

INNO-Policy TrendChart – Policy Trends and Appraisal Report

CROATIA

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PREFACE

Innovation is a priority of all Member States and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aimed at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Member States.

PRO INNO Europe is a new initiative of Directorate General Enterprise and Industry which aims to become the focal point for innovation policy analysis, learning and development in Europe, with a view to learning from the best and contributing to the development of new and better innovation policies in Europe. Run by the Innovation Policy Directorate of DG Enterprise and Industry, it pursues the collection, regular updating and analysis of information on innovation policies at national and European level.

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

The INNO-Policy TrendChart products

The INNO-Policy TrendChart, previously TrendChart on Innovation, has been running since January 2000. It now tracks innovation policy developments in all 27 EU Member States, plus Iceland, Norway, Switzerland, Croatia, Turkey, Israel, Brazil, Canada, China, Japan, the USA and India. The INNO-Policy TrendChart website¹ provides access to the following services and publications, as they become available:

- a database of innovation policy measures across 39 countries;
- a news service and related innovation policy information database;
- a 'who's who' of agencies and government departments involved in innovation;
- annual policy monitoring reports for all countries covered;
- an appraisal of the Lisbon National Reform Programme (NRP) and innovation by Member State (new separate publication in 2008);
- an annual synthesis report bringing together key points in the INNO-Policy TrendChart.

This document has been prepared within the framework of an initiative of the European Commission's Enterprise and Industry Directorate-General, Innovation Policy Development Unit. Official responsible: Cesar Santos (cesar.santos@ec.europa.eu).

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The report covers the period from September 2007 to September 2008. This year's report provides an overview and analyses on two focus themes: (1) policies in support of creativity and innovation, and (2) support of innovative start-ups including gazelles.

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¹ See: <http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=52&parentID=52>

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Executive Summary

1. Introduction: Main Recent Trends in the National Innovation System

Within the EIS framework, Croatia belongs to the group of 'catching-up countries' (alongside Malta, Lithuania, Hungary, Greece, Portugal, Slovakia, Poland, Bulgaria, Latvia and Romania). Its SII score has remained at 0.23 (it has been at this level since 2004). Its performance seems to be trailing. No catching-up effects have been observed, as the SII score of Croatia remains low and stable — i.e. it is not moving towards the EU average. The relative position has thus worsened since last year. Currently, only Turkey, Latvia and Romania are behind, and Bulgaria has displayed the same SII score. However, it should be noted that the analysis is based on rather limited dataset. Namely, 11 indicators out of 25 are not available. The first Community Innovation Survey has only been conducted in late 2007 (the results of which are expected in 2008).

Results of other available research show improvements in innovation performance, such as the effects of knowledge transfer and increasing innovation capability of foreign-owned enterprises in the period between 2003 and 2006. It remains to be seen whether these improvements will also be reflected in the CIS results. On the other hand, the analysis of indicators of macroeconomic performance shows that some macroeconomic indicators in Croatia grow faster than in the EU. In 2007, GDP per capita reached 57.5 % of the EU-27 average, while the Croatian real GDP growth rate maintained its solid expansion with the overall growth rate reaching 5.6 % (compared with the EU-27 average of 2.0 %). The growth was predominantly based on private consumption and investments, whereas the trade deficit has expanded. The unemployment rate has dropped by 2 percentage points to 9.1 %, but remained higher than the EU-27 average (7.1 %) in 2007. Labour productivity (GDP over total employment) showed a fast convergence towards the EU-27 productivity levels, reaching 71.1 % in 2007.

However, improvements are particularly required in the areas of employment creation and export competitiveness. It seems that the observed GDP growth is still weakly related to innovation capability and export competitiveness of Croatian enterprises. Innovation performance occasionally initiates a public debate, but that is rarely translated into action. Business R&D expenditures are still well below EU-27 levels (respectively 0.51 % and 1.17 % of GDP). Although R&D and innovation policies are reasonably well funded (government R&D expenditures are at 0.71 %) and surpass the EU-27 levels, their efficient utilisation remains an issue. Indicators of intellectual property and innovation drivers are rather low.

2. Major Innovation Challenges and Policy Responses

The innovation policy in Croatia is still largely underdeveloped, and burdened by the fact that systematic data collection has been introduced in 2007 (whereas evaluation is not performed at all). Consequently, any choice of challenges may seem arbitrary and/or be influenced by examples of other countries. The following issues have thus been identified as relevant challenges that provoked a recent policy response (further elaboration can be found in the introduction to the section 1.3.).

Challenge 1: Increasing participation in lifelong learning

Innovation depends on a well-trained workforce capable of absorbing and developing technologies and products. Given the changes in skill requirements, lifelong learning becomes an important prerequisite of the innovative capability of enterprises. However, its introduction requires a paradigm change whereby the learning continues throughout one's working life (and even further). Apart from on-the-job training and post-graduate qualifications (acquired by few), further learning has not been actively encouraged in Croatia in the past. At best, it has been viewed as a process of marginal importance; at worst, it has sometimes even been viewed as a distraction from more important tasks.

This is reflected in the low participation of working age citizens in lifelong learning, which has grown recently to 2.9 % in 2006, but is still low. The current education sector reform aims to change that situation. This particularly entails improvements in adult education, as the, arguably, least developed segment of the education system. The Adult Education Act was adopted in February 2007, which was complemented by adoption of the Act on State Aid to Education and Training later that year (e.g. providing tax deductions to employers financing such education). In addition to specifying the activities and objectives of the Adult Education Council and the Agency for Adult Education, the Adult Education Act defines the forms of adult education and regulates their provision. The CARDS 2004 Adult Learning project was also initiated in late 2007. Its focus is on improvements in adult education and training, adjustment and modernisation of the training programmes and training system, and an increase in public awareness of the importance of continuous training. This measure may not directly influence innovation performance in the short term, but is likely to facilitate adult learning — a precursor of innovation.

Challenge 2: Increasing business R&D expenditures

One of the key issues in the Croatian innovation system is the low level of business R&D expenditure, which is then reflected in insufficient innovation performance. Although innovation may be performed even with low R&D budgets (especially in the case of incremental and process innovations), this is often difficult to achieve as the data on innovation outputs (e.g. pilot CIS survey undertaken in 2004) demonstrate. Innovation often plays a secondary role in business strategies, and is more likely to be stimulated by competition rather than by internal resources and capabilities. The key policy measures in this field comprise tax incentives and the Technology-Related Research and Development Programme (HITRA – TEST), which is aimed at pre-commercial technological projects. Both of them underwent changes in 2007. Tax incentives were increased and incorporated into the state aid regulation compatible with the EU, whereas the project evaluation rules and institutional setting have been reformed.

Challenge 3: Increasing innovation diffusion and providing support to enterprises with high growth potential

The insufficient innovation performance is reflected in two ways: (1) few innovations are developed and/or introduced, and (2) the innovation diffusion is relatively slow. The latter is due to insufficient infrastructure and inadequate skills (which are not adequately tackled through adult learning activities), as well as by the low propensity of enterprises to cooperate with other enterprises (suppliers, customers, competitors, etc) and academic institutions. This situation especially affects enterprises with high growth potential, which is not adequately realised due to unfavourable external conditions. This is a large and diffuse policy area where financial incentives may not be sufficient enough to bridge gaps. The policy measures focus on building interfaces and collaborative projects through the government agency BICRO (Business Innovation Centre of Croatia). Its programmes developed and/or introduced in 2007 include the development of technology infrastructure (TehCro), introduction of the first public-private private equity fund (VenCro), R&D services for SMEs (IRCro), and the business competitiveness upgrading programme (KonCro).

Summary table: innovation challenges, policy responses and impact

Challenge	Relevance of policy response	Evidence of impact
Increasing participation in lifelong learning	2	3
Increasing business R&D expenditures	4	2
Increasing innovation diffusion and providing support to enterprises with high growth potential	3	3

3. Innovation Governance and Policy Trends

The government budget for science, technology and innovation activities is growing at a moderate pace. There are also funds available through international assistance (e.g. Science and Technology Project [STP] supported by the World Bank). These funds are partially spent on the reform of the existing institutions, and on the development of some new ones (e.g. Unity through Knowledge Fund). However, the efficiency of spending remains an issue, as well as the level of achievement of policy objectives. Innovation policy in Croatia stems from both conscious design (which is often facilitated through policy transfer from abroad), and evolution of the existing measures in accordance with the observed needs. Innovation policy is still in development. It may still have too strong an internal focus, with an insufficient grasp of the needs and strategies of all its intended beneficiaries. Innovation policy should be analysed by means of independent evaluation, which has not been undertaken so far.

In 2007, several new steps in policy implementation had been undertaken. However, uncertainty related to the results of parliamentary elections (conducted in November 2007) and the election campaign prior to and parliamentary elections may have slowed down the pace of policy implementation — e.g. in the case of the adoption of the Action Plan for Increasing Investments into Science and Research. The policy focus was on the reform of government agencies — the Business Innovation Centre of Croatia (BICRO) and Croatian Institute of Technology (HIT).

BICRO has undertaken further steps in implementation of its projects related to subsidies to the technology infrastructure (TehCro), foundation of the first public-private equity fund (VenCro), provision of R&D services for SMEs (IRCro), and business competitiveness upgrading (KonCro). HIT has introduced new rules for evaluation of pre-commercial research and technology development. Within the Unity through Knowledge Fund, which aims to link researchers and professionals in Croatia and Croats living abroad, the Innovation Grant programme has been developed in order to assist both researchers from the Croatian diaspora (who want to continue research towards commercialisation in Croatia), and Croatian scientists who need to collaborate with the diaspora to reach the same goal. Furthermore, following several changes in the tax system, new tax incentives for R&D and innovation activities have been introduced. It remains to be seen to what extent these measures will contribute to effective policy implementation.

4. Conclusion: Future Actions and Opportunities for Innovation Policy

Innovation policy in Croatia is relatively comprehensive, but there are still gaps that need to be addressed. These gaps are often related to policy implementation mechanisms (which can be further developed and/or simplified for final beneficiaries), promotion and communication of policy measures, coordination between different bodies responsible for innovation policy, and planning and evaluation processes (which are still either underdeveloped or missing).

Consequently, future policy can make use of the following suggestions:

- implement the Action Plan for Increasing Investments into Science and Research and monitoring its implementation on an annual basis;
- perform regular evaluation of innovation policy (including the work of institutions which are responsible for policy implementation);
- develop regional innovation strategies;
- analyse and redefine mechanisms of coordination between different government bodies (ministries, agencies, regional authorities, etc.) responsible for socio-economic development in general and innovation policy in particular;
- develop a platform for dialogue among researchers, policy makers, business people, media, the general public, and others concerned by innovation development.

1. Main Trends and Challenges in the National Innovation System

1.1 Recent Trends in Macroeconomic and Market Developments

When it comes to main economic indicators, in the last few years Croatia has been undergoing a convergence towards EU-27 average levels. However, given the low starting points, the observed levels of economic performance are in most cases well behind the EU-27 average.

The analysis of indicators of macroeconomic performance shows that some macroeconomic indicators in Croatia grow faster than in the EU. In 2007, GDP per capita reached 57.5 % of the EU-27 average. In 2007, the real Croatian GDP growth rate maintained its solid expansion with the overall growth rate reaching 5.6 % (compared to the EU-27 average of 2.0 %). The growth was predominantly based on private consumption and investments, whereas the trade deficit has expanded.

The unemployment rate has dropped by 2 percentage points to 9.1 %, but remains higher than the EU-27 average (7.1 %) in 2007. This has much to do with the expansion of the SME sector and the overall growth of the employment rate in the last few years (from 53.4 % in 2002 to 55.6 % in 2006). Labour productivity (GDP over total employment) showed a fast convergence towards EU-27 productivity levels, reaching 71.1 % in 2007.

Strong improvements were recorded in the case of public balance (net borrowing/lending) as a percentage of GDP. Here, the deficit amounted to 1.6 % of GDP (i.e. a notable improvement in comparison to 4.1 % in 2002). The indicator of general government debt as a percentage of GDP has also improved (from 40.0 % in 2002 to 37.7 % in 2007). However, borrowing by individuals/households and the business sector has grown strongly in recent years. It has mainly been financed by Croatian banks, which have borrowed funds from their parent companies abroad. The turbulences in world financial markets and the reduced ability of local economic actors to incur further debts has resulted in somewhat higher interest rates, which may burden economic activity to some extent in the future. External debt grew by 12.5 % in 2007.

Furthermore, improvements are particularly required in the areas of employment creation and export competitiveness. The exports of goods grew by 9.1 %, but imports increased by 10.1 %. The external trade deficit amounted to EUR 9.8 billion. Exports now cover only 47.9 % of imports (a historical low). These deficits are somewhat compensated through surpluses generated in services (i.e. tourism). In 2007, a record level of FDI was reached — EUR 3.63 billion— which was 32.4 % higher than in 2006. However, the structure is still unfavourable, as greenfield investments that can generate stronger employment and technology spillover effects are still rare.

Finally, it seems that the observed GDP growth is still weakly related to innovation capability and export competitiveness of Croatian enterprises. On the other hand, the conditions for further borrowing by private and public sector may be unfavourable, and inflation pressures due to global trends are likely to be present in the future. All of these factors make improvements in competitiveness crucial for future macroeconomic stability and economic growth.

Exhibit 1: Comparable indicators of economic performance

Indicator	National performance		EU 27 average	
	2002	2007	2002	2007
GDP per capita in PPS (EU27=100)	48.4	57.5	100*	100*
Real GDP growth rate (% change previous year)	5.6	4.5	1.2	2.0
Labour productivity per person employed (EU27=100)	61.6	71.1	100*	100*
Total employment growth (annual % change)	4.2	0.8 [^]	0.4	1.6
Inflation rate (average annual)	2.2	5.8	2.1	2.3
Unit labour costs (growth rate)	:	:	-0.4	-0.9
Public balance (net borrowing/lending) as a % of GDP	-4.1	-1.6	-2.5	-0.9
General government debt as a % of GDP	40.0	37.7	60.3	58.7
Unemployment rate (as % of active population)	14.7	9.1	8.9	7.1
Foreign direct investment intensity	:	:	:	:
Business investment as a percentage of GDP	:	:	17.3	18.2 [^]

Source: Eurostat - Structural Indicators and Long-term Indicators, CBS

Key: (*) EU25 average, (^) or latest available year (for example: 2005); (:) not available

1.2 Recent Trends in the National Innovation Performance

When it comes to measuring innovation performance, the lack of data poses a serious problem that should be amended as the results of the Community Innovation Survey undertaken by the Central Bureau of Statistics become available in 2008. For the time being, the performance in various dimensions of innovation for which data exists, the situation is as follows.

Within the EIS framework, Croatia belongs to the group of 'catching-up countries' (alongside Malta, Lithuania, Hungary, Greece, Portugal, Slovakia, Poland, Bulgaria, Latvia and Romania). Its SII score has remained at 0.23 (it has been at this level since 2004). Its performance seems to be trailing. There are no catching-up effects observed, as the SII score of Croatia remains low and stable — i.e. it is not moving towards the EU average. The relative position has thus worsened since last year. Currently, only Turkey, Latvia and Romania are behind, and Bulgaria has displayed the same SII score. Poor innovation performance occasionally initiates a public debate, but that is rarely translated into action by policymakers or stakeholders.

Data on knowledge creation would suggest a relatively favourable position (23rd place out of 37 observed countries). However, this estimate is based only on data on R&D expenditures. Within that data group a relatively strong position can be observed in the case of government expenditures (0.70 % of GDP). The efficiency of these expenditures remains an issue, as they rarely seem to be transferred into commercially-viable knowledge. Public R&D expenditures mainly support the existing academic infrastructure and costs of salaries of researchers, most of whom lack capabilities/interest to develop applicable knowledge and have weak linkages to external actors (including the business sector).

On the other hand, business R&D expenditure remains stagnant and insufficient (0.51 % of GDP). It should be noted that the latter figure is still higher than in most new Member States. Moreover, the coverage of the business R&D survey undertaken by the Central Bureau of Statistics is likely to be inadequate, as it focuses too strongly on larger firms, which may be less likely to increase their R&D expenditure because of restructuring or unfavourable economic trends. There is some indicative evidence that small and medium-sized enterprises (SMEs) have been increasingly investing in R&D and innovation. Aralica, Račić and Redžepagić (2007) noted these effects (including knowledge transfer and increasing innovation capability) in the case of SMEs that have received foreign direct investments. This is linked to previous findings that innovation propensity of enterprises is linked to their level of integration into international flows of capital and goods — through export orientation and direct foreign investments.

However, the overall picture is still quite unfavourable. According to Račić et al (2005), a high share of innovators in Croatia do not undertake research and development at all (33.8 % in the manufacturing sector and 20.8 % in the service sector), and enterprises that invest in research and development have generally a low level of research and development intensity. This shows the low level of innovativeness of new products and processes, and the secondary role of innovations within business strategy. In the manufacturing sector, large enterprises have relatively higher expenditures for innovation activities, while smaller enterprises have a more important role in the service sector (Račić et al, 2005).

Given the lack of official CIS data, no indicators of innovation and entrepreneurship are available. Consequently, Croatia is still not included in this section of the European Innovation Scoreboard. Other sources on these issues point to moderately positive trends. For instance, the Global Entrepreneurship Monitor (GEM), which analyses new entrepreneurial activity across countries, has demonstrated above-average frequency of innovative start-ups in Croatia (compared with other analysed countries). These high growth potential start-ups are characterised by innovation capability, export orientation and employment generation capability (CEPOR, 2006). Venture capital and private equity as means of innovation financing are underdeveloped. On the one hand, existing funds point to the insufficient number of feasible projects and to a weak interest of entrepreneurs in their services and resources (Young and Cvijanović, 2006).

On the other hand, individual inventors and innovation-based SMEs point to the lack of financial resources as the key obstacle to innovation (cf. Račić et al., 2005). According to a 2007 study commissioned by Microsoft, ICT services account for 2.3 % of GDP (global average is 2.5 %, and the average for CEE countries is 1.7 %). The available data on applications imply lags in terms of employment in technologically-advanced manufacturing and services, with rankings towards the bottom. In this section, Croatia is positioned 27th out of 32 analysed countries. Employment in high-tech services accounts for 2.18 % of the total workforce. This is somewhat lower than the EU-27 average (3.63 %). This figure is mainly explained by employment in post and telecommunications (NACE64), and (to a lesser extent) information technology including software development (NACE72). R&D services (NACE73) are much less pronounced.

Exports of high technology products accounted for 6.8 % of total exports. Although that is significantly below the EU-27 average (16.7 %), Croatia is ranked in the middle of the table and surpasses many new and some more established EU Member States. That performance is largely due to the exports of pharmaceutical industry products, which provide an exception to the low overall export competitiveness of Croatian manufacturing. However, what is of higher concern is the decreasing competitiveness of high technology exports (whose share in the year prior was 10.8 %). The share of employment in medium-high and high tech manufacturing is 4.87 % (EU-27 average is 6.63 %). Croatia has a long-standing tradition, especially in medium-high technology industries, such as chemicals (NACE24) and machinery (NACE29) and electrical equipment (NACE31). The transition period has had negative effects on employment in these sectors, but its share is still significant. High technology has not been developed extensively (this has not changed in the post-socialist period). For instance, Croatia is one of the few Eastern European economies which has not received any direct foreign investments in the automobile sector.

The data on innovation drivers show a significant lag behind the advanced countries (ranked 27th out of 36 observed countries). The key deficits are observed in the areas of S&E graduates and lifelong learning. The share of S&E graduates per 1 000 of the population aged 20-29 (5.7 %) is one of the lowest. The restructuring of the economy has brought about a reduction of employment opportunities in manufacturing, whereas services that can utilise the knowledge of S&E graduates have not been developed (with the possible exception in some areas of electrical engineering). Consequently, despite significant increases in the overall number of enrolled students, few of them enrol and obtain degrees in S&E courses. Furthermore, until recently, lifelong learning has been neglected by policy makers and many employers. This is reflected in low participation of working age citizens in lifelong learning (2.1 %, according to EIS, whereas the EU-27 average is 9.6 %). Some concerted efforts to provide a regulatory framework and a set of incentives have been made only recently, but real improvements will require an effective collaboration between public and private sectors, as well as a paradigm change.

The situation with the working age population with tertiary education is not much better. Croatia (16.2 %) lags behind the EU-27 average (23.0 %), and shows deterioration in comparison to the previous year. It is also ranked in the lowest quartile of the table. However, given the increased enrolment and graduation rates of the last few generations, the position should gradually improve in the coming years. On the other hand, youth education attainment level (93.8 %) well surpasses the EU-27 level (77.8 %) and is one of the highest overall. That shows potential to improve other education-related indicators in the long term.

The area of intellectual property remains one of the most underdeveloped, as all of the indicators entail a rather poor performance, well behind most of the observed countries. In relative terms, this is reflected in the 34th position among 37 observed countries. As it can be observed, in this area the largest gap is between the developed economies (both old EU members and comparison countries) and new Member States and candidate countries (Croatia and Turkey). Perhaps surprisingly, when it comes to indicators related to patents Croatia surpasses most new Member States, although its performance is still very weak. It is in the area of community trademarks and community industrial design that its performance is at its lowest point, indicating a lack of export competitiveness in non-generic goods and services.

There is a lack of data on sectoral or regional aspects of innovation performance. However, economic activity (especially its more prosperous parts) tends to be concentrated in the capital and largest regional centres, with only some coastal and/or industrialised counties providing exceptions. Therefore, it is likely that innovation performance follows a similar pattern.

Exhibit 2: European Innovation Scoreboard: Croatia country pages

Data availability for Croatia is limited to 14 indicators, and no data is available for Innovation & Entrepreneurship. Comparisons with EU countries should be interpreted with care.

Croatia is in the group of 'catching-up countries' and its innovation performance is below the EU average. Its innovation performance has remained stable over the last five years, relative to the EU average. Croatia's performance in Intellectual Property is relatively weak. The country's level of youth education attainment and public R&D expenditures is above the EU average.

Figure 1 Performance chart by indicator

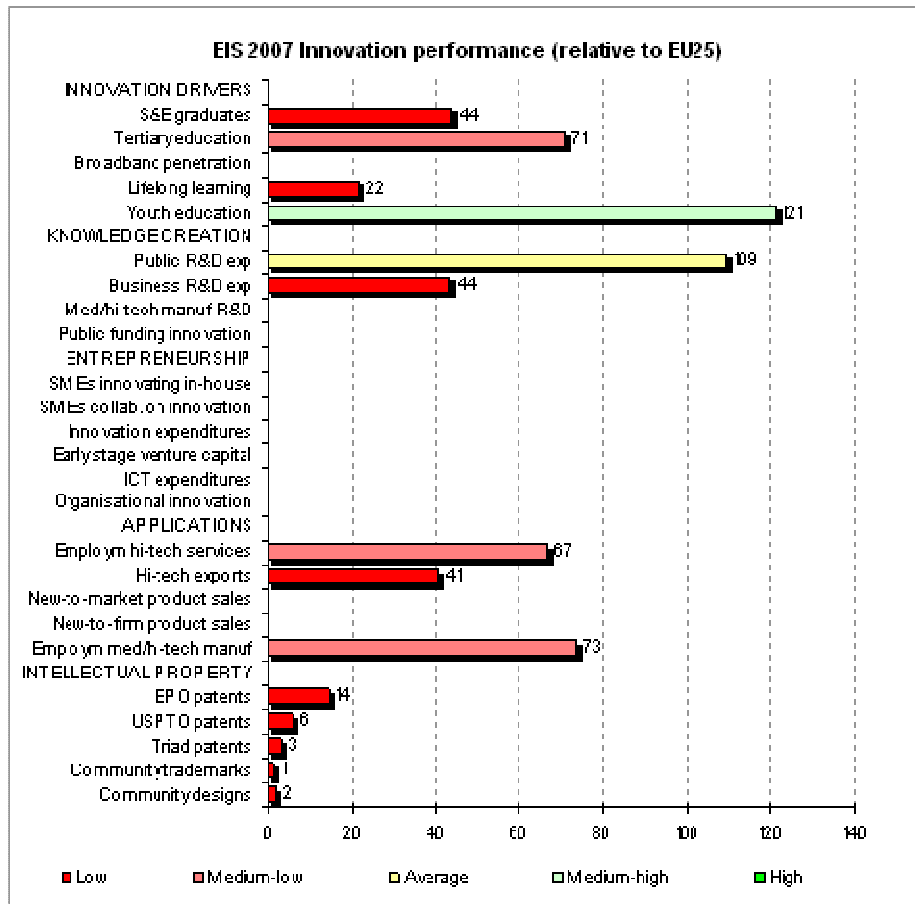


Figure 2 Performance chart by innovation dimension

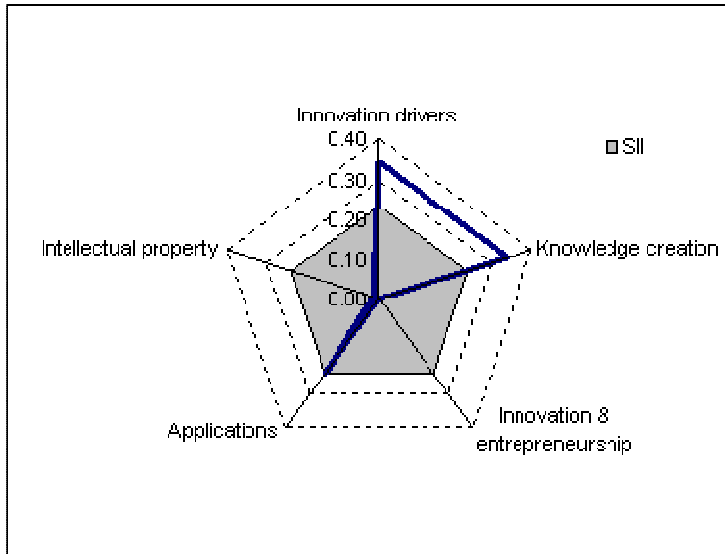


Table 1 Performance table over time

	Croatia	1999	2000	2001	2002	2003	2004	2005	2006	Rel. to EU	Ref. year
	Summary Innovation Index				0,24	0,23	0,23	0,23	0,23		
	<i>rank</i>				29	31	31	33	33		
	INPUT - Innovation drivers				0,35	0,35	0,35	0,34	0,34		
1,1	S&E graduates	--	--	--	--	5,6	5,4	5,7	--	44	2005
	<i>relative to EU</i>	--	--	--	--	46	44	44	--		
1,2	Population with tertiary education	--	--	--	15,4	15,8	16,2	16,0	16,2	71	2006
	<i>relative to EU</i>	--	--	--	77	76	75	72	71		
1,3	Broadband penetration rate	--	--	--	--	--	--	--	--		
	<i>relative to EU</i>	--	--	--	--	--	--	--	--		
1,4	Participation in life-long learning	--	--	--	1,9	1,8	1,9	2,1	--	22	2005
	<i>relative to EU</i>	--	--	--	--	21	20	22	--		
1,5	Youth education attainment level	--	--	--	90,6	91,0	93,5	93,8	--	121	2005
	<i>relative to EU</i>	--	--	--	118	118	121	121	--		
	INPUT - Knowledge creation				0,29	0,29	0,30	0,34	0,34		
2,1	Public R&D expenditures	--	--	--	0,64	0,67	0,70	--	--	109	2004
	<i>relative to EU</i>	--	--	--	97	102	109	--	--		
2,2	Business R&D expenditures	--	--	--	0,47	0,44	0,51	--	--	44	2004
	<i>relative to EU</i>	--	--	--	39	37	44	--	--		
2,3	Share of med-high/high-tech R&D	--	--	--	--	--	--	--	--		
	<i>relative to EU</i>	--	--	--	--	--	--	--	--		
2,4	Enterprises receiving public funding										
	<i>relative to EU</i>										
	INPUT - Innovation & entrepreneurship				--	--	--	--	--		
3,1	SMEs innovating in-house										
	<i>relative to EU</i>										
3,2	Innovative SMEs co-operating with others										
	<i>relative to EU</i>										
3,3	Innovation expenditures										
	<i>relative to EU</i>										
3,4	Early-stage venture capital	--	--	--	--	--	--	--	--		
	<i>relative to EU</i>	--	--	--	--	--	--	--	--		
3,5	ICT expenditures	--	--	--	--	--	--	--	--		
	<i>relative to EU</i>	--	--	--	--	--	--	--	--		
3,6	Organisational innovation										
	<i>relative to EU</i>										
	OUTPUT - Applications				0,25	0,21	0,22	0,19	0,24		
4,1	Employment in high-tech services	--	--	--	2,6	2,1	2,0	2,0	2,2	67	2006
	<i>relative to EU</i>	--	--	--	76	64	61	62	67		
4,2	Exports of high technology products	--	--	--	9,0	9,0	9,6	8,0	6,8	41	2006
	<i>relative to EU</i>	--	--	--	47	48	52	42	41		
4,3	Sales new-to-market products										
	<i>relative to EU</i>										
4,4	Sales new-to-firm products										
	<i>relative to EU</i>										
4,5	Med-hi/high-tech manufacturing employment	--	--	--	4,6	4,2	4,7	3,9	4,9	73	2006
	<i>relative to EU</i>	--	--	--	64	61	69	59	73		
	OUTPUT - Intellectual property				0,02	0,02	0,02	0,02	0,01		
5,1	EPO patent	--	12,2	12,3	19,8	18,2	--	--	--	14	2003
	<i>relative to EU</i>	--	10	10	16	14	--	--	--		
5,2	USPTO patents	--	3,1	--	--	--	--	--	--	6	2000
	<i>relative to EU</i>	--	6	--	--	--	--	--	--		
5,3	Triad patents	--	0,7	--	--	--	--	--	--	3	2000
	<i>relative to EU</i>	--	3	--	--	--	--	--	--		
5,4	Community trademarks	--	0,2	0,5	0,2	1,1	3,4	4,5	1,6	1	2006
	<i>relative to EU</i>	--	0	1	0	1	4	5	1		
5,5	Community designs	--	--	--	--	11,9	4,7	0,9	1,8	2	2006
	<i>relative to EU</i>	--	--	--	--	19	5	1	2		

1.3 Identified Challenges

Croatia displays a relatively low innovation performance, and innovation policy that is still underdeveloped. Systematic data collection has been introduced in 2007, whereas evaluation is not performed at all. It may seem that the number and scope of policy challenges can be overwhelming. On the other hand, any choice of challenges may seem arbitrary and/or be influenced by examples of other countries. However, it can be argued that several key aspects of the national innovation system pose the most important challenges that can be tackled through effective policy action. Improvements in these areas could have multiple benefits for the innovation performance in Croatia. The following issues have thus been identified based on the discussion in sections 1.1 and 1.2. They are all relevant challenges that provoked a recent policy response. In this report, we have focused on three such challenges — increasing participation in lifelong learning, increasing business R&D expenditures, and increasing innovation diffusion.

Weak innovation performance is strongly linked to the insufficient knowledge, skills and competences of the workforce. Given that skills need to be further developed over one's working age, the participation in lifelong learning is of paramount importance. Among innovation inputs in Croatia, a particularly substandard performance is observed in the case of lifelong learning. Until recently, this has often been overlooked by policy makers. Last year the first steps were made towards restructuring the adult education and lifelong learning systems.

Furthermore, low and stagnant levels of business R&D expenditures have traditionally hindered innovation in Croatia. The current incentive systems do not seem to produce adequate results. Innovation in general, and R&D-driven innovation in particular, are still not generally viewed as key components of competitive advantage. Increasing business R&D has been the key innovation challenge that has been addressed in 2007 through new incentives (especially the tax ones).

Innovation diffusion may be the most vague of innovation challenges because it covers a variety of issues — from infrastructure to human resources and organisational strategies. However, recent efforts to build the support institutions and develop measures through the World Bank Science and Technology Program have been identified as important policy developments which should facilitate innovation diffusion.

These issues are analysed below in a bit more detail.

Challenge 1: Increasing participation in lifelong learning

Innovation depends upon a well-trained workforce capable of absorbing and developing technologies and products. Given the changes in skill requirements, lifelong learning becomes an important prerequisite of the innovative capability of enterprises. However, its introduction requires a paradigm change whereby learning continues throughout one's working life (and even further). Apart from on-the-job training and post-graduate qualifications (acquired by few), further learning has not been actively encouraged in Croatia in the past. At best, it has been viewed as a process of marginal importance; at worst, it has sometimes even been viewed as a distraction from more important tasks. This is reflected in the low participation of working age citizens in lifelong learning, which has increased recently to 2.9 % in 2006, but is still low.

When it comes to human resource development, this policy area will pose a key challenge in the foreseeable future, especially in the sub-areas, such as continuing vocational education and training, and tertiary education of working age citizens. The current education sector reform aims to change the unfavourable situation. The government has developed a regulatory framework and some initial policy measures to support lifelong learning. This particularly entails improvements in adult education, as the, arguably, least developed segment of the education system. The Adult Education Act was adopted in February 2007, which was complemented by the adoption of the Act on State Aid to Education and Training later that year (for example providing tax deductions to employers financing such education). In addition to specifying the activities and objectives of the Adult Education Council

and the Agency for Adult Education, the Adult Education Act defines the forms of adult education and regulates their provision. The CARDS 2004 Adult Learning project was also initiated in late 2007. Its focus is on improvements in adult education and training provision, adjustment and modernisation of the training programmes and training provision, and increase of the public awareness of the importance of continuous training. These measures may not directly influence innovation performance in the short term, but are likely to facilitate adult learning — a precursor of innovation.

Challenge 2: Increasing business R&D expenditures

One of the key issues in the Croatian innovation system is the low level of business R&D expenditure, which is then reflected in insufficient innovation performance. Although innovation may be performed even with low R&D budgets (especially in the case of incremental and process innovations), this is often difficult to achieve, as the data on innovation outputs (e.g. pilot CIS survey undertaken in 2004) demonstrate. Innovation often plays a secondary role in business strategies, and is more likely to be facilitated by competition rather than by internal resources and capabilities. The key policy measures in this field comprise tax incentives and the Technology-Related Research and Development Programme (HITRA – TEST), which is aimed at pre-commercial technological projects. Both of them underwent changes in 2007. Tax incentives were increased and incorporated into the state aid regulation compatible with the EU, whereas the project evaluation rules and institutional setting have been reformed.

Challenge 3: Increasing innovation diffusion

The insufficient innovation performance is reflected in two ways: few innovations are developed and/or introduced, and the innovation diffusion is relatively slow. The economic utilisation of innovation is burdened by a variety of economic and non-economic factors. Developing the innovation system will require better infrastructure, skills upgrading, as well as a change of organisational cultures that needs to become more open to cooperation with other enterprises (suppliers, customers, competitors, etc) and academic institutions. This situation especially affects enterprises with high growth potential, which is not adequately realised due to unfavourable external conditions. This is a large and diffuse policy area whereby financial incentives may not be sufficient enough to bridge gaps. The policy measures focus on building interfaces and collaborative projects through the government agency BICRO (Business Innovation Centre of Croatia). Its programmes developed and/or introduced in 2007 include the development of technology infrastructure (TehCro), introduction of the first public-private private equity fund (VenCro), R&D services for SMEs (IRCro), and the business competitiveness upgrading programme (KonCro).

The main threat to innovation policy effectiveness comes from its marginal position in the overall policy framework, as well as from its fragmented nature and underdevelopment. Consequently, changes in the environment cannot be addressed by effective and targeted policy actions. Policy learning is slow and changes in administration often lead to the loss of accumulated skills and competences. Further threats include the resistance of the research community for cooperation with industry, as well as the low trust of industry in the usefulness of academic institutions and inter-sector collaboration. Both science and industry sectors are prone to institutional inertia.

The current opportunities within the Croatian innovation system stem from the possibility of designing and implementing innovation policy based on both the experiences of other countries and one's own policy learning process. The low starting point in the case of many performance indicators should also mean that the introduction of effective policy measures could yield observable results and raise the profile of innovation issues in business and the general public. This could further stimulate policy attention and increased efforts by the main stakeholders.

Exhibit 3: Main innovation policy challenges

Description of challenge	Relevant indicators and trends
<p>1. Increasing participation in lifelong learning</p> <p>Given the changes in skill requirements, lifelong learning becomes an important prerequisite of the innovative capability of enterprises. However, its introduction requires a paradigm change whereby the learning continues throughout one's working life (and even further). At best, lifelong learning has been viewed as a process of marginal importance; at worst, it has sometimes even been viewed as a distraction from more important tasks. Policy measures to support lifelong learning have been adopted only recently.</p>	<p>Widespread neglect of lifelong learning is reflected in the low participation of working age citizens in lifelong learning, which has grown recently to 2.9 % in 2006, but is still low.</p>
<p>2. Increasing business R&D expenditures</p> <p>Persistently low level of business R&D expenditures is reflected in insufficient innovation performance. Innovation often plays a secondary role in business strategies, and is more likely to be stimulated by competition, rather than by strategy that utilises internal resources and capabilities.</p>	<p>Business R&D expenditures have been stagnant in recent years (around 0.5 % of GDP). Enterprises that invest in research and development have generally a low level of research and development intensity, and many innovators do not undertake R&D at all (Račić et al, 2005).</p>
<p>3. Increasing innovation diffusion and providing support to innovative enterprises with high growth potential</p> <p>Innovation is slowly developed and diffused throughout the economy and society. This is due to insufficient infrastructure and inadequate skills (which are not adequately tackled through adult learning activities), as well as by low propensity of enterprises to cooperate with other enterprises (suppliers, customers, competitors, etc) and academic institutions. Innovative enterprises with high growth potential are particularly burdened by these conditions, as their growth opportunities are constrained.</p>	<p>The relevant indicators include weak performance in lifelong learning and participation in tertiary education (16.2 %), low broadband penetration (6.2 % in 2006, according to the Ministry of Sea, Tourism, Transport and Development), as well as low innovation cooperation propensity of enterprises (according to pilot CIS survey results — cf. Račić et al, 2005).</p>

2. Innovation Governance and Policies: Key Trends in Structures and Performance

2.1 The National Innovation Governance System: an Appraisal

The **Ministry of Science, Education and Sports (MSES)** is the central government institution responsible for implementing, coordinating and monitoring science, innovation and technology activities. It is in charge of the allocation of the budgetary funds for R&D activities in public institutes and higher education institutions, as well as allocation of budgetary funds for technology programs and related activities (including science-industry cooperation and commercialisation of research results). In order to monitor and improve the quality of the innovation system and technology development, MSES established the Technology Council in 2001. The Council is responsible for promoting and improving technology and innovation policy, strengthening of innovation culture and commercialisation of research, and overseeing implementation of the HITRA – TEST programme.

Two specialised agencies implement this programme. The first one is the **Business Innovation Centre of Croatia (BICRO)**, an innovation and investment company established in 1998 in order to provide financial and other support to innovation and technology-based businesses in Croatia. The second agency is the **Croatian Institute of Technology (HIT)**, founded in 2006 in order to create pre-conditions for accelerated application of new knowledge and technologies, by providing services, expertise and project funding. HIT is also in charge of developing the national technology foresight platform and business intelligence system.

The **Ministry of Economy, Labour and Entrepreneurship (MELE)** is the central government institution in charge of implementing enterprise policy. The SME Directorate within the Ministry implements measures and activities for the development of entrepreneurship through promotion, education of entrepreneurs, technical assistance, local financing, institutional capacity building, and commercialisation of innovations. It also encourages clustering and networking of entrepreneurs, implements measures for the development of SMEs and cooperatives, improves entrepreneurial and managerial skills, undertakes the harmonisation of legal framework with EU regulations, and implements measures for international cooperation and export and investment promotion. The **Croatian Small Business Agency (HAMAG)** provides support and implements measures from the 2004–2008 Development Programme for Small Enterprises, focusing on financial incentives schemes and business advisory services through a network of certified consultants.

Although they partially cover similar grounds, the two ministries operate quite independently. In addition to MELE and MSES and their affiliated agencies there is a range of other public or private institutions that are in charge of SMEs and entrepreneurship development. The key ones are mentioned below.

The **Croatian Chamber of Economy (CCE)** and the **Croatian Employers Association (CEA)** are two leading organisations representing employers. The former one is more traditional, with compulsory membership and stronger linkages to the government, whereas the latter is voluntary, smaller and more flexible. Both of them have an important role in the entrepreneurial policy arena, but are arguably not sufficiently active enough in promoting innovation. CCE has excelled in information dissemination related to EU accession, whereas CCE has initiated the establishment of the National Cluster Centre. The **National Competitiveness Council** is an advisory body (comprising representatives of the government, business and academic sectors, as well as trade unions) with significant influence on the public policy development. The most influential document produced by the Council is its '55 Policy recommendations for Improving Croatia's Competitiveness' from 2004. **CEPOR** is a non-profit organisation established in 2001, and the first think-tank in Croatia that deals with SMEs and enterprise policy. Its most important activity is carrying out the Global Entrepreneurship Monitor (GEM)

research, that enables international comparison of Croatian entrepreneurship and serves very important aims for setting priorities and designing national policies in the SME sector.

2.1.1 Main changes in the national governance system

In 2007, innovation policy in Croatia did not undergo any dramatic changes. This was partly due to the elections that were held in November. Pre-election uncertainty and campaign activities may have affected the pace of policy development. In the case of changes to the innovation governance system, no major reforms have been undertaken. However, some previous initiatives have been further elaborated. Based on the Science and Technology Policy of the Republic of Croatia 2006–2010, an Action Plan had been adopted in 2007 for the period 2007–2010, but its implementation has been rather slow.

There have been few changes in governance mechanisms, but the establishment of new bodies has not yet led to major results. In accordance with the aforementioned Action Plan, the Strategic Council for Science and Technology (as a permanent high-level coordination body chaired by the Prime Minister) was founded in April 2008. Its members are:

- Minister of Science, Education and Sports;
- Minister of Economy, Labour and Entrepreneurship;
- Minister of Finance;
- Minister of Sea, Transport and Infrastructure;
- Minister of Environmental Protection, Physical Planning and Construction;
- President of the Technology Council;
- President of the National Science Council.

Simultaneously, the Council of the National Innovation System (composed of one government official and academic members) was founded with the aim of facilitating the implementation and evaluation of the aforementioned Action Plan. Both of the newly created coordination bodies still need to produce visible results; no work programmes or detailed action plans have been made public. There have been suggestions that the Council of the National Innovation System involves researchers active in innovation policy analysis in order to compensate for the lack of such competences within ministries and government agencies.

In other words, only the mechanisms of coordination have been changed through foundation of the aforementioned councils. Other governance mechanisms have mostly remained unchanged. Although the establishment of the new centre-right coalition government brought about some changes in responsibilities of some ministries, it has not affected innovation policy at all. The division of responsibilities between the Ministry of Science, Education and Sports, and the Ministry of Economy, Labour and Entrepreneurship has not changed. There have been no notable changes in the responsibilities of the organisations responsible for implementing innovation policies. In some cases, some new activities and/or departments have been developed. For instance, the Croatian Institute of Technology has increased its capabilities in the area of intellectual property and technology transfer by founding a specific department. The resources available to organisations in charge of innovation policy in most cases increase annually, but without any dramatic changes. The policy debate is still underdeveloped and often restricted to academic and professional circles. This is in part due to the lack of data and evaluation studies, and in part due to insufficient communication among policy makers and business and academic communities. In other words, the occasional advocacy of Croatia as a knowledge-based society is not translated into an ongoing and focused debate.

2.1.2 Main changes in the regional governance system

Regional innovation policy still does not exist in explicit forms in Croatia, although regional policy does exist — mainly at the county (NUTS 3) level. The Regional Development Act and the Strategy of Regional Development have not yet been adopted by the parliament, although they have been developed over the course of several years (the current expectations regarding their adoption point to

the autumn of 2008). The regional policy at NUTS 2 levels is still to be implemented, which is likely to be done in connection with the upcoming EU pre-accession assistance projects (IPA). According to the available information, the regional operational programmes of counties will need to be improved.

Some of the more developed counties (NUTS 3) or associations of counties have founded development agencies that occasionally implement initiatives related to innovation policy, but that usually occurs in relation to the creation or reform of academic institutions, investment into infrastructure fostering technology development, and promotion of entrepreneurship. The competences of regional governments with respect to innovation policy are weak and do not support innovation policy development, implementation and monitoring. Decentralisation of authorities and devolving of financial means is a part of the programme of the new government, but the corresponding reforms are still to be implemented. Even the local developments (e.g. promotion of entrepreneurship at the local/county level) still often depend upon means received by the central government. Consequently, there are no coordination mechanisms in place between national and regional levels related to innovation policy.

2.2 Focus and Trends of National and Regional Innovation Policies

2.2.1 The innovation policy mix

The Science and Technology Policy of the Republic of Croatia 2006–2010 has set the following six objectives in the area of technology and innovation: promotion (of the creation and growth) of knowledge-based enterprises, creation of technology infrastructure to support knowledge-based SMEs and technology-based start-ups, stimulation of demand for R&D from business, management of intellectual property, diversification of funding sources for R&D, attraction of private sector investments and creation of risk capital industry and promotion of public awareness of science and innovation.

The policy had been developed in rather broad terms which required further specification. Action Plan 2007–2010 has attempted to do that, but has also remained at the level of rather broadly defined activities (or sets of activities), which, nevertheless, are linked to rather specific performance indicators. Innovation policy measures have not been adequately and specifically addressed, so it seems that the crucial link between goals and performance indicators is missing. Consequently, the development of the policy mix over time seems to have more to do with evolution of the initial set of policy measures and with external policy transfer (through international cooperation and technical assistance projects) rather than with conscious policy design stemming from stated policy objectives.

In the current policy mix both direct (e.g. grants) and indirect (e.g. tax incentives) innovation policy measures are in place, but their effects, interactions and the extent to which they address the needs of actors within the national innovation system can be debated. The main types of measures include financial support (e.g. grants for pre-commercial research and innovation commercialisation) and actions to improve the functioning of institutions, which affect innovation processes and performance (e.g. intellectual property rights, financial markets [including venture capital], setting up firms, regulatory reforms etc.) with some attention and resources devoted to funding of innovation infrastructure and intermediaries.

The focus of the policy measures implemented by the Ministry of Science, Education and Sports and the corresponding agencies (BICRO and HIT) is on direct assistance to research organisations, SMEs and mediating institutions (e.g. technology parks and the venture capital fund). Cooperation between research institutions and the business sector is specifically addressed. Innovation-related and competitiveness-enhancing assistance measures implemented by the Ministry of Economy, Labour and Entrepreneurship follow a similar pattern, providing direct subsidies to SMEs, cooperatives, business associations and (in some cases) mediating institutions for specific projects. These projects cover areas such as education, introduction of new technologies, marketing, certification, clustering, as well as development, protection, and commercialisation of innovations.

Although it can be argued that indirect measures are often easier to implement, they seem to be less understood (in terms of expected effects), and, correspondingly, less developed. One of key additions to the policy mix in 2007 was related to a new group of indirect support measures — subsidising costs of employee education, which is aimed to facilitate lifelong learning. The measure is not explicitly targeted at facilitating innovation. It is expected that indirect measures (both tax incentives and education subsidies) will have an effect on a broad range of companies.

Since the measures tend to be relatively new or underdeveloped, it is still relatively early to discuss strengths and weaknesses in the national policy mix. CIS data (obtained in 2007) should provide deeper insights into innovation processes (including obstacles), which will enable a better understanding of the needs of companies, and correspondingly, of the adequacy of the current innovation policy mix.

2.2.2 New or significantly changed innovation policy measures

Exhibit 4: New innovation policy support measures

IPM N°	Title	Innovation policy framework category	Organisation responsible
HR 1	VENCRO (Venture Capital Programme)	4.3.1. Support to innovative start ups including gazelles 4.3.2. Support to risk capital	BICRO

The Venture Capital Programme (VENCRO) is set up as a government initiative in order to encourage potential fund managers to start venture capital funds in Croatia. Under the VENCRO programme, the Government will match up to 30 % of other investors' capital (up to EUR 4 600 000) to start a commercially-based venture capital fund in Croatia with a target size of around EUR 20 million.

VENCRO has been designed as public-private partnership whereby an investment fund is created. The role of the public sector is to select a private sector partner (a fund manager), as well as to create favourable conditions to attract private capital. The private sector partner needs to attract or provide additional capital from qualified private sources, as well as to set up and manage venture capital fund in accordance with the investment criteria in order to facilitate the development of innovative firms. The VENCRO programme has been created so as to provide an additional source of financing for innovative companies in their start-up and expansion stage. Such enterprises may be unable to obtain bank loans. Due to the level of risk, they may also be insufficiently attractive to standard private equity or venture capital investors. The role of the public sector is to reduce these risks to private investors and provide facilitating conditions for new technology based firms, whilst preserving basic market mechanisms related to venture capital fund management.

2.2.3 Trends in innovation policy at regional level

There are no clear trends concerning innovation policy at the regional level. The main changes that can be observed in some regional authorities are related to increased attention to regional enterprise policy, which also (directly or indirectly) affects innovation. Some counties are co-financing new entrepreneurship zones, developing advisory services, providing regional guarantee schemes and supporting lifelong learning. However, the utilisation of all of these measures depends upon effective demand and the structure of the local economy. The support measures developed through external assistance projects often do not achieve long-term sustainability, as the budgetary and private sources fail to compensate the resources initially received through external assistance. Consequently, only some of the measures actually reach innovative enterprises (let alone innovative start-ups).

Furthermore, the role of regional universities and polytechnics in innovation is still relatively weak. There have been some notable improvements in the universities of Rijeka and Split, which have been

developing their organisational capabilities and attracting new researchers (including Croatian returnees from abroad). However, this has still not been translated into visible outcomes related to innovation. On the other hand, the polytechnics lack research capabilities and often, to a large extent, rely on guest lecturers. The cooperation between academic institutions, business communities and policy makers at the regional level is arguably even less adequate than at the national levels. That also precludes academic institutions from acting as vehicles of regional development and/or important stakeholders of regional innovation policy.

When it comes to measures that can have long-term effects on innovation, one good example is provided by the city of Split (the largest city in Dalmatia and one of the most important regional centres). Namely, following a feasibility study, the city has announced a plan to convert former military facilities into a technology park, complemented by an incubator of companies focusing on technology development. The project is to be implemented as a public-private partnership.

One of the operational programmes of EU pre-accession assistance (IPA) is focused on regional competitiveness, which also includes innovation. Measure 2.2 within the operational programme is 'Technology transfer and support services for knowledge-based start-ups' and aims to improve technology transfer and commercialisation capacities of higher education institutions and public research organisations. The implementation of IPA funds is expected to start in the second half of 2008.

2.2.4 Focus sub-theme: policies in support of creativity and innovation

Governments and regional authorities in several countries see creativity as an important driver of increased competitiveness and growth. The need for policies in support of creativity is also perceived as crucial in this regard. In many countries, there are programmes set up specifically to promote creativity and innovation. Such programmes may be carried out by existing actors (e.g. a government agency), or new actors may be set up to run them. This year's theme will provide an overview and analysis of the existing mix of policies in support of creativity and innovation, and programmes in Croatia at national and regional level.

Given the relatively short experience in innovation policy implementation, it may not be surprising that the support to creativity rarely comes in modes that can be characterised as a separate and/or coherent policy. This is true at the national and regional levels alike. There have been no policy papers at the national level, public and/or official studies and reports (i.e. white papers) nor policies in support of creativity — neither as separate policies nor in connection to innovation policy. Moreover, there have been no studies indicating opportunities and strengths in this policy area. Apart from occasional competitions in a specific aspect of creativity (usually targeted at students), efforts to facilitate and develop creative potentials seem to be rare and outside of the policy scope. The only possible exception is in the case of SME subsidies provided by the Ministry of Economy, Labour and Entrepreneurship, whereby design and protection of intellectual property rights are among eligible costs. Creativity in general, and creative industries in particular, are usually associated with the largest urban centres. However, there are no concerted efforts to support urban creative clusters or creativity in general. The unspoken assumption is that these issues are left to individuals and organisations, as well as to market forces.

However, some initiatives are moving in the direction of creativity facilitation and promotion. Instead of a top-down policy model, the area of creativity (in the specific form of design) has witnessed several projects that have been initiated by professionals and their associations, and which have then generated policy attention and triggered or facilitated specific changes. This bottom-up approach has been largely the result of strong advocacy by a professional association (the Croatian Designer Society). Although this society predominantly represents graphic designers (which is in accordance with the current demand for design services), it has taken a broader perspective of design issues. Namely, unlike graphic design which has prospered in the last decade, industrial design in Croatia (despite a long-standing tradition) has suffered from the lack of demand because of an unfavourable

competitive position and/or lack of strategy of most manufacturers of consumer goods whose marketability depends on design (e.g. furniture and ceramics).

The Croatian Designer Society has founded a limited liability company (the Croatian Design Centre) and used it to develop projects and seek support of various relevant ministries for design as a vehicle of competitiveness. One of its key projects was Competitiveness through Design (2004–2006), which entailed an information and education campaign targeting groups in public administration, media, PR and marketing, and the general public. Following that project and several analyses, the need for a National Design Strategy has been identified. The Government of Croatia has supported a collaborative process through which this strategy has been drafted. The process has involved designers, researchers, as well as representatives of public and private sectors. This strategy has not yet been adopted by the Parliament and its future seems uncertain. Finally, the Croatian Design Centre has been included in an international network of 18 design institutions from 14 countries, which implement Admire, a large design project within the PRO INNO Europe initiative (2007–2009). The project aims to use design management to foster innovation and competitiveness in SMEs. Croatian SMEs will also be able to take part in the project, which will provide awards, and organise workshops and exhibitions with best practice examples (and promote them in the European media).

2.3 Innovation Policy and Competitiveness: Main Conclusions

2.3.1 How well does policy respond to innovation challenges?

Exhibit 5: Summary table: innovation challenges, policy responses and impact

Challenge	Relevance of policy response	Evidence of impact
Increasing participation in lifelong learning	2	3
Increasing business R&D expenditures	4	2
Increasing innovation diffusion and providing support to innovative enterprises with high growth potential	3	3

Increasing participation in lifelong learning

Incentives to employers investing in lifelong learning of their employees have been introduced by the Adult Education Act, which was adopted in late 2007. In order to increase participation in lifelong learning for the purpose of better innovation performance, additional targeted measures should be considered. Consequently, the current policy response is partial. Its relevance is reduced by its general nature. The focus is still on institution building, whereas the policy measures focusing on final beneficiaries have not yet been adequately tackled (except the aforementioned incentives). Specific measures related to foster lifelong learning that will be more closely related to innovation performance still need to be developed and implemented (e.g. through reforming the system of training provision). Consequently, the relevance of policy response is relatively low, and as for the impact, it is still too early to estimate. Some growth in participation in lifelong learning has been observed prior to the introduction of recent measures.

Increasing business R&D expenditures

Some form of support for business R&D exists from the inception of innovation policy as a distinct policy area in Croatia. This has recently been complemented by setting up of the venture capital programme (VENCRO) and the redefinition of the system of tax incentives for R&D. Despite several years of implementation of some measures in this area, no discernible effects on business R&D can be observed: the performance is stagnant. Arguably, this can partly be explained by the incomplete coverage of R&D activities by the Central Bureau of Statistics. However, the policy measures in this

area should cover more beneficiaries and become more effective. We can argue that the current policy response is quite relevant, but there is no firm evidence on its impact.

Increasing innovation diffusion and providing support to innovative enterprises with high growth potential

There are no comprehensive or coherent efforts to promote innovation diffusion. There are a variety of initiatives and policy measures, but without sufficient focus and coordination. Some areas (e.g. broadband penetration) seem to be neglected, but nonetheless there are gradual positive trends. The support provided to innovative start-ups has not yielded strong results, but that may be partly due to the short implementation period. The issue of growth of innovative enterprises has also recently been targeted by the VENCRO programme. Due to the breadth of this policy area, the policy response is patchy. Although some specific measures exist, they are insufficient and/or there was not enough time for them to respond fully to the challenge.

There is no firm evidence that innovation policy implementation has so far significantly contributed to the competitiveness of the Croatian economy. This may be partly due to the lack of evaluation. It is also due to some extent to the relatively short period of innovation policy implementation in Croatia. There is some data on some beneficiaries of direct grants (but only related to inputs received through policy measures). These projects or companies are too early in the stages of development to be able to foster competitiveness to a significant extent. The effects on beneficiaries of indirect policy measure (e.g. tax incentives) are not recorded or analysed at all. However, the overall position of innovation policy may indicate its suboptimal performance in the area of competitiveness. Namely, innovation policy largely functions as a subset of science and technology policy for which the Ministry of Science, Education and Sports and its affiliated agencies are responsible. The coordination with the Ministry of Economy, Labour, and Entrepreneurship and agencies is more strongly associated with competitiveness issues still weak. In practice, this may mean that there is a relatively stronger focus on inputs (i.e. resources and incentives related to innovation policy), rather than outputs (increased competitiveness of enterprises and sectors achieved through innovation).

Finally, as discussed earlier, regional aspects of innovation policy in Croatia are still underdeveloped or non-existent. Regional policy itself is still an emerging area which is not supported by relevant laws and strategies. Funds for specific projects aimed at regional development are disbursed at national and regional levels (e.g. for investments into infrastructure, environmental protection, and entrepreneurship), but the overall process is not adequately guided by strategic priorities. In recent years, there has been an increase in investments into institutions that support entrepreneurship at the local or regional levels (e.g. entrepreneurship centres, incubators, and regional development agencies). However, none of them has developed a consistent policy mix and secured resources for sustained implementation of innovation policy measures at the regional level. Such institutions largely function through external assistance projects: once the project is completed, it is often hard to continue provision of services to entrepreneurs.

2.3.2 Lessons learned from policy evaluation and good practice

Over the past year, no innovation policy support measures or governance structures have been the subject of a performance review or evaluation. The lack of evaluation culture is one of the key obstacles to more effective policy making in Croatia. The introduction of regular policy evaluation would provide feedback to those who implement innovation and other relevant policies, facilitate policy learning, make efficient use of public resources, and foster transparency within the innovation system.

Consequently, a good practice case cannot be selected on the basis of an evaluation, but through assessment of the author of the report on the basis of available data. Moreover, since the period of implementation of most policy measures is relatively short and there is data scarcity, an initiative has been selected that is among the most innovative and far reaching in the Croatian innovation system, but whose results still largely need to be monitored and assessed. This is the case of a technology transfer agency, Ruđer Innovations, founded by the largest research (natural sciences) institute, the Ruđer Bošković Institute, within the Science and Technology Project supported by the World Bank. It was founded in 2006 as a limited liability company owned by the institute. However, its strategy

demonstrates the potential to reach other institutions and researchers, and provide them with increased opportunities to commercialise their knowledge. In addition to the support of international experts, this initiative has been selected on the basis of the following criteria:

- Innovativeness — it provides a departure from previous innovation policy practices whereby mediating institutions have primarily been designed as quasi-governmental bodies with too widely defined user groups (rather than independent organisations serving specific target groups and institutions, but open to external clients as well);
- Flexibility — as a company managed by professional staff, Ruđer Innovations can be much less regulated and more open to adjustments in external conditions and demands;
- Strategic orientation/coherence — it directly addresses the strategic objectives of national innovation policy (i.e. technology transfer and science-industry cooperation) and is coherent with EU innovation policy priorities.

Ruđer Innovations has been set up as a company for innovation services and transfer of technology with the support of an EUR 4 million loan from the World Bank (Science and Technology Project). Its tasks include intellectual property and patent protection, financial support for the development of new innovative products, technology transfer, establishment of new spin-off companies, and networking with other domestic and foreign scientific and high-technology field actors. The company assists with the development of high technology innovations, and all the way through to their commercialisation. A particular novelty in the Croatian context is active support to academic entrepreneurship. The services to researchers and innovators include assessment and protection of intellectual property rights, commercialisation of innovations, as well as advisory, management and education services. They also offer similar services to research-intensive companies that seek professional assistance. During its first year of operation, Ruđer Innovations has set up two spin-off companies and developed a portfolio of over a dozen research-based innovations that are being presented to potential partners.

2.3.3 Possible orientations for future policy actions

Innovation policy in Croatia is relatively comprehensive, but there are still gaps that need to be addressed. These gaps often relate to policy implementation mechanisms (which can be further developed and/or simplified for final beneficiaries), promotion and communication of policy measures, coordination between different bodies responsible for innovation policy, as well as to planning and evaluation processes (which are still either underdeveloped or missing).

Consequently, future policy can make use of the following suggestions:

- implement the Action Plan for Increasing Investments into Science and Research and monitoring its implementation on an annual basis;
- perform regular evaluation of innovation policy (including the work of institutions which are responsible for policy implementation);
- develop regional innovation strategies;
- analyse and redefine mechanisms of coordination between different government bodies (ministries, agencies, regional authorities, etc) responsible for socio-economic development in general and innovation policy in particular;
- develop a platform for dialogue among researchers, policy makers, business people, media, the general public, and others concerned by innovation development.

3. Thematic Focus: Support for Innovative Start-ups, including Gazelles

Innovative start-ups are seen as important vehicles for economic growth. Without business conditions that facilitate the creation of business start-ups, the contribution of investment in science and technology to innovation and growth will remain limited. New technology-based firms are significant employers of scientific and engineering personnel and key actors in the innovation process. These conditions may include well-functioning venture capital markets, regulatory reform to enable greater entry and exit, and a business climate stimulating risk-taking in the creation of new innovative firms.

In this section we therefore investigate the role of policies to support innovative start-ups in the national innovation system.

3.1 General Framework Condition for Innovative Start-ups

Despite improvements and some new policy measures introduced in the last decade, the general framework conditions for innovative start-ups are still not favourable. This is primarily the result of insufficient support to innovative start-ups as a specific and rather important target group for enterprise policy, which require specific support due to the higher degree of risk that accompanies such projects. This is particularly the case in countries (such as Croatia) where the business environment is characterised by legislative and public administration reform, there is a weak tradition of knowledge- and innovation-based entrepreneurship, and which does not have a developed financial (including venture capital) market.

However, innovation and enterprise policy have been developed simultaneously, but without adequate synergies. Moreover, innovative start-ups are not always singled out in policy measures, but rather grouped with other innovation-based enterprises. Innovation policy has initially focused on fostering science-industry collaboration (thereby neglecting academic entrepreneurship) through commercialisation of research results or newly developed technologies. It also had introduced a programme (RAZUM) dealing with support to existing knowledge-based enterprises, but its results have been mixed.

On the other hand, enterprise policy has focused on improvements to the business environment and specific grants have been provided to operating SMEs and SME support institutions. In recent years, the focus was also on administrative simplification in order to speed up company registration. Innovative start-ups seem to have been a group outside of policy focus. They have neither been adequately supported through innovation policy nor through enterprise policy. Incubator services have rarely been provided. Financing sources have often been too expensive (and/or often with prohibitive collateral requirements). Advisory, networking and coaching activities have been underdeveloped. Finally, business environment uncertainty has made innovation-based entrepreneurship a rather risky choice, whereas the education system (universities and polytechnics, in particular) has failed to provide students with entrepreneurial knowledge and attitudes. Consequently, the framework conditions have been largely unsupportive.

This has changed to some extent in recent years, with improvements in both innovation and enterprise policies, legislative improvements, and development of the financial system. However, innovative start-ups still do not receive adequate support. The ministries and agencies responsible for managing the measures for innovative start-ups include the Ministry of Science, Education and Sports and BICRO (on the innovation policy side), and the Ministry of Economy, Labour and Entrepreneurship and HAMAG (on the enterprise policy side). This duality has never been resolved; it may be a source of confusion to some prospective entrepreneurs.

Entrepreneurs often include availability or cost of capital among the primary obstacles to setting up or developing successful innovation-based firms (cf. Račić et al, 2005). This is true, to some extent, as

banks have been reluctant to support such projects without strong collateral. Whereas government guarantee schemes have often been underdeveloped or too bureaucratic to address the needs of these entrepreneurs. On the other hand, owners and managers of innovation-based business rarely consider seeking venture capital or private equity funds. Consequently, existing funds often experience deal flow problems (cf. Young and Cvijanović, 2006). That is, there is an insufficient number of potential investees interested in receiving private equity investments.

No policy papers or studies on innovative start-ups have been published at the national level. However, for several years, the CEPOR think tank has been taking part in the international project Global Entrepreneurship Monitor, which analyses new entrepreneurial activity across countries. One of the analysed categories is high growth potential start-ups, which are characterised by innovation capability, export orientation, and employment generation capability. The last GEM analysis has shown above-average frequency of innovative start-ups in Croatia — in comparison to other analysed countries. This research does not provide comprehensive information on innovation policy. The assessments of entrepreneurs are predominantly critical, with policies and measures related to technology transfer being viewed in a particularly unfavourable way (cf. CEPOR, 2006). The linkages between research institutions and firms are weak, and respondents seem to have ascribed most of the responsibility to ineffective policies.

3.2 Specific Policies and Programmes for Innovative Start-ups

There are two main programmes that tackle innovation commercialisation through the creation and development of innovative start-ups.

The most important programme is RAZUM, which has been designed as a seed capital and innovation commercialisation programme. It aims at ensuring a sustainable increase in the number of knowledge-based SMEs. It is implemented by BICRO, which identifies projects and firms, evaluates their capabilities, and on that basis, provides them with early seed financing. The support can be provided to companies that are using traditional or advanced technology but which can be expected to have a significant favourable impact on economic development. In addition, the new guidelines harmonise the rules for public support to technology-based companies with EU regulations regarding market competition.

The programme operates based on public support and other sources of financing contributing towards 70 % of project costs in the form of conditional grants (which are repaid only if the project is commercially successful), and the remaining 30 % is contributed from the private sector (by the entrepreneur). The projects which are expected to have higher commercialisation potential can also be financed in a different manner — through loans or equity investments which are done in cooperation with the Croatian Bank for Reconstruction and Development. In the latter case, the public sector partner exits the investment after not more than seven years. In total, the programme is expected to combine EUR 86 million of financing over the next four years, with EUR 20 million coming from the private sector.

The other programme aimed at innovation commercialisation is implemented by the Ministry of Economy, Labour and Entrepreneurship. It is called 'Innovation and New Products'. It facilitates the application of innovations to create marketable products. Consequently, innovators (physical persons), research-based SMEs (including start-ups), and associations of innovators are all encouraged to apply for grants. The eligible expenditures may include any of the following:

- costs of protection of intellectual property rights at the national and international level, and of the accompanying activities;
- costs of acquisition of additional knowledge in order to complete the innovation process;
- costs of construction or procurement of tools necessary to develop a new product;
- costs of making and testing of prototypes or processes;
- costs of instruments and research equipment;
- costs of design;
- participation in specialised innovation fairs and exhibitions;

- innovation commercialisation by the innovator;
- purchasing of innovation.

The subsidies can amount to (up to) 75 % of eligible costs, with the maximum value of HRK 200 000 (less than EUR 28 000).

3.3 Integration with other Competitiveness Policies

The presented support measures that tackle start-ups are integral parts of innovation and enterprise policy, respectively. Given the relatively early stage of policy development and underdevelopment of the knowledge-based economy in general, potential beneficiaries (e.g. innovative firms) tend to be defined in rather broad terms in order to facilitate a higher number of prospective applicants. The link between innovation and enterprise policies is quite strong, although they formally operate independently and have some overlaps. The presented support measures are also tangentially linked to other policies — for example, the Innovation and New Products measure also supports participation in specialised innovation fairs and exhibitions, which can be viewed as a step towards internationalisation. However, these linkages are not crucial elements of their design.

Annex: Sources of further information

Annex 1: Websites of key innovation organisations

Government bodies		
	Ministry of Science, Education and Sports (MSES)	http://public.mzos.hr/Default.aspx?sec=2429
	Ministry of Economy, Labour and Entrepreneurship (MELE)	http://www.mingorp.hr/defaulteng.aspx
	Technology Council of the MSES	http://public.mzos.hr/Default.aspx?sec=2178
Private sector organisations and entrepreneurship promotion		
	Croatian Chamber of Commerce (HGK)	http://www2.hgk.hr/en/
	National Competitiveness Council	http://nvk.multilink.hr/english/default.asp
	Croatian Employers Association (HUP)	http://www.hup.hr/default.asp?jezik=2
	Centre for SME policy (CEPOR)	http://www.cepor.hr/onama.html#
Industrial research centres and innovation intermediaries		
	Business-innovation centre of Croatia (BICRO)	http://www.bicro.hr/
	Croatian Institute of Technology (HIT)	http://www.hit.hr/
	Croatian Agency for Small Businesses (HAMAG)	http://www.hamag.hr/about_us.aspx
	Centre for Technology Transfer, Zagreb	http://www.ctt.hr/index_en.asp
	Technology Centre Split	http://www.tcs.hr/
	Centre for Innovative Technology Rijeka	http://www.ticri.hr/tic.htm
	Technology and Innovation Centre, Osijek	http://www.tera.hr/tera/hr/entrepreneur/budiuzor.html
	Research and Development Centre for Mariculture, Dubrovnik	http://www.unidu.hr/ric.php
Financial system		
	Croatian Bank for Reconstruction and Development (HBOR)	http://www.hbor.hr/eng/default.asp
	Croatian Private Equity and Venture Capital Association (CVCA)	http://www.cvca.hr/pages/events.asp?lan=en

Annex 2: Bibliography

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Available at: <http://www.gemhrvatska.org/gembrosura2006.pdf>

Government of Croatia (2007) *Regional Competitiveness Operational Programme 2007–2009, 2007HR16IPO001 - Instrument For Pre-Accession Assistance*.
Available at: www.strategija.hr/lgs.axd?t=16&id=517

Ministry of Science, Education and Sports (2006) *Science and Technology Policy of the Republic of Croatia 2006–2010*.
Available at: public.mzos.hr/lgs.axd?t=16&id=11958

Ministry of Science, Education and Sports (2007) *Akcijski plan 2007–2010. - Znanstvena i tehnološka politika Republike Hrvatske*.
Available at: public.mzos.hr/lgs.axd?t=16&id=12955

Račić, D. et al. (2005) *Innovation in Croatian Enterprises 2001–2003*. Zagreb: The Institute of Economics.

Young, A.E., Cvijanović, V., (2006) 'The Market for Venture Capital in Croatia' In Besler W., (ed.), *Börsen, Banken und Kapitalmärkte. Festschrift für Hartmut Schmidt zum 65. Geburtstag*, Duncker & Humblot, Berlin.

Internet sources:

Business Innovation Centre of Croatia: <http://www.bicro.hr/>

Central Bureau of Statistics: http://www.dzs.hr/default_e.htm

Central Office for Development Strategy and Coordination of EU Funds:
<http://www.strategija.hr/Default.aspx?sec=2>

Government of the Republic of Croatia: <http://www.vlada.hr/en>

Ministry of Science, Education and Sports: <http://public.mzos.hr/default.aspx?sec=2428>

Ministry of Economy, Labour and Entrepreneurship:
<http://www.mingorp.hr/cacheeng.aspx?pg=defaulteng.asp&cache=1&id=&glink=>