ERAWATCH Country Reports 2012: Bosnia and Herzegovina

Zoran Ergarac

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This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). ERAWATCH is a joint initiative of the European Commission's Directorate General for Research and Innovation and Joint Research Centre.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Mr. Nida - Kamil Ozbolat from JRC-IPTS. The contributions and comments from Ms. Alma Hasanović, Ministry of Civil Affairs of Bosnia and Herzegovina, Ms. Vahida Krekić, Federal Ministry of Education and Science, Mr. Vinko Bogdan, Ministry of Science and Technology of the Republic of Srpska are also gratefully acknowledged.

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EXECUTIVE SUMMARY

Bosnia and Herzegovina’s (BiH) 2009 national STI policy goal for R&D expenditure to reach 1% of GDP in 2015, following the envisaged GDP growth dynamic of 5%, will be difficult to achieve. The investments in R&D have stagnated due to financial crisis over the last three years. The R&D budget in the BiH entity of Republic of Srpska (RS) was €2.6m in 2009, €2m in 2010, €1.9m in 2011 and €1.85m in 2012, while in the entity of Federation of BiH (FBiH) the R&D budget was €0.8m in 2009, €1.6m in 2010, €1.5m in 2011 and €1.5m in 2012. Bosnia and Herzegovina 2012 Progress Report (European Commission [EC], 2012a) points out the political stalemate after the October 2010 general election that had a negative impact on the country’s economic and fiscal policy, with delays in adoption of the 2011 and 2012 state-level budgets and of the Global Frameworks for Fiscal Policies for the periods 2012-2014 and 2013-2015. The political stalemate increased the uncertainty over the short- and medium-term fiscal path (EC, 2012a). The Report also points out a drop in real GDP in 2009 of -2.91%, after which BiH recorded a positive real growth rate of 0.7% in 2010 and 1.3% in 2011. Per capita income, measured in purchasing power standards (PPS), decreased to 29% of the EU average in 2011 from 30% in 2010 and from 31% in 2009 (EC, 2012a). The average unemployment rate in 2011 increased from an already very high rates of 24.1% in 2009 and 27.2% in 2010 to 27.6% in 2011 (EC, 2012a).

Latest sources, such as the Global Innovation Index Report 2012 (Doutta, 2012) do not report BiH gross expenditure on R&D and other R&D indicators. At present, it is only the Bureau of Statistics of RS which provides the R&D data in an annual statistical release, but only for the territory of RS. Since this release is produced since 2010, it was possible to make a rough estimate of the basic R&D funding indicators for the whole country in this report, in which BiH GERD is around 0.3% GDP. It is difficult to position Bosnia and Herzegovina in the EU context due to a lack of national R&D statistics and the fact that country is not included in sources such as the Innovation Union Competitiveness Report 2011.

The key structural challenges of the system are: i) **Weak demand for R&D** – the biggest enterprises are active only in small part of the pre 1990s war capacities, with insufficiently competitive products and a low level of foreign investments. Medium and high-tech product exports as % of total product exports in BiH make less than a third of the European average. During and after the worldwide financial crisis in 2008-2009, foreign investments were significantly reduced. The highest decline in employment in 2011 was registered in construction, agriculture and manufacturing (EC, 2012a). Significant drop in domestic demand for R&D is also due to a lack of demand-side innovation policy measures in BiH; ii) **Weak private sector** - around 35% of R&D performed by BiH business enterprise sector within the BiH GERD in comparison with the European average of 62.4%.

1 In FBiH the R&D funding also comes from cantonal level, which does not exist in RS. Funding from FBiH cantonal level in 2010 was around €3m, to the largest extent contributed by Sarajevo Canton.
3 Available at: [http://www.rss.rs.ba/front/category/26/108/?left_mi=39&up_mi=12&add=39](http://www.rss.rs.ba/front/category/26/108/?left_mi=39&up_mi=12&add=39)
4 RS per capita R&D annual values multiplied by total BiH population annual value, adjusted for RS-specific and FBiH-specific structure of funding and outliers in government, higher education and business sector funding. The total population of RS of in 2011 made 39% of the total BiH population. The RS GDP in 2011 made 33% of BiH GDP.
5 2011, EUROSTAT
resources towards the practical application of the R&D results (Deloitte Consulting, 2012); iii) **Weak knowledge and technology transfer** - Global Innovation Index Report 2012 indicates the weakness of BiH economy in knowledge absorption and ranks it 127th out of 141 economies. Knowledge diffusion is ranked better – as 72nd (Doutta, 2012); iv) **Teaching-oriented higher education as the largest research performer** - BiH higher education institutions perform over 50% of R&D within the BiH GERD, which is more than twice than the European average of 24%.\(^6\) Scientific research capacities are mostly located at universities, but due to the lack of funding, the universities do not fully perform their research role and they are mainly focused on their teaching role (Council of Ministers of BiH, 2009) v) **Lack of harmonization in national and entity-level STI strategies’ long term goals for R&D funding** – There are discrepancies between the 2009 national STI strategy that envisaged the 33% share of business enterprise sector in the projected 2015 BiH GERD of 1% BiH GDP (Council of Ministers of BiH, 2009) and the 2012 entity-level STI strategy of RS which envisages the growth of RS GERD from 0.25% RS GDP in 2010 to 0.5% RS GDP GERD in 2016 (with an optimistic projection of RS BERD of 0.3% RS GDP in 2015) and the goal of reaching RS GERD of 1% GDP by 2020 (Government of RS, 2012).

The adoption of the 2012 entity-level STI strategy of RS provides additional policy measures to 2009 national STI strategy, with its counterpart entity-level draft FBIH STI strategy adopted by the FBIH government in 2012 but still waiting the adoption by the FBiH Parliament. The priority areas of national R&I system in these strategic documents are structured around:

- Stimulating scientific excellence and enabling the transfer of knowledge and results of scientific discoveries to industry and business (Council of Ministers of BiH, 2009).
- Stronger co-operation with EU funds for scientific research activities in BiH, together with the allocation of funds from the budget of the Ministry of Civil Affairs of BiH for co-financing of international projects (Council of Ministers of BiH, 2009).
- Enhanced commercialization of research results and their competitiveness with policies and funding support for R&D in business sector (Government of RS, 2012).
- Enhancing the role of intermediaries in facilitation of research activities in the business sector, increasing the share of business enterprise sector in GERD (Government of RS, 2012).
- Stressing the need to act according to the 2006 UNESCO Guidelines for a Science and Research Policy in Bosnia and Herzegovina (Papon & Pejovnik, 2006) and set the starting threshold of 1% GDP GERD for gradually increasing the GERD to 2% of GDP by 2020 (Government of FBIH, 2011),

The policy mix is not optimized and ambitions for improvements go to different extent and different directions at different governance levels:

- The challenges of weak domestic R&D and weak private sector are indirectly addressed as a problem of country’s economy in general.
- The knowledge and technology transfer challenge is mainly addressed through establishment of science and technology parks as intermediaries, but with differences in the regional aspects and regional specialisation rationale at the national and at the entity level.
- The challenge of teaching-oriented higher education as the largest R&D performer is addressed through the promotion of partnerships between higher education institutions and business enterprise sector, with particular attention given to this in the 2012 entity-level STI strategy of RS, stressing the role of intermediaries in transformation of R&D complex, especially universities and public research institutes (Government of RS, 2012),
- The challenge of different long-term goals in R&D funding at different governance levels is not addressed in the policy mix.

\(^6\) 2011, EUROSTAT
The potential directions for the optimization of the policy mix are in additional consultations at the national and entity level that would assess the common starting grounds and long-term goals for R&D investment and the corresponding public/private ratio. The weakness of the private sector in combination with a lack of harmonized approach in revitalization of its R&D performance in strategic documents is the biggest obstacle in addressing the structural challenges as a whole. The fact that higher education is by far the largest research performer in BiH, demands a transformation of the current role of universities and research institutes within universities.

National policy mix is generally not aligned with ERA Communication’ objectives, but there is progress in the introduction of concepts that create the basis for achievement of those objectives. The 2012 entity-level STI strategy of RS suggests an obligatory international peer-review in evaluation of scientific work and results (Government of RS, 2012). This measure is in support of the internationalization of the peer review as one of measures within the ERA Communication priority of more effective national research systems. Activities within the Bilateral Cooperation Agreement with Slovenia are in support of the priority of trans-national cooperation and competition. The Joint Committee for Scientific and Technological Cooperation has approved 28 projects to be implemented in 2012 and 2013. The priority of open labour market for researchers is supported by EURAXESS BiH which offers assistance for incoming and outgoing mobility of researchers and their families. The implementation of the European Charter for Recruitment of Researchers & Code of Conduct for Recruitment of Researchers is in the phase of promotion and signing by BiH research institutions. Ten research institutions in BiH have signed the Charter and Code by the end of 2012 / beginning of 2013. Gender equality and gender mainstreaming in research is supported by quotas set in the 2012 entity-level STI strategy of RS. Concerning the priority of optimal circulation, access to and transfer of scientific knowledge, there is regional cooperation within COBISS.Net, which enables free of charge flow of bibliographic material with Bulgaria, Montenegro, Macedonia, Slovenia and Serbia.

EC BiH 2012 Progress Report states that BiH actively promoted cooperation on research and innovation with the EU, with a slight increase in the number of submissions under the FP7, but with the low overall success rate. The administrative capacity improved by increasing the number of National Contact Points, organizing training sessions and promoting events on FP7. According to the report, the cooperation with COST and EUREKA was strengthened and the EURAXESS network was established and functions well, but the communication and coordination between the different science ministries and entities is insufficient and the overall level of investment in research remains low (EC, 2012a). NCP BiH currently lists 7 completed and 22 ongoing FP7 projects with total project cost of €149.3m (€10.3m completed, €139m ongoing) in which the institutions and organisations from BiH take part. COST Country Info shows BiH currently involved in 42 COST actions with COST economic dimension of €2,838m. EUREKA NIP BiH shows participation of BiH in two projects (total project cost €33.03m), with one project ongoing.
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1 INTRODUCTION

Bosnia and Herzegovina (BiH) is located in the Southeast Europe, bordering Croatia to the north and southwest, Serbia to the east, and Montenegro to the southeast. The total area is 51,209 km$^2$ and population is 3.752m, accounting for less than 1% of the population of the EU-27. The country has a complex constitutional structure, set by Dayton Peace Agreement that ended the 1992-1995 war, and is composed of entities of Federation of Bosnia and Herzegovina (FBiH) and Republic of Srpska (RS), and of Brčko District (BD). World Bank’s World Development Indicators 2012 report the country’s GDP in amount of €13,575m or €3,618 GDP per capita. BiH 2012 Progress Report (EC, 2012a) points out a drop in real GDP in 2009 of -2.91%, after which BiH recorded a positive real growth rate of 0.7% in 2010 and 1.3% in 2011. Per capita income, measured in purchasing power standards (PPS) decreased to 29% of the EU average in 2011 from 30% in 2010 and from 31% in 2009. The average unemployment rate in 2011 increased from an already very high rates of 24.1% in 2009 and 27.2% in 2010 to 27.6% in 2011 (EC, 2012a). The rough estimate that can be made for R&D funding, since annual R&D statistics began to appear in 2009 (although not for entire country yet), is that BiH invests around 0.3% of its GDP on R&D), which is far below the EU 27 average of 2.03% in 2011.

ENIC Centre BiH lists 45 institutions of higher education in BiH, of which 25 are universities (8 public and 17 private), and 20 are independent colleges (18 private and 2 public), with a total of 189 faculties and 10 academies (BiH Agency of Statistics, 2012a). There are 24 research institutes in RS (13 public, 10 private and 1 virtual). In FBiH there are around 30 institutes within the public universities and a large number of research centres (Đipa, 2012). Eight public universities in BiH are the main beneficiaries of competitive research funding, largest being the University of Sarajevo and University of Banja Luka (Jahić, 2011a).

BiH is not included in the Innovation Union Scoreboard, but comparable data are partly available in other sources. There are 781.4 researchers per million populations in BiH (Doutta, 2012). EBSCO Central and Eastern European Database Coverage List contains 21 academic journals from BiH (four in medical sciences, two in mathematics, and one in the area of technology). There were 294 published articles indexed in SCI Expanded from Bosnia and Herzegovina in 2009 and 387 in 2010, according to Knowledge Base for Higher Education and Research in Western Balkans. There are four indexed journals from BiH in SCI Expanded, three in medical sciences and one in the area of technology. From October 2011 to September 2012 the BiH Institute for Intellectual Property received 40 patent applications, 414 trademark applications and 11 industrial design applications (EC, 2012a). Domestic demand for R&D is weak due to post 1990s war reestablishment of BiH economy in natural resources and unskilled labour-intensive industries, including the concentration of research almost exclusively at universities, with many experts leaving BiH. The Global Competitiveness Report ranks BiH 126th out of the 142 countries studied in respect to the brain drain for the period 2011-2012 (Schwab, 2011) and 140th out of the 144 countries studied in respect to the brain drain for the period 2012-2013 (Schwab, 2012).

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15 Available at: http://data.worldbank.org/country/bosnia-and-herzegovina#cp_wdi
17 Available at: http://www.ebscohost.com/titleLists/e5hi-coverage.htm
18 Available at: http://www.herdata.org/database
19 Available at: http://thomsonreuters.com/products_services/science/science_products/a-z/science_citation_index_expanded
The state-level Ministry of Civil Affairs of Bosnia and Herzegovina coordinates BiH science policy and international cooperation through its Department of Science and Culture, and the coordination of SME policies at the state level is done by the Ministry of Foreign Trade and Economic Relations of BiH, but the complex constitutional structure of BiH delegates policy and funding responsibilities across the entity and cantonal structure of policy implementation bodies, funding instruments and STI strategy-defined research performers, which is presented in the following diagram:

Figure 1: Overview of the governance and funding structure, and performers in the BiH research and innovation system

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i) FBiH entity-level ministries are referred to as “Federal Ministry of…”

ii) Still in draft version - approved by the Government of FBiH in 2012, but is still to be adopted by the FBiH Parliament.

iii) In Sarajevo Canton: Law on Higher Education, Law on Scientific Research Activities and Law on Science Fund; In Tuzla Canton and Zenica – Doboj Canton: Law on Higher Education and Law on Scientific Research Activities; Laws on higher education in cantons: Una-Sana, Herzegovina-Neretva, Posavina, Bosnia - Podrinje, West Herzegovina, Canton 10. There is only state level relevant legislation in Central Bosnia Canton

iv) Sarajevo Canton, Zenica-Doboj Canton and Una-Sana Canton budget funds for support and publication of master’s and doctoral theses and publishing of articles in academic journals. (Including support for scientific and research projects and subscription to academic journals and databases in Sarajevo Canton); Tuzla Canton budget funds for support to science education at the University of Tuzla and co-funding of researchers in presenting their work to public.
2 RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

2.1 National economic and political context

BiH Progress Report 2012 suggests that BiH economy stalled in 2012, after a modest recovery in 2011. The report points out the political stalemate after the October 2010 general election that had a negative impact on the country's economic and fiscal policy (EC, 2012a). In 2011, the economic recovery continued with real GDP growth accelerating slightly to 1.3%, as compared to 0.7% a year earlier. Industrial production fell by 6.5% year on year in the first seven months of the year, while exports of goods dropped by 4.3%. Per capita income, measured in purchasing power standards (PPS), decreased to 29% of the EU average in 2011 from 30% in 2010 (EC, 2012a).

The Parliamentary Assembly of Bosnia and Herzegovina ended a 16-month deadlock between Bosniak, Serb, and Croat leaders in February 2012 by installing a new government. The Parliamentary Assembly has made some progress in adopting EU-related legislation in 2012, adopting 2 key EU related laws and 20 sets of amendments to existing legislation and rejecting 21 laws (EC, 2012a). At the entity level, the overall functioning of the entity assemblies has continued to be satisfactory, with the EU Integration Committees focusing more on Interim Agreement/Stabilization and Association Agreement-related obligations (EC, 2012a). The rules of procedure of the House of Peoples and the House of Representatives of the BiH Parliamentary Assembly have not yet been amended to introduce a fast-track mechanism for EU legislation (EC, 2012a). The need for an effective coordination mechanism between various levels of government for the transposition, implementation and enforcement of EU laws is a matter of priority for an effective use of the EU’s pre-accession assistance, but little progress was made in improving the functionality and efficiency of all levels of the government (EC, 2012b). A High Level Dialogue on the Accession Process (HLDAP) was launched in Brussels in June 2012 to address EU accession requirements. The first timeline (31 August 2012) agreed by all participants at HLDAP was not met.

2.2 Funding trends

Latest sources, such as the Global Innovation Index 2012 (Doutta, 2012), do not report BiH gross expenditure on R&D and other related indicators. At present, no R&D data is collected by the state-level Agency for Statistics of BiH. At the regional level, the Bureau of Statistics of FBiH does not provide R&D data for this part of the country. It is only the Bureau of Statistics of

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22 There are also no R&D statistics for Brčko District. The latest population estimate for Brčko District is 95,000 to 100,000 inhabitants, which makes around 2.5% of the entire BiH population estimate. (The latest official census in BiH was conducted in 1991, before the 1990s war, and the next one will take place in 2013). Therefore, the
RS, which provides the R&D data in an annual release since 2010, but only for the territory of RS (Bureau of Statistics of RS, 2010; 2011; 2012). Since this report is produced for a third year in a row, it is possible to make a rough estimate of the basic R&D funding indicators for the whole country based on RS GERD per capita value and BiH population index:

Table 1: Basic indicators for R&D investments in Bosnia and Herzegovina

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>EU27</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP growth rate</td>
<td>-2.91</td>
<td>0.7</td>
<td>1.3</td>
<td>-0.3 (2012)</td>
</tr>
<tr>
<td>GERD (% of GDP)</td>
<td>0.31</td>
<td>0.27</td>
<td>0.29</td>
<td>2.03s (2011)</td>
</tr>
<tr>
<td>GERD (euro per capita)</td>
<td>9.94</td>
<td>8.86</td>
<td>10.49</td>
<td>510.5s (2011)</td>
</tr>
<tr>
<td>GBAORD - Total R&amp;D appropriations (€ million)</td>
<td>8.44</td>
<td>8.55</td>
<td>6.73</td>
<td>91,277.1 (EU27 total 2011)</td>
</tr>
<tr>
<td>R&amp;D funded by Business Enterprise Sector (% of GDP)</td>
<td>0.11</td>
<td>0.09</td>
<td>0.1</td>
<td>1.26 (2011)</td>
</tr>
<tr>
<td>R&amp;D performed by HEIs (% of GERD)</td>
<td>58.5</td>
<td>57</td>
<td>50</td>
<td>24% (2011)</td>
</tr>
<tr>
<td>R&amp;D performed by Government Sector (% of GERD)</td>
<td>5.6</td>
<td>8.13</td>
<td>12.23</td>
<td>12.7% (2011)</td>
</tr>
<tr>
<td>R&amp;D performed by Business Enterprise Sector (% of GERD)</td>
<td>35.8</td>
<td>34.3</td>
<td>36</td>
<td>62.4% (2011)</td>
</tr>
<tr>
<td>Share of competitive vs institutional public funding for R&amp;D</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

s - EUROSTAT estimate
Data Source for BiH R&D indicators: rough estimate based on BiH national and regional statistics, excluding GDP growth rate (EC, 2012a)
Data Source for EU27 average: EUROSTAT

Research in BiH is mainly performed by universities and public research organisations. Higher education institutions perform two times more than the European average. The business enterprise sector is thus represented by little more than half of the European average. The 2012 European Commission Communication to the European Parliament and the Council “Enlargement Strategy and Main Challenges 2012-2013” (EC, 2012b) points out that the future involvement of the business enterprise sector in BiH is influenced by the worsened external environment, which is increasingly affecting public finances since 2012, with the government borrowing and the debt rapidly increasing. This borrowing is to a certain extent crowding out private investors (EC, 2012b).

The investments in R&D have stagnated due to financial crisis over the last three years. The R&D budget in RS (Ministry of Science and Technology of RS), was €2.6m in 2009, €2m in 2010, €1.9m in 2011 and €1.85m in 2012, while in FBiH (Ministry of Education and Science of FBiH) the R&D budget was €0.8m in 2009, €1.6m in 2010, €1.5m in 2011 and €1.5m in 2012.

influence of the lack of R&D data for Brčko District does not affect rough estimates of basic R&D indicators for entire BiH, made in this report.

23 RS per capita R&D annual values multiplied by total BiH population annual value, adjusted for RS-specific and FBiH-specific structure of funding and outliers in government, higher education and business sector funding. The total population of RS of in 2011 made 39% of the total BiH population. The RS GDP in 2011 made 33% of BiH GDP.
The overview of R&D funding in FBiH must be complemented with the cantonal level in FBiH, where the latest available data show that in 2010 Sarajevo Canton provided €2.8m, Tuzla Canton €0.82m and Zenica-Doboj Canton €0.04m (Jahić, 2011a).

The lack of harmonization and balance of the mix of science and technology development strategies became more evident in 2012 with the adoption of the entity-level “Strategy of Scientific and Technological Development in Republic of Srpska 2012-2016” in July 2012, and with its entity-level counterpart “Strategy for Development of Scientific and Development Research Activities in FBiH 2012-2022” remaining in the draft version since 2011. The 2009 Strategy for Development of Science in Bosnia and Herzegovina 2010-2015 (national STI strategy) provides that GERD should be gradually increased to 1% of BiH GDP by 2015, following the envisaged 5% growth dynamics of GDP by 2015, which would provide around €178m annually - the amount that the national STI strategy deems sufficient for 4,500 employees and 3,000 researchers in R&D in Bosnia and Herzegovina (Council of Ministers of BiH 2009). The national STI strategy also envisages the 33% share of business enterprise sector in the projected 2015 GERD of 1% GDP, achieved by increase from 10-15% estimated share in 2009.

The 2012 entity-level STI strategy of RS envisages the growth of GERD from 0.25% GDP in Republic of Srpska in 2010 to a minimum of 0.5% RS GDP in 2016, with the goal of reaching the GERD of minimally 1% GDP in 2020 defining this as in accordance with the Europe 2020 strategic goals (Government of RS, 2012). The strategy optimistically envisages the BERD of 0.3% RS GDP within the envisaged 0.5% RS GDP GERD in 2015. The draft FBiH STI strategy envisages GERD of 1% FBiH GDP already in 2013, with the gradual increase to reach 2% in 2017 (Government of FBiH, 2011). The strategy also states that the government / business enterprise sector balance should remain in the pre 1990s war ratio of 2:1 or even 3:1 (3:1 in duration of at least the first five years), justified by the state of affairs in the post 1990s conflict business enterprise structure from which much cannot be expected without major public incentives. FBiH Ministry of Finance rejected the envisaged FBiH GERD of 1% FBiH GDP as unfeasible for the 2013 budget projection, leaving the strategy document in the draft version for the second year. The justification for FBiH GERD in this percentage in the draft entity-level STI strategy of FBiH is the 2006 UNESCO Guidelines for a Science and Research Policy in Bosnia and Herzegovina with recommendation to Bosnia and Herzegovina to renew its R&D sector for its accession to EU, gradually increasing its GERD to 2% of GDP by 2020 (Papon & Pejovnik, 2006). The 2009 national STI strategy also relies on this recommendation in its projection of R&D funding (Council of Ministers of BiH, 2009).

The R&D indicators for 2009, 2010 and 2011, available only for RS in “Research and Development” annual releases of the Bureau of Statistics of RS show that the largest share of 2010 GERD in RS (€10.62m – 0.25% RS GDP) was allocated for improvement of industrial development (23%), followed by development of agriculture, forestry and fishery (22.5%), social development and services (19%), health (10%), funds for general advancement of knowledge (10%), earth and atmosphere research - 7% (Bureau of Statistics of RS, 2011). In 2011 RS allocated the largest share of GERD (€13.4m – 0.3% RS GDP) for exploration and exploitation of earth (25%), followed by funds for general advancement of knowledge (23%), environment (10%), agriculture (9%), industrial production and technology (9%), culture, recreation, religion, and mass media - 5% (Bureau of Statistics of RS, 2012). There is no equivalent source of data on GERD and its allocations in FBiH for this period, so that the corresponding share of GERD allocated to priorities is not available. The latest available FBiH R&D data show that technical sciences also receive a slightly higher priority in Federation of BiH (civil engineering, mechanical

24 Available at: http://www.rzs.rs.ba/front/category/26/108/?left_mi=39&up_mi=12&add=39
engineering and electrical engineering), the same being valid for its cantons of Sarajevo, Tuzla and Zenica-Doboj (Jahić, 2011a).

BiH, in the “third country” status, had 14 approved projects in FP5 and 44 approved projects in FP6 in total value of €2.7m. The country is an associated member in FP7 since 01 January 2009. Austrian Development Agency granted €0.35m for strengthening of Ministry of Civil Affairs of BiH capacities in EU science and research programmes, for the period of three years (2010-2013). According to data from NCP BiH, at the end of 2011 BiH had 28 approved projects of BiH research institutions and organisations in FP7, in the value of €2.5m. Since BiH is not a candidate country yet, it has access only to the first two components of IPA, targeted for capacity building to facilitate BiH accession to EU. Under the IPA 2009 National Program BiH - Community Programmes and Multi-Beneficiary IPA programme, two projects in total value of €1.8m were funded from 2009 to 2011 (see 4.2). Bosnia and Herzegovina also participates in IPA ADRIATIC Cross - Border Cooperation Programe (CBC), in the Priority 1, Measure 1.1 - Research and Innovation, where there was one project in 2012 from BiH, with the total budget of €1.28m.

NCP BiH currently lists 7 completed and 22 ongoing FP7 projects with the total project cost of €149.3m (€10.3m completed, €139m ongoing) in which the institutions and organisations from BiH take part. COST Country Info shows BiH currently involved in 42 COST actions with COST economic dimension of €2,838m. EUREKA NIP BiH shows participation of BiH in two projects (total project cost €33.03m), with one project ongoing.

2.3 New policy measures

Although both entity-level STI strategies were drafted in 2011, only the entity-level STI strategy of RS for the period 2012-2016 (Government of RS, 2012) was adopted (in July 2012), so that the changes in relation to the 2009 national STI strategy refer only to new policy measures in RS for the abovementioned period.

Tatalović (2012) identifies as one of the key measures of the Strategy the establishment of a transparent and stimulating system of science funding through the ‘lump-sum’ model, which would embrace clear rules for the funding of research on both entity and local levels. The support for the commercialisation of results will include a database of patents and industry-related research projects, including a policy and funding support for R&D centres within firms (Tatalović, 2012).

Under the specific goal to reform the evaluation of scientific research, the Strategy suggests the introduction of the obligatory evaluation of scientific work and results in accordance with internationally recognized standards and with participation of international experts (Government of RS, 2012). This measure facilitates the change towards the internationalisation of the peer review. Under the specific goal to strengthen the capacities and role of public administration in implementation of the Strategy, an establishment of a Fund for Science and Technological Development of RS is planned by 2015 (Government of RS, 2012). Networks and centres for

Available at: http://www.ncp.ba/systems/file_download.ashx?pg=2612&ver=1
Available at: http://www.adriaticipacbc.org/download/Priority_1_ranking_list.pdf
Available at: http://www.ncp.ba/ucecse-bih-u-fp7.aspx
Available at: http://www.cost.eu/about_cost/cost_countries?countrycode=BA
Available at: http://www.eurekanetwork.org/bosnia-herzegovina/search

Entity-level STI strategy of FBiH for the period 2012-2022 was approved by FBiH government in April 2012 but it is still waiting to be adopted by the FBiH Parliament.
young researchers are also envisaged in the Strategy. Under the specific goal to provide conditions for scientific careers, professional development, capacity building and specialization of researchers, the Strategy envisages the acceptance of provisions of the European Charter for Recruitment of Researchers and the Code of Conduct for Recruitment of Researches by research institutions in RS in 2013 (Government of RS, 2012). This measure corresponds with the activities of the Ministry of Civil Affairs on promotion of Charter and Code to BiH research institutions, with the support from the Austrian Development Cooperation31 and WebInUnion Project32 in which Bosnia and Herzegovina participates. Ten research institutions in BiH have signed the Charter and Code by the end of 2012 / beginning of 201333, with the two public universities in RS signing the Charter and Code in February 201334.

At the level of support measures, a change due to state-level budget alterations and delays (see 2.1) occurred in the Support for Innovation and Technical Culture in BiH Programme, administrated by the Ministry of Civil Affairs through its Department of Science and Culture. The programme had a budget of €0.25m in 2010 for funding BiH researchers to submit proposals for FP7 projects and €0.076m for grants that support innovation and technical culture in BiH. Funds were distributed through competitive calls. No allocation was made in 2011, and the program was continued in 2012, with the total of €0.067m allocated. The 2011 and 2012 budget did not allocate the resources in the budget item for FP7 project preparation. Instead, the 2012 Annual Call for Funding of Projects that Support Innovation and Technical Culture in BiH includes this category in the provided €0.067m budget35.

2.4 Recent policy documents

In relation to the 2009 national “Strategy for the Development of Science in Bosnia and Herzegovina 2010-2015” (Council of Ministers of BiH, 2009), the two entities in Bosnia and Herzegovina drafted their entity-level STI strategies in 2011. In July 2012 Republic of Srpska Parliament adopted the “Strategy of Technological and Scientific development of RS 2012-2016” (Government of RS, 2012). The Strategy includes an Action Plan36 and follows from the new Law on Scientific and Research Activities and Technology Development in Republic of Srpska that entered into force in January 2012 (RS Official Gazette 06/12). The Strategy document is supplemented with an Annex to the Strategy”, containing additional analysis of the state of science in RS. The goals of the Strategy are to achieve social and political consensus on the role of science and research, develop a favourable environment for research and development of technology, develop human resources, strengthen the cooperation and transfer of research results to business sector with the industry sector and transfer of results from research; re-evaluate and redefine the role and tasks of science institutions and increase financial investments in R&D, bring a larger number of guest researchers and lecturers and increase the cooperation with EU-funded STI programmes (Government of RS, 2012). Stimulations for scientific output in international publications and increased media coverage of research activities and results are also envisaged in the strategy, as well as the support for research in the industry sector and R&D

32 http://webmob.mafsk.ni.ac.rs/
34 More information available at: http://www.euraxess.ba/?n=97
35 See: http://www.mcp.gov.ba/org_edinice/sektor_nauka_kultura/konkursi/?id=3446
36 Available at: http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mnk/PAO/Strategije/Pages/default.aspx
37 Available at: http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mnk/PAO/Strategije/Documents/Prilog%20Strategiji-L.pdf
centres in businesses, with efforts to create a database of patents and research projects in the business sector (Government of RS, 2012).

The Federation of BiH Parliament is still to adopt the entity-level FBiH STI strategy formerly under the title “Science Development Strategy of Federation of Bosnia and Herzegovina 2011-2021” which has been in the draft version since 2011. As the document has not been adopted until the end of 2011, the Science Council of Federation of BiH recommended that the document period of action be changed to 2012 – 2022. The Strategy was redrafted in December 2011 under the title “The Strategy for Development of Scientific and Development Research Activities in Federation of BiH for the period 2012-2022” (Government of FBiH, 2011). The draft Strategy document is supplemented with Annexes to the Strategy\(^\text{38}\), containing additional analyses of the state of science in FBiH and BiH in general. The Government of FBiH approved the redrafted text in April 2012 and forwarded it to the Parliament of FBiH for adoption. However, prior to the approval of the text by the Government of FBiH and its forwarding into parliamentary procedure, the Ministry of Finance of FBiH deemed the projection of budget resources resulting from envisaged GERD of 1% of FBiH GDP in 2013 (€55m) unfeasible within available budget capacities. The Strategy was returned from the parliamentary procedure to FBiH Government with the instruction that it should undergo public debate again. The redrafted FBiH Strategy document thus remains in the draft version.

2.5 Research and innovation system changes

The new Law on Science and Research Activities and Technology Development of Republic of Srpska, which entered into force in January 2012 [RS Official Gazette, 06/12], defines the procedures for establishing of science and technology parks and defines their purpose as infrastructural support and linkage between science and research organisations and business enterprises, together with business technology incubators and centres for technology transfer. The 2012 entity-level STI Strategy of RS indicates a direction for strengthening the role of intermediaries in facilitation of research activities in the business sector, in support of the projected share of 0.2% RS GDP from public sources and 0.3% RS GDP from business sector in the envisaged RS GERD of 0.5% RS GDP in 2016 (Government of RS, 2012). The role of technology parks is defined in the RS strategy as “an intermediary-operative form within the technological intermediary infrastructure that motivates and supports the development of science, innovativeness, creativity and entrepreneurial spirit through provision of adequate infrastructure, expert services, counselling and access to strategic linkages” (Government of RS, 2012).

The aim of these intermediary-operative institutions envisaged in the RS strategy is the transformation of R&D complex, especially universities and public research institutes, support to technology transfer and development of competition based, technologically advanced industry. Existing intermediaries are the Agency for Development of Small and Medium Enterprises in RS, Banja Luka Innovation Centre – ICBL and local development agencies in RS (Government of RS, 2012). The RS strategy indicates the more pronounced role of the Republic of Srpska Chamber of Commerce as an intermediary to business enterprise sector with its five regional chambers in RS. In support of this, the Strategy envisages a system of science funding through the ‘lump-sum’ model for funding of research on both state and local levels (Government of RS, 2012).

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

There are no strategies on smart specialization in BiH, however the country is represented in the WBC-INCO.Net Coordination of Research Policies with the Western Balkan Countries Project through which the need for smart specialization in South East European Countries is currently promoted.39

2.7 Evaluations, consultations

There is a lack of systematic, comprehensive and performance-based evaluation of research support programs administered by relevant BiH entity ministries (Jahić, 2011a). What is also evident is the lack of a harmonized methodology for a unified system of evaluation and control of the quality of scientific research and application of standards for assessing the indicators of research activities. The lack of harmonization in methodology used by the BiH entities’ bureaus of statistics requires the establishment of a database of indicators in accordance with OECD/UNESCO standards as a precondition for any important evaluation.

The STI evaluations in BiH should be viewed, for now, in close relationship with evaluations performed in higher education sector as by far the largest research performer. The 2007 Framework Law on Higher Education in BiH [Official Gazette of BiH 59/07 and 59/09] stipulates that the state-level Agency for Development of Higher Education and Quality Assurance of Bosnia and Herzegovinā40 is responsible for establishing the criteria for accreditation of higher education institutions, establishing of quality standards, conducting the process of accreditation, and for representation of BiH in international organisations for quality assurance in higher education. The Agency was established in 2008 and, through public debates and consultations, it produced a set of standards and rules for accreditation of higher education institutions in BiH, with recommendations for criteria and standards for higher education institutions to relevant ministries and departments in RS, FBiH cantons, and Brčko District.41

The recommendations and standards dedicate attention to strengthening of the research component and provide that institutions of higher education should allocate resources for scientific activities of academic staff (participation in science projects and scientific conferences), and stimulate their mobility and scientific publishing, preferably in renowned peer-reviewed scholarly publications (Agency for Development of Higher Education and Quality Assurance, 2011). It also provides that the institutions of higher education should keep the records of scientific publications and research projects at the institution, and make it available for public, including the analysis of publications per classification and indexing of journals and their relationship to received funding for research. The latter should provide a basis for evaluation of scientific output per funding. In 2012 the Agency received the first applications from higher education institutions for accreditation, and the first results of accreditation process should be expected before the end of 2013.

40 http://www.hea.gov.ba
41 Available at: http://hea.gov.ba/Dokumenti/dokumenti_agencije/Archive.aspx?template_id=52&pageIndex=1
3 STRUCTURAL CHALLENGES FACING THE NATIONAL SYSTEM

It is difficult to position Bosnia and Herzegovina in the EU context due to a lack of national R&D statistics and the fact that country is not included in sources such as the Innovation Union Competitiveness Report. The indicative data can partly be obtained in combination of available international sources and national statistics.

Table 2

<table>
<thead>
<tr>
<th>HUMAN RESOURCES</th>
<th>0.3</th>
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<tbody>
<tr>
<td>New doctorate graduates (ISCED 6) per 1000 population aged 25-34</td>
<td></td>
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<tr>
<td>Percentage population aged 25-64 having completed tertiary education</td>
<td>17.1</td>
</tr>
<tr>
<td>Open, excellent and attractive research systems</td>
<td></td>
</tr>
<tr>
<td>International scientific co-publications per million population</td>
<td>-</td>
</tr>
<tr>
<td>Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country</td>
<td>-</td>
</tr>
<tr>
<td>Finance and support</td>
<td>0.2</td>
</tr>
<tr>
<td>R&amp;D expenditure in the public sector as % of GDP</td>
<td></td>
</tr>
<tr>
<td>FIRM ACTIVITIES</td>
<td>0.1</td>
</tr>
<tr>
<td>R&amp;D expenditure in the business sector as % of GDP</td>
<td></td>
</tr>
<tr>
<td>Linkages &amp; entrepreneurship</td>
<td></td>
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<tr>
<td>Public-private co-publications per million population</td>
<td>-</td>
</tr>
<tr>
<td>Intellectual assets</td>
<td></td>
</tr>
<tr>
<td>PCT patents applications per billion GDP (in PPP$)</td>
<td>*43</td>
</tr>
<tr>
<td>PCT patents applications in societal challenges per billion GDP (in PPP$) (climate change mitigation; health)</td>
<td>-</td>
</tr>
<tr>
<td>OUTPUTS</td>
<td></td>
</tr>
<tr>
<td>Economic effects</td>
<td></td>
</tr>
<tr>
<td>Medium and high-tech product exports as % total product exports</td>
<td>17.61</td>
</tr>
<tr>
<td>Knowledge-intensive services exports as % total service exports</td>
<td></td>
</tr>
<tr>
<td>License and patent revenues from abroad as % of GDP</td>
<td>**45</td>
</tr>
</tbody>
</table>

Data source: BiH national statistics and Global Innovation Index

n/a – not available for individual year in existing international databases or national statistics
* - available in comparable source in similar category / different standard
** - within a wider category in existing international databases or national statistics
- - no data in international databases or BiH national or regional statistics

There is a need for increased efficiency and productivity, as well as a larger share of domestic know-how in export products and services. This is especially important in moving from a resource-based and unskilled labour intensive products to capital and skilled labour intensive products, as was already the case from 2003 to 2007 in BiH export (Jahić, 2011a). The most important structural challenges identified by Jahić (2011a) are in (i) increasing domestic demand for R&D, (ii) increasing collaboration with the business sector; and (iii) facilitating knowledge.

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43 BiH Domestic Resident and PCT patents applications / bn GDP PPP$ are listed in Global Innovation Index 2011 (Domestic Resident: 18, PCT: 0.2 in 2011/2012), available at: http://www.globalinnovationindex.org/gii/main/previous/
44 Royalty and license fees receipts / th GDP are listed in Global Innovation Index 2011 (0.9% in 2011/2012, however without the percentage of revenue from abroad), available at: http://www.globalinnovationindex.org/gii/main/previous/
and technology transfer. With the rough estimate of basic R&D indicators for BiH (see 2.2) and adoption of entity-level STI strategy of RS in July 2012, additional structural challenges can be identified in (iv) transforming the role of predominantly teaching-oriented universities as largest research performers and (v) harmonization of national and entity-level STI strategies’ long term goals for R&D funding and corresponding public/private ratio.

i) Domestic demand for R&D - 1990s war and transformation to a market-led system produced significant changes in R&D expenditure. Research and technological development lost the political component of planned economy from the former Yugoslavia. This significantly affected industries that began developing their original technologies and know-how directly before the 1990s war, causing disappearance of R&D units or change of their general research orientation. The restructuring of the enterprise sector in Bosnia and Herzegovina faced a 27.6% average unemployment rate in 2011, with the highest decline in employment registered in construction, agriculture and manufacturing (EC, 2012a). The biggest enterprises are active only in small part of the pre 1990s war capacities, with insufficiently competitive products and a low level of foreign investments. During and after the worldwide financial crisis in 2008-2009, foreign investments were reduced considerably (Jahić, 2011a). Significant drop in domestic demand for R&D was also complemented with a lack of demand-side innovation policy measures in BiH, such as the lack of innovation procurement section in the Strategy for Development of Public Procurement System in BiH 2010-2015 adopted in May 2010 (Jahić, 2011b).

ii) Weak private sector - R&D in BiH is mainly done by universities and public research organisations. The business enterprise sector in BiH is represented by around 35% within the BiH GERD (see 2.2), which is little more than half of the European average of 62.4% of R&D performed by business enterprise sector within GERD. Stronger integration of private sector in R&D was stressed as a priority in the 2009 national STI strategy (Council of Ministers of BiH, 2009). The main economic reasons for the weak private sector involvement in research policy making are in the low level of technology, the innovative and absorptive capabilities of the companies as well as their financial restrictions (Jahić, 2011a). The involvement of the industry sector in BiH only in providing financial resources towards the practical application of the R&D results (Deloitte Consulting, 2012).

iii) Knowledge and Technology transfer - Global Innovation Index Report 2012 indicates the weakness of BiH economy in knowledge absorption and ranks it 127th out of 141 economies. Knowledge diffusion is ranked better – as 72nd (Doutta, 2012). The report also ranks BiH university/industry research collaboration 81st out of 141 ranked world economies. Partnerships between higher education institutions and business enterprise sector have been promoted in strategy documents, including higher quality and easier support public support to research and innovation in business (Government of RS, 2012). However, there is no unified system for tracking of institutions, projects, finances and other factors for assessing the sector quality and inter-sectoral dimension.

iv) Teaching-oriented higher education as the largest research performer - BiH higher education performs well over 50% within the BiH GERD (see 2.2), which is more than twice than the European average of 24% of research performed by HEIs within GERD. The R&D statistics available only for RS shows 75.7% researchers employed in higher education and 14.5% in business enterprise sector in RS in 2011, with 52% of experimental development research articles in RS coming from higher education in 2011, compared to 21% from business enterprise sector and 26% from government sector (Bureau of Statistics of RS, 2012). Scientific research capacities are mostly

46 2011, EUROSTAT
47 2011, EUROSTAT
48 No equivalent data available for FBiH and Brčko District.
located at universities, but due to the lack of funding, the universities do not fully perform their research role and they are mainly focused on their teaching role (Council of Ministers of BiH, 2009). Global Innovation Index Report 2012 ranks the quality of BiH scientific research institutions as 95th out of 141 ranked countries (Doutta, 2012).

v) Lack of harmonization in national and entity-level STI strategies’ long term goals for R&D funding and corresponding public/private ratio (see 2.2) - The 2009 national STI strategy envisages a 33% share of business enterprise sector in the projected 2015 BiH GERD of 1% BiH GDP (Council of Ministers of BiH, 2009). The 2012 entity-level STI strategy of RS envisages the growth of GERD from 0.25% RS GDP in 2010 to 0.5% RS GDP in 2016, with an optimistic projection of BERD of 0.3% RS GDP (within the 0.5% RS GDP GERD) in 2015 and the goal of reaching GERD of 1% RS GDP by 2020 (Government of RS, 2012). The draft FBiH STI strategy envisages FBiH GERD of 1% FBiH GDP already in 2013, with the gradual increase to reach 2% in 2017 with suggestion that the government / business sector balance should remain in the pre 1990s war ratio of 2:1 or even 3:1 - 3:1 in duration of at least the first five years (Government of FBiH, 2011).

The weakness of the private sector in combination with a lack of harmonized approach in revitalization of its R&D performance is the biggest obstacle in addressing the structural challenges as a whole. IPA Multi-annual Indicative Planning Document (MIPD) 2011-2013 states that Bosnia and Herzegovina’s preparations in the area of SMEs are at an early stage (EC, 2011). Further efforts are needed to properly implement the state-level strategy for SMEs and entities’ support measures for SMEs are not harmonised which reduces their positive effects while SMEs are operating under different conditions across the country (EC, 2011). Sector objectives are to improve the institutional and legal framework, coordination and harmonisation of SMEs related public policies, support Bosnia and Herzegovina to adhere to its obligations under the IA/SAA, advance the implementation of the Small Business Act, stimulate the innovation by SMEs and increase competitiveness in growth sectors (EC, 2011). The objectives also aim to strengthen the business support infrastructure and services in particular at local level, with corresponding indicators including the establishment of incubators, industrial and business parks, reduction of the share of public expenditure to GDP and the reduction of administrative burdens to doing business (EC, 2011).

The policy mix in BiH addresses the SME / public sector linkage through incubators and technology parks (see 4.2), with particular attention given to intermediaries in the 2012 entity-level STI strategy of RS for the period 2012-2016 (Government of RS, 2012). The area where the increased harmonisation at all governance levels is particularly important is the reduction of administrative burdens to doing business and establishment of a single company registration system for the entire country. Companies are still required to register in both BiH entities before they can do business in the whole country (EC, 2012a). Bosnia and Herzegovina made little progress towards meeting European standards on a number of sectoral policies until the end of 2012, and a country development strategy including industrial policy elements and the new SME strategy still remain to be adopted (EC, 2012b). In the first half of 2012, alongside the worsened external environment and decreased economic activity, the number of newly registered companies dropped by around 12% year on year (EC, 2012a).
4 ASSESSMENT OF THE NATIONAL INNOVATION STRATEGY

4.1 National research and innovation priorities

After the adoption of the national “Strategy for the Development of Science in Bosnia and Herzegovina 2010-2015” in 2009, the BiH entities of Republic of Srpska and Federation of BiH drafted their entity-level STI strategies for different action periods. “Strategy of Scientific and Technological Development of Republic of Srpska 2012-2016” was adopted by the RS Parliament in July 2012. “Strategy for Development of Scientific and Development Research Activities in the Federation of BiH for the period 2012-2022” was approved by the Government of FBiH in April 2012, but is still in the draft version, until the adoption by the FBiH Parliament (see 2.4).

The 2009 national STI strategy was preceded by the 2006 “Strategy of Scientific and Technological Development of Bosnia and Herzegovina”, commissioned by the National Commission of Bosnia and Herzegovina for UNESCO and made by the Academy of Sciences and Arts of BiH - ANUBIH. The Strategy presented the analysis of the state of science in BiH at the national level and stressed the need for all governance levels which participate in public spending in BiH to also participate in science and research funding, with their level of participation defined by their fiscal strength (ANUBIH, 2006). A gradual increase of GERD to 2% GDP (starting from 1%) is suggested in the Strategy, in accordance with the UNESCO recommendation that BiH must renew its R&D sector for EU accession, targeting the 2% GDP GERD (Papon & Pejovnik, 2006).

The 2009 national STI strategy followed from the Framework law on Scientific Research Activities and Coordination of Internal and International Scientific Co-operation in BiH, adopted in May 2009 [BiH Official Gazette 43/09]. The Strategy is based on the coordinated planning between the Ministry of Civil Affairs and relevant entity and cantonal ministries. It does not have a specific and thematic focus and identifies the main objectives, implementation instruments and budget allocation for scientific research in BiH. The general goals are to stimulate the scientific excellence and enable the transfer of knowledge and results of scientific discoveries to industry and business, in order to increase competitiveness and generate sustainable growth and productivity. The strategy stresses the role of the Department of Science and Culture within the state-level Ministry of Civil Affairs and stronger co-operation with EU funds for scientific research activities in BiH (Council of Ministers of BiH, 2009). The attention is also given to participation in FP7 and in other international programmes, together with allocation of funds from the budget of the Ministry for co-financing of international projects. The Strategy presents the state of science with strengths and weaknesses analysis at the national level, based on a series of round tables and discussions on the state of R&D in BiH held prior to the adoption of the strategy document (Council of Ministers of BiH, 2009).

Structural challenges faced by the country are not addressed systematically. The research policy is generic, with main policy instruments following a horizontal approach to assure the balanced development of the main research fields. Engineering and technology take around 30% of the budget (Jahić, 2011a). The 2012 entity-level STI strategy of RS provides measures for creation of R&D environment that would serve as a basis for commercialisation of research results and their competitiveness, suggesting policies and funding support for R&D in business sector (see 2.4). It introduces changes to the R&D system by enhancing the role of intermediaries in facilitation of research activities in the business sector (see 2.5). The 2012 RS Strategy presents the first
strengths and weaknesses analysis of the state of R&D in RS. The series of conferences, analyses at the round tables and thematic debates were held prior to the adoption of the strategy (Government of RS, 2012).

Due to a complex constitutional composition of Bosnia and Herzegovina, public debates regarding the national priorities in R&D have been organised separately at different governance levels. There is an evident difference in the envisaged growth of GERD and in assessment of the state of business enterprise sector in Bosnia and Herzegovina that entered the strategy documents as the envisaged BERD (see 2.2). No evaluations of the impact of state and entity-level policies have been performed meanwhile to assess the level at which the policies are dealing with the structural challenge of the weak business enterprise sector. The division of political and administrative responsibilities among the three levels of government makes it very difficult to define and implement country-level science policy (UNESCO, 2010). This is the main obstacle for a comprehensive identification of strengths and weaknesses for R&D in Bosnia and Herzegovina in relation to structural challenges.

In terms of fiscal policies, the incentives that indirectly support R&D are exemptions from custom duties and VAT refunds for equipment that has been procured in BiH or abroad for higher education institutions. The Law on Corporate Tax in RS [Official Gazette of RS 91/06] and the Law on Corporate Tax in FBiH, [Official Gazette of FBiH 97/07 and 14/08] provide incentives to those companies who re-invest in the production part of their activities⁴⁹. The 2009 national STI strategy states the need for introduction of tax and customs duties exemptions for scientific research activities, as well as providing state guarantees to research institutions in securing of bank loans for purchasing scientific equipment (Council of Ministers of BiH, 2009). The 2012 entity-level STI Strategy of RS also recognizes the need for tax exemptions and incentives, however, the RS Strategy points out that due to constant fiscal tensions in the conditions of high deficit and pressure on public spending, there is little space for tax incentives, and that tax exemptions and incentives should depend on economic growth indicators (Government of RS, 2012).

4.2 Evolution and analysis of the policy mixes

There are difficulties in distinguishing a policy mix for research in BiH from documents guiding research and innovation, and other policies affecting research which were adopted in the past three years (Jahić, 2011a). There is no coordination between them and only international institutions have created several financial instruments fostering innovation and development in the country so far (Jahić, 2011a; p.16):

Business Innovation Programs (BIP) – Norwegian non-profit foundation
Competitive Regional Economic Development (CREDO) – Swedish International Development Agency (SIDA) - Project period: 2010-2014;
Open Regional Fund for Foreign Trade Promotion in South- East Europe (ORF) - German Federal Ministry for Economic Cooperation and Development (implemented by Deutsche Gesellschaft fur Internationale Zusammenarbeit - GIZ) - Project period 2007-2012;
Turn-around Management and Business Advisory Services Program BiH (TAM/BAS) – European Bank for Reconstruction and Development - Set in EBRD Strategy 2010 – 2013;
USAID Bosnia and Herzegovina - supervising the following projects supporting innovation in

⁴⁹ The FBiH Law on Corporate Tax also provides that all R&D costs can be listed as expenditures in the tax balance.
the country: *Fostering Interventions for Rapid Market Advancement – FIRMA* (co-sponsored by Sida); *Enterprise Energy Efficiency – 3E, Excellence in Innovation Project – EI* (co-sponsored by the Norwegian Ministry of Foreign Affairs); *Development Credit Authority (DCA) Loan Portfolio Guarantee – LPG* (co-sponsored by Sida, strengthening local banks’ ability to finance medium and long term loans to SMEs in productive sectors, key complement to FIRMA project).

The Ministry of Civil Affairs through its Department of Science and Culture had a budget of €250,000 in 2010 for funding BiH researchers to submit proposals for FP7 projects and €0.076m in 2010 for its Support to Innovation and Technical Culture in BiH Programme. No allocation was made in 2011, and the program was continued in 2012, with the total of €0.067m allocated (see 2.3). According to the latest available data for BiH entities, the support for technological development in RS in 2010 was €0.41m. The distribution of funding was performed through competitive call to innovators (€0.06m or 6.3% of the total budget), development of new technologies (€0.30m or 86.3% of the total budget) and development of the information society - €0.05m or 7.4% of the total budget (Jahić, 2011a). For the same purposes Ministry of Education and Science of FBiH allocated €0.37m in 2010 through competitive calls (Jahić, 2011a).

IPA 2009 National Program BiH – Community Programmes provided support in amount of €1.3m for strengthening of institutional capacities and purchase of equipment for three research and innovation centres: Innovation Centre Banja Luka, Entrepreneurship and Innovation Centre of the University of Zenica and International Business Centre Mostar (EC, 2009). The main emphasis was on developing the capacities of centres to conduct feasibility and/or development studies in the areas of research, technology, development and innovation (EC, 2009). Activities also included training the research and innovation centres’ staff in managing of R&D innovation centres and methodology for know-how transfer, capacity building, promoting innovation and entrepreneurship and purchasing equipment they need for carrying out the activities (EC, 2009).

The Ministry of Civil Affairs of BiH implemented the project Triple Helix Innovation Partnerships to improve the co-operation within public-private-research communities in BiH in the food sector. Project was carried out under Multi-Beneficiary IPA programme and with the support of the Government of Flanders, in cooperation with OECD Investment Compact for South East Europe within the Western Balkans Regional Competitiveness Initiative. The objectives were to strengthen the links between research and the business sector and encourage SMEs to invest in research and innovation. With the budget of €0.5m, the project ensured cooperation between the ministries in charge of research, chambers of commerce and universities. Out of 24 presented ideas for Triple Helix in 2011, three project proposals from the University Enterprise Center Banja Luka, ”KIKO” company from Bijeljina, and Biotechnical Faculty of the University of Bihać received free technical assistance from OECD experts for project realization.

ERAWATCH Country Reports 2011 Bosnia and Herzegovina pointed out that the performance of the BiH science system is unsatisfactory in the categories of the Self-Assessment Tool of the Innovation Union Flagship Initiative (Jahić, 2011a). The innovations are not considered as a key driver of competitiveness and job creation, but are treated as other priorities such as budget.

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52 ibid.
deficits, wage insurance and pensions, European integration, agricultural policy, fight against corruption, etc. (Jahić, 2011a). Promoting research and innovation as a key driver for competitiveness and job creation is limited to multi-annual strategy documents at the national and entity level and there are significant differences in levels of the preceding public debates at which the R&D weaknesses and strengths have been identified for strategic goals (see 4.1). Communication of research and innovation objectives is limited to closed academic or intellectual circles, shared with the public only through occasional media coverage and commentary. There are also significant differences in STI strategies over the potential of the business enterprise sector, thus envisaging different public/private ratios of R&D investment in their action timeframes (see 2.2).

Bosnia and Herzegovina maintained the scientific research potential at higher education institutions for public sector to be the driver of innovation, but the education and training system does not motivate the research and teaching staff at the universities to dedicate more time to research and does not provide the right mix of skills. Skills agenda or similar measures to build researcher employability skills and capacities have not been implemented. the same being valid for implementation of provisions of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (Deloitte Consulting, 2012). The Ministry of Civil Affairs of Bosnia and Herzegovina, NCP BiH and Euraxess BiH are in the process of promoting the signing of the Charter and Code by the BiH research institutions (see 5).

BiH has a potential of relatively young scientific research personnel, but there are considerably less students that study mathematics, natural sciences and technical sciences in comparison to social sciences and humanities (Deloitte Consulting, 2012). R&D jobs became less attractive because of lower personal income and benefits compared to other sectors. Brain drain has caused a shortage of experienced mid-career researchers. BiH institutions provide financial support for science and research projects, participation at science conferences and trainings in country and abroad, etc, but there are no incentives for increasing the personal income component (Deloitte Consulting, 2012). There is no data on the outward and inward mobility of researchers, including the quotas or other measures to ensure a representative gender balance for researchers.

189 PhD degrees were obtained in 2011/2012, the number including 75 PhD degrees obtained by women (BiH Agency of Statistics, 2012b). In that period 27 Ph.D degrees were obtained in natural sciences, mathematics and computing and 42 in engineering and technology (BiH Agency of Statistics, 2012b). Out of the total number of 7,722 graduated students in RS in 2011/2012, 514 graduated in natural sciences, mathematics and informatics, 525 in engineering, manufacturing and construction, 175 in agriculture and veterinary sciences and 745 in health and welfare (Bureau of Statistics of RS, 2012). Out of the total number of 11,209 graduated students in 2011/2012 in FBiH, 374 obtained degrees in electrical engineering, 534 in mechanical engineering, 611 in agriculture and biotechnology, 66 in veterinary sciences and 709 in natural sciences and mathematics (Bureau of Statistics of FBiH, 2012).

4.3 Assessment of the policy mix

Policy actions introduced to tackle BiH structural challenges are in the range of public sector promoting itself as a driver of innovation and promoting partnerships between higher education, research centres and businesses. The 2009 national STI strategy pointed out the need for
establishment of science and technology parks with different focus in different areas of BiH\(^{53}\), but also stressed that it is necessary to avoid the establishment of an excessive number of science parks and business zones, bearing in mind the scarce capital and human resources (Council of Ministers of BiH, 2009). The Strategy recommended the “regional centres of excellence” rationale for defining the focuses of science and technology parks around the country, with human resources, scientific competences, existing R&I infrastructure and natural disposition of regions to be taken into account in profiling the centres of excellence. For this, the Strategy recommended the approach from Spain, as one of the leading European countries in establishment of science and technology parks (Council of Ministers of BiH, 2009).

The 2012 entity-level STI strategy of RS set the directions for a higher quality and easier-to-obtain public support to research and innovation in business, stressing the role of intermediaries in evoking more response from the business sector (see 2.5). Further increase of the number of science and technology parks, technology transfer centres and innovation centres is suggested in the Strategy, but regional aspects are addressed in the document through the existing network of five RS Chamber of Commerce regional offices, where regionalisation is observed within the entity-level limits\(^{54}\). The Strategy also points out that the role of the RS Chamber of Commerce, as part of the envisaged role of intermediaries, is more pronounced lately (Government of RS, 2012). The draft 2011 entity-level STI strategy of FBiH outlines the establishment of science and technology parks under the general directions for development of R&I system (Government of FBiH, 2011), but the Strategy does not address the regional aspects of the process.

Technology Park Mostar operates within the Foundation for Innovation and Technology Development (INTERA) Mostar\(^{55}\). Business Innovation and Technology Park Tuzla\(^{56}\) entered in its third phase with the establishment of ICT science research centre “BIT III” in October 2012, as the result of cooperation with the University of Tuzla and Tuzla Municipality. The Technology Park in Zenica opened its laboratory for quality control in wood processing in November 2012, with the park operating as organisational unit of Zenica Local Development Agency\(^{57}\) (ZEDA). In 2010 Republic of Srpska established the Innovation Centre Banja Luka\(^{58}\) (ICBL), ICBL is the first combined centre for support and development of entrepreneurship in the RS, which supports the development of companies that are able to offer advanced commercial solutions in terms of products, services, employment and improvement of business processes based on knowledge and application of innovative and advanced technologies. The City Development Agency of Banja Luka\(^{59}\) (CIDEA) is in the process establishing the Technology Business Park Banja Luka.

The effects of these measures on innovation and socio-economic development remain modest due to the overall framework conditions which do not favour research and innovation for development and growth as well as very little investments (Jahić, 2011a). The adoption of the 2012 entity level STI strategy of RS provides additional policy measures to national STI strategy,

\(^{53}\) 2009 national STI strategy proposed the establishment of a technology park in Sarajevo with a focus on information technologies, electronics, mechatronics and bio-medicine; technology park in Tuzla with a focus on chemicals, IT and energy; technology park in Mostar focusing on processing of coloured metals, agri-business, energy efficiency/renewable energy; technology park in Banja Luka with a focus on electronics; and technology park in Zenica dedicated to new materials, metal and wood processing.

\(^{54}\) Due to a very complex constitutional structure set by the Dayton Peace Agreement in 1995, many geographical regions of BiH are divided between jurisdictions of two BiH entities and ten cantons (cantonal structure present only in the entity of Federation of BiH).

\(^{55}\) http://www.intera.ba/eng/

\(^{56}\) https://sites.google.com/a/bitcentar.com/engleski/home

\(^{57}\) http://www.zeda.ba/index.php

\(^{58}\) http://www.icbl.ba/en/

with its counterpart entity-level draft FBIH STI strategy adopted by the FBIH government but still awaiting the adoption by the FBIH Parliament. The national and entity-level strategies and national priorities address the structural challenges, but since there is a lack of harmonisation between the governance levels in terms of R&D investment goals, the policy mix is not optimized and ambitions for improvements go to different extent and different directions.

Table 3: Assessment of policy measures

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Policy measures/ actions</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak domestic demand for R&amp;D</td>
<td>National and entity-level STI strategies indirectly address the challenge as a problem of country’s economy in general.</td>
<td>Policy mix recognizes that R&amp;D jobs became less attractive because of lower personal income and benefits compared to other sectors. Brain drain is causing a shortage of experienced mid-career researchers. There are considerably less students that study mathematics, natural sciences and technical sciences in comparison to social sciences and humanities. There is a lack of demand-side innovation policy measures in BiH. Fiscal policy in BiH does not provide specific tax incentives for R&amp;D. Incentives are given only to companies who reinvest into the production part of their activities.</td>
</tr>
<tr>
<td>Weak private sector</td>
<td>National and entity-level STI strategies address the challenge, suggesting the level and modes for larger involvement of private sector.</td>
<td>The 2009 national STI strategy, the draft 2011 entity-level STI strategy of FBIH and the 2012 entity-level STI strategy of RS recognize the underinvestment in R&amp;D in the private sector. Innovative and absorptive capacities of the companies are very limited, including the financial restrictions. The 2012 entity-level STI strategy of RS introduced the modes for higher quality and easier-to-obtain public support to research and innovation in business. It places the emphasis on the role of intermediaries, such as the RS Chamber of Commerce regional offices and local development agencies.</td>
</tr>
<tr>
<td>Knowledge and technology transfer</td>
<td>National and entity-level STI strategies address the challenge and propose directions. Support measures are within the competitive grants programmes at the state and entity level.</td>
<td>The 2009 national STI strategy aims to stimulate scientific excellence and enable the transfer of knowledge and results of scientific discoveries to industry and business. The 2012 entity-level STI strategy of RS follows on this, but this challenge is closely tied with the private sector weakness and HEIs as by far the largest research performer. So far, the measures were reflected in establishment of science and technology parks as intermediaries across the country. However, the rationale for establishment of science and technology parks in terms of regional aspects is different at the national and at the entity level. There are no specific measures for tracking inward and outward mobility of researchers and there are no specific measures for entry in national, regional and trans-national programs of researcher mobility funded by the EU.</td>
</tr>
<tr>
<td>Teaching-oriented higher education as the largest research performer</td>
<td>National and entity-level STI strategies address the challenge. Support measures are within the competitive grants programmes at the state and entity level.</td>
<td>Partnerships between higher education institutions and business enterprise sector have been promoted in strategy documents, including higher quality and easier support public support to research and innovation in business. The 2012 entity-level STI strategy of RS stresses the role of intermediaries in transformation of R&amp;D complex. This is especially related to HEIs and public research institutes.</td>
</tr>
<tr>
<td>Lack of harmonization for long term goals in R&amp;D funding</td>
<td>National and entity-level STI strategies envisage different long-term goals in R&amp;D funding</td>
<td>There is an evident difference in understanding of the current state of business enterprise sector in BiH at the national and at the entity level. This is reflected in differences in the envisaged BERD share in GERD in national and entity-level STI strategies. Discrepancies in assessing the ability of private sector to respond to policy measures present are mostly due to different extent to which public debates at round tables and discussions influenced the strategy documents prior to adoption. This presents a major obstacle for policy measures appropriateness and efficiency.</td>
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60 Horizontal measures for funding support.
5 NATIONAL POLICY AND THE EUROPEAN PERSPECTIVE

The integration of the BiH research system in ERA is led by the state-level Ministry of Civil Affairs of BiH within the BiH Council of Ministers. The 2009 national STI strategy stresses the role of Ministry’s Science Department and the need for stronger co-operation with EU funds for scientific research activities in BiH - participation in FP7 and in other international programmes supported by funds from the budget of the Ministry for co-financing of international projects (Council of Ministers of BiH, 2009). The Ministry participated in the Steering Platform on Research for the Western Balkan countries and it contributed to the communication activities of the Information Office see-science.eu. In terms of providing additional support to R&I activities and researcher mobility, the Ministry of Civil Affairs participates in FP7 projects SEE-ERA.NET Plus, WBC-INCO.NET, BAMONET, I-SEEmob and MIRA.

Since 2010 the Ministry of Civil Affairs implements the project “Strengthening the capacities of the Ministry of Civil Affairs BiH for participation in the programmes FP7, COST and EUREKA” funded by the Government of Austria through Austrian Development Agency. According to data from NCP BiH, at the end of 2011 BiH had 28 approved projects of BiH research institutions and organisations in FP7, with Ministry of Civil Affairs of BiH participating in four projects, and in the coordinator role in one. To address the ERA related project activities the Ministry aims to provide additional services in relation to FP7, COST and EUREKA, securing additional funding for research and innovation. This is done within the horizontal measures of funding support, through competitive calls, which are administrated similarly to entity-level support measures in RS and in FBiH. However, at the state level this is affected by continuing disagreements within the governance structure on the budget of BiH joint institutions (see 2.1 and 2.3).

BiH actively promoted cooperation on research and innovation with the EU, with a slight increase in the number of submissions under the FP7, but with the low overall success rate (EC, 2012a). The administrative capacity improved by increasing the number of National Contact Points, organizing training sessions and promoting events on FP7 and the cooperation with COST and EUREKA was strengthened, with EURAXESS network established and functioning well, but the communication and coordination between the different science ministries and entities is insufficient and the overall level of investment in research remains low (EC, 2012a).

ERAWATCH Country Report 2011 identified the key challenges for integration of national policy mix into the European perspective in short and medium terms (Jahić, 2011a). They include inward and outward mobility of researchers, proportion of researchers in the private sector, research infrastructures and securing their efficient utilisation, reforming research and

61 http://www.mcp.gov.ba
63 More information available at: https://www.zsi.at/en/object/project/977
64 http://www.see-era.net/
65 http://wbccnco.net/
67 http://www.iseemob.eu
68 http://www.miraproject.eu/
70 More information available in Masnik-Ćulahović D., Public Presentation on BiH Accession to EU Programmes, 21/05/2012, available at: http://www.ncp.ba/systems/file_download.ashx?pg=2612&ver=1
higher education through improved funding mechanisms, quality assurance, accountability, and developing science - industry collaboration and internationalisation (Jahić, 2011a). It can be added to this the issue of the lack of consensus between the national and entity governance levels and the corresponding lack of harmonization of R&D investment goals in STI strategies.

The potential directions for optimization of the policy mix are in additional consultations at the national and entity level that would assess the common starting grounds and long-term goals for R&D investment and the corresponding public/private ratio. The creation of a broader consensus also requires a broader space for debates and consultations with stakeholders which have been too fragmented and closed in isolated academic, intellectual and professional circles to produce a shared ambition for improvements. It is in this area that the proposed STI strategy measures and research system changes such as the envisaged role of intermediaries in the recently adopted entity-level STI strategy of RS (see 2.5) should contribute to improvements.

Table 4: Alignment of National Policy Mix with ERA Communication Objectives

<table>
<thead>
<tr>
<th>ERA priority 1: More effective national research systems</th>
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<tr>
<td>- No changes in the trend regarding the competitive funding performed at the state and entity level.</td>
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<td>- The 2012 entity-level STI strategy of RS suggests an obligatory international peer-review in evaluation (see 2.3).</td>
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<tr>
<th>ERA priority 2: Optimal trans-national co-operation and competition</th>
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<tr>
<td>- No strategic alignment of committed national funding at European level.</td>
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<td>- No specific measures are defined for introduction of international peer review in funding decisions and there are no initiatives to remove legal and other barriers to the cross-border interoperability of national programmes.</td>
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<td>- BiH is not represented in ESFRI.</td>
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<tr>
<th>ERA priority 3: An open labour market for researchers</th>
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<tbody>
<tr>
<td>- EURAXESS BiH72 provides information on the life and work in Bosnia and Herzegovina, offering assistance for incoming and outgoing mobility of researchers and their families.</td>
</tr>
<tr>
<td>- Publicly funded grants or fellowships are portable to other EU countries only for local students and national grants or fellowships are not open to non-residents (Deloitte Consulting, 2012).</td>
</tr>
<tr>
<td>- The creation of an enabling framework for the implementation of the HR Strategy for Researchers incorporating the implementation of European Charter for Recruitment of Researchers &amp; Code of Conduct for Recruitment of Researchers is in the phase of promotion and signing by BiH research institutions (see 2.3).</td>
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<td>- There are no initiatives for introduction of the Principles for Innovative Doctoral Training.</td>
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<tr>
<th>ERA priority 4: Gender equality and gender mainstreaming in research</th>
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<tbody>
<tr>
<td>- Female researchers in BiH have the right to paid maternity leave for a year, as well as social and health insurance.</td>
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<tr>
<td>- There are entity-level measures (2012 STI strategy of RS) to promote gender equality in the research profession.</td>
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<tr>
<th>ERA priority 5: Optimal circulation, access to and transfer of scientific knowledge including via digital ERA</th>
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<tr>
<td>- There are measures for granting access to scientific research publications and data for free for academic sector and there are measures supporting the development of digital research services, but open access is not actively promoted. There are also no measures in place for a federated electronic identity of researchers.</td>
</tr>
<tr>
<td>- Fostering knowledge transfer between public and private sectors is mostly envisaged through the role of intermediaries (Government of RS, 2012), but there are no additional strategies with a specific focus on access and circulation between sectors.</td>
</tr>
</tbody>
</table>

Concerning the ERA Priority 1 - The 2009 national Strategy for Development of Science in Bosnia and Herzegovina 2010-2015 provides that institutional funding is to be used only for financing of fundamental and applied research for which there is still no recognizable need at the market of research services, and which are in accordance with scientific and development priorities defined in national strategies (Council of Ministers of BiH, 2009). The 2012 entity-level STI strategy of RS recognizes the need for competitive funding, but indicates a risk of allocating

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71 More information available at: [http://ec.europa.eu/research/era/consultation/era_communication_en.htm](http://ec.europa.eu/research/era/consultation/era_communication_en.htm)

72 [http://www.euraxess.ba](http://www.euraxess.ba)
“a little to all” through competitive funding, instead of allocating resources according to strategic orientation and quality of scientific research and development research projects (Government of RS, 2012). The draft entity-level STI strategy of FBiH does not specifically address the issue of competitive vs. institutional funding. Altogether, there is no indication of the change in trend.

Concerning the ERA Priority 2 - One example of the change in trend is the implementation of the bilateral programme with Slovenia where there is support for joint activities, sharing information, joint research agenda, joint calls and joint programming. Bosnia and Herzegovina signed bilateral agreements in the field of higher education with Bulgaria, Serbia, Croatia, Greece, Montenegro, Slovenia and Turkey, while in the field of scientific research there are bilateral collaborations with Albania, Bulgaria, Greece, Croatia and Slovenia (Korez, Le Gohebel, & Marinković, 2010). The Joint Committee for Scientific and Technological Cooperation between Slovenia and BiH has approved 28 projects to be implemented in 2012 and 2013. The country also signed bilateral agreements in the field of scientific research and higher education with France, Italy and Germany (Korez et al., 2010). However, results are mostly seen in the cooperation with Slovenia, and other international activities (joint workshops, conferences, scholarships, student exchanges) are mainly based on direct inter-institutional agreements (Korez et al., 2010).

Concerning the ERA Priority 3 - The findings of the Researchers Report 2012 Country Profile BiH are that not all BiH institutions publish job vacancies on their websites; institutions may choose or not to publish vacancies on the BiH EURAXESS portal; job vacancies are not published in English; institutions systematically establish selection panels; clear rules are established for the composition of selection panels; public institutions must publish vacancies together with the selection criteria in one of the existing public media; institutions regulate a minimum time period between vacancy publication and the deadline; there is a burden of proof on the employer to prove that the recruitment process was open and transparent; institutions offer applicants the right to receive adequate feedback (Deloitte Consulting, 2012).

Concerning the ERA Priority 4 - The 2012 entity-level STI strategy of RS states that one of the genders must be represented in a portion of no less than 40% in the RS Science and Technology Council, work groups, expert committees, management bodies of scientific research organizations and institutions, public and private institutions. The counterpart 2011 entity-level STI strategy of FBiH for the period 2012-2022, which is still in the draft version, is not specific on this issue. The same is valid for the 2009 national STI strategy for the period 2010-2015.

Concerning the ERA Priority 5 – A change in trend is that Bosnia and Herzegovina is part of COBISS.Net, which enables free of charge flow of bibliographic material among the participating countries. The COBISS.Net agreement has been signed by six countries: Bosnia and Herzegovina, Bulgaria, Montenegro, Macedonia, Slovenia and Serbia. The 2009 national STI strategy envisages activities on facilitation of researchers’ access to electronic resources for research and delegates this to relevant entity-level ministries in FBiH and RS, and to BiH libraries (Council of Ministers of BiH, 2009). The 2012 entity-level STI strategy of RS also envisages and delegates these tasks to relevant RS ministries, and to the libraries in RS (Government of RS, 2012). The draft Strategy for Development of Scientific and Development Research Activities in Federation of BiH 2012-2022 addresses the specific issue of university libraries access to electronic databases and indicates the need for further funding at the entity level for establishing of functional access to resources and science metrics (Government of FBiH, 2011).

74 http://www.cobiss.net/
REFERENCES


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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANUBIH</td>
<td>National acronym for the Academy of Sciences and Arts of Bosnia and Herzegovina</td>
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<td>BERD</td>
<td>Business Expenditure on Research and Development</td>
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<td>BiH</td>
<td>National acronym for Bosnia and Herzegovina (Bosna i Hercegovina)</td>
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<tr>
<td>COST</td>
<td>European Cooperation in Science and Technology</td>
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<td>EC</td>
<td>European Commission</td>
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<td>ENIC</td>
<td>European Network of Information Centres</td>
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<td>ERA</td>
<td>European Research Area</td>
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<td>ERA-NET</td>
<td>European Research Area Network</td>
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<td>ESFRI</td>
<td>European Strategy Forum on Research Infrastructures</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EU-27</td>
<td>European Union including 27 Member States</td>
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<tr>
<td>EUREKA</td>
<td>A Europe-Wide Network for Market-Oriented Industrial R&amp;D and Innovation</td>
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<tr>
<td>FBiH</td>
<td>National acronym for BiH entity of Federation of Bosnia and Herzegovina (Federacija Bosne i Hercegovine)</td>
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<tr>
<td>FP</td>
<td>Framework Programme</td>
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<td>FP7</td>
<td>7th Framework Programme</td>
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<tr>
<td>GBAORD</td>
<td>Government Budget Appropriations or Outlays on R&amp;D</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GERD</td>
<td>Gross Domestic Expenditure on R&amp;D</td>
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<td>HEI</td>
<td>Higher education institution</td>
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<tr>
<td>IA</td>
<td>Interim Agreement</td>
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<td>IPA</td>
<td>Instrument for Pre-Accession Assistance</td>
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<td>ISCED</td>
<td>International Standard Classification of Education</td>
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<td>JRC</td>
<td>European Commission Joint Research Centre</td>
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<td>NCP</td>
<td>National Contact Point</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>PCT</td>
<td>Patent Cooperation Treaty</td>
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<tr>
<td>PRO</td>
<td>Public research organisation</td>
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<tr>
<td>R&amp;D</td>
<td>Research and development</td>
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<tr>
<td>RI</td>
<td>Research infrastructure</td>
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<tr>
<td>RS</td>
<td>National acronym for the BiH entity of Republic of Srpska (Republika Srpska)</td>
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<tr>
<td>SAA</td>
<td>Stabilization and Accession Agreement</td>
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<tr>
<td>SCI</td>
<td>Science Citation Index</td>
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<tr>
<td>SITC</td>
<td>Standard International Trade Classification</td>
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<tr>
<td>SME</td>
<td>Small and Medium Sized Enterprise</td>
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<tr>
<td>STI</td>
<td>Science, technology, innovation</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organisation</td>
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<tr>
<td>WIPO</td>
<td>World Intellectual Property Organisation</td>
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Abstract
This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.

The reports were produced by independent experts under direct contract with IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from external experts.
As the Commission’s in-house science service, the Joint Research Centre’s mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.