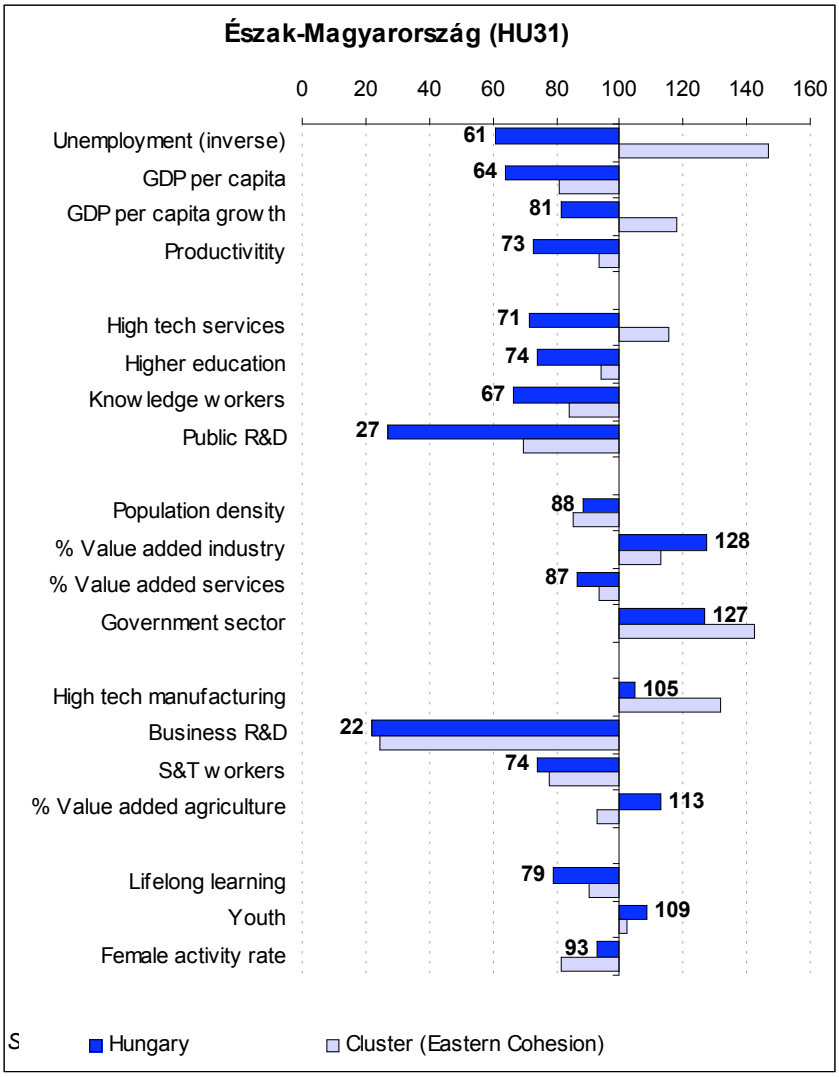
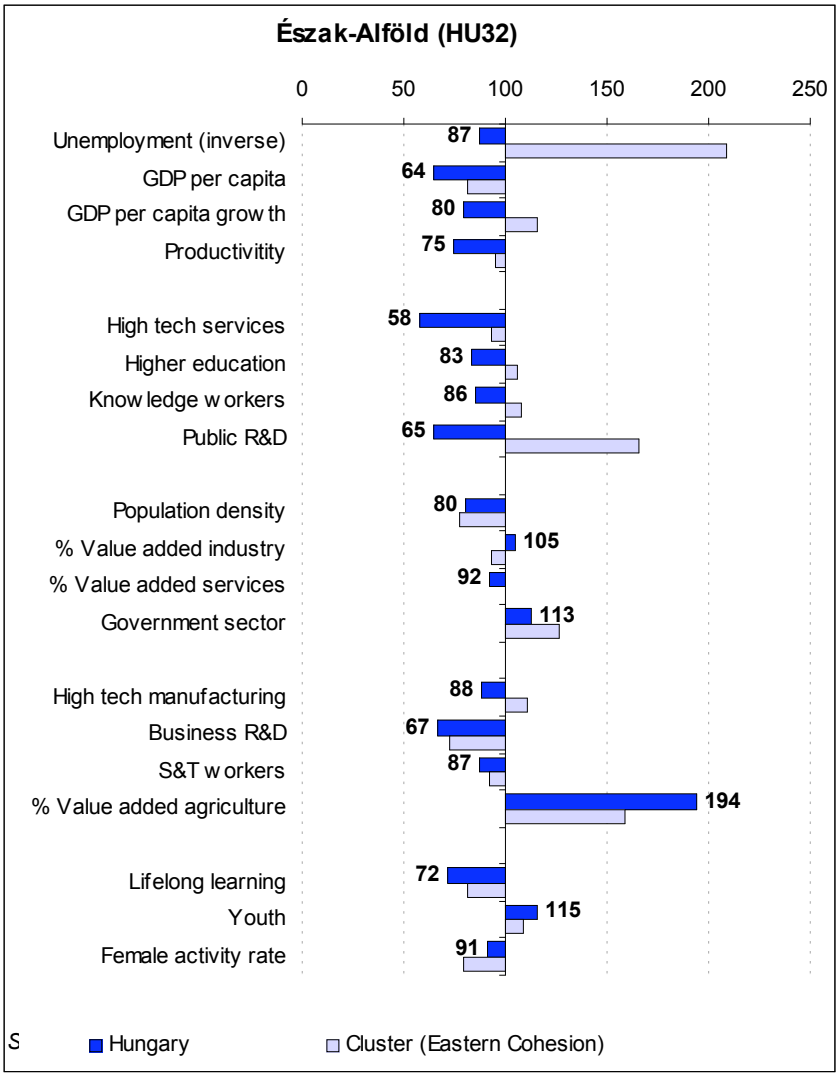
99
95
Hungary
Cluster (Eastern Cohesion)


Észak-Magyarország (HU31)
0
20
40
60
80
100
120
140
160
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
61
64
81
73
71
74
67
27
88
128
87
127
105
22
74
113
79
109
93
Hungary
Cluster (Eastern Cohesion)


Észak-Alföld (HU32)
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GDP per capita grow th
Productivitity
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Lifelong learning
Youth
Female activity rate
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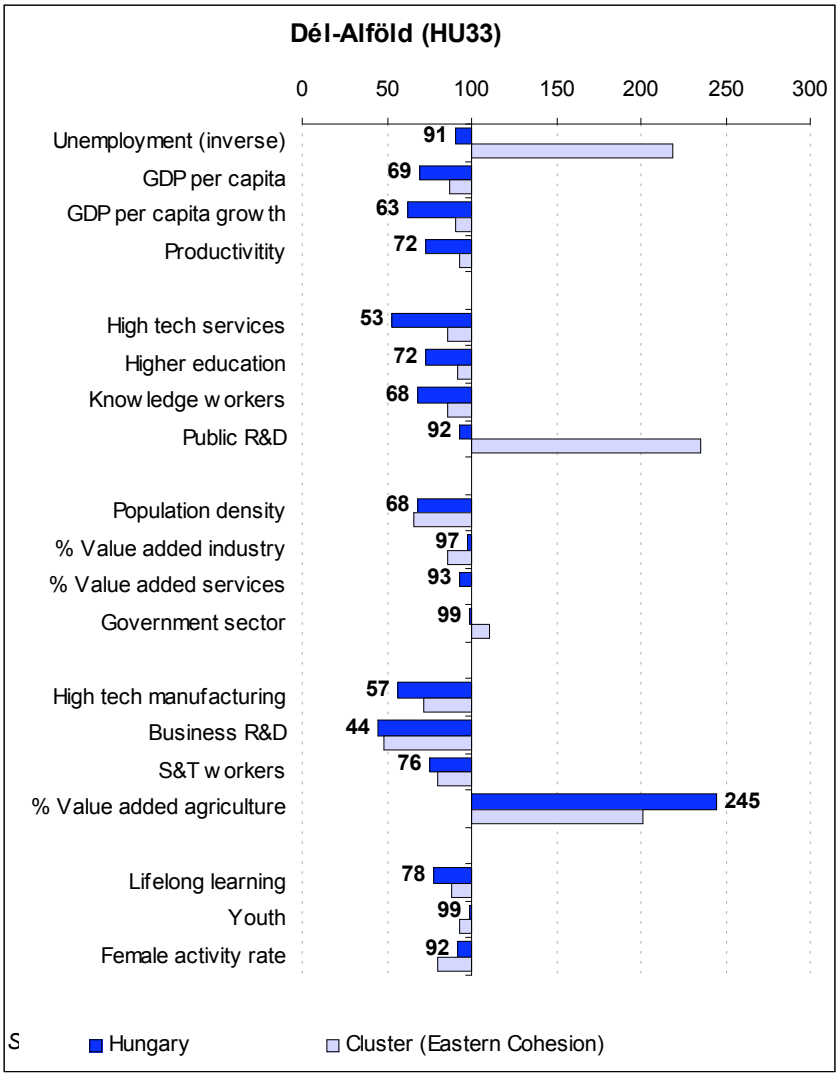
Hungary
Cluster (Eastern Cohesion)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Government sector
High tech manufacturing
Business R&D
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% Value added agriculture
Lifelong learning
Youth
Female activity rate
91
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245
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Hungary
Cluster (Eastern Cohesion)

Appendix C Categories used for policy-mix analysis

C.1 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[38];
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.
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.

[38] 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.

C.2 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

C.3 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 D Financial and policy measure tables

D.1 Additional financial tables

RTDI plus business (innovation technology) support

Exhibit 17: Overall allocation of resources at an objective 1 and 2 level (allocated Euro)

Objective	Total cost	SF			National funds	
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	237,614,956.14	176,720,020.54	176,720,020.54	0.00	60,894,935.60	0.00
TOTAL COHESION POLICY						
Objective 1	2,701,943,371.00	1,995,717,160.00	1,239,381,188.00	439,117,222.00	700,495,293.00	5,730,918.00

Exhibit 18: Regional allocation of resources (Euro)

Programs	RTDI INTERVENTIONS			TOTAL		
	Total SF	ERDF	ESF	Total SF	ERDF	ESF
OBJECTIVE 1						
Economic Competitiveness	131,248,895.54	131,248,895.54	0.00	429,009,213.00	429,009,213.00	0.00
Environmental Protection and Infrastructure	0.00	0.00	0.00	327,245,758.00	327,245,758.00	0.00
Human Resources Development	0.00	0.00	0.00	562,822,687.00	177,381,752.00	385,440,935.00
Agriculture and Rural Development	0.00	0.00	0.00	317,218,750.00	0.00	0.00
Regional Development	45,471,125.00	45,471,125.00	0.00	359,420,752.00	305,744,465.00	53,676,287.00
Total Multiregional OPs	**176,720,020.54**	**176,720,020.54**	**0.00**	**1,995,717,160.00**	**1,239,381,188.00**	**439,117,222.00**

Provided by ISMERI

Exhibit 19: Absorption capacity of RTDI interventions

Objectives	Allocated SF	Disbursed total SF	Expenditure capacity
Objective 1	176,720,020.54	7,324,388.47	4.1%

Provided by ISMERI

Exhibit 20: Absorption capacity by field of intervention

Codes	Allocated SF	Disbursed SF	Expenditure capacity
Objective 1			
153	1,346,895.60	27,204.13	2.0%
163	28,422,691.00	2,729,991.55	9.6%
164	2,806,730.94	72,838.68	2.6%
181	22,548,030.50	0.00	0.0%
182	48,248,795.50	354,794.77	0.7%
183	73,346,877.00	4,139,559.34	5.6%
Total objective 1	**144,143,703.00**	**4,494,354.11**	**3.1%**

Provided by ISMERI

Categories 181 to 184 plus:
152 Environment-friendly technologies, clean and economical energy technologies
153 Business organisation advisory service (including internationalisation, exporting and environmental management, purchase of technology)
155 Financial engineering
162 Environment-friendly technologies, clean and economical energy technologies
163 Enterprise advisory service (information, business planning, consultancy services, marketing, management, design, internationalisation, exporting, environmental management, purchase of technology)
164 Shared business services (business estates, incubator units, stimulation, promotional services, networking, conferences, trade fairs)
165 Financial engineering

Broad innovation and knowledge economy funding

Exhibit 21: Overall allocation of resources at an objective 1 and 2 level (allocated Euro)

Objective	Total cost	SF			National funds	
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	339,572,503.14	249,089,033.54	249,089,033.54	0.00	90,483,469.60	0.00
TOTAL COHESION POLICY						
Objective 1	2,701,943,371.00	1,995,717,160.00	1,239,381,188.00	439,117,222.00	700,495,293.00	5,730,918.00

Provided by ISMERI

Exhibit 22: Regional allocation of resources (Euro)

Programs	RTDI INTERVENTIONS			TOTAL		
	Total SF	ERDF	ESF	Total SF	ERDF	ESF
OBJECTIVE 1						
Economic Competitiveness	203,617,908.54	203,617,908.54	0.00	429,009,213.00	429,009,213.00	0.00
Environmental Protection and Infrastructure	0.00	0.00	0.00	327,245,758.00	327,245,758.00	0.00
Human Resources Development	0.00	0.00	0.00	562,822,687.00	177,381,752.00	385,440,935.00
Agriculture and Rural Development	0.00	0.00	0.00	317,218,750.00	0.00	0.00
Regional Development	45,471,125.00	45,471,125.00	0.00	359,420,752.00	305,744,465.00	53,676,287.00
Total Multiregional OPs	**249,089,033.54**	**249,089,033.54**	**0.00**	**1,995,717,160.00**	**1,239,381,188.00**	**439,117,222.00**

Provided by ISMERI

Exhibit 23: Absorption capacity of RTDI interventions

Objectives	Allocated SF	Disbursed total SF	Expenditure capacity
Objective 1	249,089,033.54	10,914,581.42	4.4%

Provided by ISMERI

Exhibit 24: Absorption capacity by field of intervention

Codes	Allocated SF	Disbursed SF	Expenditure capacity
Objective 1			
153	1,346,895.60	27,204.13	2.0%
163	28,422,691.00	2,729,991.55	9.6%
164	2,806,730.94	72,838.68	2.6%
181	22,548,030.50	0.00	0.0%
182	48,248,795.50	354,794.77	0.7%
183	73,346,877.00	4,139,559.34	5.6%
324	72,369,013.00	3,590,192.95	5.0%
Total objective 1	**144,143,703.00**	**4,494,354.11**	**3.1%**

Provided by ISMERI

This third calculation adds RTDI plus business (innovation & technology) support plus information society. As D.1.1 plus:
322 Information and Communication Technology (including security and safe transmission measures)
324 Services and applications for SMEs (electronic commerce and transactions, education and training, networking)

D.2 Summary of key policy measures per programme

The Community Support Framework (*CSF; or the first National Development Plan*) document identifies the following major goals and priorities in terms of competitiveness: i) convergence with the level of the socio-economic development of the EU; ii) meeting the convergence criteria for socio-economic development, a sustained period of high growth in the economy is required by creating a more competitive economy; iii) improving both the business environment, providing the conditions for businesses to expand, and support investments to modernise businesses; iii) increasing use of modern technologies, including information and communication technologies; iv) improving the application of entrepreneurial and scientific knowledge in support of innovation in order to increase competitiveness; v) the development of small and medium sized enterprises will get particular attention in the CSF.

The other three specific objectives of the CSF, relevant for this report, are: i) improving the use of human resources; ii) better environment and basic infrastructure; iii) a more balanced regional development.

The Community Support Framework is implemented through *five operational programmes, one of which is the Economic Competitiveness Operational Programme (ECOP)*. ECOP has set strategic goals in four fields (ECOP, pp. 10-11):

- *Investment promotion*: embedding foreign companies into the Hungarian economy by strengthening supplier relations and encouraging companies to develop existing operations in Hungary through re-investments of their profits and new investments in higher value-added activities.
- *SME strategy:* promoting technological modernisation of growth oriented SMEs and their competitiveness; assisting new enterprises in entering the market; facilitating the development of company management, technical culture and entrepreneurial skills.
- *Research & development, innovation strategy:* support of strategically important research and technology developments in co-operation between R&D organisations and the corporate sector.
- *Information society strategy:* the promotion of IT-based business solutions (resources management planning, subcontracting and supply chain management, marketing tools and web-based e-economy applications) for SMEs.

As for promoting R&D and innovation, actions are organised into three sets of measures:

1) Support of application-oriented co-operative research and technology development activities. The objective of these measures is to support technology development based on applied (industrial) and pre-competitive (experimental) research and to develop and test new products, instruments, procedures and services. Another objective is to strengthen co-operation between publicly financed research facilities and the corporate sector. (ECOP, p. 89)

2) Improvement of the conditions of research, technology transfer and co-operation at publicly financed and non-profit research facilities. The purpose of the measure is the

indirect improvement of the competitiveness of domestic R&D activity on the one hand by increasing the efficiency of the R&D activity in publicly financed and non-profit research facilities, and by improving their supply of instruments and developing their research infrastructure; on the other hand, by reinforcing the scientific and technological co-operation of the business sector and the publicly financed research facilities, the integration of education, economic and social target-oriented R&D, knowledge and technological co-operation for strategic purposes in Co-operative Research Centres. (ECOP, p. 91)

3) Reinforcement of corporate R&D capacities and innovation skills. The measure targets the improvement of the competitiveness of the corporate sector by developing corporate R&D potential and capability and innovative, technology-intensive activities by: raising the quality of corporate research work, supporting high value-added activities; broadening the fields of corporate R&D activity and strengthening the adaptation and utilisation of R&D results at companies; promoting innovative new enterprises and technology-intensive SMEs; and improving the quality of corporate research infrastructure. (ECOP, p. 93)

Innovation friendly environment

Two of SF co-financed schemes promote developing human capital. *"Promoting long life learning and adaptability"* aims at improving the efficiency of the education and training systems through the provision of more effective and responsive initial and continuing vocational training. Through support for training of employees and entrepreneurs, it seeks to foster skills development in line with the knowledge-based economy, including in particular the development of skills required by the information society. It consists of 5 elements, of which 3 are relevant to innovation: (a) promoting the development of skills and competences necessary for lifelong learning; (b) developing the content, methodology and structure of vocational training; (c) developing the structure and content of the higher education.

"Developing the infrastructure of education and training" aims at improving the infrastructure of education and training so as to reduce the territorial disparities in this respect, through the development of the infrastructure of (i) the integrated regional vocational training centres in order to ensure an appropriate environment for practice-oriented and modular training; and (ii) higher education institutes to facilitate high quality mass-education.

Knowledge transfer and technology diffusion to enterprises

"Innovation and research activities of SMEs" aims at promoting the introduction of new, improved products, technologies and services; supporting the development of absorptive and innovation capabilities of SMEs; supporting RTDI activities of SMEs; promoting academia-industry co-operation. The activities eligible for funding are as follows: (a) preparation of feasibility studies for experimental development projects; (b) in-house experimental development projects; (c) in-house development projects (products, processes and services); (d) adapting purchased R&D results; purchasing applied research and experimental development services; (e) obtaining know-how, licence.

Applicant SMEs must be registered at least for a year in Hungary. They can apply for a grant of up to HUF50 million (approx. €20,000). Up to 30% of the total grant can be spent on purchasing R&D equipment. This scheme offers R&D, investment and de minimis subsidy, i.e. the applicants can chose among these forms, depending on their project proposals. Support intensity is 45% in case of pre-competitive development, but grant size can be increased in the following cases:

- programmes related to EU 6th Framework Programme: maximum 50%
- international co-operation: maximum 50%.
- feasibility studies related to pre-competitive development: 50%.

The applicant SME agrees to continuously operate and maintain the capacities and services established by the investment for a minimum period of 5 years in accordance with the original objective and provides a contribution to the project of at least 25 % of total costs of the investment, which must not contain any state aid.

The overall budget of the measure is 1.6 MEUR (1.18% of the total ECOP Priority 3 budget), for the period of May 2004-2006, disbursed as grants. The beneficiaries are SMEs.

Innovation poles and clusters

"S&T co-operation of businesses and publicly financed research units" is aimed at promoting scientific and technological co-operation of the business sector and the publicly financed research units; integration of education, economic and social target-oriented RTD co-operation for strategic purposes by supporting the establishment of new Co-operative Research Centres.

Support to creation and growth of innovative enterprises

"New, technology and knowledge-intensive micro-enterprises and spin-off companies" The main objective of this measure is to foster the commercialisation of innovative ideas and R&D results by supporting start-up and spin-off firms. Specifically: (i) to promote the establishment of innovative, technology-based micro firms; (ii) commercialise RTD results by setting up spin-off companies; (iii) improve the quality of RTD activities of firms. Eligible activities/ cost elements include: R&D projects; adaptation, improving upon R&D results; feasibility studies for innovation projects; purchasing R&D services; obtaining licences, know-how; patent and trademark application fees; purchasing legal, IPR, financial, management consultancy services.
The overall budget of the measure is 3.2 MEUR (2.3% of the total ECOP Priority 3 budget, and 40% of the 3.3 measure ("Reinforcement of corporate R&D capacities and innovations skills"), for the period of May 2004-2006. This is a so-called de minimis subsidy, i.e. an applicant can receive up to €100,000 in a 3-year period, as defined by EU rules on state subsidies.

Boosting applied research and product development

"Application-oriented co-operative RTD activity" supports projects in the following fields: (i) material sciences, nanotechnology and manufacturing technologies; (b) biotechnology; (c) electronics, measurement, control technologies; (d) energy technologies; (e) information and communication technologies; (f) environmental

technologies; (g) transport technologies, logistics. Academia-industry co-operation is given a priority.

"Development of corporate research infrastructure" is aimed at providing incentives to increase both BERD and the share of business RSE in total R&D employment. New R&D jobs supported by this scheme have to be maintained at least for 5 years. The scheme improves the quality of firms' RTD activities and helps developing skills required to commercialise RTD results by upgrading their RTD infrastructure.

Increased investment in basic research capacities

"Development of the research infrastructure of publicly financed and non-profit research facilities" provides funding to upgrade equipment at public R&D institutes and thus lower the average age of R&D infrastructure.

Exhibit 25: Main measures in favour of innovation and knowledge

Identified RTDI measure or major project	Focus of intervention (policy areas classification)*	Main instruments**	Main beneficiaries***
Application-oriented co-operative RTD activity (ECOP 3.1.1)	Boosting applied research and product development	Aid schemes (grants)	Private sector; Networks
Development of the research infrastructure of publicly financed and non-profit research facilities (ECOP 3.2.1)	Increased investment in basic research capacities; Boosting applied research and product development	Aid schemes (grants)	Public sector
S&T co-operation of businesses and publicly financed research units (ECOP 3.2.2)	Innovation poles and clusters; Boosting applied research and product development; Knowledge transfer and technology diffusion to enterprises	Aid schemes (grants)	Networks
Support to new, technology and knowledge-intensive micro-enterprises and spin-off companies (ECOP 3.3.1)	Support to creation and growth of innovative enterprises	Aid schemes (grants)	Private sector; Networks
Development of corporate research infrastructure related to the creation of new RTD jobs (ECOP 3.3.2)	Boosting applied research and product development	Aid schemes (grants)	Private sector
Innovation and research activities of SMEs (ECOP 3.3.3)	Knowledge transfer and technology diffusion to enterprises; Boosting applied research and product development; Support to creation and growth of innovative enterprises	Aid schemes (grants)	Private sector; Networks
Promoting life-long learning and adaptability (HRDOP 3)	Innovation friendly environment	Aid schemes (grants)	Public sector
Developing the infrastructure of education and training (HRDOP 4.1)	Innovation friendly environment	Aid schemes (grants); Infrastructures and facilities	Public sector

* Classification of RTDI interventions: Improving governance capacities for innovation and knowledge policies; Innovation friendly environment; Knowledge transfer and technology diffusion enterprises; Innovation poles and clusters; Support to creation and growth of innovative enterprises; Boosting applied research and product development (see appendix).
**Classification of instruments: Infrastructures and facilities; Aid schemes; Education and training.
***Classification of Beneficiaries: Public sectors; Private sectors; Networks

Main source: Ops

Appendix E Case study

Name of Case: Co-operation Research Centres, CRC

Title of measure/project
in English: Scientific and technological co-operation of the business sector and the publicly financed research units (Co-operation Research Centres, CRC); ECOP 3.2.2
national language: Felsőoktatás és a vállalatok közötti kooperatív kutatást és technológiatranszfert segítő partnerkapcsolatok és hálózatok kiépítésének támogatása (Kooperációs Kutató Központok, KKK); GVOP 3.2.2

Description:
This scheme is aimed at promoting:

- scientific and technological co-operation of the business sector and publicly financed research organisations;
- integration of education, economic and social target-oriented RTD co-operation for strategic purposes;

by supporting the establishment of new Co-operative Research Centres. The overall budget of the measure is 12 MEUR, for the period of May 2004-2006.

Zone: Objective 1

Policy framework:

Brief history and main features

What policy area does the initiative belong to?
Boosting applied research and product development; Investment in basic research capacities; Innovation poles and clusters

What are the main instruments characterising the initiative?
Grants (mobilising contributions from the private sector)

What are the main beneficiaries characterising the initiative?
Networks: Businesses and public RTD organisations; more precisely their newly set up Co-operation Research Centres

Was the intervention inspired by a previous experience? Which one?
Hungarian policy-makers studied similar initiatives in the US in the 1990s, and then 'transferred' this idea to Hungary. The first few Co-operation Research Centres were set up by using national funding. When Hungary joined the EU in 2004, and hence when the EU Structural Funds became available, that original scheme was dissolved, and this one replaced it, co-funded by the EU SF.

Which organisations have been involved? What was their role?
The original scheme was designed in the late 1990s by the experts of the National Committee of Technological Development, in consultation with chambers of commerce and professional associations representing the academic community (universities, other public research organisations). Then it was replaced by the current scheme, designed by involving again the same groups of stakeholders.

What was the structure of the initiative (operational phases, length…)?
The original Co-operative Research Centre (CRC) scheme was launched in 1999

to foster strategic, long-term co-operation between higher education institutes, other non-profit R&D units and businesses, by establishing CRCs. It was mainly based on a similar US policy instrument, studied by Hungarian experts and policy-makers on-site. Its overall goal, on one hand, was to promote innovation and competitiveness and, on the other, to "inject" practical, business considerations into research carried out at higher education institutes, and indirectly to enrich the curricula with these aspects. Its detailed aims were to:

- facilitate technological breakthroughs and the introduction of innovative products and services
- foster competitiveness
- promote the integration of business-oriented, applied R&D into the various activities of higher education institutes (HEI)
- adapt market-oriented, entrepreneurial attitudes at HEIs
- integrate economic and social needs into education activities of HEIs
- encourage and facilitate the application of high-tech at HEIs
- prepare for joint R&D projects aimed at solved specific problems of the business partners
- create appropriate jobs for graduates and post-docs
- contribute to develop knowledge-building capabilities at HEIs
- prepare HEIs for participation in various international co-operative projects due to their accumulated experience in managing large-scale projects.

CRCs can only be established together with private business partners. The leading higher education institutes of the consortia may only be the ones who have the right of offering PhD training, i.e. are accredited by the Hungarian Accreditation Committee.

This original scheme was closed down when co-funding from the EU SF became available in 2004, and replaced by the current ECOP scheme, called "Scientific and technological co-operation of the business sector and the publicly financed research units" (CRC) The main features of this "successor" scheme are the same, though.

The measure ends in 2006.

What is the degree of novelty of the initiative?

As explained above, this scheme is a "successor" of a nationally funded measure, launched in 1999, which, in turn, was modelled on a similar US scheme.

Main results

What are the main outcomes (financial and physical)?

Five CRCs were set up in the framework of the original scheme (by 2004), two of them at the Budapest University of Technology and Economics, and Semmelweis University, while the remaining three CRCs at the universities of Miskolc, Pécs, and Veszprém, respectively (located in three different regions).

14 other CRCs have been supported by the current scheme, either at universities or at research institutes, covering different fields of S&T (e.g. pharmaceuticals, chemistry, innovation management, ICT, environmental technologies, life sciences, materials, biotech, fishery, automotive [electronics and logistics] technologies). Now each region has at least one CRC.

22 project proposals have been submitted; requesting 6.4 billion HUF as grants in total. The 14 approved projects requested 4.5 billion HUF as grants. All the 14 contracts have been signed, with the same budget approved as the requested one

(i.e. 4.5 bln HUF). Until June 2006 a total of 1.1 bln HUF grants have been disbursed.

What are the main evaluation results?

Only the original ("predecessor") scheme has been evaluated so far (the results were published in June 2005). Actually, this is the only Hungarian RTDI policy scheme evaluated recently, although the Law on Innovation made the evaluation of RTDI policy programmes compulsory.

The evaluation report found that the Co-operative Research Centre measure has had a positive effect on the innovation activities of the participating companies, the number of PhD students and their employment prospects and the professional performance of the hosting higher education institutes. The results suggest that the budget of the programme has been used in an efficient way.

Have all the objectives been fulfilled?

It is too early to assess the 14 new CRCs, but project monitoring tools are in place, i.e. if it is needed, the managing authority can intervene.

What is the current state in terms of execution? What are the expected prospects?

As already mentioned, the 14 new CRCs are in operation, and no more project proposal can be funded during the life time of this measure (end of 2006).

Reasons of success and conditions for repeatability

Why has the initiative been considered a good practice?

Academia-industry co-operation has been weak in Hungary – this measure addresses this issue, building on a very similar 'predecessor' measure.

What are the main socio-economic and institutional conditions that contributed to the success? How?

At this stage only the policy rationale and the tools of this measure can be assessed as a good practice; actual impacts of the scheme can be evaluated in a few years' time.

What were the main socio-economic and institutional obstacles?

So far no major obstacles have been observed.

What are the main lessons?

The rationale, the objective and the tools of this measure are appropriate in the Hungarian context, but it would be too early to attempt drawing further lessons.

Did the case inspire new initiatives in either the same or different contexts?

This scheme itself has been inspired by a similar US initiative, and the success of the 'predecessor' scheme, based on the US measure (operated until 2004).

What are the main aspects of the initiative, which are susceptible to be transferred?

No such aspect can be identified.

Are there constraints to transferability?

No constraint to transferability can be envisaged.

Appendix F Further reading

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List of useful websites at national and regional level

Science and Technology Policy Council	www.4t.gov.hu
Prime Minister's Office	www.meh.gov.hu
Ministry of Economy and Transport	www.gkm.hu
National Development Office	www.nfh.hu
National Office for Regional Development	www.oth.gov.hu
National Office for Research and Technology	www.nkth.gov.hu
Agency for Research Fund Management and Research Exploitation	www.kpi.gov.hu
Hungarian Foundation for Enterprise Promotion	www.mva.hu
Hungarian Association for Innovation	www.innovacio.hu
Regional Development Councils and Development Agencies	
Central Hungary	www.proregio.hu
Central Trans-Danubia	www.kdrfu.hu
Western Trans-Danubia	www.westpa.hu
Southern Trans-Danubia	www.deldunantul.com
Southern Great Plain	www.del-alfold.hu
Northern Great Plain	www.eszakalfold.hu
North Hungary	www.norda.hu

Appendix G Stakeholders consulted

List of all individuals interviewed

Name	Position	Organisation
Tivadar Lippényi	vice-president	National Office for Research and Technology
Ildikó Májer	director	Central Hungarian Innovation Centre
János Rechnitzer	director	West Hungarian Research Institute, Regional Research Centre, Hungarian Academy of Sciences
Gábor Szabó	vice-president	Hungarian Association for Innovation

Participants to focus group

Name	Position	Organisation
Etele Baráth	former minister without portfolio	formerly: Prime Minister's Office; National Development Office
Tivadar Lippényi	vice-president	National Office for Research and Technology
Gábor Szabó	vice-president	Hungarian Association for Innovation
János Pakucs	president	Hungarian Association for Innovation
Ildikó Májer	director	Central Hungarian Innovation Centre