European Commission

ERA Country Report 2024
Croatia

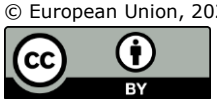
Independent
Expert
Report

Research and Innovation

ERA Country Report 2024: Croatia

European Commission
Directorate-General for Research and Innovation
Directorate A — ERA & Innovation
Unit A2 — ERA, Spreading Excellence and Research Careers
Contact Magda De Carli, Head of Unit A.2
Heiko Prange-Gstoehl
Email RTD-ERA-FORUM@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu
European Commission
B-1049 Brussels

Manuscript completed in June 2025



EUROPEAN COMMISSION

ERA Country Report 2024

Croatia

This report was prepared by

Elma Demir, Independent Science, Technology and Innovation policy expert

as part of the project ‘Implementation of the ERA Monitoring Mechanism’ for the European Commission, Directorate-General for Research and Innovation (RTD/2023/OP/0017)

2025 Directorate-General for Research and Innovation EN

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Key takeaways

- Croatia's classification as an Emerging Innovator highlights its leading position among countries in the Western Balkans, with strengths in innovation and digital skills.
- National R&I strategies and reforms, including the Recovery and Resilience Plan, aim to streamline the ecosystem.
- The Croatian research and innovation system, though advancing through strategic reforms and ERA alignment, requires targeted support to enhance research excellence and stimulate innovation with the private sector.

1. National context

Croatia is classified as an *Emerging Innovator*, achieving 79.6 percent of the EU27 average in the European Innovation Scoreboard (EIS) in 2024.[1] This places Croatia at the top of the Emerging Innovators. According to the EIS, Croatia shows relative strengths in areas such as public-private co-publications, advanced digital skills, and product and process innovation. However, broader systemic challenges, particularly in public-private collaboration, and challenges in areas like lifelong learning, environmental technologies, and the export of knowledge-intensive services persist.

Croatia has embraced several research and innovation (R&I) strategies and reforms. The National Development Strategy until 2030 provides the overarching framework for economic development, while the Smart Specialisation Strategy 2029 focuses on R&I governance and policy, leveraging Croatia's strengths in areas like ICT and energy transition. The Recovery and Resilience Plan (RRP) has been pivotal triggering reform processes among others with the objective of streamlining the fragmented R&I system and providing investments to fostering science-industry collaboration. Recent legislative advancements, such as the Act on Higher Education and Scientific Activity and the Act on Quality Assurance in Higher Education and Science, aim to align national priorities with European Research Area (ERA) objectives.

Structural key indicators for Croatia demonstrate a very positive development, notably the steady increase in Business Enterprise Expenditure on R&D (BERD) and the rising number of researchers per million inhabitants, both of which now approach or exceed previous averages. Gender equality in research is a notable area of progress, with Croatia surpassing the EU27 average in the proportion of women in STEM doctoral programmes and academic leadership roles. However, international mobility and talent retention remain areas requiring further development. Overall, Croatia's commitment to the ERA Policy Agenda and its associated actions underscores the nation's strategic alignment with broader EU priorities.

Table 1 Structural Key Indicators

Indicator	EU27	Croatia		
	2023	2023	Average 2018-2020	Average 2021-2023
GDP in current prices, per capita	35 790.00	17 500.00	12 996.67	14 990.00
Gross Domestic Expenditure on R&D (GERD) as a share of GDP	2.27	1.40	1.08	1.34
Government Budget Allocations for R&D (GBARD) as share of GDP	0.73	0.66	0.75	0.67
Business Enterprise expenditure on R&D (BERD) as a share of GDP	1.52	0.76	0.52	0.70
Expenditure on R&D procurement as a percentage of GDP	0.06	0.04	/	0.04
Size of the population (million)	448.80	3.85	3.97	3.87
Researchers (in FTE) per million inhabitants	4 681.34	2 566.60	2 176.08	2 525.15
Share of female researchers, all sectors of performance (%)	33.71	/	48.76	/

Note: EU and country averages are for 2023, except share of female researchers (2021); Source: See Annex 1

[1] See https://projects.research-and-innovation.ec.europa.eu/en/statistics/performance-indicators/european-innovation-scoreboard/eis-2024#/eis/countries/HR

2. Status of the Implementation of the ERA Policy Agenda

Chapter 2 briefly summarises **new developments in Croatia since the publication of the ERA Country Report 2023**, based on the commitments to ERA Actions. The findings are based on qualitative desk research and interviews.

Croatia has committed to 7 out of the 20 ERA Actions, covering two of the four ERA Priority Areas. The national implementation of ERA Actions is guided by the **National ERA Action Plan 2023-2025,** which focuses on Open Science, research assessment reform, talent mobility, gender equality, and knowledge valorisation. These focus areas align with Croatia's broader R&I objectives, such as fostering inclusiveness, enhancing institutional capacities, and bridging the gap between academia and industry.

Table 2 Commitment to ERA Actions

1: Deepening a truly functioning internal market for knowledge								
1. Enable Open Science, including through EOSC	2. Propose an EU copyright and data legislative framework for research	3. Reform the Assessment System for research, researchers and institutions	4. Promote attractive research careers, talent circulation and mobility	5. Promote gender equality and foster inclusiveness	6. Protect academic freedom in Europe	7. Upgrade EU guidance for a better knowledge valorisation	8. Strengthen research infrastructures	9. Promote international cooperation
2: Taking up together the challenges posed by the twin green and digital transition, and increasing society's participation in the ERA					3: Amplifying access R&I excellence across the Union		4: Advancing concerted research and innovation investments and reforms	
10. Make EU R&I missions and partnerships key contributors to the ERA	11. An ERA for green transformation	12. Accelerate the green & digital transition of Europe's key industrial ecosystems	13. Empower Higher Education Institutions	14. Bring Science closer to citizens	16. Improve EU-wide access to excellence	17. Enhance public research institutions' strategic capacity	19. Establish an ERA monitoring system	

Source: European Commission (Note: Actions 15, 18 and 20 were not implemented)

The implementation of the national ERA Action Plan is monitored by the Ministry of Science, Education and Youth in collaboration with national research bodies like the Croatian Science Foundation (HRZZ) and the Agency for Science and Higher Education (AZVO). The Action Plan was revised in 2023 to include updated targets for ERA Actions 1 and 4, emphasising interventions in digital research infrastructure and balanced talent circulation. These efforts reflect Croatia's commitment to aligning its R&I system with ERA objectives and strengthening its contribution to the European research landscape.

ERA Priority 1: Deepening a truly functioning internal market for knowledge

ERA Action 1) Enable the open sharing of knowledge and the re-use of research outputs, including through the development of the European Open

Central to Open Science efforts in Croatia is the University of Zagreb's University Computing Centre (SRCE), which has been instrumental in advancing the nation's digital infrastructure to support Open Science practices. SRCE manages the Croatian Scientific and Educational Cloud (HR-ZOO), providing advanced computing resources, including supercomputers like Supek and Vrančić. These resources are pivotal in facilitating data-intensive research and promoting seamless access to research data.[2] In March 2023 Croatia hosted a National Tripartite Event, organised by SRCE, to encourage coordination among

[2] EOSC (2023). Building a Digital Infrastructure to Advance Open Science in Croatia: Interview with Ivan Marić of SRCE. https://eosc.eu/news/2024/04/building-a-digital-infrastructure-to-advance-open-science-in-croatia-interview-with-ivan-maric-of-srce

Science Cloud (EOSC)	policymakers, research funding organisations, research-performing organisations, serviceproviders, and the broader research community in Open Science. Discussions focused on policies and activities related to EOSC, evaluating the state of Open Science in Croatia from various perspectives[3], and publicly presenting the draft of the Croatian Open Science Plan[4]. However, this plan has yet to receive formal approval from the Ministry of Science and Education. Additionally, the Croatian Science Foundation (HRZZ) has mandated Data Management Plans (DMPs) for project reports since March 2022, encouraging researchers to adhere to Open Science principles.[5]
ERA Action 3) Advance towards the reform of the Assessment System for research, researchers and institutions to improve their quality, performance and impact	Based on the Act on Higher Education and Scientific Activity and the Act on Quality Assurance in Higher Education and Science, the Agency for Science and Higher Education (AZVO) in Croatia has been conducting mandatory external evaluations, known as re-accreditations, of all public and private higher education institutions. Its primary goal is to assess and enhance the quality of these institutions in line with national legal criteria, the Standards and Guidelines for Quality Assurance in the European Higher Education Area, and international best practices.[6] A significant development was the University of Rijeka's proactive stance in this reformative journey related to ERA Action 3. As an early signatory of the Agreement on Reforming Research Assessment (ARRA), the University joined the Coalition for Advancing Research Assessment (CoARA) in 2022. This coalition brings together European research funders and performers committed to a new approach in research assessment. The University of Rijeka actively contributed to CoARA's working groups, focusing on "Reforming Academic Career Assessment" and "Early-and-mid-Career Researchers – Assessment and Research Culture." Additionally, the university participated in Horizon Europe projects like the Open and Universal Science (OPUS) and Sustainable Careers for Researcher Empowerment (SECURE), piloting interventions to promote open science practices and improve research careers.[7]
ERA Action 4) Promote attractive and sustainable research careers, balanced talent circulation and international, transdisciplinary and intersectoral mobility across the ERA	Croatia's Agency for mobility and EU programmes, gathering 115 employees has been actively working on promoting research mobility and talent circulation in the reporting period.[8] Croatia has bolstered the international mobility of its doctoral students and postdoctoral researchers through new national programs financed by the RRP – implemented by the Croatian Science Foundation to fund outgoing research stays and attract young scientists from abroad – a targeted effort that complements broader schemes like Erasmus+ by focusing directly on research career development and brain circulation.[9] A recent analysis indicates that Croatia's mobility of researchers, particularly through the Erasmus+

[3] OpenAIRE. (2023). EOSC National Tripartite Event in Croatia. https://www.openaire.eu/blogs/eosc-national-tripartite-event-in-croatia

[4] Hrvatski plan za otvorenu znanost

[5] OpenAIRE. (2022). Supporting Open Science in Croatia. https://www.openaire.eu/blogs/supporting-open-science-in-croatia

[6] Agency for Science and Higher Education (AZVO). Reaccreditation of higher education institutions. https://www.azvo.hr/vrednovanja/reakreditacija/reakreditacija-visokih-ucilista

[7] University of Rijeka. CoARA Action Plan 2024: Reform of Research Assessment. Retrieved from https://uniri.hr/wp-content/uploads/2024/03/UNIRI-CoARA-Action-Plan.pdf

[8] Agency for mobility and EU programme, Work Report for 2023, https://www.ampeu.hr/o-nama/dokumenti/planovi-rada

[9] Croatian Science Foundation (HRZZ) – Annual Report 2023 (mobility program implementation and RRP funding), hrzz.hr.

programme, reflects progress but lags in certain structural and strategic aspects compared to other studied countries like Austria or Slovenia. Croatian researchers benefit from formal national requirements for international mobility tied to academic career progression, which fosters participation. However, the analysis highlights areas for improvement, such as enhancing institutional frameworks for internationalisation and providing more robust support systems for researchers. Suggestions for Croatia include increasing administrative support for mobility, promoting inter-sectoral collaboration, and addressing skills mismatches to optimise the benefits of researcher mobility programmes.[10]

ERA Action 5) Promote gender equality and foster inclusiveness, taking note of the Ljubljana declaration

The Croatian government has developed and implemented the National Action Plan for Gender Equality 2022–2024, which served as a strategic document to eliminate discrimination and promote gender equality across various sectors, including R&I.[11] Croatian public bodies, higher education institutions, and research organisations have adopted Gender Equality Plans. Despite these policies in place, challenges persist. The World Bank's "Croatia Gender Landscape 2024" report highlights ongoing issues such as the underrepresentation of women in STEM fields and leadership positions, as well as a significant gender pay gap. The report recommends enhancing access to affordable childcare, promoting flexible work arrangements, and implementing public awareness campaigns to combat stereotypes.[12] The University of Rijeka joined a consortium of European institutions that developed the Supporting the Promotion of Equality in Research and Academia (SUPERA 2.0) project, which works on the promotion of gender equality and inclusiveness in research and innovation through transformative Gender Equality Plans (GEPs) that address intersectionality and foster equal opportunities across European institutions.[13]

ERA Action 7) Upgrade EU guidance for better knowledge valorisation

In 2024, Croatia has actively engaged in implementing the Action 7. While several measures have been led by individual institutions, more systemic efforts to enhance the knowledge transfer and valorisation ecosystem have also emerged. These include investments under the RRP and Cohesion Policy funds aimed at strengthening science-business collaboration. Notable examples are the programme supporting start-up and spin-off companies founded by young researchers and the adoption of national technology transfer guidelines. In addition, Croatia is participating in awareness-raising activities such as the EU Knowledge Valorisation Week and regional campaigns like the "Knowledge Valorisation Tour Capital 2024", which aim to promote a culture of innovation and entrepreneurial knowledge use across the research community.[14] This

[10] Academic Cooperation Association (ACA) (2023). Driving Impact of Erasmus+ Outgoing Academic Staff Mobility: Current Landscape and Pathways for the Future. Brussels, Belgium. https://www.aca-secretariat.be

[11] European Institute for Gender Equality (EIGE). (n.d.). Croatia - Gender Mainstreaming. https://eige.europa.eu/gender-mainstreaming/countries/croatia?language_content_entity=en

[12] The World Bank (2024). Unlocking Croatia's Potential: Addressing Systemic Gender Inequality. https://www.worldbank.org/en/country/croatia/publication/unlocking-croatia-s-potential-addressing-systemic-gender-inequality

[13] European Commission (n.d.). SUPERA 2.0 - Supporting the Promotion of Equality in Research and Academia. https://cordis.europa.eu/project/id/101188467

[14] OECD (2023). "Technology Transfer Guidelines", OECD STIP Compass, https://stip.oecd.org/stip/interactive-dashboards/policy-initiatives/2023/data/policyInitiatives/99996926;
European IP Helpdesk (2024), Awareness raising campaign – Knowledge Valorisation Tour Capital 2024, https://intellectual-property-helpdesk.ec.europa.eu/news-events/upcoming-events/awareness-raising-campaign-knowledge-valorisation-tour-capital-2024-06-04_en

commitment is evident through Croatia's participation in the Mutual Learning Exercise (MLE) on Knowledge Valorisation, initiated in March 2023 and set to conclude in April 2024, which was a direct follow-up to the Policy Support Facility (PSF) project aimed at strengthening the early stages of innovation and science-business linkages in Croatia.[15] The MLE aimed to enhance value creation from research by focusing on skills development, intersectoral cooperation, and incentive systems. Additionally, Croatia's participation in the EU Knowledge Valorisation Platform facilitates the exchange of good practices and enhances the capacities and skills of stakeholders at all levels. The University of Zagreb is taking part in the *Unpacking the possibilities of Intellectual Properties for Open Science* (IP4OS) project, promoting a concerted approach to agile intellectual property management and open science practices.[16] Also, the Ruder Boskovic Institute in Croatia joined a consortium of European institutions that developed the ReSkillSpan project, which aims to enhance researchers' career prospects by developing transversal skills, fostering industry-academia collaboration, and equipping researchers with tools for impactful careers, bridging gaps between research, market, and societal needs in the next two years.[17]

ERA Priority 2: Taking up together the green transition and digital transformation and other challenges with impact on society and increasing society's participation in the ERA

While Croatia has not formally committed to any of the ERA Actions under this Priority Area, many initiatives are actively underway. A prominent example is the Digital, Innovation, and Green Technology (DIGIT) Project, launched in 2023 with World Bank support. This €106 million initiative aims to strengthen Croatia's research and innovation ecosystem by financing digital and green research and innovation through various grant schemes, enhancing institutional capacities, and supporting reforms outlined in the National Recovery and Resilience Plan and the Smart Specialization Strategy.[18] Despite the absence of formal commitments under ERA Priority 2, these activities demonstrate Croatia's engagement in advancing the green and digital transitions.

[15] European Commission. Mutual Learning Exercise on Knowledge Valorisation. https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/thematic-focus/mutual-learning-exercise-knowledge-valorisation_en; European Commission (2023). PSF support to the early stages of innovation and science-business linkages in Croatia. Policy Support Facility. Retrieved from https://projects.research-and-innovation.ec.europa.eu/en/statistics/policy-support-facility/psf-country/psf-support-early-stages-innovation-and-science-business-linkages-croatia.

[16] CORDIS. IP4OS - Intellectual Property for Open Science. https://cordis.europa.eu/project/id/101188026

[17] CORDIS. SKILLSPAN – Training for Impactful Research Careers. https://cordis.europa.eu/project/id/101188141

[18] World Bank. (2024, June 20). Croatia Digital, Innovation, and Green Technology Project. Retrieved from https://www.worldbank.org/en/country/croatia/brief/croatia-digital-innovation-and-green-technology-project; Ministry of Science, Education, and Youth. (n.d.). About the DIGIT Project. Retrieved from https://digit.mzom.hr/en/about-digit-project/

ERA Priority 3: Enhancing access to research and innovation excellence across the Union and enhancing interconnections between innovation ecosystems across the Union

ERA Action 16) Improve EU-wide access to excellence

Croatia has taken an active participation in the 'Access to Excellence' – 'R&I and Cohesion Managing Authorities' Network (RIMA) subgroup. Additionally, Croatia has prioritised R&I investments through its national Recovery and Resilience Plan, aimed at strengthening the national R&I ecosystem, fostering innovation, and enhancing collaboration between academia and industry.

ERA Action 17) Enhance the strategic capacity of Europe's public research-performing organisations

A significant development is the adoption of the "Plan for Fostering Mobility of Researchers for the Period 2024-2027" by the Croatian Ministry of Science and Education. This plan aims to increase international, cross-sectoral, and balanced mobility of researchers, thereby contributing to the development of human resources in science and higher education. Key activities include the further development of EURAXESS centers, capacity building within higher education institutions, and the promotion of national and European mobility programmes.[19] Additionally, Croatia hosted the "Horizon Europe Implementation Day" on 11 April 2024, in Zagreb. This event provided comprehensive training for research management staff, covering topics such as proposal preparation, project implementation, and maximising research impact.[20] Furthermore, the "Horizon Europe Summit 2024" May 2024 in Zagreb featured a session titled "Success Stories from Croatia," highlighting the achievements of Croatian institutions in securing and utilising Horizon Europe funding. This session underscored the importance of effective research management and the strategic capacity of public research institutions in Croatia.[21] Furthermore, Croatia has undertaken significant reforms to improve the quality and effectiveness of its research-performing institutions. Notably, the country has introduced a performance-based funding (PBF) model for public higher education institutions (HEIs) and research organizations. This model allocates state budget funds based on performance indicators, aligning funding with the achievement of specific objectives and indicators as outlined in funding agreements.[22] Additionally, the Digital, Innovation, and Green Technology (DIGIT) Project, launched in 2023 with World Bank support, aims to strengthen Croatia's research and innovation ecosystem. The DIGIT Project includes technical assistance to establish a system for assessing the quality of research and innovation plans of public research organizations, monitoring their

[19] ERA Policy Platform (2024). News: Croatia Adopts New Plan for Fostering Mobility of Researchers (2024–2027). https://european-research-area.ec.europa.eu/news/croatia-adopts-new-plan-fostering-mobility-researchers

[20] Ministry of Science and Education of Croatia (2024). Agenda: Horizon Europe Implementation Day in Croatia – April 11, 2024. https://mzom.gov.hr/UserDocsImages/dokumenti/Znanost/ObzorEuropa/Agenda-Horizon-Europe-Implementation-Day-in-Croatia-11-4-2024.pdf

[21] Horizon Europe Summit (2024). Horizon Europe Summit 2024: Success Stories from Croatia. https://horizoneuropesummit.com

[22] European Commission (2024). *2024 European Semester: Country Report – Croatia*. Commission Staff Working Document SWD(2024) 611 final. Brussels, 19 June 2024. Retrieved from https://economy-finance.ec.europa.eu/system/files/2024-06/2024%20Country%20Report%20-%20Croatia_en.pdf

implementation, and guiding these organizations through the process.[23] Furthermore, Croatia's RRP encompasses investments aimed at enhancing the quality of research-performing institutions, including reforms to improve institutional capacity for implementing research and innovation policies.

ERA Priority 4: Advancing concerted research and innovation investments and reforms

Croatia has not committed to an ERA Actions under this Priority Area.

3. Contribution of ERA Actions to national performance in reaching ERA objectives

This chapter provides a qualitative assessment of how the joint ERA Actions contributed to Croatia's performance in achieving the ERA objectives as defined in the Pact for R&I during the period 2022-2024.

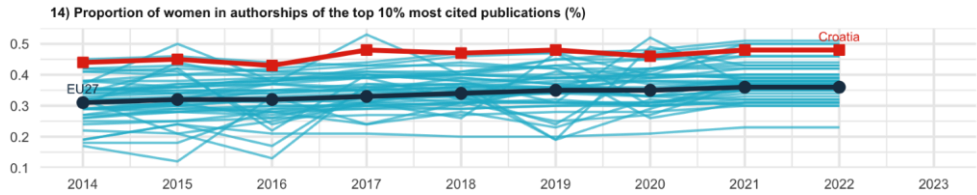
Within the **ERA Priority 1** Croatia has selected **ERA Actions 1, 3, 4, 5, and 7** which aim to create a cohesive and competitive research and innovation ecosystem by promoting Open Science practices, reforming research assessment systems, enhancing research careers and mobility, fostering gender equality and inclusiveness, and upgrading knowledge valorisation frameworks to maximise societal and economic impact. The implementation of these activities in largely on track and supported by dedicated investments. In terms of Open Science, Croatia has been catching up with the EU average performance. Its improving performance is evidenced in ERA Dashboard Indicators 6, 7, and 11 suggesting initial progress in reaching the ERA objectives. Commitment to gender inclusion is great, and Croatia continues to perform well, above the EU average, in this domain.

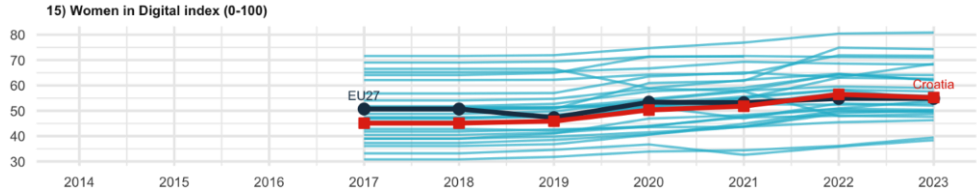
The commitment to **ERA Action 7** is proceeding, but investments take time to show full effect on indicators due to time-lag, corresponding to slower progress in ERA Dashboard Indicators 21, 25, and 26. The comparison clearly demonstrates that while the EU27 maintains a relatively high and stable level of patent applications relative to GDP, reflecting sustained innovation capacity, Croatia lags significantly behind. For Croatia to close this gap, strategic investments in R&D, patenting support, and private sector innovation are needed. Similarly, while Europe maintains a stable level of academic innovation, Croatia's universities and public research organizations contribute minimally to patent generation.

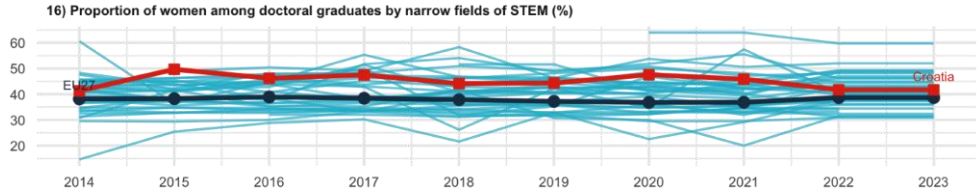
Croatia's percentage of scientific publications among the top 10 percent most cited worldwide remains well below the EU27 average (ranging from ~2.8 percent to 4.6 percent compared to the EU27's ~9.6 percent to 10.1 percent) but it has shown a gradual improvement in recent years, indicating a growing research impact, though still significantly trailing leading innovation-driven countries like Belgium and Austria, where citation rates remain consistently above 10 percent, highlighting the need for stronger research collaborations, increased funding, and improved publication strategies to enhance Croatia's international scientific influence.

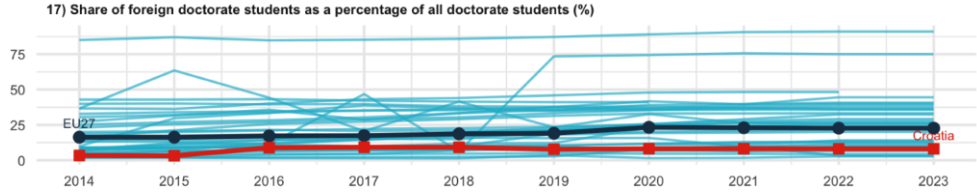
[23] Ministry of Science and Education. (n.d.). Terms of Reference: Performance-based Coordinator – DIGIT Project. Retrieved from https://mzom.gov.hr/UserDocsImages/dokumenti/Znanost/Projekt-digit/voditelj-tima-instituc/tor-performance-based-coordinator-digit.pdf

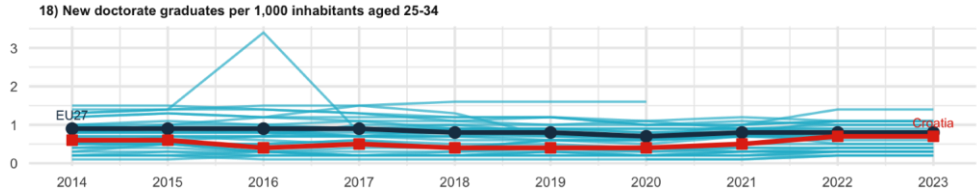
Figure 3-1 Indicators for ERA Priority 1

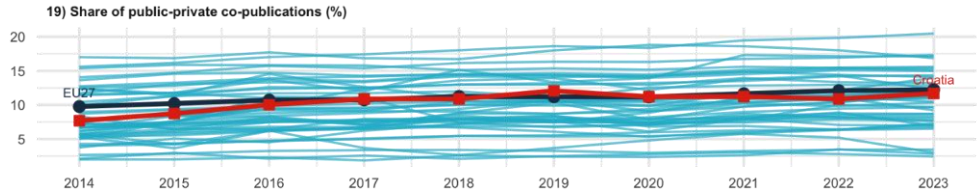

14) Proportion of women in authorships of the top 10% most cited publications (%)
Croatia
EU27
0.5
0.4
0.3
0.2
0.1
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


15) Women in Digital index (0-100)
Croatia
EU27
80
70
60
50
40
30
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


16) Proportion of women among doctoral graduates by narrow fields of STEM (%)
Croatia
EU27
60
50
40
30
20
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


17) Share of foreign doctorate students as a percentage of all doctorate students (%)
Croatia
EU27
75
50
25
0
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


18) New doctorate graduates per 1,000 inhabitants aged 25-34
Croatia
EU27
3
2
1
0
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


19) Share of public-private co-publications (%)
Croatia
EU27
20
15
10
5
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


20) Best practice examples and methodologies for knowledge valorisation - 2023
30
20
10
0
10
25
2
2
6
4
1
7
9
11
2
1
7
13
3
4
3
1
21
1
11
1
1
1
6
13
6
6
Austria
Belgium
Croatia
Cyprus
Czechia
Denmark
Estonia
EU27
Finland
France
Germany
Greece
Hungary
Ireland
Italy
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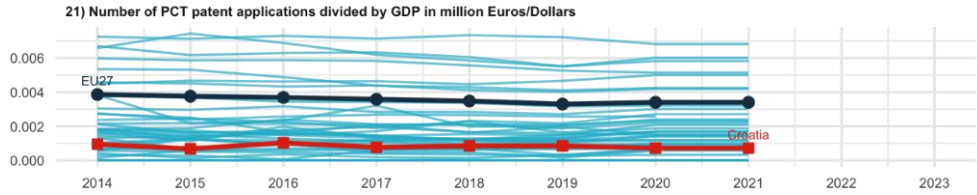
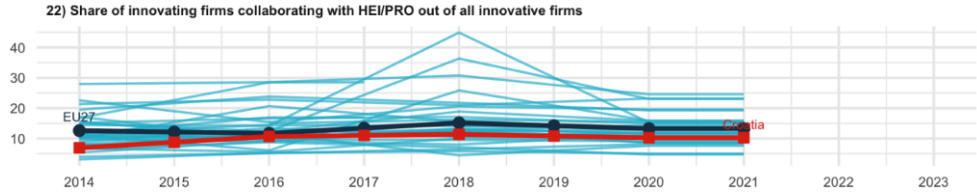
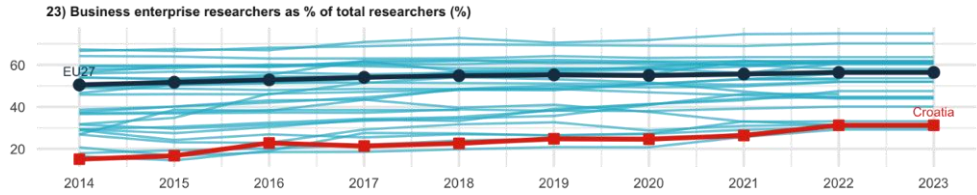
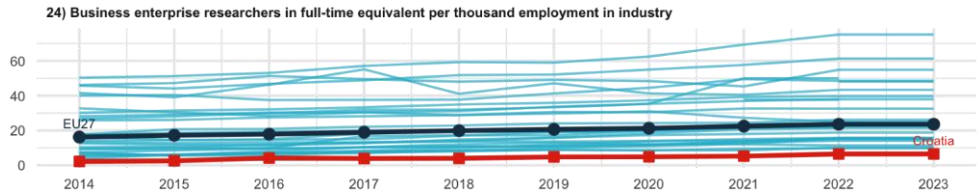
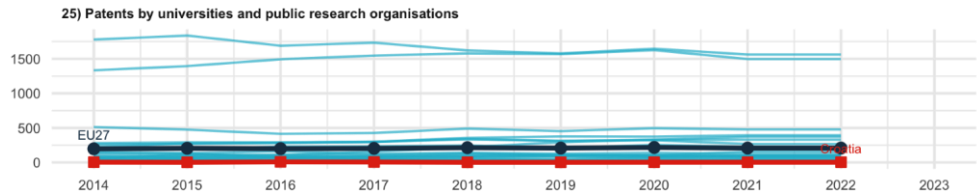
Netherlands
Poland
Portugal
Romania
Serbia
Slovakia
Slovenia
Spain
Sweden
United Kingdom

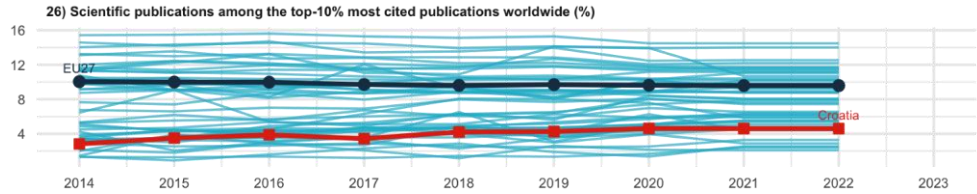

21) Number of PCT patent applications divided by GDP in million Euros/Dollars
0.006
0.004
0.002
0.000
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

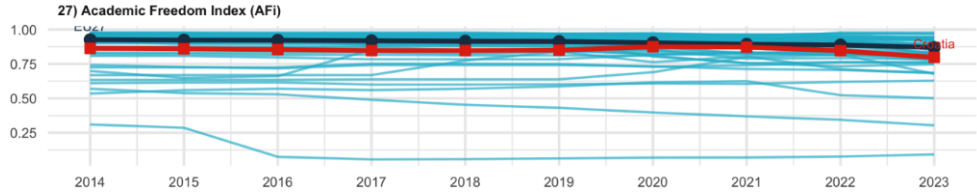

22) Share of innovating firms collaborating with HEI/PRO out of all innovative firms
40
30
20
10
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

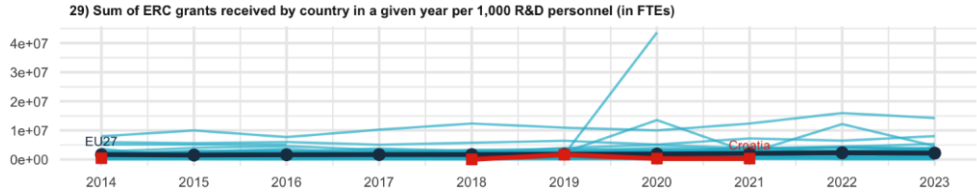

23) Business enterprise researchers as % of total researchers (%)
60
40
20
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

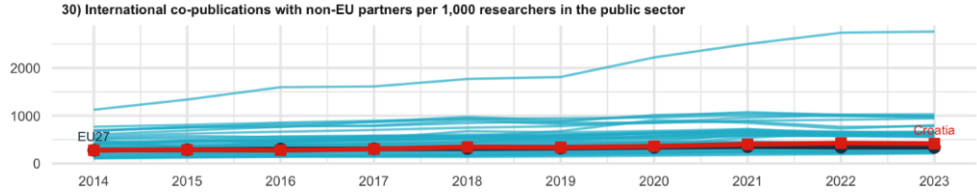

24) Business enterprise researchers in full-time equivalent per thousand employment in industry
60
40
20
0
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

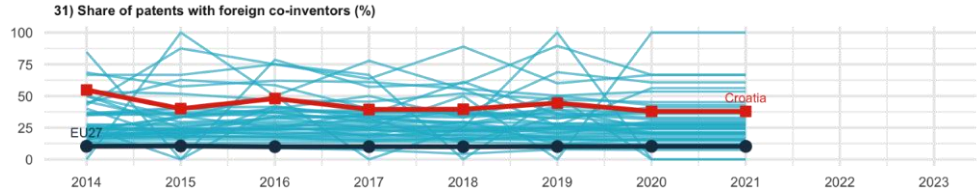

25) Patents by universities and public research organisations
1500
1000
500
0
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

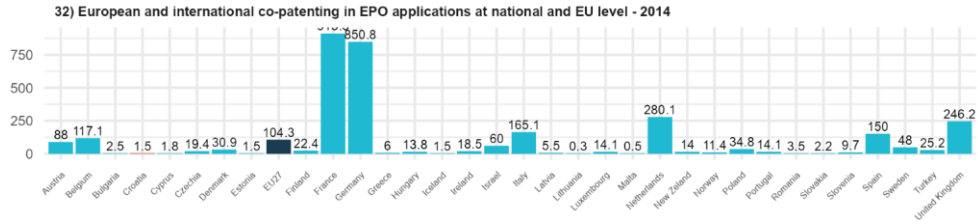

26) Scientific publications among the top-10% most cited publications worldwide (%)
16
12
8
4
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


27) Academic Freedom Index (AFi)
1.00
0.75
0.50
0.25
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


29) Sum of ERC grants received by country in a given year per 1,000 R&D personnel (in FTEs)
4e+07
3e+07
2e+07
1e+07
0e+00
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


30) International co-publications with non-EU partners per 1,000 researchers in the public sector
2000
1000
0
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


31) Share of patents with foreign co-inventors (%)
100
75
50
25
0
EU27
Croatia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


32) European and international co-patenting in EPO applications at national and EU level - 2014
750
500
250
0
88
117.1
2.5
1.5
1.8
19.4
30.9
1.5
104.3
22.4
350.8
6
13.8
1.5
18.5
60
165.1
5.5
0.3
14.1
0.5
280.1
14
11.4
34.8
14.1
3.5
2.2
9.7
150
48
25.2
246.2
Austria
Belgium
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
EU27
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Latvia
Lithuania
Luxembourg
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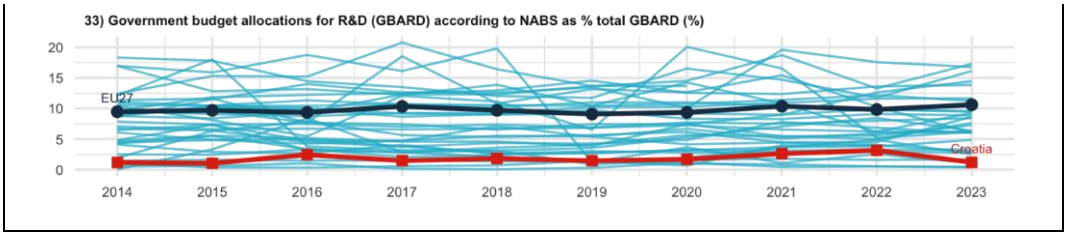
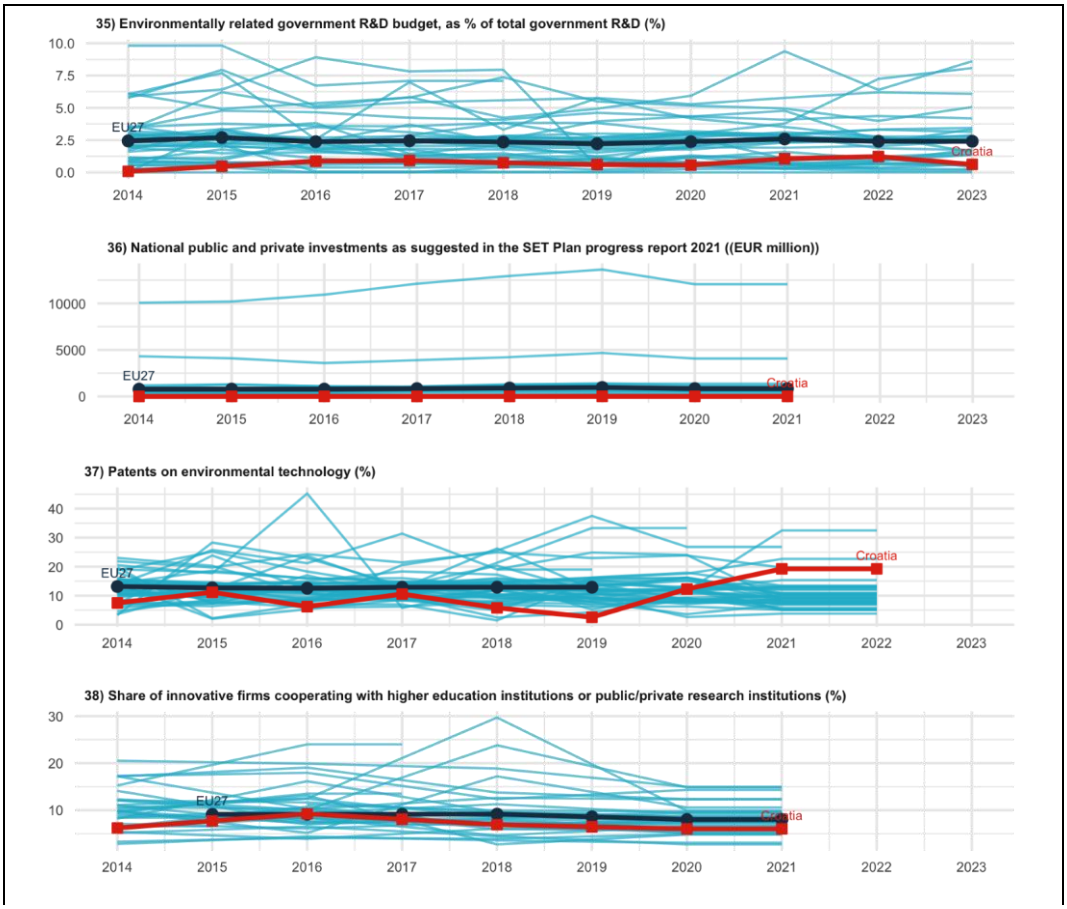
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
Turkey
United Kingdom

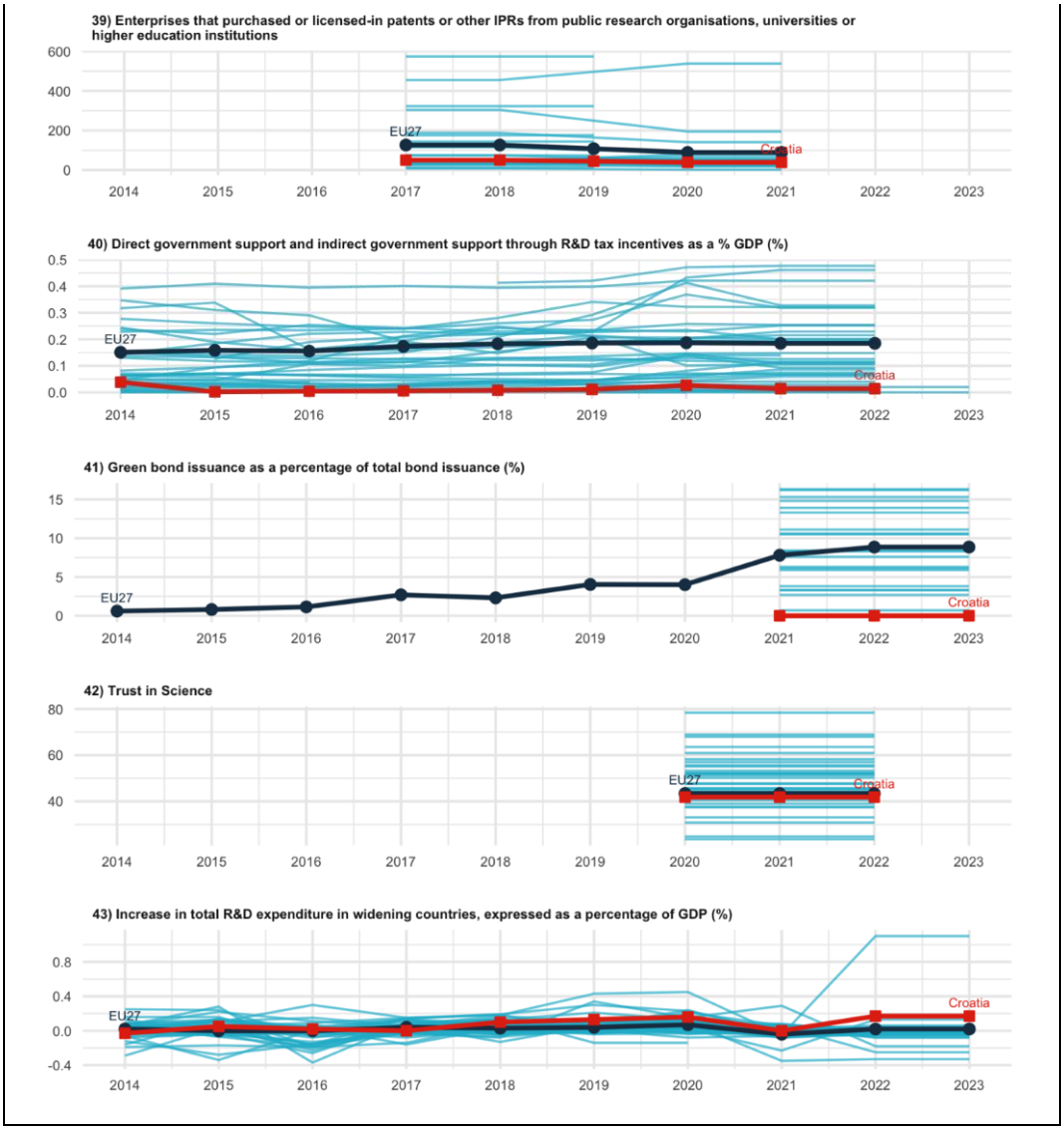


Source: see Annex 1

ERA Priority 2 is not part of Croatia's ERA commitments. The related ERA Dashboard Indicators show a mixed picture. For example, while environmentally related government R&D budget has declined (ERA Dashboard Indicator 35), the number of patents on environmental technologies has seen an increase (ERA Dashboard Indicator 37). Other indicators show only minor changes in performance.

Figure 3-2 Indicators for ERA Priority 2





Source: see Annex 1

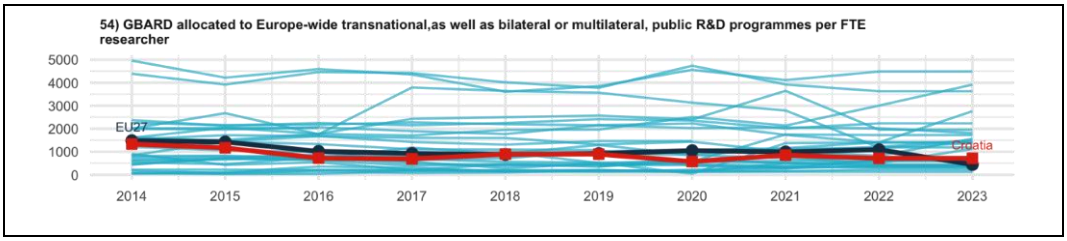
ERA Dashboard Indicators related to **ERA Priority 3** showcase that Croatia is close or slightly bellow EU average. Croatia's participation in Horizon Europe per 1,000 R&D personnel is below the EU27 average and significantly lower than countries like Austria and Belgium, but it shows gradual improvement over time, reflecting increased integration into EU research frameworks, though still highlighting the need for stronger R&D capacity and international collaboration to fully leverage European funding opportunities. Croatia shows gradual improvement from 0.31 to 0.38 for the Summary Innovation Index but remains well below the EU average and leading countries, indicating persistent challenges in closing the innovation gap with more advanced EU members, although performing better than Bulgaria. The country's strengths include public-private co-publications, advanced digital skills, and innovative business practices such as product and process innovation. However, challenges persist in areas like lifelong learning, environmental technologies, and the export of knowledge-intensive services.

Figure 3-3 Indicators for ERA Priority 3

Source: see Annex 1

ERA Priority 4 is not part of Croatia's ERA commitments.

Figure 3-4 Indicators for ERA Priority 4



Source: see Annex 1

4. Effects of ERA Action implementation on the national R&I system

This chapter presents a qualitative assessment of the ERA Action commitments of Croatia and their effects on the national R&I system, including the quantitative performance in the ERA Dashboard.

Under **ERA Priority 1**, Croatia is focusing on implementation of ERA Actions 1, 3, 4, 5, and 7. The University of Zagreb's Computing Centre (SRCE) has been pivotal in advancing digital infrastructure and Open Science practices, particularly through the Croatian Scientific and Educational Cloud (HR-ZOO). However, the Croatian Open Science Plan, while publicly presented, awaits formal approval from the Ministry of Science and Education, making a detailed assessment difficult. The University of Rijeka's active participation in CoARA and Horizon Europe projects highlights how the ERA Action implementation induces organisations within Croatia to reforming research assessment systems and fostering innovative research careers under the scope of ERA Actions 3 and 4.

Within **ERA Priority 3**, the country has actively participated in the 'Access to Excellence' RIMA subgroup, promoting synergy between Horizon Europe and Cohesion Policy programmes. Croatia’s national Recovery and Resilience Plan has been a key driver in strengthening its R&I ecosystem, emphasising collaboration between academia and industry. However, the European Commission’s 2024 Country Report emphasises the need to accelerate R&D investments outside the capital region to reduce disparities and foster balanced regional innovation. The report also highlights the importance of strengthening administrative capacity to manage EU funds effectively and enhancing the coordination between national and EU funding programmes. This priority, which seeks to enhance access to research and innovation excellence, aligns with Croatia's national R&I strategies.

The strategic capacity of Croatia’s public research institutions has been bolstered through initiatives like the "Plan for Fostering Mobility of Researchers 2024–2027" by the Ministry of Science and Education, which supports researcher mobility and capacity building. Events such as the "Horizon Europe Implementation Day" and "Horizon Europe Summit 2024" provided critical training for research management staff and celebrated Croatia's successes in securing Horizon Europe funding. These initiatives reflect the country's progress in implementing ERA Action 17, emphasising the enhancement of research management skills and fostering collaboration to align national R&I priorities with ERA objectives. Croatia’s efforts illustrate a cohesive approach to integrating ERA priorities into its national strategies, contributing to a more robust and interconnected R&I landscape.

5. Conclusions

Croatia has been classified as an Emerging Innovator in the European Innovation Scoreboard (EIS) 2024, achieving 79.6 percent of the EU-27 average, which places it at the forefront of Emerging Innovators. The country demonstrates significant strengths in public-private co-publications, advanced digital skills, and innovative business practices, including product and process innovations.

Croatia’s research and innovation (R&I) policy is guided by strategic frameworks such as the National Development Strategy 2030 and the Smart Specialisation Strategy 2029, which prioritise digital transformation, the green transition, and innovation-led growth. The Recovery and Resilience Plan (RRP) has played a key role in consolidating the R&I ecosystem,

particularly by fostering stronger links between academia and industry. Recent legislative reforms, notably the Act on Higher Education and Scientific Activity and the Act on Quality Assurance in Higher Education and Science, support a shift toward performance-based funding and institutional accountability, thereby aligning Croatia's R&I agenda more closely with ERA objectives.

Croatia's commitment to the ERA Policy Agenda is evident through its engagement in seven ERA Actions, focusing on Open Science, research assessment reform, talent mobility, gender equality, and knowledge valorisation. Notable progress includes advancements in digital infrastructure through HR-ZOO and enhanced gender equality in STEM fields. However, talent retention and international mobility remain areas requiring additional focus. Croatia's strategic alignment with ERA priorities underscores its dedication to fostering a competitive and inclusive R&I ecosystem.

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Annex 1 – Full list of ERA Dashboard indicators

Table 1 Structural Key Indicators:

Indicator number	Indicator	Source
/	GDP in euro per capita, current prices	Eurostat https://doi.org/10.2908/TEC00001
1	Gross Domestic Expenditure on R&D (GERD) as a share of GDP	Eurostat
2	Government Budget Allocations for R&D (GBARD) as share of GDP	Eurostat
4	Business Enterprise Expenditure on R&D (BERD) as a share of GDP	Eurostat
5.2	Expenditure on R&D procurement as a percentage of GDP	EC/European Innovation Procurement Observatory
/	Size of the population (million)	Eurostat, https://doi.org/10.2908/TPS00001
3	Researchers (in FTE) per million inhabitants	Eurostat
/	Share of female researchers, all sectors of performance (%)	Eurostat, https://doi.org/10.2908/TSC00005

Figure 3.1 Indicators for ERA Priority 1

Indicator number	Indicator	Source
6	Share of publications available in open access (green, gold, and diamond)	OpenAIRE
7	Number of open-access research datasets by country	OpenAIRE
8	Number of repositories by country	EOSC - Re3data
9	Country investments in EOSC and Open Science (in ranges of investment)	EOSC Observatory
10	Share of national public R&D expenditure committed to European research infrastructures	ESFRI
11	Number of European RIs in which a Member State or an Associated Country participates	ESFRI
12	Proportion of women of Grade A among academic staff/researchers	Women in Science - She Figures
13	(Corrected) Proportion of mixed-gender teams	EC_Scopus
14	(Corrected) Proportion of women in authorships of the top 10% most cited publications	EC_Scopus
15	Women in Digital index (0-100)	EC-Women in Digital Scoreboard
16	Proportion of women among doctoral graduates by narrow fields of STEM	Eurostat
17	Share of foreign doctorate students as a percentage of all doctorate students	Eurostat
18	New doctorate graduates per 1,000 inhabitants aged 25-34	Eurostat
19	Share of public-private co-publications	EC_Scopus
20	(Cumulative number of) Best practice examples and methodologies for knowledge valorisation	Knowledge Valorisation Platform
21	Number of PCT patent applications divided by GDP in million Euros/Dollars	OECD, Eurostat & World Bank

22	Share of innovating firms collaborating with HEI/PRO out of all innovative firms	Eurostat CIS (own calculations)
23	Business enterprise researchers as % of total researchers	OECD
24	Business enterprise researchers in full-time equivalent per thousand employment in industry	OECD
25	Patents by universities and public research organisations	EPO PATSTAT - Fraunhofer ISI calculations
26	% of scientific publications among the top-10% most cited publications worldwide	EC_Scopus
27	Academic Freedom Index (AFi)	V-Dem Varieties of Democracy
28	Average ranking score of top 10 universities by country and year	QS World University Ranking
29	Sum of ERC grants received by country in a given year per 1,000 R&D personnel (in FTEs)	EC-ERC
30	International co-publications with non-EU partners per 1,000 researchers in the public sector	EC_ScienceMetrix and Eurostat/OECD
31	Share of patents with foreign co-inventors	OECD
32	European and international co-patenting in EPO applications at national and EU level	Eurostat
33	Government budget allocations for R&D (GBARD) according to NABS as % total GBARD	Eurostat

Figure 3.2 Indicators for ERA Priority 2

Indicator number	Indicator	Source
34	Note: The ERA Dashboard Indicator 34 was removed from the Dashboard in January 2025. As a consequence, the indicator has also been omitted from the Country Report, while, however, keeping the original numbering of the indicators.	
35	Environmentally related government R&D budget, as % of total government R&D	Eurostat
36	National public and private investments as suggested in the SET Plan progress report 2021 (EUR million)	SETIS R&I data
37	% Patents on environmental technology	OECD
38	Share of innovative firms cooperating with higher education institutions or public/private research institutions	Eurostat CIS
39	Enterprises that purchased or licensed-in patents or other IPRs from public research organisations, universities or higher education institutions	Eurostat CIS
40	Direct government support and indirect government support through R&D tax incentives as a % GDP	OECD
41	Green bond issuance as a percentage of total bond issuance	Eurostat - EEA
42	Trust in Science	Eurobarometer 95.2
43	Increase in total R&D expenditure in widening countries, expressed as a percentage of GDP	Eurostat, OECD, UNESCO

Figure 3.3 Indicators for ERA Priority 3

Indicator number	Indicator	Source
44	Number of participations in Horizon Europe (of Widening countries) measured in terms of 1,000 R&D personnel (in FTEs)	Cordis - Eurostat
45	Sum of Horizon Europe grants (€) received by Widening countries in terms of 1,000 R&D personnel (in FTEs)	Cordis - Eurostat
46	Summary Innovation Index (Widening countries)	EC_EIS
47	Share of enterprises using public funds from different governance levels (local or regional, national, and EU) for R&I activities	Eurostat CIS
48	Number of Seal of Excellence projects on the InvestEU Portal per 1,000 R&D personnel (in FTEs)	EC - Invest EU
49	Number of collaboration networks of RPOs in Widening countries with other EU countries	Cordis - Horizon Dashboard
50	Average number of partners from non-widening countries per institution from a Widening country participating in the Horizon programme each year	Cordis - Eurostat
51	Share of patents registered by a Widening country together with partners from other EU countries	OECD
52	Share of innovative enterprises that cooperated with RPOs located in other countries	Eurostat CIS
53	Share of public R&D expenditures financed by the private sector	Eurostat

Figure 3.4 Indicators for ERA Priority 4

Indicator number	Indicator	Source
54	GBARD allocated to Europe-wide transnational, as well as bilateral or multilateral, public R&D programmes per FTE researcher	Eurostat

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ERA Monitoring 2024: ERA Country Report Croatia.

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