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COUNTRY SNAPSHOT

Progress of Slovakia towards ERA Roadmap

	Indicator	Performance					Growth				
	Name	**Reference year**	**Score**	**Cluster**	**Lead/Gap (Δ %)**	**EU-28**	**Reference Period**	**CAGR**	**Trend (2005–2015)**	**Lead/Gap (Δ % pt)**	**EU-28**
Across Priorities	**1 – Adjusted Research Excellence**	**2013**	**18.6**	**3**	**-58**	**44.4**	**2010–2013**	**4.0%**		**-2.4**	**6.4%**
	2A – GBARD to transnatl coop (EUR/researcher)	**2014**	**52**	**4**	**-98**	**2,507**	**2010–2014**	**15.7%**		**7.9**	**7.8%**
	2B – Roadmap for ESFRI projects	**No national roadmap in place**									
	3 – EURAXESS job ads per 1 000 researchers	**2014**	**1.4**	**3**	**-97**	**47.0**	**2012–2014**	**111.8%**		**104.0**	**7.8%**
	4 – Share of women among Grade A HES	**2014**	**25.3%**	**2**	**8**	**23.5%**	**2007–2014**	**3.3%**		**-0.1**	**3.4%**
	5A – Research institute–private collaboration	**2012**	**5.3%**	**3**	**-27**	**7.3%**	**2008–2012**	**-11.5%**		**-15.0**	**3.5%**
	5A – Higher education–private collaboration	**2012**	**12.6%**	**2**	**4**	**12.0%**	**2008–2012**	**0.1%**		**-1.2**	**1.3%**
	5B – Share of papers in Open Access (Total)	**2014**	**53.2%**	**3**	**2**	**52.2%**	*Not computed*				
	6 – Collab papers w/non-ERA per 1 000 researchers	**2014**	**10.5**	**4**	**-79**	**50.7**	**2005–2014**	**1.6%**		**-2.5**	**4.1%**
	Headline Composite	2016	31	4	-38	50	*Not computed*				
Priority 1	**Adjusted Research Excellence [c]**	**2013**	**18.6**	**3**	**-58**	**44.4**	**2010–2013**	**4.0%**		**-2.4**	**6.4%**
	GBARD as share of GDP [c]	2014	0.383%	3	-43	0.671%	2008–2014	5.9%		6.4	-0.5%
	European Innovation Scoreboard	2015	0.350	3	-33	0.521	2008–2015	1.4%		0.6	0.7%
	GBARD as share of government expenditures	2014	0.91%	3	-34	1.39%	2005–2014	3.1%		3.9	-0.8%
	R&D tax incentives as share of GBARD	2013	0.0%	3	-100	11.4%	*Not computed*				
	Share of GBARD allocated on project basis	2014	21.6%	*Not computed*			2009–2014	:		*Not computed*	
	Patent applications per 1 000 researchers	2013	4.8	3	-84	29.8	2005–2013	3.9%		5.1	-1.2%
	Researchers per 1 000 active population [c]	2014	5.45	3	-26	7.40	2005–2014	3%		0.7	2.4%
	Publications per 1 000 researchers [c]	2014	192	4	-60	481	2005–2014	2.1%		0.4	1.6%
	Priority 1 Composite	2016	17	4	-66	50	*Not computed*				
Priority 2	**A – GBARD to transnatl coop (EUR/researcher) [c]**	**2014**	**52**	**4**	**-98**	**2,507**	**2010–2014**	**15.7%**		**7.9**	**7.8%**
	A – Collab papers w/ERA per 1 000 researchers [c]	2014	37.7	3	-43	65.7	2005–2014	2.3%		-1.3	3.6%
	A – Public-to-public partnerships (EUR/researcher) [c]	2014	142	3	-72	512	2012–2014	14.6%		-27.5	42.1%
	A – Co-invention rate w/ERA partners [c]	2011–13 [R]	41.1%	1	216	13.0%	2007–2013 [R]	-1.4%		-0.9	-0.5%
	B – Roadmap for ESFRI projects	**No national roadmap in place**									
	B – Participation in developing ESFRI projects	2016	9.5%	3	-54	20.7%	*Not computed*				
	B – Participation in operational ESFRI landmarks [c]	2016	6.9%	3	-77	30.2%	*Not computed*				
	Priority 2 Composite	2016	44	3	-12	50	*Not computed*				

	Indicator	Performance					Growth				
	Name	**Reference year**	**Score**	**Cluster**	**Lead/Gap (Δ %)**	**EU-28**	**Reference Period**	**CAGR**	**Trend (2005-2015)**	**Lead/Gap (Δ % pt)**	**EU-28**
Priority 3	**EURAXESS job ads per 1 000 researchers [c]**	**2014**	**1.4**	**3**	**-97**	**47.0**	**2012-2014**	**111.8%**		**104.0**	**7.8%**
	Open, transparent, merit-based hiring process [c]	2012	37.3%	3	-24	49.0%			*Not computed*		
	Share of doctoral students from EU countries [c]	2013	7.6%	3	3	7.4%			*Not computed*		
	Priority 3 Composite	2016	37	3	-41	63			*Not computed*		
Priority 4	**Share of women among Grade A in HES [c]**	**2014**	**25.3%**	**2**	**8**	**23.5%**	**2007-2014**	**3.3%**		**-0.1**	**3.4%**
	Gender dimension in research content [c]	2011-15 (R)	2.88	1	195	0.97	2005-2015 (R)	33.9%		34.4	-0.5%
	Share of women among heads of HES institutions [c]	2014	13.9%	3	-31	20.1%			*Not computed*		
	Share of women researchers [c]	2013	42.7%	2	29	33.2%	2005-2013	0.4%		-0.4	0.8%
	Share of women among PhD graduates [c]	2012	48.7%	3	3	47.3%	2005-2012	0.7%		-0.6	1.2%
	Priority 4 Composite	2016	62	2	35	46			*Not computed*		
Priority 5	**A - Research institute-private collaboration [c]**	**2012**	**5.3%**	**3**	**-27**	**7.3%**	**2008-2012**	**-11.5%**		**-15.0**	**3.5%**
	A - Higher education-private collaboration [c]	**2012**	**12.6%**	**2**	**4**	**12.0%**	**2008-2012**	**0.1%**		**-1.2**	**1.3%**
	A - Share of public R&D funded privately [c]	2013	5.0%	3	-39	8.1%	2009-2013	-14.9%		-15.9	0.9%
	A - Public-private collab papers per capita [c]	2014	8.1	3	-76	33.9	2008-2014	-4.6%		-4.5	-0.1%
	B - Share of papers in Open Access (Total) [c]	**2014**	**53.2%**	**3**	**2**	**52.2%**			*Not computed*		
	B - Share of papers in Open Access (Green)	**2014**	**42.5%**	**3**	**-5**	**44.7%**			*Not computed*		
	B - Share of papers in Open Access (Gold)	**2014**	**20.6%**	**3**	**-2**	**21.0%**			*Not computed*		
	B - National Open Access policies adopted	No OA policies for research data; No OA policies for scientific publications									
	Priority 5 Composite	2016	35	3	-15	41			*Not computed*		
Priority 6	**Collab papers w/non-ERA per 1 000 researchers [c]**	**2014**	**10.5**	**4**	**-79**	**50.7**	**2005-2014**	**1.6%**		**-2.5**	**4.1%**
	Share of doctoral students from outside EU [c]	2012	1.5%	3	-94	25.5%	2005-2012	14.4%		10.9	3.5%
	Licence & patent rev. from abroad, share of GDP [c]	2013	0.00%	3	-100	0.64%	2006-2013	-100%		-109.6	9.6%
	Co-invention rate w/non-ERA partners [c]	2011-13 (R)	6.0%	4	-39	9.8%	2007-2013 (R)	0.9%		-1.4	2.3%
	Priority 6 Composite	2016	24	4	-56	55			*Not computed*		

COUNTRY NARRATIVE

Slovakia's overall progress towards the achievement of the European Research Area (ERA) leaves room for improvement, falling into Cluster 4 in the headline composite indicator and trailing the EU-28 average by 38 %. Note that this composite score relies on the core high level indicators that were selected as being the most relevant in monitoring progress in achieving the ERA by the European Research Area and Innovation Committee (ERAC Secretariat, 2015). As such, it provides only a partial view of all the relevant and complementary dimensions captured by the indicators listed in the above table. The reader should be careful in extracting conclusions on overall performance, acknowledging the presence of variability across all the dimensions within and between priorities.

1. More effective national research systems

Priority 1 is not a strength for Slovakia, with all performance scores falling into Clusters 3 or 4. Indeed, the country falls into Cluster 4 on the priority composite indicator and trails the EU-28 average by 66 %. Slovakia falls into Cluster 4 in the number of publications per 1 000 researchers and in 2013, reported no R&D tax incentives as a share of GBARD relative to the 11.4 % average in the EU-28. Relative to the EU-28 average, Slovakia comes closest in the number of researchers per 1 000 active population but still trails by 26 %.

This finding is consistent with other reports indicating that the Slovakian research and innovation (R&I) system tends to fare worse in input and output markers relative to other European Union countries, including the other members of the Visegrad 4 Group: the Czech Republic, Hungary and Poland (Baláž & Zifciakova, 2016).

Competitive funding in Slovakia is always subject to peer review (Baláž, 2015; Baláž & Zifciakova, 2016). At institutional level, despite funding being theoretically tied to institutional assessments, in reality this is not the case and factors such as 'work entitlements, demands on mass education and the ability of the [higher education institutions] HEIs and [the Slovak Academy of Sciences] SAS to negotiate their budgets with the Ministry of Finance' (Baláž & Zifciakova, 2016, p. 36). Other challenges facing the R&D funding system include an unpredictable budgetary framework, as well as evaluation procedures that are not yet adequately engrained in culture and are also not clearly tied to funding amounts disbursed (Baláž, 2015).

Despite performance indicators which suggest that Priority 1 is not a strength, Slovakia's performance improved in all areas across this priority in recent years — often matching or exceeding the annual growth rate of the EU-28. Growth was highest for GBARD as a share of GDP, which had an annual growth rate of 5.9 % over the 2008-2014 period relative to the decline observed at EU-28 level.

2. Optimal transnational co-operation and competition

Slovakia's overall performance in Priority 2 falls behind the EU-28 average by 12 % and places the country in Cluster 3 on the priority composite indicator.

a. Jointly addressing grand challenges

Slovakia's performance in Sub-priority 2a is mixed, with Cluster assignments between 1 and 3 and performance scores falling both above and below the EU-28 average.

Slovakia's R&D policies have generally not focused on joint programming or research agendas to address grand challenges, so actions in this area have generally evolved in an ad hoc manner (Baláž & Zifciakova, 2016). The development of the country's smart specialisation strategy (RIS3) has led to some developments on this front, however. Specifically, the RIS3 outlines thematic priorities and measures to encourage increased international cooperation and coordination. While the Ministry of Education, Science, Research and Sport of the Slovak Republic (MESRS) is the main body involved in international cooperation and competition, the Visegrad Fund foundation also disburses small grants to encourage cross-border cooperation, among other priorities (Baláž & Zifciakova, 2016).

Performance is strongest in the co-invention rate with ERA partners, which exceeded the EU-28 average by 216 % and earned Slovakia a Cluster 1 ranking. Performance was below the EU-28

level for public-to-public partnerships, but this was also where the highest annual growth rate emerged over the 2012-2014 period.

On the other hand, performance in the headline indicator of the share of GBARD allocated to transnational cooperation lagged behind the EU-28 average by 98 % and fell into Cluster 3 relative to the ERA average. Other sources have indicated that there is little funding allocated to international cooperation at either European or international levels (Baláž & Zifciakova, 2016). Performance was also below average for the number of papers produced in collaboration with ERA partners per 1 000 researchers.

b. Make optimal use of public investments in research infrastructures

A draft National Research Infrastructure Roadmap was developed by MESRS in 2010, however this did not obtain the approval of the Slovak government (Baláž & Zifciakova, 2016). A national roadmap was due to enter into force in 2016. To date, ESFRI project participation has been allocated by MESRS on an ad hoc basis, and no policy document had been developed for transnational access to Slovak research infrastructure (Baláž & Zifciakova, 2016).

Potentially as a result of the challenges that have been faced in the policy development process, performance in this priority is not particularly strong. In 2016, Slovakia was a participant in 9.5 % developing ESFRI projects and their involvement as a partner in landmark ESFRI projects stood at 6.9 %. Participation in both fell well below the EU-28 average.

3. An open labour market for researchers

Slovakia falls into Cluster 3 in the Priority 3 composite indicator, trailing the EU-28 average by 41 %. Performance falls exclusively into Cluster 3 across all indicators in this priority and was slightly above the EU-28 average for the share of doctoral students from EU countries. Slovakia's lowest performing area was in the headline indicator of EURAXESS job ads per 1 000 researchers, which fell 97 % below the EU-28 average in 2014 despite having experienced a large increase in 2014. EURAXESS has been active in Slovakia since 2004, and while it may not be used to its full potential for posting job advertisements, it is an important source of information for Slovak researchers looking for postings abroad (Baláž & Zifciakova, 2016).

Slovakia's higher education institutions and the SAS adhere to labour market regulations for researchers, including the Labour Code and Law on Civil Service although both have a relative degree of freedom in staffing and research programming decisions (Baláž & Zifciakova, 2016). In 2012, 37.3 % of Slovak researchers indicated that they perceived hiring processes to be open, transparent and merit-based, falling 24 % below the EU-28 average. Indeed, there are no measures in place which cover the merit-based recruitment of researchers in the country, although some sector-specific mechanisms for merit-based career advancement do exist (Baláž & Zifciakova, 2016). Other barriers also exist in terms of encouraging an open labour market, including language barriers and the need to have foreign credentials approved by MESRS.

4. Gender equality and gender mainstreaming in research

There are a series of general laws that touch on gender equality issues in Slovakia, although none are specific to female researchers (Baláž & Zifciakova, 2016).

Priority 4 is a strength for Slovakia, with the priority composite score falling into Cluster 2 and exceeding the EU-28 average by 35 %. Performance is particularly strong in the gender dimension in research content, where Slovakia led the EU-28 average by 195 %. This score follows from the strong growth rate observed in this area over the 2005-2015 period, which averaged 33.9 % per year.

Despite performing relatively well in the share of women in Grade A positions in the higher education sector, performance fell below the EU-28 average by 31 % for the share of women among heads of higher education institutions. Evidence presented elsewhere suggests that despite this below-average performance, important improvements in the number of women in decision-making positions is taking place in research performing and funding organisations (Baláž & Zifciakova, 2016). Data for 2015 indicate that the share of women in Grade A positions stood at 25.7 %; this figure was not considered for the analysis relative to the whole of ERA due to differences in data availability for other countries.

5. Optimal circulation, access to and transfer of scientific knowledge including via digital ERA

Slovakia's overall performance in Priority 5 fell behind the EU-28 and ERA averages (as evidenced by the priority composite indicator), although the country comes close to or exceeds average performance scores on some indicators.

a. Knowledge transfer

Slovakia's performance in Sub-priority 5a is variable, with the two components of the headline composite indicator performing very differently from one another. The private sector collaborated to a much greater extent with the higher education sector than research institutions, with the former leading the EU-28 average by 4 % and the latter falling 27 % below. Performance was also weaker for the number of papers produced in collaboration between the public and private sector, which fell 76 % below the EU-28 average.

Asides from a very modest annual growth rate of 0.1 % over the 2008-2012 period for the collaboration between the higher education sector and private institutions, the other indicators in this priority declined in recent years while the EU-28 experienced, in general, positive annual growth rates. Indeed, knowledge transfer initiatives implemented in Slovakia to date appear to have had little impact (Baláž & Zifciakova, 2016). Contributing factors include a lack of initiatives in this area asides from those financed through Structural Funds as well as an apparent decrease in the interest of firms in incubators.

b. Open access

Slovakia does not have any national policies on open access publications and data, and it is the responsibility of HEIs and PROs to set their own regulations in this area (Baláž & Zifciakova, 2016).

Slovakia falls below the ERA average for Sub-priority 5b, with all indicators scoring in Cluster 3. Differences with the EU-28 are, however, relatively small and for the total share of papers in open access (total), even show Slovakia having a slight edge (leading by 2 %). Overall, however, Slovakia's performance in Priority 5 leaves room for improvement.

6. International cooperation

Priority 6 is one of the priorities in which the most room for improvement exists, falling into Cluster 4 on the priority composite indicator and trailing the EU-28 average by 56 %.

In 2013, Slovakia reported no licence and patent revenue from abroad, despite having done so for the earlier years in the time trend series beginning in 2006. This led to a large deficit between Slovakia's performance and growth scores relative to the EU-28.

Performance was also below average for the headline indicator of papers produced in collaboration with non-ERA partners, which lagged behind the EU-28 score by 79 %. The share of doctoral students from non-ERA partners was also below the EU-28 average by a large margin, however both of these indicators had experience positive annual growth in recent years. In particular, the mean annual increase in the number of doctoral students from outside the ERA exceeded the annual growth rate in the EU-28 by 10.9 percentage points.

Despite an overall performance in Priority 6 that leaves much room for improvement, Slovakia has developed cooperative relationships with the United States, Turkey, Japan, China and Israel (Baláž & Zifciakova, 2016). Slovakia also has a longstanding relationship with the Joint Institute for Nuclear Research in Dubna, Russia. However, no national strategy exists to guide cooperation with third countries, so these tend to be implemented on a ad hoc basis through bilateral or multilateral agreements financed by MESRS (Baláž & Zifciakova, 2016).

Summary

Slovakia is making progress in many of the priority areas but leaves ample room for improvement in others.

Performance is particularly strong in Priority 4, where Slovakia outperforms the EU-28 on almost all metrics. Overall performance is also strong for Priority 2, however this is heavily influenced by the high scores in two indicators within Sub-priority 2a (co-patenting rate with ERA partners and public-to-public partnerships), while performance in Sub-priority 2b is less strong.

On the other end, performance in priorities 1 and 6 leaves room for improvement, with scores trailing the EU-28 for all indicators and falling into Clusters 3 or 4 relative to the EU-28 average. Most of the indicators in these two priority areas showed positive growth over the preceding years, however, suggesting that Slovakia is working towards closing the gap with other countries.

Slovakia provided the European Commission with a summary of its 2016 National Action Plan (also called an ERA national roadmap), while preparing the full document. In the full roadmap, two main areas will be covered: (a) 'Transfer of scientific knowledge' and (b) 'The strategic approach to international cooperation in research and development' (Government of Slovakia, 2016).

References

Baláž, V. (2015). *RIO country report 2014: Slovak Republic*. Luxembourg: Publications Office. Retrieved from http://dx.publications.europa.eu/10.2791/765395

Baláž, V., & Zifciakova, J. (2016). *RIO Country Report 2015: Slovak Republic*. Luxembourg: Publications Office. Retrieved from https://rio.jrc.ec.europa.eu/en/library/rio-country-report-slovak-republic-2015

ERAC Secretariat. (2015). ERAC Opinion on the ERA Roadmap - Core high level indicators for monitoring progress. ERAC 1213/15. European Union. Retrieved from https://era.gv.at/object/document/2343

Government of Slovakia. (2016). ERA Roadmap Slovakia.

ANNEX: METHODOLOGICAL NOTES

	Indicator	Data availability	Flag								
			Exception to ref. year	Exception to ref. period	Break in time series	Definition differs	Estimated	Provisional	Potential outlier	Revised	Eurostat estimate
Priority 1	**Adjusted Research Excellence**	Available									
	GBARD as share of GDP	Available									
	European Innovation Scoreboard	Available									
	GBARD as share of government expenditures	Available									
	R&D tax incentives as share of GBARD	Available									
	Share of GBARD allocated on project basis	Available		no CAGR							
	Patent applications per 1 000 researchers	Available									
	Researchers per 1 000 active population	Available			2011						
	Publications per 1 000 researchers	Available				2005-2014					
Priority 2	**A - GBARD to transnatl coop (EUR/researcher)**	Available				2007-2014	2007				
	A - Collab papers w/ERA per 1 000 researchers	Available				2005-2014					
	A - Public-to-public partnerships (EUR/researcher)	Available				2012-2014					
	A - Co-invention rate w/ERA partners	Available									
	B - Roadmap for ESFRI projects	Available									
	B - Participation in developing ESFRI projects	Available									
	B - Participation in operational ESFRI landmarks	Available									
Priority 3	**EURAXESS job ads per 1 000 researchers**	Available				2012-2014					
	Open, transparent, merit-based hiring process	Available									
	Share of doctoral students from EU countries	Available									
Priority 4	**Share of women among Grade A HES**	Available									
	Gender dimension in research content	Available									
	Share of women among PhD graduates	Available									
	Share of women among heads of HEI	Available									
	Share of women researchers	Available									
Priority 5	**A - Research institute-private collaboration**	Available				2012					2012
	A - Higher education-private collaboration	Available									
	A - Share of public R&D funded privately	Available				2009-2013					
	A - Public-private collab papers per capita	Available		2009-2013		2009-2013					
	B - Share of papers in Open Access (Total)	Available									
	B - Share of papers in Open Access (Green)	Available									
	B - Share of papers in Open Access (Gold)	Available									
	B - National Open Access policies adopted	Available									
Priority 6	**Collab papers w/non-ERA per 1 000 researchers**	Available				2005-2014					
	Share of doctoral students from outside EU	Available									
	Licence & patent rev. from abroad, share of GDP	Available						2013			
	Co-invention rate w/non-ERA partners	Available									

The European Research Area (ERA) Progress Report 2016 shows the state of play in ERA. A lot has happened in the European research landscape since the last edition in 2014. The ERA Roadmap at EU level was endorsed by the Council in early 2015. This called for top action priorities that will have the biggest impact on Europe's science and innovation systems. Member States were invited to draw up national action plans based on this approach. Last year almost all Member States and a number of Associated Countries have published their National Action Plans on ERA showing clear political ownership of ERA.

This analysis carried out in 2016 shows strong progress in all ERA priorities across the EU. This was possible because of a true partnership among the Member States and Associated Countries, the Commission and research stakeholder organisations. But we cannot be complacent. European strength in the field of Research and Innovation is needed more than ever to reinforce competitiveness but is also increasingly challenged to deliver on impacts. The Commission's policy agenda on Open Science, Open Innovation and Open to the World will open up ERA to future challenges, like digitalisation and global networks. There are new barriers to break down to create more wealth and security for our citizens.

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