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Research and Innovation performance in Croatia

Country profile

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Croatia

The challenge of structural change for a more knowledge-intensive economy

Summary: Performance in research, innovation and competitiveness

The indicators in the table below present a synthesis of research, innovation and competitiveness in Croatia. They relate knowledge investment and input to performance or economic output throughout the innovation cycle. They show thematic strengths in key technologies and also the high-tech and medium-tech contribution to the trade balance. The table includes a new index on excellence in science and technology which takes into consideration the quality of scientific production as well as technological development. The indicator on knowledge-intensity of the economy is an index on structural change that focuses on the sectoral composition and specialisation of the economy and shows the evolution of the weight of knowledge-intensive sectors and products and services.

	Investment and Input	**Performance/economic output**
Research	*R&D intensity* 2011: 0.75% (EU: 2.03%; US: 2.75%) 2000-2011: -2.72% (EU: +0.8%; US: +0.2%)	*Excellence in S&T* 2010:12.25 (EU:47.86; US: 56.68) 2005-2010: +2.31% (EU: +3.09%;US: +0.53)
Innovation and Structural change	*Index of economic impact of innovation* 2010-2011: 0.353 (EU: 0.612)	*Knowledge-intensity of the economy* 2010:n.a (EU:48.75; US: 56.25) 2000-2010: n.a. (EU: +0.93%; US: +0.5%)
Competitiveness	*Hot-spots in key technologies* Healthcare sector; Food processing and agro-business; Energy technology; Electronics and Advanced materials and Digital techniques	*HT + MT contribution to the trade balance* 2011: 2.98% (EU: 4.2%; US: 1.93%) 2000-2011: +133.23% (EU: +4.99%; US:-10.75%)

Croatia is building up its research and innovation system. Although starting from a low level, its science and technology excellence has clearly improved after 2005. Efforts are still needed to enhance R&D investment and to build up capacities in key technology areas and to improve international competitiveness and trade by producing more technology-intensive goods.

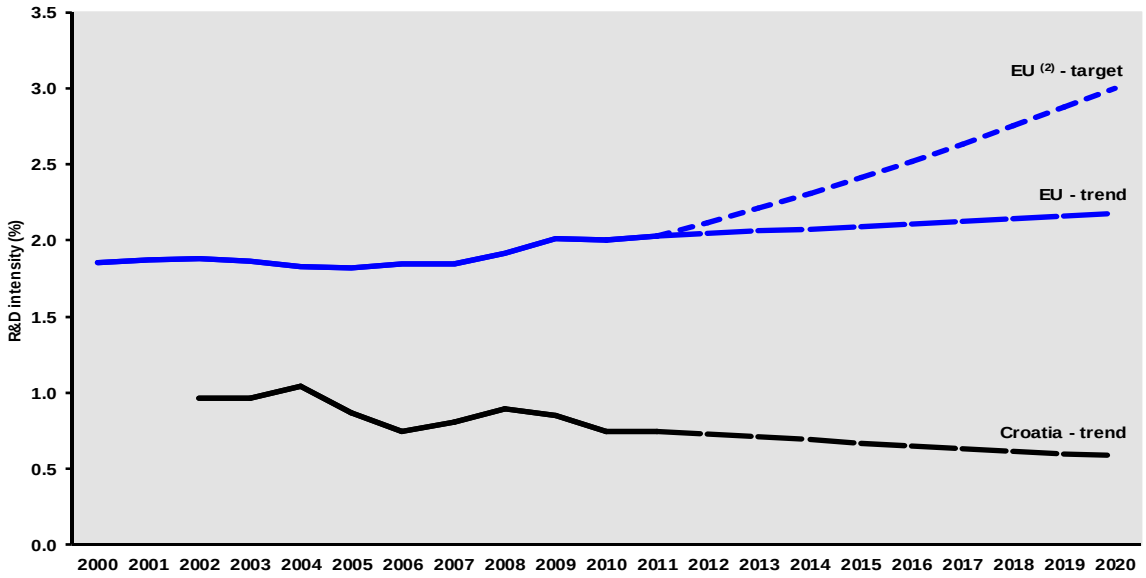
Since 2000, Croatia has restructured its science (and education) system with the objectives of turning the country into a knowledge based society and of strengthening the country's research capacity as a lever for economic development. Driven its determination to join the EU, Croatia has taken steps to strengthen its national research capacity by taking measures and adopting polices that are compatible with EU policy on the European Research Area. Croatia, however, has been slow to implement the envisaged actions and lacks reliable statistics and the administrative capacity to monitor and follow-up the envisaged reforms. Croatia has also suffered from the economic recession.

The new Government elected in December 2011 continued the efforts to reform the science system by proposing amendments to the Act on Scientific Activity and Higher Education aimed at creating an adequate legislative framework for a more programme-based and competitive funding of research institutes (adoption by Parliament foreseen before end of 2012).

A new R&D strategy and a "National Innovation Strategy is under preparation for the period 2013-2020.

Investing in knowledge

Croatia - R&D intensity projections, 2000-2020 (1)



Source: DG Research and Innovation - Economic Analysis Unit
Data: DG Research and Innovation, Eurostat
Notes: (1) The R&D intensity projections based on trends are derived from the average annual growth in R&D intensity for 2000-2011.in the the case of the EU and for 2002-2011 in the case of Croatia.
(2) EU: This projection is based on the R&D intensity target of 3.0% for 2020.
(3) HR: An R&D intensity target for 2020 is not available.

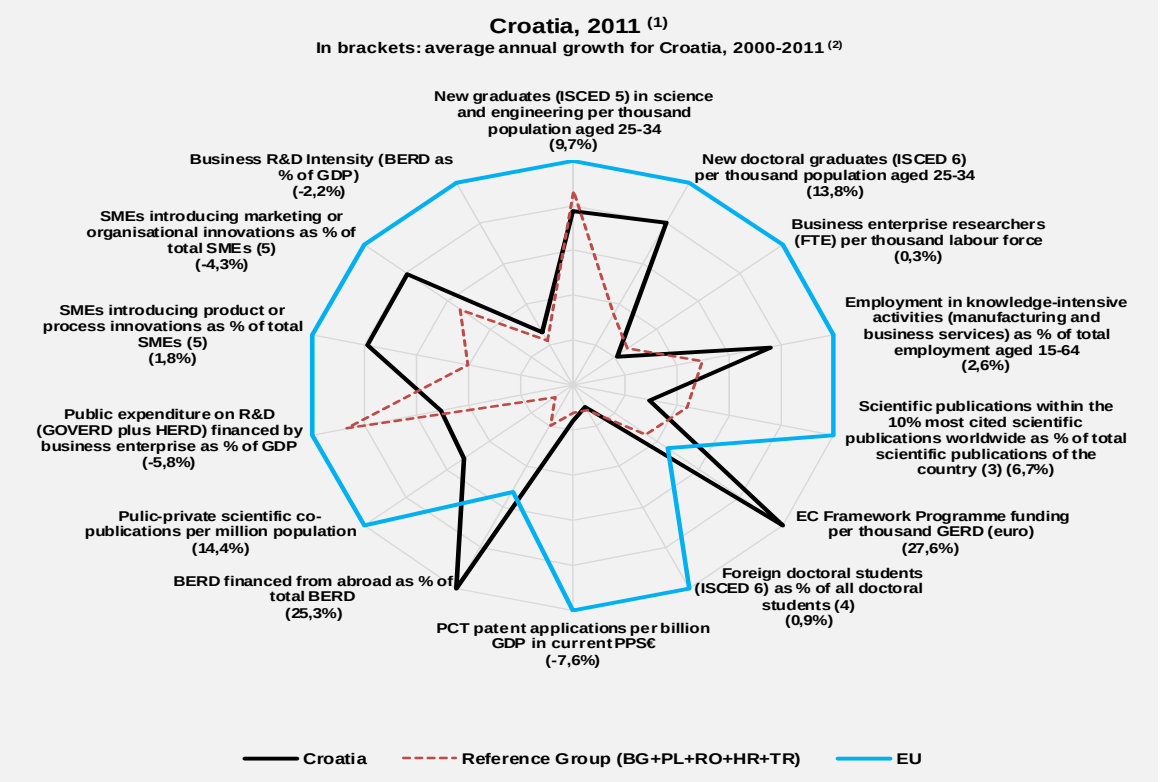
In 2011 Croatia had an R&D intensity of 0.75% and a business R&D intensity of 0.33%. Croatia's R&D intensity decreased from 0.90% in 2008 to 0.75 % in 2011. This was mainly due to an overall slowdown of the national economy during the last four years, which was additionally affected by the global financial and economic crisis. Croatia did not meet its own national target of 1% by 2010. Accordingly, Croatia has opted to first reform the science system before setting new targets. Total R&D expenditure (GERD) which amounted to € 330 million in 2011 decreased by 3.2% between 2004 and 2011. Croatia's R&D intensity of 0.75% in 2011 was well below the EU average of 2.03%. and has decreased at an average annual rate of 2.7% over the period 2002-2011.

Regarding EU funding, Croatia participates in FP7 as an associated country. It has a good level of participation (an average success rate close to 18%) which has amounted to about € 50 million of EU funding for Croatian research entities since the beginning of FP7. Croatia is particularly successful under the scientific themes in which it is also strong at national level i.e.: healthcare, ICT, biotechnology and transport. Participation of SMEs is also good: out of 225 applicants 57 (or more than 25%) were selected for funding. Croatia is a full member of the Eurostar initiative. Croatia is also a member of COST and EUREKA.

As a Candidate Country, and since December 2011, an Accession Country, Croatia is eligible for EU support under the Pre-Accession Instrument (IPA) and has used that instrument in support of research and innovation capacity building such as the creation of the Business Innovation Centre of Croatia (BRICO) which is a dedicated institution for the promotion of research and innovation in SMEs. The latter is a good demonstration that Croatia is concentrating its efforts on innovation and creating links between the public and private sectors. Croatia wll become a member State on 1 July 2013 and will then have access to the Structural Funds and notably the European Regional Development Fund (ERDF) and the European Social Fund (ESF) for R&I capacity building purposes. BRICO will be the ggency in charge of the competitiveness axis under the Structural Funds.

An effective research and innovation system building on the European Research Area

The graph below illustrates the strengths and weaknesses of Croatia's R&I system. Reading clockwise, it provides information on human resources, scientific production, technology valorisation and innovation. Average annual growth rates from 2000 to the latest available year are given in brackets.



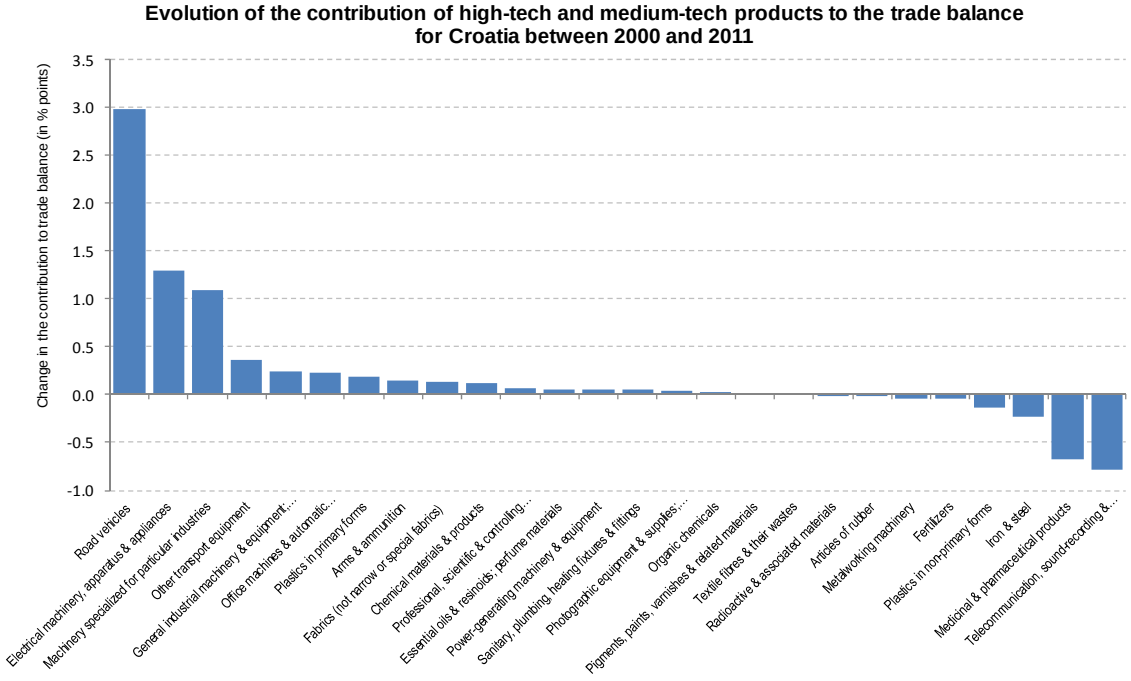
Source: DG Research and Innovation - Economic Analysis Unit
Data: DG Research and Innovation, Eurostat, OECD, Science Metrix / Scopus (Elsevier), Innovation Union Scoreboard
Notes: (1) The values refer to 2011 or to the latest available year.
(2) Growth rates which do not refer to 2000-2011 refer to growth between the earliest available year and the latest available year for which comparable data are available over the period 2000-2011.
(3) Fractional counting method.
(4) EU does not include DE, IE, EL, LU, NL.
(5) TR is not included in the reference group.

This graph shows that Croatia is lagging behind the EU average on most key research and innovation indicators but it is doing well or better than several other Member States and Associated Countries with a similar knowledge and economic structure. Croatia is performing above the EU average in attracting business R&D from abroad, although this is also linked to the low total business R&D in the country. Croatia faces a particular challenge in improving private-public cooperation and in valorising and commercialising research generated by publicly funded institutes.

Human capital building in S&T is below the EU average. Croatia still has a large scientific diaspora. The lack of attractive research infrastructures and good research management is leading to a further increase in brain drain. The MSES and the Agency for Mobility have, however, stepped up efforts on human capital building by actively supporting the principles of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers. In total, nine Croatian institutes have been accredited for HR excellence in research. Croatia is participating in the work of the Steering Group on Human Resources and Mobility (SGHRM). The Croatian Researchers Mobility Portal was launched in 2009.

Competitiveness in global demand and markets

Investment in knowledge, technology-intensive clusters, innovation and the upgrading of the manufacturing sector are determinants of a country's competitiveness in global export markets. A positive contribution of high-tech and medium-tech products to the trade balance is an indication of specialisation and competitiveness in these products.



Source: DG Research and Innovation - Economic Analysis unit
Data: COMTRADE
Notes: "Textile fibres & their wastes" refers only to the following 3-digits sub-divisions: 266 and 267.
"Organic chemicals" refers only to the following 3-digits sub-divisions: 512 and 513.
"Essential oils & resinoids; perfume materials" refers only to the following 3-digits sub-divisions: 553 and 554. "Chemical materials & products" refers only to the following 3-digits sub-divisions: 591, 593, 597 and 598. "Iron & steel" refers only to the following 3-digits sub-divisions: 671, 672 and 679.
"Metalworking machinery" refers only to the following 3-digits sub-divisions: 731, 733 and 737.

Croatia is a net importer with a trade deficit in the order of € 8 billion in 2010 compared to about € 3.5 billion in 2001. Following the economic crisis, trade volume decreased significantly in 2009, 2010 and 2011 but exports in high-tech and medium-tech products continued to grow. Croatia is, for example, a net exporter of goods and products in which its research capacity is also strong such as fertilizers, plastic products in primary forms, electrical machinery and transport equipment. The graph above shows that important sectors such as road vehicles, electrical and specialised machinery have increased their contribution to the Croatian trade balance.

Croatia's employment rate has fallen since 2008 as a result of the economic crisis. The share of renewable energy in total energy consumption has slightly increased over the last years. However, Croatia's performance on energy efficiency and reducing the level of CO2 by stimulating the use of renewable energy is still at a low level, which is also reflected in the Croatian research capacity under the FP7 environment theme.

Key indicators for Croatia

CROATIA	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average annual growth [1] (%)	EU average [2]
ENABLERS															
Investment in knowledge															
New doctoral graduates (ISCED 6) per thousand population aged 25-34	:	:	:	0.55	0.60	0.64	0.72	0.76	0.80	0.92	1.35	:	:	13.8	*1.69*
Business enterprise expenditure on R&D (BERD) as % of GDP	:	:	0.41	0.38	0.44	0.36	0.27	0.33	0.40	0.34	0.33	0.33		-2.2	*1.26*
Public expenditure on R&D (GOVERD + HERD) as % of GDP	:	:	0.55	0.59	0.61	0.51	0.47	0.48	0.50	0.51	0.42	0.41	:	-3.1	*0.74*
Venture Capital as % of GDP	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
S&T excellence and cooperation															
Composite indicator of research excellence	:	:	:	:	:	10.9	:	:	:	:	12.2	:	:	2.3	47.9
Scientific publications within the 10% most cited scientific publications worldwide as % of total scientific publications of the country	1.9	1.9	2.3	2.1	2.4	2.8	3.0	3.1	3.2	:	:	:	:	6.7	10.9
International scientific co-publications per million population	*81*	*84*	97	149	172	194	210	233	247	293	334	388	:	15.3	300
Public-private scientific co-publications per million population	:	:	:	:	:	:	:	16	18	23	27	27	:	14.4	53
FIRM ACTIVITIES AND IMPACT															
Innovation contributing to international competitiveness															
PCT patent applications per billion GDP in current PPS€	1.3	1.2	1.8	1.6	1.4	1.2	1.1	0.9	0.7	0.6	:	:	:	-7.6	3.9
License and patent revenues from abroad as % of GDP	:	:	:	:	0.10	0.16	0.09	0.07	0.06	0.05	0.05	0.04	:	-12.9	0.58
Sales of new to market and new to firm innovations as % of turnover	:	:	:	:	:	:	13.0	:	14.4	:	10.5	:	:	-5.2	14.4
Knowledge-intensive services exports as % total service exports	:	:	:	:	13.9	14.8	14.8	16.8	16.0	14.0	15.0	:	:	1.3	45.1
Contribution of high-tech and medium-tech products to the trade balance as % of total exports plus imports of products	-3.06	-2.79	-3.25	-4.07	-2.21	-2.46	-2.27	-1.22	0.23	-0.44	2.12	2.98	:	-	4,20 [3]
Growth of total factor productivity (total economy) - 2000 = 100	100	103	106	107	109	110	110	111	109	101	101	102	101	1 [4]	103
Factors for structural change and addressing societal challenges															
Composite indicator of structural change	32.0	:	:	:	:	37.1	:	:	:	:	38.2	:	:	1.8	48.7
Employment in knowledge-intensive activities (manufacturing and business services) as % of total employment aged 15-64	:	:	:	:	:	:	:	:	9.5	9.2	9.9	10.3	:	2.6	13.6
SMEs introducing product or process innovations as % of SMEs	:	:	:	:	:	:	28.3	:	31.5	:	30.4	:	:	1.8	38.4
Environment-related technologies - patent applications to the EPO per billion GDP in current PPS€	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	:	:	:	:	-6.9	0.39
Health-related technologies - patent applications to the EPO per billion GDP in current PPS€	0.12	0.24	0.40	0.48	0.23	0.36	0.25	0.05	0.07	:	:	:	:	-6.1	0.52
EUROPE 2020 OBJECTIVES FOR GROWTH, JOBS AND SOCIETAL CHALLENGES															
Employment rate of the population aged 20-64 (%)	:	:	58.4	58.3	59.6	60.0	60.6	62.3	62.9	61.7	58.7	57.0	:	-0.3	68.6
R&D Intensity (GERD as % of GDP)	:	:	0.96	0.96	1.05	0.87	0.75	0.80	0.90	0.85	0.75	0.75	:	-2.7	*2.03*
Greenhouse gas emissions - 1990 = 100	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Share of renewable energy in gross final energy consumption (%)	:	:	:	:	15.2	14.1	13.8	12.4	12.2	13.2	14.6	:	:	-0.7	12.5
Share of population aged 30-34 who have successfully completed tertiary education (%)	:	:	16.2	16.9	16.8	17.4	16.7	16.7	18.5	20.6	24.3	24.5	:	4.7	34.6
Share of population at risk of poverty or social exclusion (%)	:	:	:	:	:	:	:	:	:	:	31.3	32.7	:	4.5	*24.2*

Source: DG Research and Innovation - Economic Analysis Unit

Data: Eurostat, DG JRC - ISPRA, DG ECFIN, OECD, Science Metrix / Scopus (Elsevier), Innovation Union Scoreboard

Notes: (1) Average annual growth refers to growth between the earliest available year and the latest available year for which compatible data are available over the period 2000-2012.

(2) EU average for the latest available year.

(3) EU is the weighted average of the values for the Member States.

(4) The value is the difference between 2012 and 2000.

(5) Values in italics are estimated or provisional.

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