
JRC SCIENCE FOR POLICY REPORT

From the complete publication:

# RIO Country Report 2015: Croatia

Chapter:

*Executive summary*

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2016

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JRC101193



**Abstract**

The 2015 series of RIO Country Reports analyse and assess the policy and the national research and innovation system developments in relation to national policy priorities and the EU policy agenda with special focus on ERA and Innovation Union. The executive summaries of these reports put forward the main challenges of the research and innovation systems.

# Executive summary

The report offers an analysis of the R&I system in Croatia for 2015, including relevant policies and funding, taking into account the priorities of the European Research Area and the Innovation Union. The report was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites, etc. The quantitative and qualitative data is, whenever possible, comparable across all EU Member State reports. The report contents are partly based on the RIO Country Report Croatia 2014 (Račić, Domagoj and Švarc, Jadranka, 2015).

**Context**

GDP per capita amounted to €10,200 (16 100 in PPS and 59 PPS where EU28=100) in 2014 (Eurostat) and it is significantly below EU-28 level (€27,400, 27 400 PPS). GDP has continuously declined over the last several years. In 2012, GDP growth rate amounted to -2.2%, followed by decrease in 2013 by -0.9%, and continuation of the trend in 2014 (-0.4%). Positive indications, considering GDP growth rate, have been registered in the 4th quarter of 2014. The forecast for 2015-2017 is positive as well: 1.8-2.1% growth[1].

In line with the EU Council recommendations from January 2014, Croatia needs to address the issue of excessive budget deficit by 2016 – by 4.6% in 2014; 3.5% in 2015 and 2.7% in 2016. The Croatian post-crisis fiscal adjustment has not started up until 2011 and it is not accomplished yet, with 2011 being the year with the strongest fiscal adjustment. During 2011-14 GBAORD and GERD funded domestically by the government decreased steadily, both nominally and as a share of the GDP by 0.15% of GDP – GBAORD, and 0.04% – government financed GERD. Therefore we can conclude that the Croatian post-crisis fiscal adjustment has come at an expense of direct public support to R&D expenditures through significant cuts in R&D budgets. Croatia is still experiencing excessive macroeconomic imbalances which require decisive policy action and specific monitoring. In addition, already scarce state budget resources have been announced to further decrease in 2016 and 2017. GBAORD decreased from 1.54% of government expenditures in 2011 to 1.3% in 2014 (Eurostat).

The total gross domestic expenditure on R&D (GERD) amounted to €340m in 2014, which is a decrease compared to €354 in 2013. In the past years GERD was characterized by fluctuation; in 2012 it has decreased to €330m from €336m in 2011. The R&D intensity amounted to 0.81% in 2013, which was 0.06 percentage points higher in comparison to 2012 and 2011 when it was at the same level (0.75%) (Eurostat). However, GERD decreased again in 2014, amounting to 0.79% of GDP. This is significantly below the latest R&D investment target, which has been set to 1.4% of GDP by 2020.

The R&I system has gone through significant changes since mid-2013 due reduced budget resources for R&I and to the significant reforms in both research and innovation system in pursuit of scientific excellence and innovation efficiency. The austerity policy, caused by the sixth consecutive year of economic contraction and excessive public deficits, resulted in significant changes not only in funding but also in the organisation, governance, performing and evaluation of R&I activities.

Key developments in the R&I system in 2015 included:

- Two programmes of CSF (the Partnership in research and the Unity through Knowledge Fund) and three innovation programmes run by the HAMAG-BICRO (PoC, RAZUM, IRCRO) for allocation of R&I grants were re-launched in 2015, given the STP II funds availability;

[1] EC Winter 2016 Economic Forecast : http://ec.europa.eu/economy_finance/publications/eeip/pdf/ip020_en.pdf

- A new programme for technology transfer at universities (TTU) has been launched in February 2015 and co-funded by STP II resources;
- In April 2015, a new call for Centres of research excellence has been launched; in November 2015 six new Centres of research excellence have been established;
- Croatia begun its participation in the Regional innovation fund of the Western Balkan countries (ENIF) with a total national contribution of around €0.5m per year;
- Establishment of the first venture capital fund for innovation and entrepreneurship;
- A new programme announced for funding young researchers/teachers;
- S3 has been drafted and several drafts have been sent to EC for adoption (it was adopted in 2016);
- The Ministry of Science, Education and Sports (MSES) has announced a third call for research infrastructures which will be funded by European Structural and Investment Funds (ESIF) 2014-2020 for restricted applicants.

Croatia is a new member of the EU, but is making efforts to align with ERA priorities and participates actively in several international initiatives. Research e-Infrastructures are rather well developed in Croatia and in the area of open, transparent and merit based recruitment Croatia has made a big progress since 2012. On the other side, as a general rule, national research grants are not portable and the country has a weak share of publications in the top 10% most cited publications worldwide.

Croatian R&I policy is relatively young. Demand-side instruments are not developed which significantly influences innovation performance of both public and private sectors. The main supporting measures providing incentives for businesses to invest in R&D are tax incentives and direct support schemes. The country scores poorly in IUS rankings, but is on the path of important reforms which are expected to bring more efficiency in the system.

The identified challenges for Croatia's R&I system are:

1. Lack of coherent and integrated R&I policy framework
2. Strengthening private sector's R&I capability and improving the business innovation environment
3. Strengthening public R&I capacity

## R&I challenges

### Challenge 1: Lack of coherent and integrated R&I policy framework

Description

Croatia is the youngest member of the European Union and has a relatively young R&I system. The country has been for long characterised by a lack of sustained political commitment to innovation (OECD, 2014). One reflection of this situation could be found in the low levels of R&D intensity (as % of GDP) in the last years albeit GDP was declining. In addition, further decrease of budget resources for R&I funding has been announced for 2015 and 2016. The present science policy suffers also from the lack of coordination between government bodies responsible for research and innovation policy (Ministry for Science, Education and Sport, Ministry of Economy, Ministry of Entrepreneurship and Crafts and Ministry of Regional Development and European Funds). Their policies and supporting measures are not harmonised nor related in a way to produce a synergy in innovation and technological development. This is further reflected in the weak performance (efficiency) of Croatia, which is ranked 23rd according to the SII 2015 and 27th when calculating the ratio between innovation output and input (Edquist and Zabala-Iturriagagoitia, 2015).

There is a risk that the low level of coordination and division of responsibilities between relevant public bodies could lead to an ineffective management of available ESI funding. The system already experiences significant delays in implementation of grant schemes for R&I activities. The lack of coherence and coordination in the R&I system resulted also in delays in the drafting and implementation of several important strategic documents, such as the Strategy for Fostering Innovation of the Republic of Croatia 2014-2020, Strategy for Education, Science and Technology 2014-2020 (SEST) and Smart Specialisation Strategy. Croatia needs to absorb the SF allocation 2007-2013 by the end of 2016 and at the same time to launch the new 2014-20 calls which will challenge the management capacities of administration. Besides, the programmes under ESIF include a number of new sectors (ICT, energy, climate change, health and social inclusion, education) which will require specific technical capacities in the management bodies and support for project beneficiaries.

Policy response

In the area of R&I policy, significant developments have occurred during the period 2013-2014. The National Science Council (NSC) and the National Council for Higher Education (NCHE) were merged into the single body - National Council for Science, Higher Education and Technological Development, which became the highest advisory body in the system. To better link interventions and consolidate support measures to the private sector, the government decided to merge the Business and innovation agency of Croatia (BICRO), the previous pillar institution of the Croatian innovation system with the Croatian Agency for Small Businesses and Investments (HAMAG) into a single agency called the Croatian Agency for Small Business, Innovation and Investment – HAMAG-BICRO.

Several important documents were adopted: these primarily include the Strategy for Education, Science and Technology and Strategy for Fostering Innovation of the Republic of Croatia 2014-2020. The Strategy for Education, Science and Technology offers, among other things, recommendations for the establishment of a comprehensive R&I environment. The Strategy for Fostering Innovation is one of the most important cross-sectorial strategies. It aims to strengthen the Croatian national innovation system (NIS) and provide an efficient framework to foster the competitiveness of Croatian R&D and economy in general, through innovation and technological development.

During 2015 the Smart Specialisation Strategy (S3) was still in draft but at an advanced stage, and was adopted in March 2016 The S3 is seeking to unify all the relevant aspects from the various national strategies in a strategic framework. It acknowledges that implementing such policy is very complex and requires commitment of relevant institutions and strong policy capabilities at national and regional level. The strengthening of the national innovation system is set as a priority in the Croatian National Reform Programme 2015 and the Partnership Agreement with the EU.

The development of the Croatian Research Information System (CroRIS) has been initiated in 2014, with the drafting of project documentation for the national Science and Technology Foresight Project (STF). STF involves systemic analysis of the long-term trends in science and technology in order to create and implement tools and methods for development and sustainable execution of evidence based policy in the area of RDI, specifically for development and monitoring of S3 and other strategic documents, as well as to competitiveness, economic development and society.

Assessment

The R&I framework has undergone significant reforms since 2013. Although seen as not advancing at sufficiently fast pace, they led to certain improvement and advancement in the R&I governance, such as the introduction of performance-based institutional funding. With the accession to the EU, Croatia got access to ESIF and these funds could play a very positive role in the development of the NIS, should favourable R&I policy framework be put in place. It could be expected that the merger of some key intermediary institutions (i.e., HAMAG-BICRO) and the rationalisation and connecting of the offices for EU projects in various ministries (S2E Report) would bring about better synergy between institutions. Croatia will need to make major efforts to ensure adequate capacities for absorption of ESIF for the benefits of national development (EC, 2015b).

The recently adopted (2014) strategic documents (Innovation Strategy and SEST) present a significant breakthrough in reforming the national education, research and innovation systems. However, while the implementation of SEST has been initiated immediately after its adoption, implementation of Innovation Strategy is quite slow, which raises the question will the relatively ambitious development goals be achieved by 2020. Interim and ex-post evaluation are envisaged, but in general the Croatian evaluation system seems rather weak in this aspect. A positive development in the area of evaluation is the S3 where a number of analytical documents with impact assessment were drafted during the preparation phase.

Development of the CroRIS should significantly contribute to future monitoring and development of R&I policies, as well as general evaluation on the efficiency of the overall R&I system, which currently lacks on efficient monitoring and evaluation mechanisms and policy planning tools.

**Challenge 2: Strengthening private sector's R&I capability and improving the business innovation environment**

Description

Analytical reports (OECD, 2014; CEU, 2015; EC, 2015b; WEF, 2014) mention several factors playing a restrictive role towards the business innovation and research activities. Overall business environment in Croatia creates disincentives to innovation due to the lack of coordination in the design of support instruments for innovation (see Challenge 1), access to finance and the inadequate framework conditions. There is still room for improvement in the regulation of product markets, facilitation of firm entry and exit and there are some delays and difficulties in obtaining licences and in contracting utilities. *"[L]ow transparency and predictability in the working of administrative bodies, unevenly developed electronic communication channels, and lengthy judicial proceedings, in particular in commercial courts"* (CEU, 2015), are among the disincentives to business innovation.

Despite the fact that the share of GERD funded by business enterprise sector increased in 2013 compared to the years before, volume and investment of private businesses R&D remains at low levels, with low interest in cooperation with the public R&D sector. In addition, R&I activities are hindered by low capacities, unfavourable structure of available incentives and limited internationalisation (EC, 2015b). Economy is dominated by the large and un-reformed public companies that are not exposed to market competition which would urge them to innovate. A new layer of SMEs is composed of sectors which are not R&I intensive and consists largely of micro companies with less than 10 employees, having modest capacities to perform or absorb research. The wholesale and retail trade sector, construction and hospitality industry make nearly 50% of all SMEs (MEC, 2012). Low and decreasing public expenditures on R&D, as well as public policies in support of innovation which are "*characterised by weak commitment, slow reform pace and inefficient governance structures*", as reported by the European Commission (EC, 2015b) also hinder innovation capacities.

Many documents report on mismatches between labour demand and supply and skills profile that is unfavourable to innovation, since *"[b]usiness innovation capability depends crucially on specialised skills in design, engineering, marketing and information technology, among others, and on the innovation demands and activities that the presence of such skills generates in firms*" (OECD, 2014). Private investment on R&I remained low, compared to other EU Member States with similar profiles, and access to finance is a major bottleneck. Croatia is lagging behind in several output indicators i.e., designs and trademarks, SMEs innovating in-house, SMEs introducing any type of innovation etc. (see Table 1). Innovation capacity is also negatively affected by insufficient public R&D investments, which contributes to the current situation of "low-level equilibrium" innovation system. As stated in the SWD 2015 "[i]*n a low-level equilibrium, business sector's weak innovation capabilities and low investment in R&D&I leads to little effective demand for and supply of innovation-related services and research".* This represents also an important obstacle to public-private collaboration.

Policy response

Creating innovation friendly business environment for SMEs, strengthening the links between science and business and developing the necessary "smart" skills to meet the business need are among the key targets of the S3 and the National Innovation Strategy and the other R&I related strategic documents (see Challenge 1). Human resources issues are also addressed in the Strategy for Education, Science and Technology (see challenge 3). Several R&I support "infrastructures" are envisaged in the S3 Action Plan: Centres of Competence, Centres of Excellence, Competitiveness Clusters.

In the light of the reduced R&D funding, the Croatian government has reviewed and revised the grant schemes and renewed a number of instruments to support business investment in R&I. Several funding programmes were integrated in the Business Impulse Programme 2015 (IRCRO, RAZUM and Proof of Concept), funded by the joint project of the World Bank and MSES funded by IBRD loan – Second Science and Technology Project and managed by HAMAG-BICRO). Business Impulse Programme 2015 also envisages several measures aiming towards facilitating access to capital, including seed and early stage capital schemes. Publication of several grant schemes for R&I activities, funded through the ESIF, is also expected. These schemes will be implemented by the Ministry of Economy and Ministry of Entrepreneurship and Crafts.

In addition of direct funding programmes Croatia offers to the business sector the possibility to use R&D tax incentives. In 2011, an analysis of R&D tax incentives (Aralica et al., 2011) resulted in a conclusion that tax incentives in Croatia are more generous form of state aid for R&D than subsidies. In 2015 the income tax incentives have been discontinued because of the discrepancies of the Croatian legal framework and EU Commission Regulation No 651/2014 declaring certain categories of aid compatible with the internal market (GBER).

State aid for research and development projects has been granted since 2007, pursuant to Articles 111 a-f of the Act on Science and Higher Education (Official Gazette No. 123/03, 198/03, 105/24, 174/04, 02/07, 46/07) and the Rules on State Aid for Research and Development Projects (Official Gazette No. 116/07). Given that this is an "older" state aid measure, it is not in line with the regulations of the European Commission on state aid. Namely, this measure is listed on the list of aid schemes and individual aid which were put into effect in Croatia before the date of accession and apply after that date as well, in accordance with the provisions of Section 2 ("Competition policy") of Annex IV of the Treaty of Accession of the Republic of Croatia (hereinafter: the Treaty, Official Gazette, International Treaties No. 2/2012, 28 March 2012). In accordance with Annex IV of the Treaty, the duration of the measure is limited to 31 December 2014 and no requests for state aid for research and development projects have been granted from that date on.

Assessment

The overall funding provided to the business sector is insufficient and additional sources should be made available. In order to facilitate greater participation of the private sector in ESIF, a comprehensive evaluation of previous public calls should be conducted in order to eliminate unnecessary administrative burden which hinders or slows down project application. This implies building competence and maintaining organisational stability in the agencies, dealing with R&I related ESIF.

Renewal of some of the direct grant schemes which proved successful seems a suitable way forward. Over the last few years, the private sector gained more prominent place in the R&I system (compared to the traditional model where the public sector accounted for the bigger part of GERD). Evaluating the needs of the business and putting in place new instruments using ESIF and in the light of the S3 have the potential to further nurture R&I private activities and to help Croatia exit the trap of "low-level equilibrium" (WB Report 2015 on Smart Specialisation in Croatia). As for the indirect measures, according to the evaluation of the R&D tax incentives, they "*have increased the number of firms having R&D expenditures, although not necessary the value of expenditures itself*"(Aralica et al., 2011). However, 90% of the total tax incentives have been used by a small number of large companies. There are estimations that the tax breaks tend to be of little relevance to SMEs and to favour incumbent firms to the detriment of entrants (Aprahamian and Correa, 2015). This indicates that further evaluation of this instrument is needed. When it comes to newly planned grant schemes for fostering R&I activities in the business sector, significant efforts of relevant public bodies should be invested in the design of these measures in a way to correspond to actual needs of potential applicants and enable implementation of clear and transparent evaluation procedures.

**Challenge 3: Strengthening public R&I capacity**

Description

In Croatia there are 25 public research institutes in five main fields of science. Most of them are in Social sciences and Humanities. Also, tertiary educational attainment and matching between academic curricula and labour market (e.g., increasing the number of graduates in STEM) need further improvement. Croatian universities are mostly fragmented and faculties are usually organised as individual legal entities, rather than departments of one single legal person, i.e. university. This leaves individual faculties with significant autonomy which may be an obstacle for implementing coherent strategies and long-term planning. At the same time, public research is largely underfunded and funding arrangements are rather fragmented. Public research funding was insufficiently linked to performance and evaluation of HEIs/PROs was largely underused until 2013.

Project funding was primarily based on allocation of a large number of competition-based project grants (around 2,500) from the State budget through the Z-project programme[2], administered by the MSES. This negatively affects the level of integration of Croatian HEIs and PROs, especially when it comes to possibility of fast adaptation to international competition and achieving excellence – Research excellence composite indicator score is still very low with only 2 EU Member States performing worse than Croatia (18.89 compared to EU28 47.8 in 2012. There are also significant obstacles when it comes to commercialisation of research results and development of science-industry linkages.

Policy response

Reforms of the science and higher education system have been initiated by the adoption of the Act on Science and Higher Education in July 2013. A new model for public R&D funding has been developed, focused on awarding multi-annual (three-year basis) block grants for HEIs and PROs from the State budget by MSES, using performance-based indicators. The process of awarding project-based R&D grants has also experienced significant changes. Since 2013, responsibility for R&D grants allocation has been transferred from MSES to the Croatian Science Foundation. New procedures include more rigorous project evaluation process aimed at selection of fewer high quality research projects (around 20%). Through these institutional changes, Croatian Science Foundation became a principal agency for allocation of project-based public funding of R&D activities in Croatia.

Another new form of institutional funding has also been introduced in 2014. This refers to the Centres of Research Excellence, whose establishment has been funded by MSES from the State Budget for the initial phase of establishing 7 Centres. In November 2015 six new Centres of research excellence have been established. Additional resources for the Centres are planned through ESI Funds, in line with S3 (see S3 Implementation Plan).

Unity through Knowledge Fund (UKF) was merged with the Croatian Science Foundation (CSF). It supports collaborative research with Croatian scientists living in Croatia and abroad and leading international scientific institutions to raise absorption capacity for EU funds, especially ESIF and Horizon 2020.

The Strategy for Education, Science and Technology was adopted in October 2014. This is a comprehensive document with a numerous measures to improve the R&D&I ranging from changing the HEIs and PROs management and *funding*, developing science-business collaborations including to measures for sufficient supply of (post)graduates in science, technology, engineering and mathematics.

By the end of 2014, the Government initiated the process of restructuring of the public research institutes in order to rationalize resources and raising the quality of research as well as accountability of public research institutions. By now, the Government has adopted the Decision on establishing the Committee for drafting the model of restructuring of public research institutes in Croatia in December 2014 which should be applied in a near future.

Assessment

Proposed reforms can seem somewhat radical and their actual implementation remains to be seen in the future, but the initial results of these reforms are rather promising. Although this is only the beginning, there are positive signs. The institutional funding in combination with the process of re-accreditation of the PROs and HEIs contributed significantly to strengthening the financial accountability and responsibility of the public research organisations.

[2] This programme was considered not creating sufficient level of competition and was ended, while funding was transferred to CSF

The awarding of project research grants assumes a rigorous evaluation process that should end up with a smaller number of high quality research projects, up to 250 per call per year. However, this can put at risk significant segments of the national scientific base since Croatia has insufficient public research funding and there is a lack of diversified resources for competitive research funding. For example, research funds have proved to be insufficient[3] to cover all needs of researchers especially in natural, medical and technical sciences (S2E Report, JRC-IPTS, 2015). Already as a full member of the EU, Croatia should target efforts towards a better use of ESIF and H2020 projects, which is highly dependent on governance capacities.

The science and higher education policy should be devised more coherently and carefully to prevent the devastation of research potentials due to the budget restraints. For example, a large cohort of young scientist at universities in the status of post-doctoral degree, teaching assistant or assistant professor were expected to terminate their job contracts with universities in 2015 and succeeding year, primarily due to the changes introduced by the new Act on Science and Higher Education. This was prevented by a special decision of the government to continue to fund these young scientists. This will surely contribute to strengthening the scientific base and prevent the loss of financial resources invested in their education.

[3] *Some PROs decided to cover, for example, only a part of costs for scientific conferences in order to allow mobility for as many researchers as possible*