European Commission

Supporting an Innovation Agenda for the Western Balkans

Tools and Methodologies

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Supporting an Innovation Agenda for the Western Balkans: Tools and Methodologies

This report gives an overview of the Western Balkan region, looking at challenges and emerging potentials for innovation. It presents tools and methodologies available at the JRC to support an innovation agenda for economic transformation inspired by smart specialisation. Each challenge is supported by a concrete implementation example.

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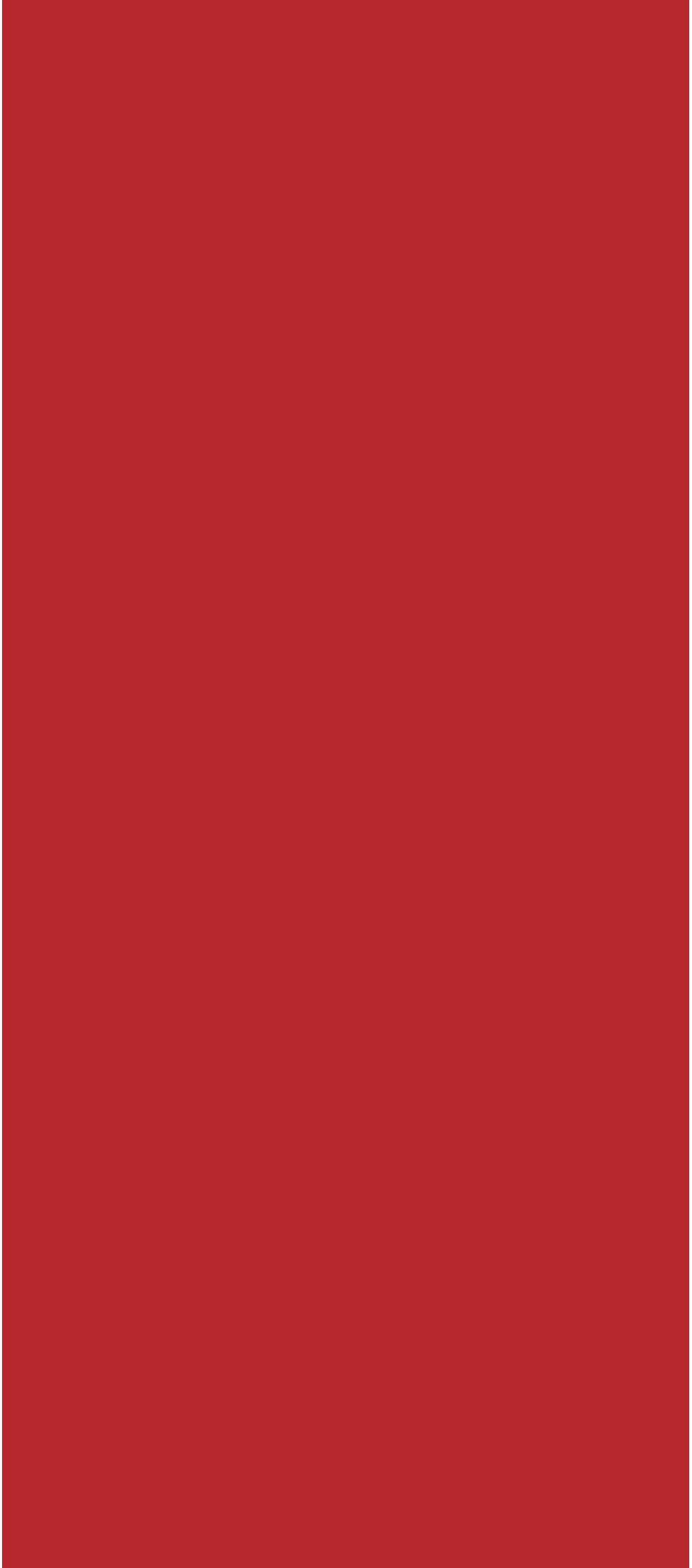

Place-based innovation policies for economic transformation in the Western Balkans

This report presents the ongoing work of the European Commission's Joint Research Centre (JRC) in supporting an Innovation Agenda for the Western Balkans in cooperation with the Directorate-General for Neighbourhood and Enlargement Negotiations (DG NEAR). It provides a preliminary overview of the present situation in the context of economic, innovative and scientific potential of the Western Balkan economies, presenting tools and methodologies that can help address the existing and emerging challenges. As the integration and enlargement processes move on pace, it is a good time to take stock and set new directions for future cooperation.

A successful structural transformation of the Western Balkan economies, driven by innovation, needs to be based on a deep understanding of the existing economic fabric as well as the challenges and interrelations between traditional and emerging sectors. Innovation is one of the main factors driving territorial transformations and as these vary between territories, taking account of place-based diversity is essential.

Smart specialisation is the EU answer to the need of such place-based territorial innovation policies. This policy approach is implemented in all EU Member States, and is gaining increasing worldwide appreciation. It advocates focusing public investment in research, development and innovation activities on a few, carefully chosen priority domains, where the impact can be greatest. In addition to the support provided to EU regions and Member States for the design and implementation of smart specialisation strategies over the last years, the JRC of the European Commission has been providing guidance and assistance to the Enlargement and Neighbourhood countries for the development of smart specialisation strategies since 2013, in particular through its Smart Specialisation Platform (S3P). Serbia (together with Moldova and Ukraine) is one of three target countries of a pilot project launched in 2016 and Montenegro joined the project in the following year to work together on smart specialisation. In 2018, also Albania and Former Yugoslav Republic of Macedonia joined the S3P to start this process.

The innovation in policy-making that smart specialisation brings, takes research, innovation, industrial, SME and cluster policies out of their traditional silos and enhances synergies and co-ordination between them for a greater impact. It also brings openness and transparency to the policy-making process by encouraging evidence-informed stakeholder dialogue focused on business and policy needs – the entrepreneurial discovery process. Finally, it improves the institutional capacity for innovation policy-making at the highest levels by stimulating inter-ministerial cooperation, exchanges between international and national experts and targeted, hands-on guidance from JRC.

Access to data is critical for evidence-informed policies. Data are a precondition for the development of innovative businesses, creating growth, boosting productivity, promoting innovation, transforming public services and finally, improving citizens' quality of life. These are among the key topics addressed by JRC work within the 'Digital Agenda for the Western Balkans.' Cooperation between JRC and other international organisations has led to the opening up of geospatial datasets to the public, as a basic evidence foundation for various policies.

Focus on results means that it is important to design effective policy instruments. Consequently, JRC has been working on creating capacities for technology transfer, supporting the design of a new financial instrument for Proof of Concept and providing *ad hoc* support to science and technology parks in the Western Balkans. These activities should support the implementation of smart specialisation in the future.

Interregional and international cooperation help the development of Balkan and European value chains, especially for the specialisation domains. It also encourages cross-border partnerships between territories with similar specialisations, which can multiply the impacts from implementing transformative territorial innovation policies. The foundations of such cooperation in the Western Balkans have been built through EU-supported cross-border and bilateral cooperation and EU Macro-regional Strategies. JRC scientific and horizontal policy support has been focused on building capacity for international cooperation among policy makers, researchers and other stakeholders.

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This report is based on JRC work in the Western Balkans but would not be possible without the work and commitment of our partners in Western Balkan economies.

Executive summary

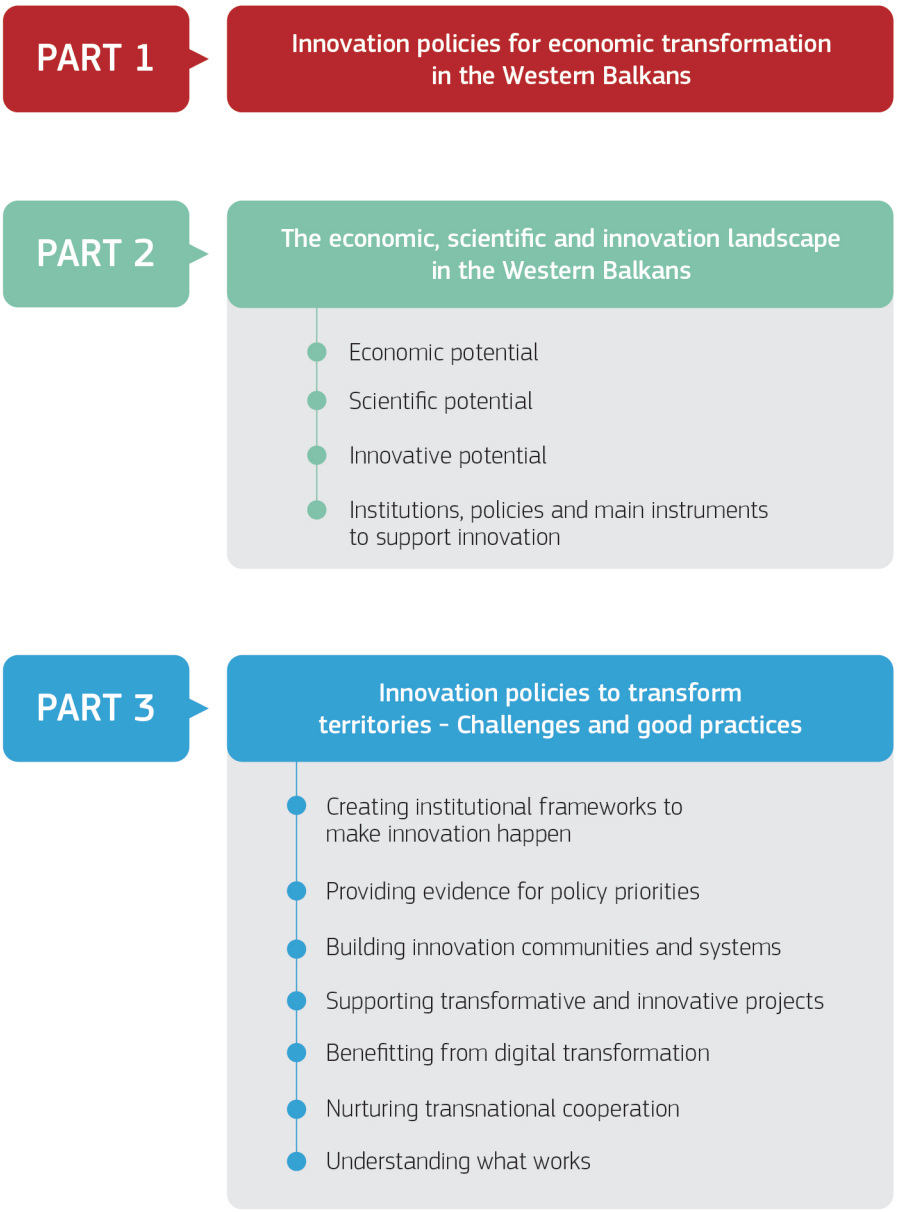
The Western Balkan region has significantly improved in terms of innovation performance in the last ten years. However, in catching up with other European regions, the focus of innovation efforts should be enhanced. Exports are still far more focused on medium- and low-technology products. Innovative efforts mostly accommodate traditionally strong sectors, which do not necessarily reflect the ideal competitiveness paths for economies in the region. Although some Western Balkan economies record increases in patent activity, patent intensity in the region is still low, while, on the other hand, scientific publication production displays a stable growth trend.

While Western Balkan economies are at different stages in the formation of research and innovation (R&I) policy governance systems, national research and innovation policy frameworks are continuously being improved. The enhancement of governance in the area of R&I came as the result of increased capacity building activities in the region, as well as of the real needs emerging as a result of social and economic transformation. On the other hand, R&I systems in the Western Balkan economies need to continue shifting their focus towards businesses to provide better balance between public and private sector orientation.

The Joint Research Centre of the European Commission is committed to supporting the shift in innovation policies and improvement of R&I efforts and governance in the Western Balkan economies through a number of tools and activities, allowing policy instruments to be matched with the specific needs of the economy. This approach seeks efficient governance mechanisms for R&I policy by reaching out to the business sector and other important actors of the innovation ecosystem. It determines sustainable development directions for economies and ensures the continuity of policy monitoring and evaluation cycles. This ambitious challenge is translated into four specific lines of activity: (i) the application of the smart specialisation methodology to design and implement innovation strategies; (ii) capacity-building activities for technology transfer, in particular through specialised workshops, tools and instruments specifically designed to assist the academic institutions in the regional economies; (iii) support to transnational collaboration and linkages in the context of EU macro-regional strategies; and (iv) data quality enhancement.

The analysis of the development potential of the Western Balkan region in terms of economic, innovative and scientific capabilities in this report is supported with the good practices addressing specific challenges in the region.

Figure 1. Outline of the report



Source: JRC.

PART 1.

Innovation policies for economic transformation in the Western Balkans

The Western Balkans are a diversified and complex region, where political and economic reforms are an integral part of the EU accession process and have ranked high on the policy agenda for the past fifteen years (Table 1). The attention of policy-makers in the region has been focused on questions of economic growth and competitiveness, although less so on using R&I to achieve broader societal goals. At the same time, the European Commission has made research an explicit priority for competitiveness with important links to economic governance and the annual Economic Reform Programmes. All economies in the region have proposed reforms to modernize their policies and structures in support of research, technology and development.

Table 1. General information about Western Balkan economies

	Population (2016) million	GDP per capita (2016) EUR	EU financial support (2014-2020)			EU accession status
			Total million EUR	Innovation and competitiveness		
				million EUR	% of support	
Albania	2.88	3,718	649	44	7 %	candidate
Bosnia and Herzegovina[a]	3.52	4,494	167	34	20 %	potential candidate
Kosovo*	1.82	3,304	645	135	21 %	potential candidate
Former Yugoslav Republic of Macedonia	2.08	4,691	664	73	11 %	candidate
Montenegro	0.62	6,355	270	21	8 %	candidate
Serbia	7.06	4,904	1.508	105	7 %	candidate

Source: JRC compilation based on Eurostat and DG NEAR data.

[a] For Bosnia and Herzegovina the time span covers only the period from 2014 to 2017.
* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence. This note applies to the whole document and each time Kosovo is mentioned.

It is important to build on the track record of credible reforms by investing in R&I, preventing brain drain as well as by investing and managing funds in a responsible and strategic way. For the Western Balkan economies[1], membership of the European Union holds the promise of long-term economic convergence, capital inflow and rising productivity through increased trade, competition and investment. It is a chance for free access to the single market in goods and services, to achieve improved consumer choice (welfare gains) and to access EU Structural and Investment Funds to help finance R&D, innovation, infrastructure and environmental projects. These opportunities are manifold and apply to all Western Balkan economies as a unifying force in otherwise quite fragmented societies. However, it is important to bear in mind that enlargement by itself does not solve competitiveness and technology or industrial upgrading issues. Access to the single market and meeting institutional preconditions for EU membership improve the legal and institutional context for economic growth, but do not guarantee improved competitiveness, social cohesion and balanced development on their own.

It is thus imperative to reform economies and enhance competitiveness for closer integration among Western Balkan economies and with the EU. Place-based innovation and related smart specialisation strategies can drive this transformation, alongside with both targeted support to innovation in the business sector such as technology transfer measures and the promotion of more

1. Western Balkan economies include Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Kosovo, Montenegro and Serbia.

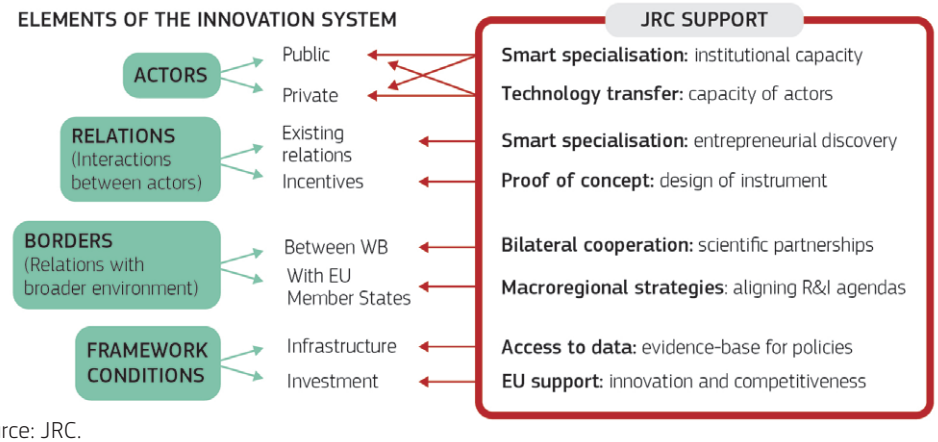
horizontal framework conditions like transnational collaboration as well as data availability and quality. The combination of these elements would enhance the efficiency of the region's innovation ecosystems and lead the way to cross-innovation and concrete innovative investment projects.

Policy context

While there is not one common definition of innovation systems (Lundvall[2], Nelson[3], Patel and Pavitt[4], Metcalfe[5], OECD[6]), most approaches underline three basic dimensions: actors, relations between them and borders or boundaries of the system delineating it from the broader environment. Actors can be divided into public and private ones, or institutions and companies. Framework conditions should be taken into account, especially intangibles such as talent, knowledge assets, productive culture, level of financial capacity, investment climate and infrastructure (Jackson[7], Allas[8]). Innovation systems are place-based and therefore influenced by the economic and social structure of the economy (Cooke[9]), which requires public intervention and learning to accommodate territorial diversity. The general assumption of public intervention in innovation systems is that incentives designed in the right way can change the behaviour of chosen actors in the system. This simplified description shows that innovation systems are complex and require appropriate innovation policy mixes in order to induce change.

JRC support for an innovation agenda in the Western Balkans has targeted different elements of the innovation systems in the region, using a range of tools and methodologies, often in cooperation with other European Commission services (Figure 2). These interventions answer specific needs and do not express an ambition to change the whole innovation systems, which is the responsibility of national governments. They offer insights and experience from EU Member States, the European Commission and the community of experts and academics to stimulate and inspire necessary developments.

Figure 2. JRC support for the Western Balkan innovation systems



Source: JRC.

2. Lundvall, B.-A., *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning,* Pinter, London, 1992.

3. Nelson, R. (ed.), *National Innovation Systems: A Comparative Analysis,* Oxford University Press, New York/Oxford, 1993.

4. Patel P. and Pavitt K. (1994), 'The Nature and Economic Importance of National Innovation Systems', *STI Review,* No. 14, OECD, Paris.

5. Metcalfe, S., 'The Economic Foundations of Technology Policy: Equilibrium and Evolutionary Perspectives', in: Stoneman P. (ed.), *Handbook of the Economics of Innovation and Technological Change,* Blackwell, Oxford/Cambridge, pp. 409-512, 1995.

6. OECD, *National Innovation Systems,* Organisation for Economic Co-operation and Development Publishing, Paris, 1997.

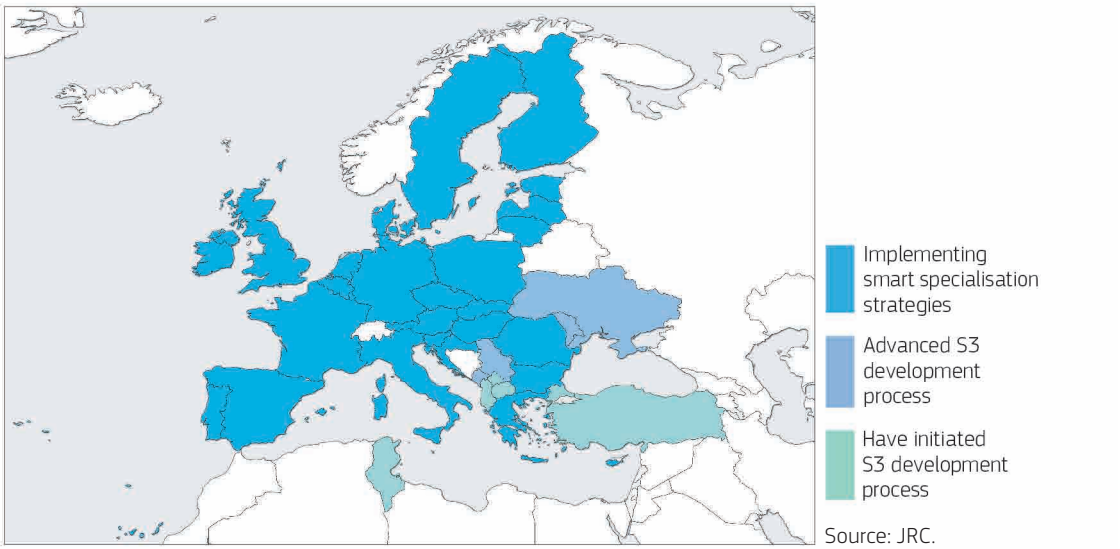
7. Jackson, D.J., *What is an Innovation Ecosystem?,* National Science Foundation, Arlington, 2011.

8. Allas, T., 'Insights from International Benchmarking of the UK Science and Innovation System', *BIS Analysis Paper,* No 03, 2014.

9. Cooke, P., *Complex Adaptive Innovation Systems: Relatedness and Transversality in the Evolving Region,* Routledge, Abingdon/New York, 2012.

The first line of JRC activities includes the development of smart specialisation strategies for the Western Balkans (WB). Smart specialisation is a European approach to foster knowledge-intensive development, a central element of the Europe 2020 strategy for smart, sustainable and inclusive growth with strong links to the renewed EU Industrial Policy Strategy[10]. The European Commission has identified regional development, competitiveness and smart specialisation as key areas for joint support activities in enlargement and neighbourhood countries[11]. The regulation outlining pre-accession funding clearly mentions smart specialisation as a thematic priority for assistance to enlargement countries[12]. The new EU Strategy for Western Balkans spells out how smart specialisation can be implemented through technology transfer and start-up support in order to boost entrepreneurship and innovation across the entire region.[13] In 2017, the heads of government of Albania, Bosnia & Herzegovina, the former Yugoslav Republic of Macedonia, Kosovo, Montenegro and Serbia, endorsed a Multi-annual Action Plan for a Regional Economic Area in WB. This encompasses economic development strategies based on knowledge and innovation and building on the experience of smart specialisation from EU Member States and regions. JRC is currently conducting a pilot project to build capacities for participatory and evidence-based processes in Serbia, Moldova and Ukraine. Insights from this pilot will provide critical input for designing and implementing innovation policies for smart specialisation in emerging economies and less developed countries more generally. The interest in smart specialisation has been increasing also in other Enlargement and Neighbourhood contexts (see Figure 3). The first two strategies in Serbia and Montenegro are to be adopted by 2019.

Figure 3. Place-based innovation policies in the EU, Enlargement and Neighbourhood



Source: JRC.

Apart from the strategic approach, JRC has been also focusing its actions on tangible activities and instruments. The project on 'Technology Transfer Capacity Building in the Western Balkans' has been designed to support and strengthen the technology transfer and innovation ecosystems. It strives

10. Foray, D., *Smart Specialisation: Opportunities and Challenges for Regional Innovation Policy,* Routledge, Abingdon/New York, 2015. European Commission, Investing in a smart, innovative and sustainable Industry A renewed EU Industrial Policy Strategy, Communication to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank, COM(2017) 479 final.

11. JRC and DG NEAR have launched an operational dialogue through a Joint Seminar at the end of 2014 when the two Directorates-General identified seven areas of mutual interest for cooperation: statistical area, regional development policies including smart specialisation, capacity building, energy, CBRN, reference laboratories, participation in H2020.

12. European Parliament & Council of the EU, Regulation 231/2014 establishing an Instrument for Pre-accession Assistance (IPA II).

13. European Commission, *A Credible Enlargement Perspective for and Enhanced EU Engagement with the Western Balkans,* Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2018) 65 final, 2018.

to mobilise actors operating in the technology transfer and innovation ecosystem ranging from academic institutions through early stage investors to science parks, spin-out companies and policymakers. A range of workshops, conferences, expert support and policy instrument design activities has been put in place to achieve the objective of supporting the development of the technology transfer and research commercialisation ecosystem in the economies of the Western Balkans.

Another line of activities has been focused on enhancing the access to data. Considering the cross-cutting nature and importance of high quality data for an informed decision-making process, JRC has been the technical coordinator of the INSPIRE Directive since 2007[14]. The Directive itself is not mandatory for Western Balkan economies, however they all follow the principles of INSPIRE[15]. JRC is collaborating with other international actors such as the World Bank, the Food and Agriculture Organization and the United Nations Economic Commission for Europe in the establishment of spatial data infrastructures and open data developments in the region. In addition, in 2014 the network of experts Danube_Net[16] was founded within the framework of the JRC 'Scientific Support to the EU Strategy for the Danube Region'[17]. The Danube_Net consists of representatives of each of the 14 Danube countries who act as ambassadors of open data on their respective national levels.

Finally, JRC has been supporting transnational cooperation both within WB and with other EU Member States. Most of activities were organised in the framework of macro-regional strategies through targeted scientific support to the Danube Strategy, which helped addressing not only scientific needs but also targeting capacity building activities and governance practices. Even though JRC has been addressing policy-makers, researchers and other stakeholders from the whole Danube EU territory of the macro-region, the capacity-building processes were very much focused on participating economies from the Western Balkans. A strong human capital base was required in the WB not only to be able to provide expert knowledge in certain scientific fields, but also to develop governance mechanisms that are capable of policy coordination, systematic planning and robust acting across various disciplines and policy domains.

14. Infrastructure for Spatial Information in Europe, see https://inspire.ec.europa.eu/whos-who-inspire/57734.

15. Cetl, V., Tóth, K., Smits, P., 'Development of NSDIs in Western Balkan Countries in Accordance with INSPIRE', *Survey Review* 46, No 338, pp. 316-321, 2014.

16. Dusart, J. et al., *Data Infrastructures in Support of Macro-Regional Development: Experiences and Lessons Learned from the Danube Region,* Publications Office of the European Union, Luxembourg, 2016.

17. Western Balkan economies covered by the European Union Strategy for the Danube Region (EUSDR) include Serbia, Bosnia and Herzegovina and Montenegro.

PART 2.

The economic, scientific and innovation landscape of the Western Balkans

This chapter gives an overview of the WB as a region, looking at emerging potentials and critical mass for economic, innovative and scientific development. It examines available data as a preliminary evidence for place-based and innovation-driven economic transformation agendas. The analysis is made on the basis of internationally accessible data and will need to be supplemented by national data sources in order to give a complete picture and serve as a basis for evidence-informed decisions (see Chapter 3, Challenge 2).

Economic potential

Compared to other regions in the world, the Western Balkans have experienced substantial productivity growth in the period 1995-2005 after the initial transition recession, mainly due to investments in upgrading capacities and new value chains[18]. Since then reforms have stalled or been reversed, making structural reforms and innovation support pre-conditions for sustained socio-economic development.

When thinking about the role of innovation for economic growth, it is important to first identify the different components that constitute the underlying growth model[19]. Table 2 focuses on aggregate demand and displays the average annual growth of GDP, exports and household consumption for the entire WB region and the EU as a benchmark in the period 2008 to 2016. In this period that partly overlaps with the economic and financial crisis, the WB outperform the EU in terms of GDP growth.

Linking exports to household consumption yields insights into the relative importance of domestic demand and exports as the main drivers of the growth model. Exports grew faster than domestic demand in all economies except Montenegro. Serbia stands out in terms of the ratio of exports to household consumption, while being the slowest growing WB economy. This echoes findings from the assessment of Economic Reform Programmes, showing how the region 'continues to face considerable external imbalances and rely on external financing, exposing them to sudden changes in investor sentiment'[20].

Table 2. Average annual real growth rates, 2008-2016

	GDP	(A) Exports	(B) Household consumption	A/B
Albania	2.57	8.10	3.80	2.13
Bosnia and Herzegovina	1.47	4.99	0.63	7.88
Kosovo	3.21	7.26	3.33	2.18
Former Yugoslav Republic of Macedonia	2.57	7.11	1.45	4.91
Montenegro	1.40	0.61	0.83	0.73
Serbia	0.84	8.06	0.42	19.39
EU	**0.64**	**N/A**	**0.54**	**N/A**

Source: JRC calculations based on World Bank data.

The share of exports related to high-tech products in the WB is low. However, these economies perform significantly better with regard to exports of medium-tech products. This is mostly due to automotive industry growth in Serbia and the former Yugoslav Republic of Macedonia, where high-

18. Georgiev, Y., Nagy-Mohacsi, P., Plekhanov, A., *Structural Reform and Productivity Growth in Emerging Europe and Central Asia,* LSE Institute of Global Affairs, London, 2017.

19. Baccaro, L., Pontusson, J., 'Rethinking Comparative Political Economy: The Growth Model Perspective', *Politics & Society* 44, No 2, pp. 175–207, 2016.

20. European Commission. 2017 Economic Reform: The Commission's Overview and Country Assessments. (Publications Office of the European Union, 2017), p. 7.

and medium-tech products accounted for 39 % and 56 % of manufactured exports respectively[21]. Reliance on exports implies that innovation policies in this context are not only about research and development (R&D). To generate medium-term results, they must also address broader issues of sectoral technological upgrading, user-led innovation, product quality, productivity improvements, engineering and software. In many of these domains WB have relative cost advantages.

However, quality standards vary significantly. Certificates issued by the International Organization for Standardization indicate to what extent organisations meet globally recognised proprietary, industrial and commercial standards. Data on ISO9001 certificates give a picture of the diffusion of quality management systems and quality-based competition among firms in a given country[22]. Table 3 exhibits very strong variation across the region, with Serbia and Bosnia and Herzegovina having most ISO9001 certificates per one million inhabitants, whereas Albania has one quarter of the WB average and only one fifteenth of the EU-wide average.

Table 3. ISO 9001 certificates per million inhabitants, 2008-2016

	ISO certificates per 1 million inhabitants
Albania	517
Bosnia and Herzegovina	2,223
Kosovo[a]	15
Former Yugoslav Republic of Macedonia	1,488
Montenegro	1,726
Serbia	3,250
WB	**2,039**
EU	**7,367**

Source: JRC calculations based on ISO data and Eurostat 2015 population data.
[a] Data for Kosovo only available for 2015-16.

Policy-makers and stakeholders from all WB see information and communication technologies (ICT) as a central priority for research and development, followed by energy, digital services, health-care, food, environment and biosciences/biotechnology[23]. While this broad consensus suggests that ICT may be an obvious general purpose technology to prioritise, such a policy decision very much depends on the relative importance of ICT and the covered niches in total exports. Table 4 reports stark variations between export shares of ICT goods and those of services across WB. In Serbia, ICT goods are substantially more important as an export good compared to Bosnia and Herzegovina. In this area, Serbia's performance exceeds the WB average. In the former Yugoslav Republic of Macedonia, ICT service exports were more than twice as large as in Albania. This data suggests that having ICT as a priority domain for innovation will entail very different elements across the WB.

21. OECD, *Competitiveness in South East Europe: A Policy Outlook*, Competitiveness and Private Sector Development, Organisation for Economic Co-operation and Development Publishing, Paris, 2016.

22. Anderson, S.W., Daly, J.D., Johnson, M.F., 'Why Firms Seek ISO 9000 Certification: Regulatory Compliance or Competitive Advantage?', *Production and Operations Management* 8, No 28-43, pp. 28-43, 2009.

23. Radosevic, S., Aralica, Z., Raos, J., *Assessing Research and Policy Support Needs for Innovation in South East Europe,* SmartEIZ Report, 2017.

Table 4. Average annual export shares of ICT goods and services, 2008-2016

	ICT goods export (% of total goods exports)[a]	ICT service export (% of service exports, BoP)
Albania	0.55	10.83
Bosnia and Herzegovina	0.20	8.23
Kosovo	n/a	15.96
Former Yugoslav Republic of Macedonia	0.39	24.56
Montenegro	0.42	8.27
Serbia	1.71	34.58
WB	**1**	**17.07**
EU	**5.66**	**34.17**

Source: JRC calculations based on World Bank data. Shares are of total goods and service exports respectively.
[a] ICT goods export data are missing the year 2016; no goods export data are available for Kosovo.

The economic fabric of territories can be analysed by identifying critical mass in terms of employment and value added as well as the growth dynamics at the sub-sectoral level. A preliminary analysis of this type based on international databases has been prepared by JRC in cooperation with UNU-MERIT as a starting point for more detailed mapping exercises (see Chapter 3).

Economic specialisations in the WB are identified using aggregate industry data for employment and turnover for 2008-2017. These data have been extracted from the Orbis database[24]. The data comprises statistics on turnover and number of employees for enterprises operating at the NACE 4-digit sector level in each of the WB. Orbis data misses around 40 % of data leading to inconsistent aggregate results over time. In Annex 2 we present the methodology to impute missing values that allows improve data availability from 60 % to almost 90 % for employment and turnover.

For each country, enterprise data are then aggregated to the NACE 3-digit industry level. Aggregate industry level data are then used to identify two types of industries: specialised industries with critical mass and emerging industries with increasing degrees of specialisation and relative size. For all industries the following indicators are calculated for both employment and turnover: 1) average degree of specialisation for 2010-2017, 2) average relative size in national economy for 2010-2017, 3) rate of change between degree of specialisation in 2010 and 2017, and 4) rate of change between relative size in national economy between 2010 and 2017. Degrees of specialisation are calculated using location quotients, which compare the relative size of industry in a country with the relative size of the same industry for all WB combined. Specialised industries with critical mass are identified as those industries for which the degree of specialisation and relative size for both employment and turnover are above predefined thresholds. In Annex 2 we show the details of these thresholds for current and emerging strengths. Emerging industries with increasing degrees of specialisation and relative size are identified as those industries for which the change in the degree of specialisation and the change in relative size for both employment and turnover are above these thresholds. Different thresholds have been used for changes over time to ensure comparable numbers of specialised industries.

The identified economic specialisations are shown in Table 5. For all WB combined, 46 industries have current strengths and 52 industries have emerging strengths. For Albania, Kosovo and Montenegro some industries show both current and emerging strengths, highlighted in bold. What is striking is that these overlapping current and growing strengths are in local industries such as construction, wholesale, retail and gastronomy. Local industries typically are in services, pay relatively low wages and compete much less with industries in other regions or countries. Employment usually correlates evenly with population figures. To be internationally competitive and achieve higher wages, however, traded industries are more relevant but also more concentrated in different places.[25]

24. https://orbis.bvdinfo.com/version-2018410/home.serv?product=OrbisNeo.

25. Porter, M. E., 'The Economic Performance of Regions', *Regional Studies* 37, No 6-7, 549–578, 2003.

Table 5. Identified economic specialisations for WB

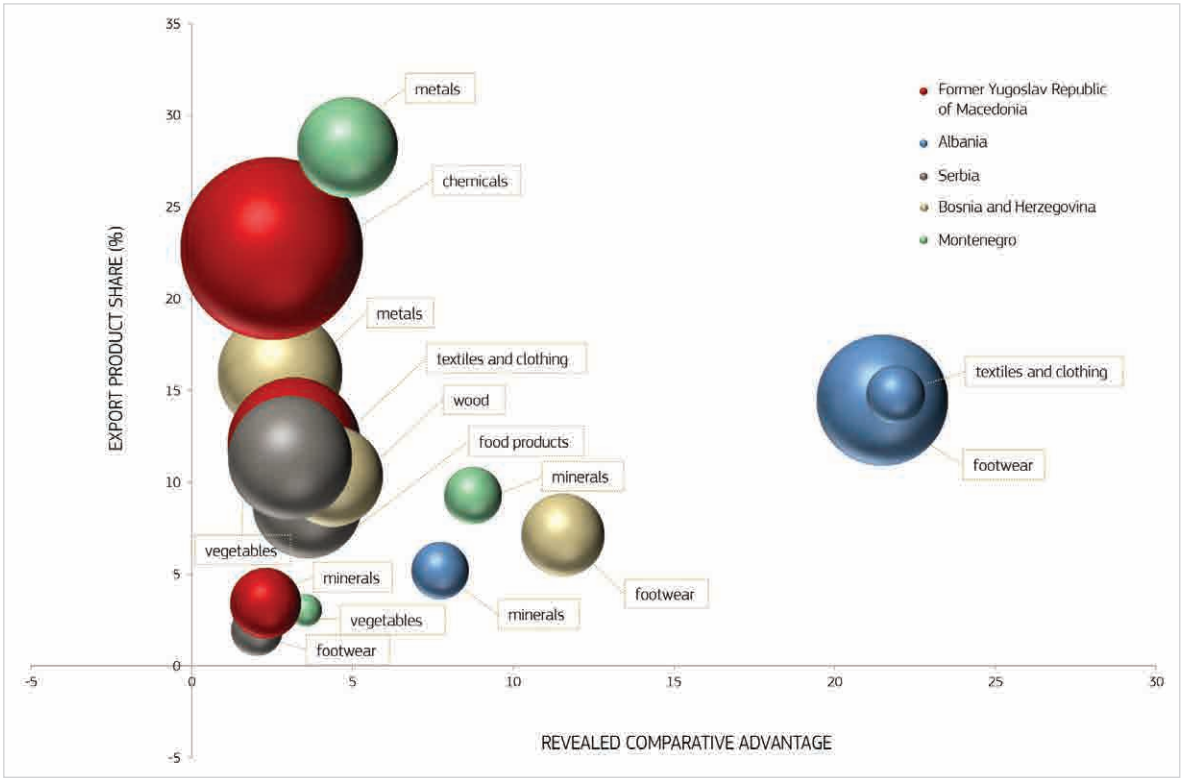
	Current strengths	Emerging strengths
Albania	031 Marine fishing 236 Manufacture of concrete, cement and plaster products **439 Other specific construction works** 465 Wholesale of information-communication equipment 469 Non-specialised wholesale trade **471 Retail in non-specialised stores** 641 Monetary intermediation 683 Management of real estate on a fee or contract basis	089 Other mining and quarrying 152 Manufacture of footwear **439 Other specific construction works** **471 Retail in non-specialised stores**
Bosnia and Herzegovina	021 Silviculture and other forestry activities 052 Mining of lignite 161 Sawmilling and planing of wood 251 Manufacture of metal structures 461 Wholesale for a commission 472 Retail of food, beverages and tobacco in specialised stores 619 Other telecommunication activities	101 Processing and preserving of meat and meat products 132 Manufacture of textiles 222 Manufacture of plastic products 255 Forging, pressing, stamping and roll-forming of metal; powder metallurgy 256 Treatment and coating of metals; machine processing of metal 259 Manufacture of other metal products 279 Manufacture of other electrical equipment 453 Sale of motor vehicle parts and accessories 473 Retail sale of automotive fuel in specialised stores
Kosovo	072 Mining of non-ferrous metal ores 235 Manufacture of cement, lime and plaster 351 Production, transmission and distribution of electricity **461 Wholesale for a commission** 463 Wholesale of food, beverages and tobacco 467 Other specialised wholesale **479 Retail sale not in stores, stalls and markets** 611 Wired telecommunication activities 649 Other financial service activities, except insurance and pension funding	360 Water collection, treatment and supply 412 Construction of residential and non-residential buildings 452 Maintenance and repair of motor vehicles **461 Wholesale for a commission** 464 Wholesale of household goods 466 Wholesale of other machinery, equipment and tools 471 Retail in non-specialised stores 475 Retail in other household articles in specialised stores 477 Retail in other goods in specialised stores **479 Retail sale not in stores, stalls and markets**
Former Yugoslav Republic of Macedonia	141 Manufacture of clothes, except fur 475 Retail in other household articles in specialised stores 477 Retail in other goods in specialised stores 494 Freight transport by road and removal services 561 Restaurants and mobile food service activities	013 Plant propagation 016 Services in agriculture and post-harvest crop activities 261 Manufacture of electric components and boards 282 Manufacture of other general purpose machines 293 Manufacture of other parts and accessories for motor vehicles 353 Steam and air conditioning supply 612 Wireless telecommunication activities 682 Renting and operating of own or leased real estate 683 Management of real estate on a fee or contract basis
Montenegro	110 Manufacture of drinks 429 Construction of other civil engineering projects 452 Maintenance and repair of motor vehicles 469 Non-specialised wholesale trade 475 Retail in other household articles in specialised stores 477 Retail in other goods in specialised stores 511 Passenger air transport 551 Hotels and similar accommodation **561 Restaurants and mobile food service activities** 563 Beverage preparing and serving activities 619 Other telecommunication activities 649 Other financial service activities, except insurance and pension funding	162 Manufacture of wood products, manufacture of articles of cork, straw and plaiting materials 241 Manufacture of basic iron and steel and ferro alloys 254 Manufacture of weapons and ammunition 412 Construction of residential and non-residential buildings 421 Construction of roads and railways 464 Wholesale of household goods **561 Restaurants and mobile food service activities** 711 Architectural and engineering activities and technical consultancy

	Current strengths	Emerging strengths
Serbia	011 Growing of one-year and two-year plants 091 Support activities for petroleum and natural gas extraction 221 Manufacture of rubber products 611 Wired telecommunication activities 702 Management consultancy activities	141 Manufacture of clothes, except fur 161 Sawmilling and planing of wood 257 Manufacture of cutlery, tools and general purpose goods of metal 275 Manufacture of electric domestic appliances 301 Building of ships and floating structures 351 Production, transmission and distribution of electricity 461 Wholesale for a commission 474 Retail sale of information-communication equipment in specialised stores 492 Freight rail transport 522 Service activities incidental to transportation 563 Beverage preparing and serving activities 620 Computer programming, consultancy and related activities

Source: UNU-MERIT calculations based on Orbis data. The industry names are those used in the NACE classification. The 3-digit numbers show the corresponding NACE code.

Additional information on economic specialisation can be derived from data on international competitiveness at sectoral level. In relation to relative advantage based on export trends, there are several sectors that appear to be of similar significance in all Western Balkan economies, such as footwear and minerals. The relative advantage in specific sectors is shown by the revealed comparative advantage indicator measured by trade flows. Figure 4 provides a closer look at the main sectors with revealed comparative advantage in the WB in 2016, putting them in relation to the export share for all products in the same year. The size of the bubble is determined by the value of exports in USD for a given sector per 100,000 inhabitants.

Figure 4. Top three sectors in the WB by revealed comparative advantage



Source: JRC calculations based on WITS data[26]. No data are available for Kosovo.

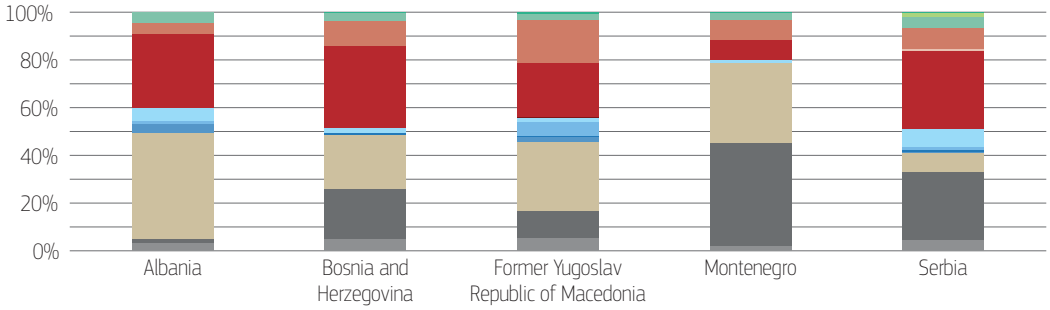
Another important indicator of emerging economic specialisations is the popularity of different sectors among foreign investors. The 2017 fDi Markets database (Financial Times Limited) can be

26. The World Integrated Trade Solution (WITS) software provides access to international merchandise trade, tariff and non-tariff measures (NTM) data; https://wits.worldbank.org/Default.aspx?lang=en.

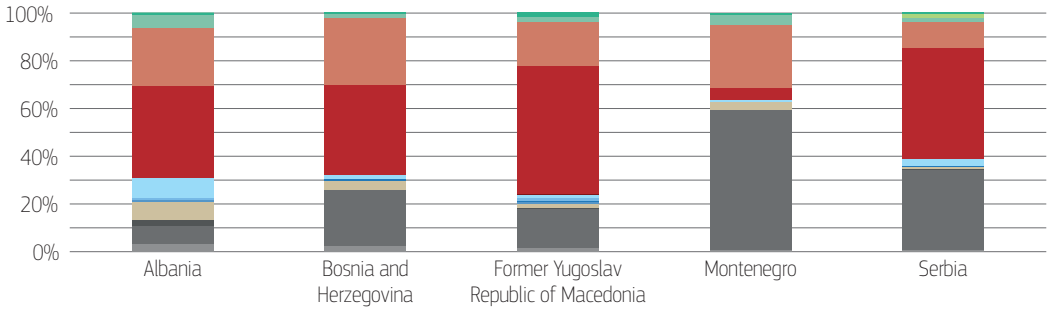
used to map international greenfield investments towards Western Balkan economies as a proxy for the attractiveness of specific sectors. This is achieved by mapping the different types of greenfield investments at the project or microeconomic level. Investments can be distinguished between those that expand existing facilities and those that build new facilities.

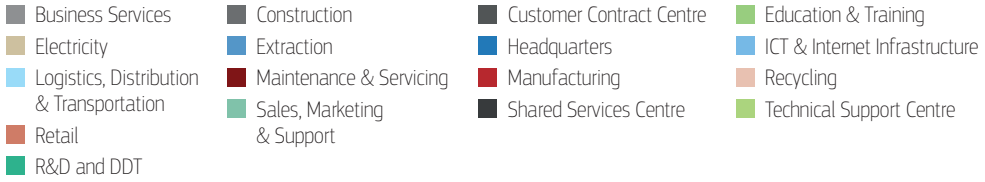
Figure 5. Distribution of inward greenfield FDI by destination and industrial activity (2003-2017)

Based on Capital expenditures estimated



Based on estimated Jobs created





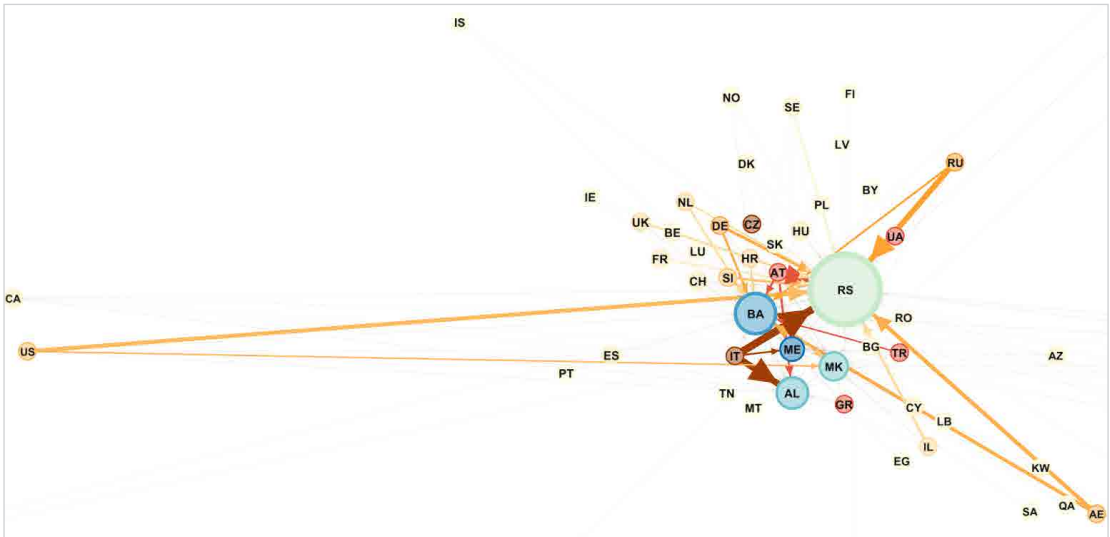
Source: JRC compilation based on fDi data. No data are available for Kosovo.

In the period 2003-2017, 1,775 inward greenfield foreign direct investment (FDI) projects have been implemented in the WB economies for which such data are available - Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Montenegro and Serbia. They represent at least USD 82,500 million in terms of estimated capital expenditures and about 413,020 estimated jobs created. Figure 5 breaks down this investment by country of destination and industrial activity.

The distribution of estimated capital expenditures and jobs creation confirms the attractiveness of selected economies for manufacturing activities. The importance of these activities for the WB is also highlighted in Figure 4 where textiles and clothing, footwear, food-related products or wood appear to contribute significantly to their export-based performance[27]. Moreover, Figure 5 suggests further that the target group of economies appears relatively attractive for electricity-related investments, although to a much lower extent in the case of Serbia. In Montenegro and Serbia, construction-related industrial activities represent respectively 40 % and 25 % of inward FDI in terms of estimated capital expenditures.

27. Note that these comparisons should be handled with care as the export and FDI-based graphs do not cover the same period.

Figure 6. Main greenfield FDI flows in Western Balkan economies



Code		Code		Code		Code		Code	
AL	Albania	**CZ**	Czech Republic	**IL**	Israel	**NO**	Norway	**ES**	Spain
AT	Austria	**DK**	Denmark	**IT**	Italy	**PL**	Poland	**SE**	Sweden
AZ	Azerbaijan	**EG**	Egypt	**KW**	Kuwait	**PT**	Portugal	**CH**	Switzerland
BY	Belarus	**FI**	Finland	**LV**	Latvia	**QA**	Qatar	**TN**	Tunisia
BE	Belgium	**FR**	France	**LB**	Lebanon	**RO**	Romania	**TR**	Turkey
BA	Bosnia-Herzegovina	**DE**	Germany	**LU**	Luxembourg	**RU**	Russia	**AE**	UAE
BG	Bulgaria	**GR**	Greece	**MK**	Former Yugoslav Republic of Macedonia	**SA**	Saudi Arabia	**UK**	United Kingdom
CA	Canada	**HU**	Hungary	**MT**	Malta	**RS**	Serbia	**UA**	Ukraine
HR	Croatia	**IS**	Iceland	**ME**	Montenegro	**SK**	Slovakia	**US**	United States
CY	Cyprus	**IE**	Ireland	**NL**	Netherlands	**SI**	Slovenia		

Source: JRC. *The darker the investing country's circle, the more important it is as a source country and the bigger the Western Balkan economy's circle, the larger are the capital expenditures involved.*

In terms of the origin of the foreign investments, important source countries include Italy, Austria, Russian Federation, the United States and Germany (Figure 6). Greenfield FDI flows, in the estimated volume of capital expenditures involved, are largest towards Serbia, followed by Bosnia and Herzegovina, Albania, the former Yugoslav Republic of Macedonia and then Montenegro.

Scientific potential

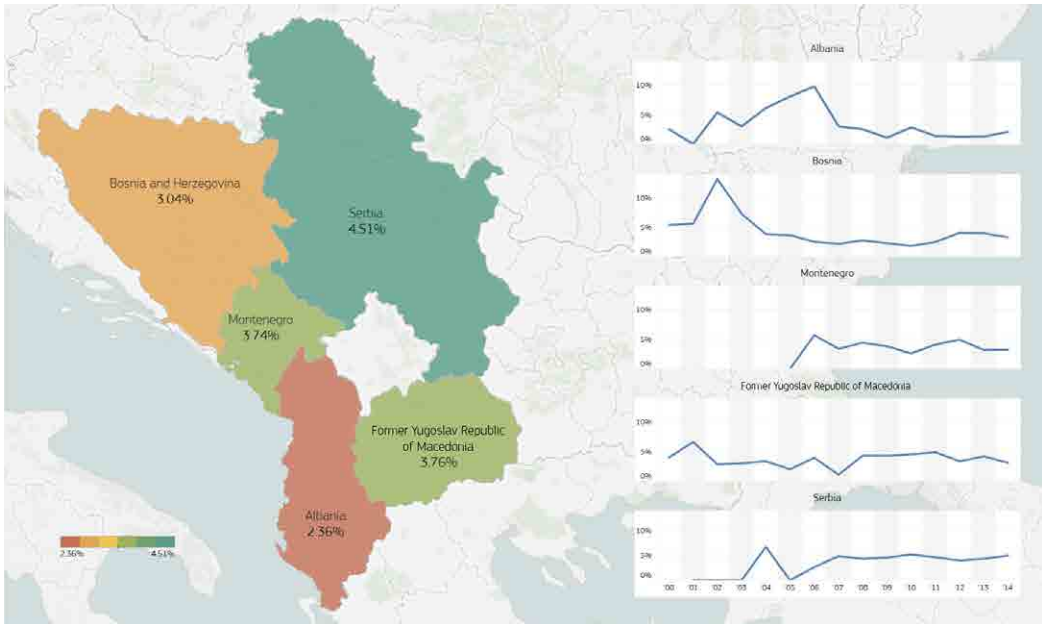
Another important aspect of the analysis is scientific potential, which can be measured by both input and output indicators. No consistent data on government and business expenditure in research and development across the WB are available. Based on available information, however, the share of government R&D investments of GDP seems low across the region. Only Serbia reaches almost the levels of Croatia and Bulgaria in 2015. It is followed by the former Yugoslav Republic of Macedonia, Montenegro and Bosnia and Herzegovina. Albania spent least with only around 0.1 %[28]. Business R&D expenditure appears also very low. The Serbian private sector spent around 0.3 % of GDP, which is the largest amount in the WB but only half of the share spent in Bulgaria[29]. Despite commitment to R&I is often expressed, investments are comparatively low.

28. The OECD has been collecting this information from some national statistical offices in the WB. See OECD, *Competitiveness in South East Europe: A Policy Outlook*, Competitiveness and Private Sector Development, Organisation for Economic Co-operation and Development Publishing, Paris, 2018.

29. Ibid.

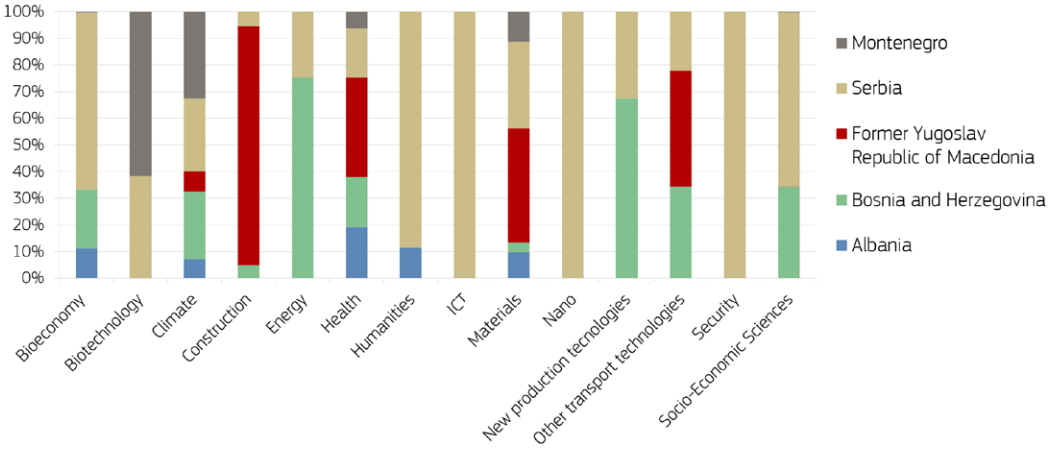
Relevant output indicators capture, among others, publications. Bibliometric information is available for Montenegro, the former Yugoslav Republic of Macedonia, Albania, Serbia and Bosnia and Herzegovina. For the time period 2007-2016, the general tendency is an increasing publication production in each of the five economies. Highly cited publications are considered to be one of the important impact factors of the research output in a given economy. Figure 7 depicts the proportion of publications that belong to the top 10 % most cited publications worldwide. The map on the left provides the top 10 % most cited publications as a share of the total number of scientific publications for the period 2000-2014, while the charts on the right hand side show the respective numbers per year. The citation window, the time period after the appearance of the publications, is two years. Figure 8 shows the distribution of the top-10 % most cited publications in thematic fields in 2014. As pointed out above, the performance of the economies follows a pattern where Serbia has the biggest thematic variety of the most impactful share of publications and is closely followed by Bosnia and Herzegovina.

Figure 7. Top-10 % most cited publications worldwide as a share of total national scientific publications



Source: JRC calculations based on DG RTD data and Web of Science. The citation window is publication year plus two years. No data are available for Kosovo.

Figure 8. Top-10 % most cited publications worldwide as a share of total national scientific publications per thematic fields in 2014



Source: JRC calculations based on DG RTD data and Web of Science. The citation window is publication year plus two years. No data are available for Kosovo.

As universities and research institutions are important actors in innovation systems, especially in transition and developing economies, the participation in R&I partnerships within the region and in a broader EU framework is an important indicator of their activity and capacity. The Horizon 2020 Dashboard of the European Commission provides detailed information about participation in the framework programme (in consortia with EU Member States), success rates of project applications and EU funding contribution. As can be seen in Table 6, Kosovo has the highest success rate, which is more than double that of Albania. The success rate of the other WB is comparable, ranging from 14 % in the case of Bosnia and Herzegovina to 11 % for Serbia.

Table 6. Horizon 2020 success rates

	Eligible applications	Retained applications	Success rate applications
Albania	270	21	7.78 %
Bosnia and Herzegovina	331	46	13.90 %
Kosovo	61	11	18.03 %
Former Yugoslav Republic of Macedonia	510	51	10.00 %
Montenegro	158	20	12.66 %
Serbia	2204	242	10.98 %

Source: JRC compilation based on the European Commission's Horizon 2020 Dashboard.

Table 7 provides detailed information on participations and the share of small and medium-sized enterprises (SMEs) in funded projects. Interestingly, in Montenegro no SME has so far participated in a Horizon 2020 project, while in Serbia SMEs have been consortium members in almost one quarter of all projects.

Table 7. H2020 participation details

	Participations number	Unique participants number	Net EU contrbution €	SME participations %	SME net EU contribution €	SME net EU contribution %
Albania	20	17	2,071,738	10.00	127,831	6.17
Bosnia and Herzegovina	44	36	3,996,409	11.36	288,000	7.21
Kosovo	10	9	880,532	10.00	176,075	20
Former Yugoslav Republic of Macedonia	51	28	5,866,204	9.80	700,394	11.94
Montenegro	21	12	1,413,364	0.00	0	0
Serbia	257	128	62,345,966	22.96	14,442,879	23.17

Source: JRC compilation.

The information available on participation in Framework Programme 7 (FP7) consists exclusively of the EU financial contribution. As can be seen in Table 8, Serbia has received the largest amount of EU contributions, which is considerably higher than that received by the rest of the Western Balkan economies. It can be noted that in Serbia and the former Yugoslav Republic of Macedonia, a similar amount of funding has been provided for the three types of organisations in research and innovation: higher or secondary education organisations, research organisations and private for profit organisations.

Table 8. EU contribution by type of organisation in FP7

Type of organisation	Albania	Bosnia and Herzegovina	Former Yugoslav Republic of Macedonia	Kosovo	Montenegro	Serbia
HES	1,027,793	1,632,776	4,034,426	No data available	3,558,411	22,333,585
OTH	178,776	No data available	586,340	No data available	180,882	812,810
PRC	363,711	714,738	3,523,632	91,700	22,622	18,520,508
PUB	495,086	430,543	905,256		415,642	1,126,536
REC	285,922	292,947	3,188,099	92,400	138,204	21,530,199
Total	2,351,288	3,071,005	12,237,752	184,100	4,315,762	64,323,639

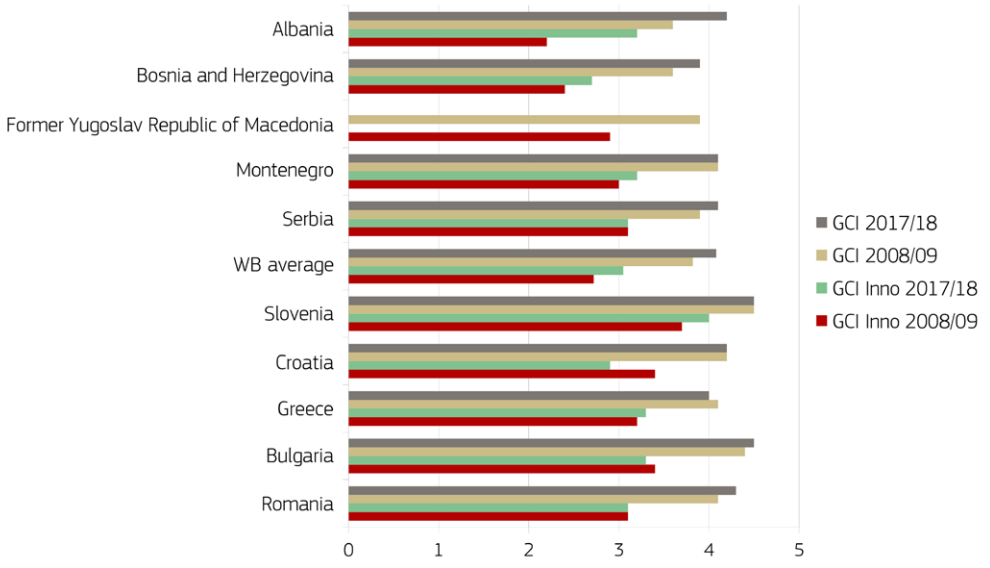
Source: JRC. HES - Higher or Secondary Education Organisation, OTH – Other, PRC - Private for Profit Organisation, PUB - Public Body, REC - Research Organisation).

Innovative potential

It is worth noticing that in transition and developing countries, main sources of innovation are not R&D and technology-based but more connected with managerial skills and process and organisational innovation. While the WB economies are in the process of identifying the main drivers for their competitiveness, it is clear that the innovation capacity, being one of the leading forces for sustainable growth and competitiveness, is yet to be fully exploited.

The Global Competitiveness Index (GCI), which determines countries' competitiveness based on their performance measured in twelve pillars[30], is showing signs of steady growth in the WB region, in particular in terms of innovation performance. The innovation pillar[31], one the main GCI constituents, indicates that although the Western Balkan economies are still performing below EU average in terms of innovation performance, the last ten years saw a rise of this indicator in all WB economies, with the average score of 2.72 in 2008/09 rising to 3.05 in 2017/18. Figure 9 shows the scores of Western Balkan and other economies from Southeast Europe (excluding Turkey) for both overall GCI and innovation.

Figure 9. Global Competitiveness Index scores



30. The World Economic Forum publishes the Global Competitiveness Index in its Global Competitiveness Reports, archived at www.weforum.org.

31. Innovation scores are determined by several indicators: capacity for innovation, quality of scientific research institutions, company spending on R&D, university-industry collaboration in R&D, government procurement of advanced technology products, availability of scientists and engineers and PCT patent applications.

Source: JRC calculations based on the data from GCR. No data are available for Kosovo. Data for former Yugoslav Republic of Macedonia for 2017/18 are missing. Scale runs from 1 (min) to 7 (max).

As the Eurostat Community Innovation Survey methodology has not yet been implemented in all WB, there is not much data available that can show differences in the region in this context. Table 9 reports firm survey data on new products and services, process innovations and R&D spending. It can be seen that stark differences exist in terms of firm R&D spending and innovation outputs, but there is a visible innovation activity at the company level, that is not always dependent on R&D. Variation between the worst performing economy and the WB average ranges from a factor of three up to a factor of eleven. For instance, less than 1 per cent of firms in Albania spent on R&D in 2013, in Kosovo this percentage was 26. Firm survey data should be interpreted with caution, however, since it is based on long questionnaires that may reduce data quality and limited samples that may reduce representativeness.

Table 9. Innovation inputs and performance of firms (2013)

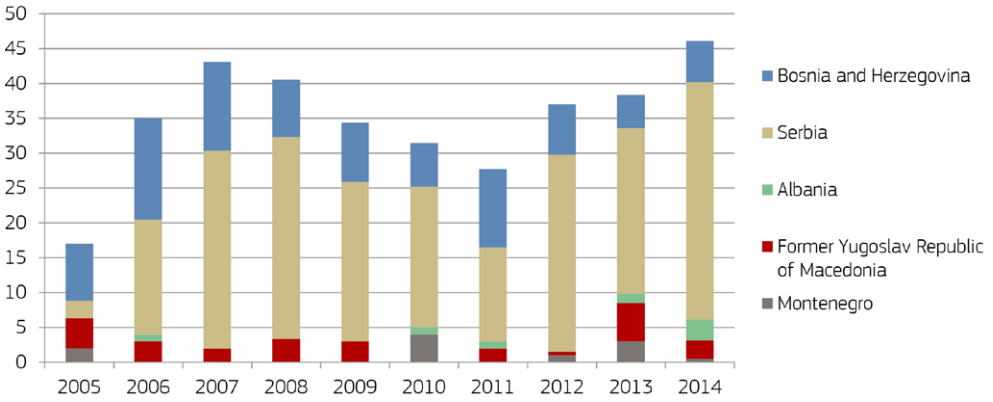
	% of firms that introduced a new product/service	% of firms whose new product/service is also new to the main market	% of firms that introduced a process innovation	% of firms that spend on R&D
Albania	8.4	56.8	2.9	0.9
Bosnia and Herzegovina	43.9	76.8	34.4	10.6
Kosovo	57.1	88.7	44.0	26.2
Former Yugoslav Republic of Macedonia	27.0	79.6	14.8	8.8
Montenegro	14.3	22.7	11.7	9.5
Serbia	39.5	56.6	21.5	15.1
WB average	31.7	63.5	21.6	11.9

Source: JRC compilation based on World Bank Enterprise Survey 2013.

The next part of this analysis briefly outlines the main differences and similarities of technological potential in the WB. Understanding the technological capabilities of territories is fundamental both for the definition of upgrading strategies and the identification of potentials and niches for development. The number of patent applications per million inhabitants for the ten-year period 2005-2014 provided in Figure 10 shows a significant difference among the economies as well as considerable national fluctuations. Since 2006 Serbia, has been the leader in patent applications despite some downturns in the middle of the time period.

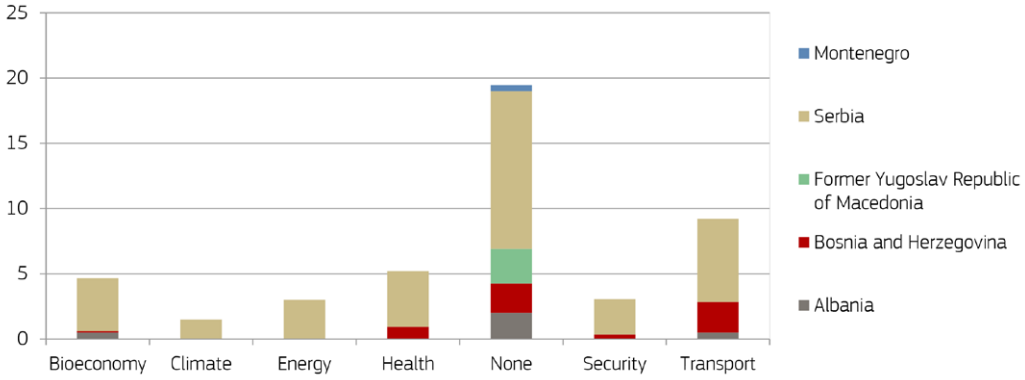
Figure 11 shows the distribution of patent applications by societal grand challenges in 2014. It can be seen that Serbia not only has the largest number of patent applications but it is the only economy that has patent applications in all the fields representing grand societal challenges. Serbia is closely followed by Bosnia and Herzegovina, while the rest of the economies are at a considerable distance behind. A similar pattern can be observed in other measures presented in this report. The scale of performance exhibited by the Western Balkan economies can be explained by the historical development of the region and its economic legacy.

Figure 10. Number of patent applications (per million inhabitants)



Source: JRC calculations based on DG RTD data and on PCT application data from PATSTAT and REGPAT. No data was available for Kosovo.

Figure 11. Number of patent applications by societal challenge in 2014



Source: JRC calculations based on DG RTD data and on PCT application data from PATSTAT and REGPAT. No data was available for Kosovo.

Looking in more detail, it is possible to differentiate the place of residence of inventors and applicants. While the inventor location is often used to proxy the location of effective R&D activities (leading to the patents), the residence of the applicants reflects more the 'control' of the newly produced technological knowledge[32]. Table 10 shows the extent to which Western Balkans embed inventive capacity in their territories (inventor located there)[33]. This quantitative analysis exploits the PATSTAT database of the European Patent Office (EPO). PATSTAT is a worldwide patent statistical database, which provides applications from more than 80 countries. The 2017b edition is employed for the analyses. The table provides the volume of patent families that have been invented in the selected economies on the period 2010-2017. Patent families allow protection of the same invention to be traced across different offices. In generic terms, in order not to count the same patent several times, all patents related to a 'priority filing' (or first filing worldwide) are combined into a patent family[34].

32. OECD, *Patent Statistics Manual,* Organisation for Economic Co-operation and Development Publishing, Paris, 2009.

33. Patent data offer rich and consistent information on the technological content and location of inventive activity over long time periods, they feature several shortcomings to be kept in mind when the data are analysed and interpretated (Griliches 1990, Brusoni et al 2006). Yet, patents nevertheless constitute a relevant and unique proxy to study the inventive activities of companies (Acs and Audretsch 1989, de Rassenfosse et al. 2013).

34. See Dernis, H. et al., *World Corporate Top R&D Investors: Innovation and IP Bundles. A JRC and OECD Common Report,* Publications Office of the European Union, Luxembourg, 2015, and Martínez, C., 'Patent Families: When Do Different Definitions Really Matter?', *Scientometrics* 86, No 1, pp. 39-63, 2011.

Table 10. Volume of inventive technological activities (*patent families*) and destination economies (*applicant*)

Inventor(s) of residence	INPADOC patent families, 2000-2017	Top 2 applicant locations
Albania	51.2	Albania - US
Bosnia and Herzegovina	214.3	Bosnia and Herzegovina - US
Montenegro	49.8	Montenegro - US
Former Yugoslav Republic of Macedonia	96.9	Former Yugoslav Republic of Macedonia - US
Serbia	2,166.2	Serbia - US

Source: JRC compilation based on PATSTAT database of the European Patent Office. The detailed definition of INPADOC patent families can be found at https://www.epo.org/index.html. Fractional counts of patents across inventor locations are applied to avoid double counting.

A closer look at the top destinations of this technological knowledge (applicant locations, column 3) point out that most knowledge flows internally and then to a much lesser extent towards the United States (US). This is to say that the top applicants are located in the same economy. However, US-located applicants rank second in all cases. More research on the type and origin of applicant profiles is needed to understand which technological knowledge is associated with these dynamics. In particular, further explorations should look at and differentiate between the patent classes or technologies targeted by local applicants and US-based applicants in view of identifying potential future niches for technological advantage.

The scientific and innovation strengths should be further analysed and matched to the critical mass and emerging sectors in terms of the economic potential in order to be able to define the priority domains for place-based innovation policies.

Institutions, policies and main instruments to support innovation

Innovation policies are designed and implemented within the broader institutional and political framework. In the recent Communication by the European Commission outlining a credible enlargement perspective for the Western Balkans[35], rule of law and good governance were underscored as key areas in need of continuous reform efforts. Only by overcoming state capture at all levels of government and administration can public interests be clearly separated from private ones. Reasons for the lack of competitiveness of the region's economies include undue political interference, an underdeveloped private sector and dysfunctional market institutions. Business institutions and state-owned enterprises are among the weakest institutions in the WB[36]. Capture of public institutions by private interests coupled with relatively weak administrative capacities and a lack of cooperation and coordination among government agencies are obstacles to sustainable and coherent innovation policies. The overall institutional quality regarding property right protection and judicial independence in the WB economies is lower than in Central Europe, although these economies have made recent progress[37].

Governance in the area of research and innovation has been gradually established in the WB through international cooperation and largely through EU-funded programmes and projects or as part of enlargement policy. However, WB economies are at very different stages of formation of R&I policy governance. R&I policy governance is quite well established in Serbia, it is in the process

35. European Commission, *A Credible Enlargement Perspective for and Enhanced EU Engagement with the Western Balkans,* Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2018) 65 final, 2018.

36. Transparency International, *Fighting Corruption in the Western Balkans and Turkey: Priorities for Reform,* TI International Secretariat, Berlin, 2016.

37. EBRD, *Transition Report 2015-16: Rebalancing Finance,* European Bank for Reconstruction and Development, London, 2015.

of being formed in Montenegro and re-activated in the former Yugoslav Republic of Macedonia. The other three economies are still in early stages of establishing R&I governance[38].

Regarding scope, R&I policy governance either exists still in a rudimentary form (Albania and Bosnia and Herzegovina) or is very much concentrated around a single ministry (Serbia, the former Yugoslav Republic of Macedonia and Montenegro). This is largely a reflection of very limited investments in R&D and a weak business R&D sector. The overall model of governance is rooted in the idea of the linear innovation model which puts the focus on R&D as the main source of innovation. This has its most elaborate expression in Serbia which has the most advanced R&I governance. There are no comparable governance mechanisms or bodies, networks or organisational arrangements that are focused on non-R&D sources of innovation. Organisations like productivity centres, quality control and quality enhancement centres, industrial extension services, sector technology support services are almost non-existent and not yet the targets of policy. Overwhelming emphasis is put on upstream R&D organisations. The need for downstream organisations to increase innovation and productivity is largely neglected.

In the three economies with more developed R&I governance, competitive funding of projects prevails. Competitive funding has the advantage to potentially promote the best teams and projects. On the other hand, having only competitive funding can undermine the building of sustainable R&D organisations and independent research. An appropriate balance between competitive project and institutional funding would be more favourable for the systems where demand for R&D is still limited.

Overall, R&I systems in WB economies are predominantly public-sector oriented with activities concentrated in public centres and institutes, higher education institutions, line ministries and governmental agencies. Even when organisations have a name that suggests a broader remit, such as the Albanian National Agency for Technology and Innovation, they are still very much public-sector oriented. These strongly R&D focused organisations have been recently complemented by more downstream types of organisations. Largely driven by foreign funding and as part of innovation and technology strategies, there are activities establishing non-R&D organisations like innovation funds, business innovation services, business incubator and cluster programmes (Serbia, Montenegro and Albania).

Taking account of the analysis and the different perspectives presented, it is likely that WB economies would need to expand their governance in two directions. First, they would need to create fully-fledged governance mechanisms for R&I policy by reaching out and interacting with the business sector. Second, they would need to include business actors in the process of policy-making by making innovation an inter-ministerial task. Indeed, coordination and communication problems between science and economy-related ministries and implementing agencies are a major impediment to effective and strategic innovation and development policies[39].

However, two factors could hinder an inclusive, more participatory and coordinated innovation policy process. First, wage-setting in WB economies takes place mainly at the company level and not in a more centralised way at the industry level. This together with high unemployment leads to high flexibility in employing and laying off labour which in turn reduces incentives for investments in training. Second, the labour market in the WB economies is characterised by confrontational relations between employees and employers; it is much less based on cooperation. In summary, cooperative institutions for negotiating social partnerships and coordinating wage-setting as a way to enhance competitiveness linked to productivity are largely missing[40]. Wage-setting and related policies are an important element of successful growth models. Both these factors are significant obstacles to a broader participation of all stakeholders for a structural transformation of the economy. Coupled with the very limited experience of participatory policy-making more generally, the narrow focused on the public R&D sector makes it difficult to effectively identify and mobilise relevant and committed businesses, research and higher education institutions and civil society

38. OECD, *Competitiveness in South East Europe: A Policy Outlook,* Competitiveness and Private Sector Development, Organisation for Economic Co-operation and Development Publishing, Paris, 2018.

39. OECD, *Competitiveness in South East Europe: A Policy Outlook*, Competitiveness and Private Sector Development, Organisation for Economic Co-operation and Development Publishing, Paris, 2016.

40. Grabisch, H. et al., *Improving Competitiveness in the Balkan Region: Opportunities and Limits,* Vienna Institute for International Economic Studies, Vienna, 2016.

organisations. Yet without involving stakeholders and using their knowledge of innovation activities, governments will struggle to create shared visions of future comparative advantages.

Main conclusions of the analysis

To be able to meaningfully start a comprehensive innovation strategy and stakeholder process, governments need to understand first where their economies stand and how they arrived at their current economic fabric. Every time such a diagnosis is done, new discoveries can emerge about the evolution of economic sectors, their linkages, and subnational or regional variety. This exercise has also shown that economic potential does not lie only in high-tech manufacturing or established research and development (R&D). Rather, a broader definition is more appropriate, given the overall importance of services, and of combining new activities with existing traditional sectors to upgrade to higher value added.

Transition economies are driven to remodel and drastically reform their socio-economic and political systems at the same time. Governments in such contexts often resort to mimicking the economic priorities and instruments of advanced countries. Yet this alienates the policies from the economic reality on the ground, resulting in an increasing gap between wrongly defined policy agendas and their implementation[41].

According to a widely used global competiveness and innovation index, most economies in the region have improved their performance over the past ten years. Yet which are the domains that have demonstrated comparative advantages and are likely to be sustained in the future? The growth of computerised manufacturing and the digitisation of economic processes are often cited as offering high-potential for the economies in the Western Balkans. This is well reflected in the views of governments and key stakeholders in the WB who by and large see information and communication technologies as a priority domain for research and innovation. A closer examination of exports shows, however, that the starting positions differ widely. Exports of ICT services as a share of all service exports has been more than four times higher in Serbia compared to Montenegro and Bosnia and Herzegovina. In the entire region, only Serbia has a relative economic specialisation in computer programming, consultancy and related activities that has been growing in terms of employment and turnover since 2010. All this suggests that having ICT as a priority domain for innovation should entail very different niches and approaches across the WB.

The WB have similar revealed comparative advantages in terms of exported products, mainly textiles and clothing (especially footwear), food products, minerals and metals. Yet only food is cited by government and stakeholder groups as one of the most prominent priority domains. Those domains perceived to be most relevant for research and innovation resemble very much those that are fashionable in the EU, namely energy, healthcare, environment and biosciences/biotechnology. Looking at exports in relation to household consumption yields interesting insights into underlying general growth models of economies. Economic growth has been driven by exports in Serbia, Bosnia and Herzegovina and the former Yugoslav Republic of Macedonia in 2008-2016. On the other side, domestic consumption was a more important source of growth in Albania, Montenegro and Kosovo. Exports are still focused on medium- and low-technology products. Innovation support mostly addresses traditionally strong sectors, which does not necessarily reflect the ideal competitiveness paths for economies in the region. These incongruences and variations deserve closer analysis to enable better understanding of how future comparative advantages can be built.

To generate medium-term results, the WB should address broader issues of sectoral technological upgrading, user-led innovation, product quality, productivity improvements, engineering and software. In many of these domains, the WB have relative cost advantages. However, quality standards in firms vary significantly, thus aggravating quality-based competition among firms. Recent measures to establish a Science and Technology Park in Montenegro illustrate the need for complementing large R&D investments with an appropriate social and 'soft' infrastructure. Investments in physical infrastructure must be accompanied by technological upgrading, skills-development and new management techniques within broader strategic objectives to have a significant effect.

41. Kleibrink, A., Larédo, P., Philipp, S., *Promoting Innovation in Transition Countries: A Trajectory for Smart Specialisation,* Publications Office of the European Union, Luxembourg, 2017.

In the period 2007-2013, more than two thousand inward greenfield FDI projects have been financed in the WB economies, representing at least 80 billion EUR in terms of estimated capital expenditures and almost half a million of estimated jobs created. Very different sectors benefitted from these investments and estimated employment growth across the region.

Although some Western Balkan economies record increases in patent activity, patent intensity of the region is still low. Scientific publication output, on the other hand, displays stable high growth trends. It is interesting to note that success rates for applications to the EU Research and Innovation programme Horizon 2020 have ranged from 7.8 % in Albania to 18 % in Kosovo. In Serbia, almost one quarter of participants in Horizon 2020 are small- and medium-sized enterprises, while in Montenegro no SMEs have so far participated. Such differences should be taken into account when preparing a new strategic framework for research and innovation.

Political interference in the economy, a private sector that is not focused on R&D and dysfunctional market institutions are partly to be blamed for the lack of competitiveness. Businesses and state-owned enterprises are among the weakest institutions in the WB. State capture by private interests lowers administrative capacities even more, which in turn aggravates cooperation and coordination among government agencies in terms of innovation policies.

Following the analysis and considering the lessons learnt from the JRC activity on innovation policies in the Enlargement and Neighbourhood countries, a number of major challenges would need to be addressed.

Firstly, appropriate institutional frameworks need to be created. This requires the design of an adequate governance structure, build-up of administrative capacities and coordination with stakeholders. Progressive and iterative efforts are needed to accumulate experience and trigger policy learning. Getting the process right is at least as important as the final outcome of the strategy process. Secondly, a better knowledge of the socio-economic fabric is an important pre-condition for identifying critical domains on which to focus effort[42]. Identifying key domains and defining the policy instruments that can support them are the primary objectives of this strategic endeavour.

The next challenge is to open up the policy-making process by triggering dialogue and creating coalitions of stakeholders than can help bring about the desired change. To support such coalitions, appropriate policy mixes and instruments to support innovative activities must be developed.

The whole process has to be informed by evidence, requiring novel and openly accessible datasets that are part of a broader digital transformation of governments and societies. Moreover, inter-regional and transnational cooperation must be continued and geared towards innovation and competitiveness.

Finally, the results of innovation policies need to be better understood and used to adapt these policies to developments on the ground. Therefore, studies of potential and real impacts should be encouraged and fed into the policy process.

These challenges are further explored in Part 3 of this report, under the assumption that the Western Balkan innovation ecosystems and their performance can be effectively and successfully enhanced only through a well-articulated combination of policy support actions. At the same time, such combinations should tackle vital elements of the innovation system such as institutions, strategies, projects and actors. An overarching consideration lies also in the appropriateness to promote place-based approaches to innovation, which allow for tailor-made solutions to specific challenges and bottlenecks, while permitting successful transnational exchange and aggregation of interests into larger investment projects that achieve critical mass and benefit from broader funding opportunities. Two key success points in this context are the mobilisation of the business sector – and private capital – and the governments' ability to match policy instruments with the specific needs and potentials of the economy. Under this vision, smart specialisation constitutes a meaningful methodological policy framework, able to catalyse efforts towards the improvement of innovation ecosystems as experienced in a wide number of EU countries and regions.

42. Rodrik, D., Hausmann, R., 'Self-Discovery in a Development Strategy for El Salvador', *Economia* 6, No 1, pp. 43-87, 2005.

PART 3.

Innovation policies to transform territories: Challenges and good practices

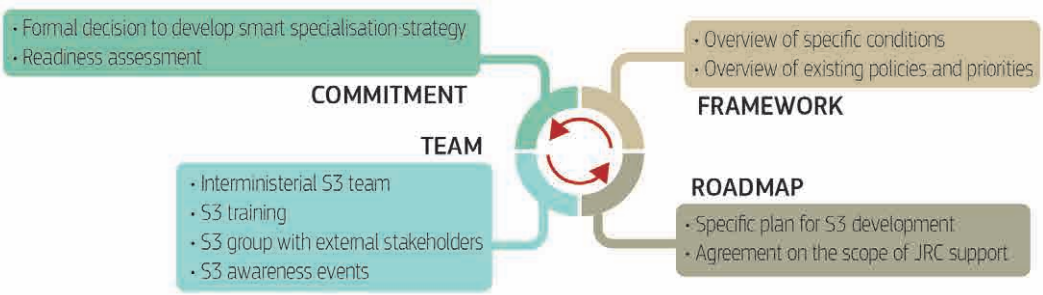
Taking the relay from the conclusive paragraphs of the previous part, this chapter presents seven challenges for innovation in the Western Balkans that can be supported through tools and methodologies available at the JRC, in the context of developing a place-based innovation agenda for economic transformation in the region. Each challenge is supported by an illustrative example of good practice.

Challenge 1: Creating institutional frameworks to make innovation happen

The effective design and implementation of place-based innovation polices requires a certain institutional maturity necessary for inter-institutional coordination of policies and support instruments, but also an ability to acquire, interpret and use data and evidence for policy processes. In the European Union, smart specialisation and earlier innovation policy concepts have been strongly connected with Structural Funds for regional development and cohesion with strong established institutional structures to manage these processes. The institutions designing and implementing new innovation policies can build on past experience and existing policy frameworks that are well understood by relevant internal and external stakeholders[43].

An important condition for the success of place-based innovation policies in the Western Balkans is therefore the development of institutional capacity. Based on JRC experience acquired during the support of the initial development of smart specialisation strategies in Serbia, Ukraine, Moldova and Montenegro, four basic components of institutional capacity-building were identified (see Figure 12) as part of a comprehensive Smart Specialisation Framework for Enlargement and Neighbourhood countries (Annex 1), which specifically address the challenges faced in the Western Balkans. The general assumption of the process is to create stable institutional conditions and organisational structures that will drive not only the strategy design but also its implementation, financing and monitoring. They should enhance coordination and synergies between the existing policies addressed to similar target groups. Very often research, innovation, SME, industrial and cluster policies are designed and implemented in 'silos', with many useful connections being lost and their potential impact diminished. A key success factor in this context is the ability to nurture and develop a strong sense of ownership in the public administration, so that the strategy is not exclusively dependent on external experts contracted and consequently not a barrier to implementation.

Figure 12. Four building blocks for institutional capacity for smart specialisation



Source: JRC.

43. **Internal:** stakeholders are representatives of ministries/ departments/units in the national or regional administration that have competences connected with different aspects of smart specialisation policy, especially economic and industrial development, innovation, research and education policies. This group can also include representatives from national institutions and agencies like innovation agencies or statistical offices.

External: stakeholders are the key actors of innovation systems that do not form part of the public administration: representatives of business, academia, civic society etc. Organizations like clusters, chambers of commerce, educational and scientific institutions are also important external stakeholders for innovation policies

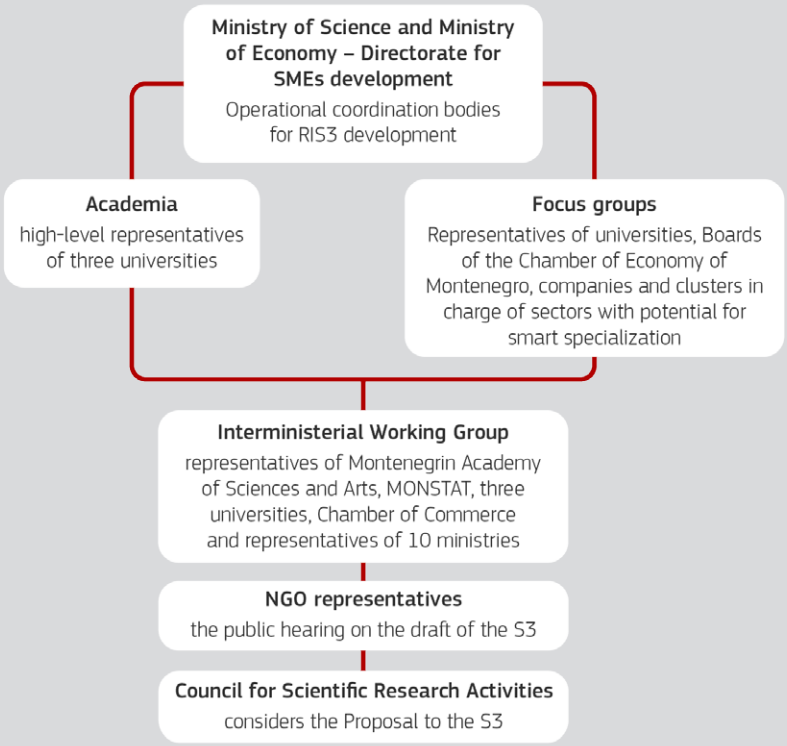
In light of the above, the basic building blocks of creating institutional capacity for place-based innovation policies start with an official decision and commitment to launch the process of strategy design, taken usually at the level of national government. After a general overview of specific conditions and existing policies and strategies, a decision is taken on the specific model for developing smart specialisation, adjusted to the size and needs of the economy. As it is a place-based policy, especially in larger economies it is recommended to develop regional priorities and action plans. This may be an issue in economies where regional administrations are weak or do not exist. In such cases, there can be regional components in the strategy managed by authorities.

An important element of the necessary institutional capacity is the creation of a co-ordination team, an inter-institutional body charged with the development, management and coordination of the smart specialisation strategy. This general concept can be applied in different ways, depending on the administrative rules and culture of the economy. In some cases, there is one national team made of internal and external stakeholders. In other cases, there is an internal operational team and a wider external group. If subnational administrations exist at regional level, there should also be regional smart specialisation teams.

A good example of a centralised approach for a small economy is the smart specialisation team working in Montenegro that allows for the different forms of participation in the smart specialisation process (see text box). The central team works directly with JRC and receives targeted training, guidance and expert support. On the basis of discussions and dialogue, a roadmap for smart specialisation is agreed which also includes the scope of JRC support for the development of smart specialisation strategies.

Montenegrin Smart Specialisation Team – an interministerial body involving a wide range of external stakeholders set to design the smart specialisation strategy for Montenegro. It is an example of building institutional capacity for innovation policies and framework for stakeholder dialogue.

Figure 13. Composition of Smart Specialisation Team



Source: Montenegrin Smart Specialisation Team

Challenge 2: Providing evidence for policy priorities

In general terms policies, and particularly policies requiring public spending, are better equipped to tackle the underlying challenges and achieve relevant objectives if they are strongly rooted in evidence. In the case of place-based innovation, they should be grounded in a detailed diagnosis of the economic, scientific and innovative potential of countries and regions. Research, development and innovation activities are seen in this context as possible sources of transformation of the key and emerging economic sectors. The ability to analyse relevant combinations of potentials and strengths is one of crucial elements of the smart specialisation approach. JRC provides partner economies with a methodology and further guidance for this kind of exercise. This is implemented with international experts who work with local teams to build capacities, ensure ownership and guarantee the sustainability of the process.

Table 11. Key indicators for smart specialisation mapping

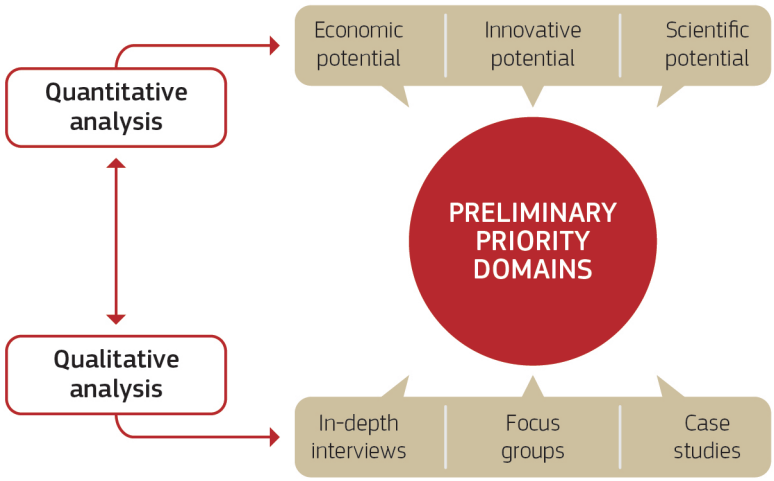
Type of potential	Indicator	Disagg-regation	Data source
Economic potential	**Specialisation, growth dynamics and relative importance of industrial subsectors** based on: • Employment • Value added/Turnover • Number of companies **International competitiveness** based on: • Main product groups in exports • Revealed comparative advantage in exports	NACE rev. 3 or 4 digit, 5-10 year period, regionalised (NUTS2 level)	**Preferred source:** • National Statistics Office **Alternative source:** • ORBIS database • World Bank WITS database • MIT Observatory of Economic Complexity • ILO database
Innovative potential	**Community Innovation Survey indicators** • Share of innovative companies • BERD • Types of innovation • Cooperation in innovative activities **Education profiles:** • Number of students/graduates at vocational schools • Number of students/graduates at HEI • STEM graduates	NACE rev. 3 or 4 digit, 5-10 year period, regionalised (NUTS2 level)	**Preferred source:** • National Statistics Office **Alternative source:** • Innovation indicators from World Bank Enterprise Surveys • ETF skills mapping analyses
Scientific potential	**Main strengths in science and technology** • Main specialisations in scientific publications • Main specialisations in patents • R&D employment	IPC subclasses and science fields	**Preferred source:** • SCOPUS/Web of Science • EPO/WIPO/National Patent Office **Alternative source:** • SCIMAGO database • UNESCO Institute for Statistics

Source: JRC.

This methodology is enriched and adapted to the needs through a dialogue with the central co-ordination team. The level of detail in the analyses depends also on the availability of data. The components of the mapping exercise are shown in Table 11.

The diagnosis of economic, innovative and scientific potential results in a set of preliminary priority domains that are based on matching strengths in terms of critical mass of economic activities, innovative companies and research excellence. They also include emerging fields and sectors with growth potential. Since part of the analysis is based only on 'hard' statistical data, it needs to be interpreted with the help of experts and key stakeholders. Such qualitative assessment enables policy-makers to better understand the exact position of the potential priority domains in global value chains, discover important opportunities and threats, and overcome the inherent limitations of using classifications like NACE or IPC to categorise economic domains. The main inputs into qualitative analysis are obtained during individual and group interviews with experts and key stakeholders as well as through case studies (see Figure 14). Only after such an interpretation is it possible to start the next stage of the strategy development, the entrepreneurial discovery process.

Figure 14. Quantitative and qualitative inputs into place-based innovation policies



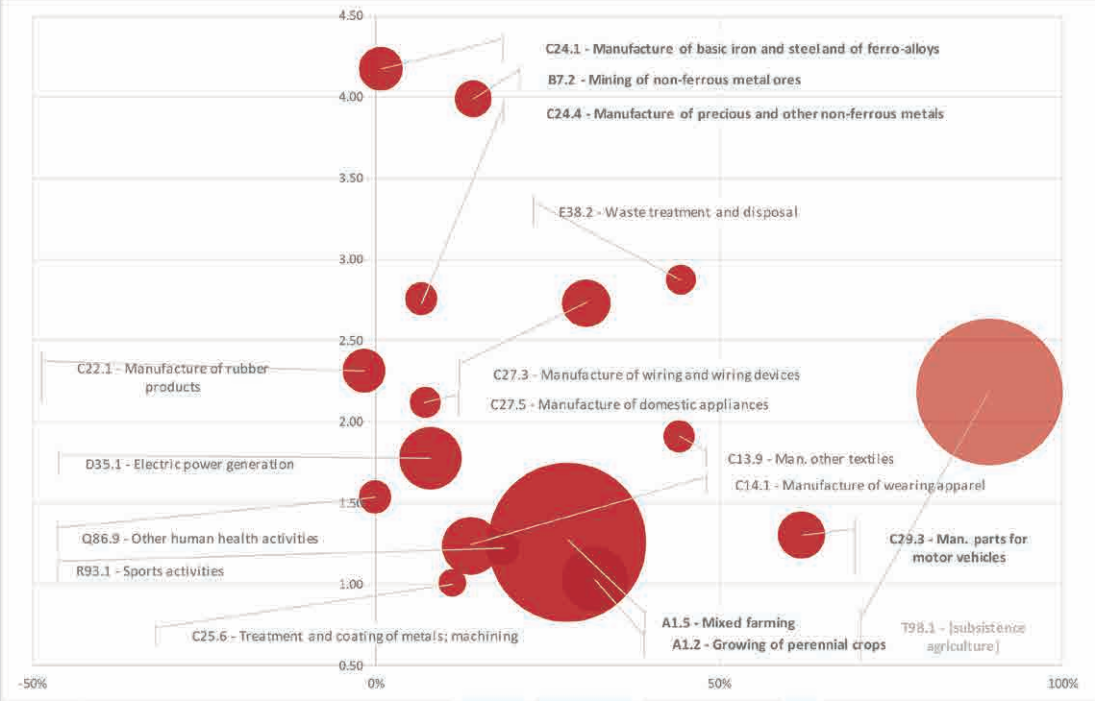
Source: JRC.

The uniqueness of the JRC approach derives from three components of the mapping methodology. The first step is focused on making data available. This can be achieved by inviting Statistical and Patent Offices already in the early stages of the process to the co-ordination teams. This body creates opportunities for discussion with international experts on the type of indicators needed and the appropriate level of their disaggregation. Thanks to this approach, it was possible for instance to acquire NACE 3-4 digit (sub-sectoral) datasets for the mapping exercises carried out in Serbia and Montenegro. This is a level of detail which is rarely achieved even in EU Member States. An example of such an analysis can be seen in Figure 15.

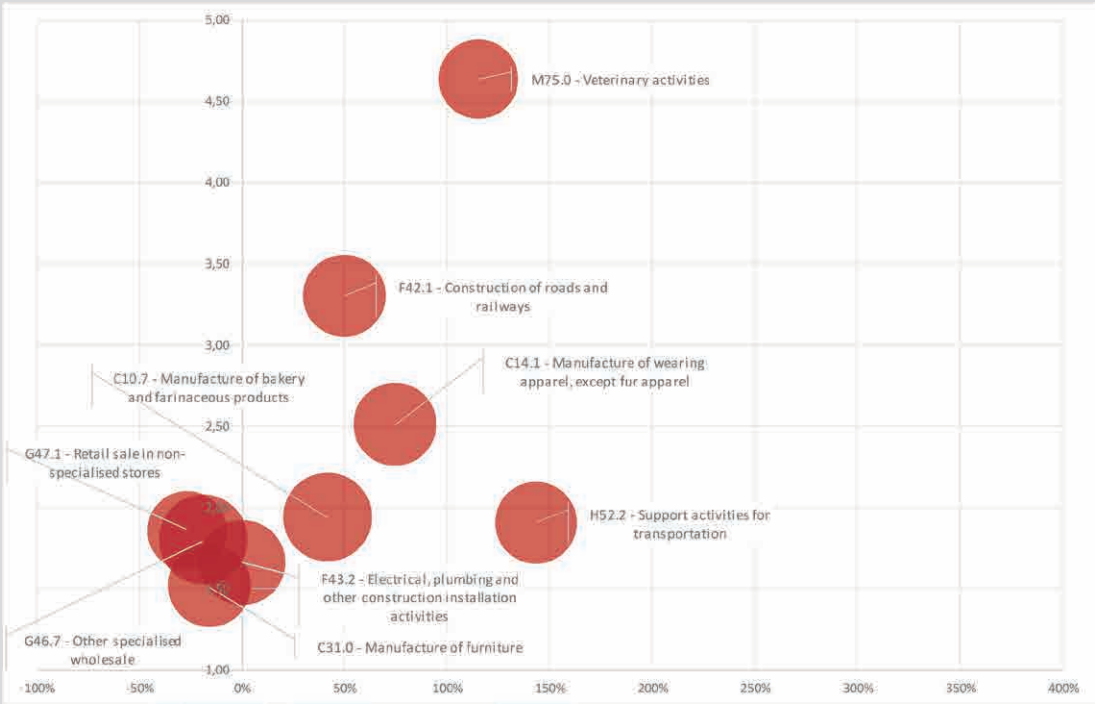
Mapping of economic, innovative and scientific potential for smart specialisation in Serbia. The analysis was made under guidance of an international expert working on the basis of the JRC methodology with a local expert team. It was based on a number of unique, industry-specific indicators to deliver a detailed picture of the economic fabric in Serbian regions. This has laid the groundwork for evidence-informed innovation policies.

Figure 15. Regional dimension of analysis of economic, innovative and scientific potential (examples of indicators for Southeastern Serbia)

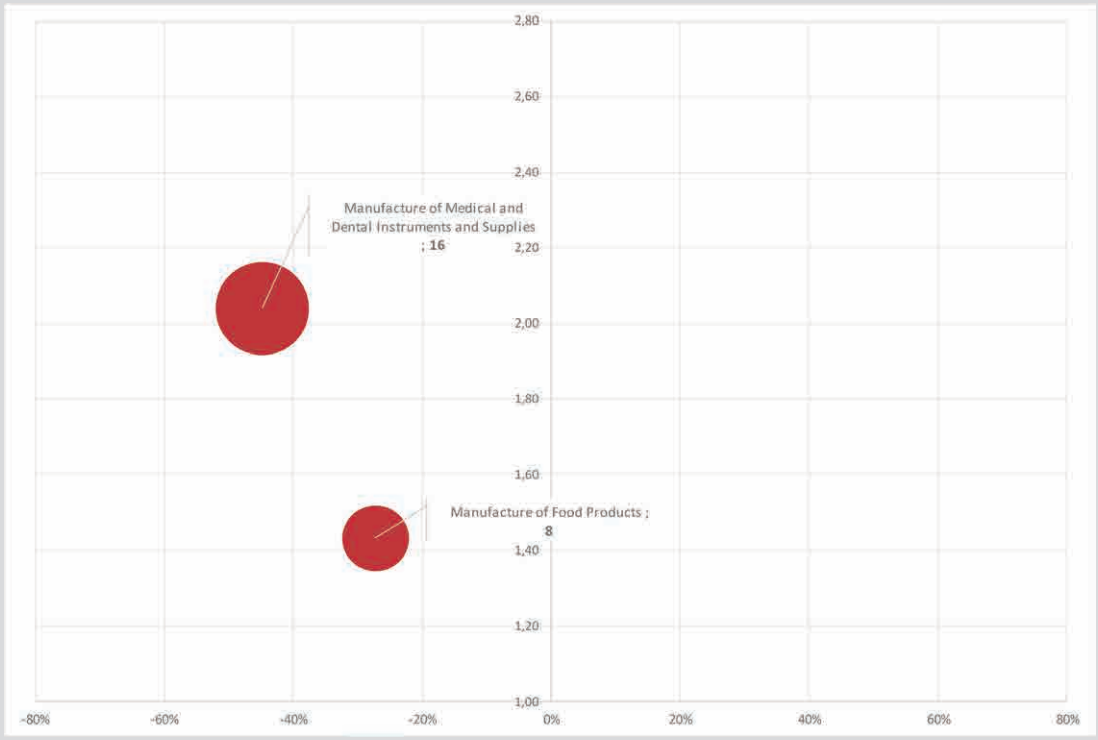
1. Concentration of employment



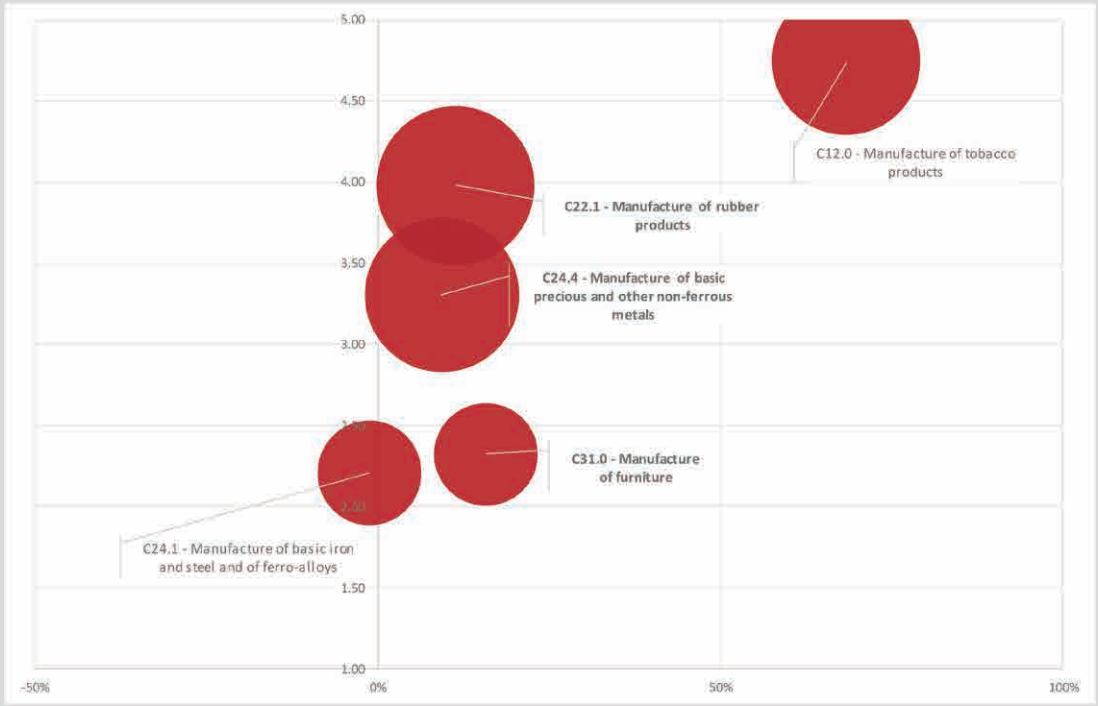
2. Innovating companies



3. Patents by NACE



4. Exports



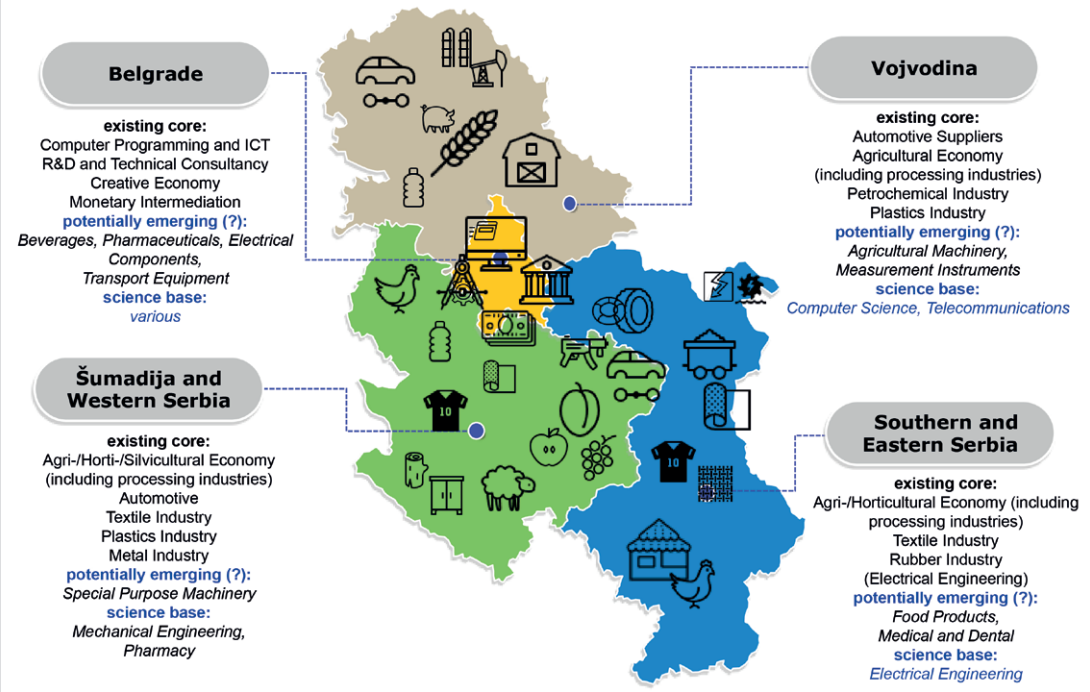
Source: Fraunhofer ISI and the Analytical Team of the Serbian Interministerial Working Group for Smart Specialisation together with JRC.

The second step is capacity building for the analytical exercise, which is done by encouraging the creation of a local analytical team and employing an international expert to work together with them on a targeted approach. This ensures the continuity of the process and builds up a team of local experts familiar with the methodology and capable of both updating the results of the analysis and explaining them to stakeholders.

Finally, the last and vital aspect is the improvement of transparency of policy-making by providing the industry- and stakeholder-specific interpretation to the results of statistical analyses and 'hard data'. This is done by initiating discussions with stakeholders at the early stages of the mapping exercise and asking for their feedback. A rule of thumb is that stakeholders should to be consulted at least twice during the analytical stage: when the first results are available and once the final version of the mapping report is ready. The final results of the mapping exercise for Serbia can be seen in Figure 16.

Mapping of economic, innovative and scientific potential for smart specialisation in Serbia

Figure 16. Preliminary priority domains for smart specialisation in Serbia



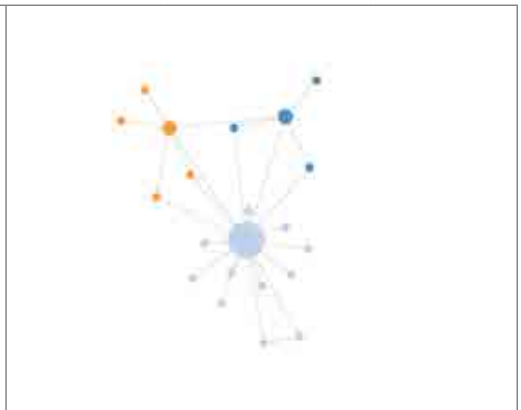
Source: Fraunhofer ISI and the Analytical Team of the Serbian Interministerial Working Group for Smart Specialisation together with JRC.

Challenge 3: Building innovation communities and systems

Regional and national innovation systems are complex and composed of multiple actors and stakeholders, while the public resources for policy interventions are limited. As a result, the potential impact of public intervention on the innovative behaviour of actors in innovation systems is often negligible, especially if it is spread out thinly across all sectors and stakeholders. The smart specialisation approach advocates focusing public interventions in the domains that have the largest potential impact and spill-over effects on growth and jobs, under the umbrella of a long-term vision of sustainable economic transformation. However, it is not enough to take evidence-informed decisions on priority domains, it is also necessary to identify and engage key stakeholders who can change the subsystem they operate in. Literature on socio-economic networks suggest that significant behavioural change of actors in a system occurs when at least 10 % of key actors change their behaviour[44]. Therefore, a significant effort is needed in order to identify key players in important value chains, most important research centres and innovative companies. This can be done on the basis of expert knowledge during the qualitative assessment phase or using more sophisticated tools like network analysis.

Figure 17 illustrates the difference between a horizontal identification of innovation actors and a specific focus on one priority domain recommended in the smart specialisation approach. In order to identify the relevant stakeholders, data on internationally-indexed publications, EU projects, nationally-funded Moldovan R&I projects and national patents have been analysed and collaboration networks mapped for each of these datasets, with institutions as nodes and collaboration links as edges (co-authorship in publications, project consortia and patent co-applications). They were grouped according to preliminary priority domains identified in the mapping exercise, showing specific stakeholders active in every domain (see Challenge 2). This exercise has so far been carried out for Moldova within a JRC pilot project, and is presently ongoing for the Western Balkans.

Figure 17. Key actors in Moldovan Innovation System



System as a whole			Chemical industries, materials and nanotechnology		
Number of scientific publications 2007-2017	**Public investment into R&D&I projects 2008-2016 (EUR)**	**Number of patents 2007-2017**	**Number of scientific publications 2007-2017**	**Public investment into R&D&I projects 2008-2016 (EUR)**	**Number of patents 2007-2017**
3,925	113,023,040	2,815	1,771	35,215,199	762

Source: SIRIS Academic for JRC.

The identification of appropriate actors can later be a base for meaningful stakeholder dialogue (entrepreneurial discovery process or EDP). As a key focus of EDP is business needs and how to address them with R&I activities, it is important to make efforts to attract companies, especially SMEs, to take part in the process. After relevant stakeholders have been identified, they need to be

44. Latour, B., *Reassembling the Social: An Introduction to Actor-Network-Theory,* Oxford University Press, xford/New York, 2005.

mobilised and invited to EDP working groups. Clusters, business associations, non-governmental and sectoral organisations can make significant contributions in this process. The central co-ordination team plays an important role, since it legitimises and facilitates the process. The main idea of the EDP is to involve stakeholders in co-deciding on the priority investment areas for public intervention, to create a shared vision for their development and detailed action plans. For such a dialogue to be meaningful it has to be built on trust; stakeholders have to believe that their input will be valued and will have an influence on funding decisions at the level priority domains.

Another important feature of EDP is its continuity. The dialogue started during the development of the strategy should be maintained during its implementation and monitoring phases[45]. It should also be a basis for all future updates as the priority domains may evolve and develop. It is therefore important to set clear and transparent rules for the choice of members and the operating procedures of the working groups. Charismatic and involved leaders should be invited to chair them and at least half of participants should represent companies.

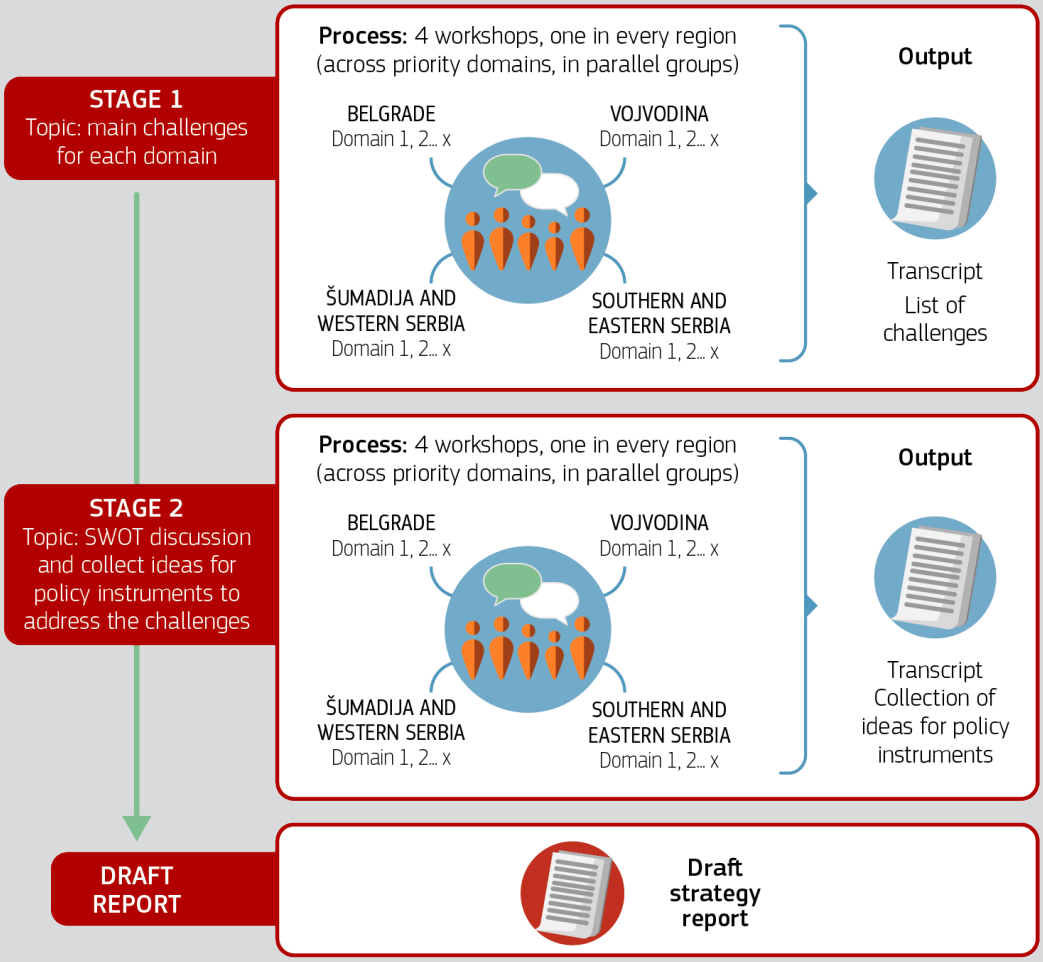
45. Kleibrink, A., Gianelle, C., Doussineau, M., 'Monitoring Innovation and Territorial Development in Europe: Emergent Strategic Management', *European Planning Studies* 24, No 8, pp. 1438-1458, 2016.

Qualitative case study and innovation camp for software industry in Serbia. Based on the identification of preliminary priority domains for smart specialisation, the software industry was chosen for a case study that included an online survey and qualitative interviews with experts and key organisations and firms. On this basis, 78 stakeholders were identified, including representatives of this industry from Montenegro, Bosnia and Herzegovina and the former Yugoslav Republic of Macedonia. Over two days, participants were discussing main challenges and opportunities and possible roadmaps for innovation in the software industry with the participation of international experts. Their contribution will be a main input for the entrepreneurial discovery process that is just starting in Serbia and will culminate at the end of 2018 with a draft smart specialisation strategy.

While it was difficult to mobilise local stakeholders, almost all participants who attended came for both days and the majority stressed the added value of the workshop to start discussions on innovation priorities. For the pilot project of JRC a key outcome was the development of a detailed plan to start the stakeholder dialogue workshops in Serbia. The Serbian Interministerial Working Group for Smart Specialisation discussed with crucial partner organisations like the Chamber of Commerce and the National Alliance for Local Economic Development.

Another meeting with JRC took place early February 2018 in which the division of tasks was discussed. At a dedicated JRC training for the entire Western Balkans, co-organised with the Regional Cooperation Council in April 2018, the Serbian EDP coordinators and facilitators agreed on the method and sequence of workshops supported by JRC.

Figure 18. The roadmap for developing smart specialisation priorities prepared by stakeholders during an Innovation Camp in Belgrade



Source: Serbian Interministerial Working Group for Smart Specialisation.

Challenge 4: Supporting transformative and innovative projects

The implementation of innovation policies has to be focused around specific projects and practical activities that together can support the goals and objectives of the actors of the innovation ecosystems. JRC activities in the Western Balkans have, until now, been focused on capacity building and the exchange of best practices in the domain of technology transfer. These have been implemented in the framework of the EU Strategy for the Danube Region and in response to specific requests for support from DG NEAR. Such activities are an important part of building capacities of the various actors for future implementation of innovation policies. A number of activities to actively promote technology transfer and innovation in East and South Europe took place in the Western Balkans.

These activities include, inter alia, the project managed by the JRC in cooperation with DG NEAR called 'Technology Transfer Capacity Building in the Western Balkans'. This aims to create capacities for technology transfer, supporting the design of a new financial instrument for Proof of Concept (PoC) for the Western Balkans, supporting various thematic workshops organised in the region as well as providing *ad hoc* support to science and technology Parks. Within this framework, the JRC also provides the technical expertise, support and advice for the implementation of the EU4TECH project, funded by DG NEAR as part of the Instrument for Pre-accession Assistance (IPA II) and implemented by a consortium of consultants. Fifteen public research organisations from across the WB region have been identified and selected to take part in the project.

As part of its own Enlargement & Integration Action, JRC provides scientific and technical support to countries on the road towards EU membership. Specialised workshops and conferences related to technology transfer are organised on a regular basis, engaging competent stakeholders and organisations in these countries to discuss and share best practices, while studying the methods underpinning EU policy implementation. During the years, JRC has built a community of over 1,000 innovation practitioners in the WB. In 2017 the JRC organised the following workshops, all with a specific regional focus:

- Investment Vehicles and Financial Instruments supporting Technology Transfer and Innovation, March 2017, Belgrade, Serbia;
- The role of Science/ Technology Parks and Incubators in Innovation Ecosystems, May 2017, Thessaloniki, Greece;
- Proof of Concept (PoC) in South Eastern Europe, September 2017, Trieste, Italy.

One of the main objectives of the Trieste workshop was the design of a Proof-of-Concept (PoC) pilot financial instrument for the Western Balkan region, which could be supported by the Western Balkans Enterprise Development and Innovation Facility, implemented by the European Investment Bank Group and other partners. The target beneficiaries of this pilot instrument will be public research organizations and higher education institutions (universities) where there is a clear funding gap, while SMEs in economies where there is no specific central funding available from other sources will also be eligible. The action will leverage, and provide continuation of, the activities performed as part of the EU4TECH project and in particular on the best performing research organisations identified.

Case Study: Technology Transfer Capacity Building in the Western Balkans

The project Technology Transfer Capacity Building in the Western Balkans aims to support and strengthen the technology transfer and innovation ecosystem in the economies of the Western Balkans. It involves all actors operating in the technology transfer and innovation ecosystem ranging from academic institutions to early stage investors to science parks, spin-out companies and policy makers. The purpose of this project is to deliver concrete plans for and practical initiatives in support of the technology transfer and research commercialisation ecosystem in the economies of the Western Balkans and contains five components.

Table 12. Components of the project on Technology Transfer Capacity Building

Project Components:	
1	Technology Transfer Training and Exchange of Best Practices: Improving the skillset of technology transfer professionals and researchers in the Western Balkans and supporting technology transfer offices from the region to access advice and best practices from the most advanced technology transfer offices in the EU.
2	Contract research: Identifying capacity for contract research and advisory services by Universities and research centres. It will also generate recommendation for the creation of instruments to accelerate and support industry-academia collaborations e.g. innovation vouchers.
3	Science Parks and Incubators: Two key outputs: The first will be to develop a strategy for supporting and facilitating the establishment of new science parks and incubators in the region focused on strategic sectors. The second will be to support existing facilities in the region in networking among themselves and with entities in other parts of Europe and beyond through the organisation of a conference focused on exchanging best practices for the establishment and management of Science parks and Incubation facilities.
4	Technology Transfer Financial Instruments policy platform: Establishing a platform for the various stakeholders (international Financial Institutions, local financial Intermediaries, local ministries, universities, research centres and technology transfer offices) to come together and analyse the challenges and necessary solutions and develop a roadmap for the launch of dedicated technology transfer funds in the region including Proof of Concept.
5	Investor readiness training and matchmaking: Organisation of two investment fora at which 35 companies from the region will be presented to an international group of at least 20 angel, early stage and VC investors and experts. All companies will receive investment readiness training delivered by expert in advance of the investment fora. The training will be focused on how to present their business proposition and on how to properly address questions and concerns of potential investors.

Source: JRC.

The fifteen selected public research organisations from across the region will be the focus of the project's capacity-building efforts, particularly for Component 2 (Contract Research) and Component 1 (Technology Transfer). In making the selection, the aim was to identify organisations and actors with the greatest potential to drive regional level innovation activities and with a clear willingness to collaborate and pool resources. The project is expected to be completed by December 2019. Further information could be found on the project's website: https://eu4tech.eu/about.

Challenge 5: Benefitting from digital transformation

The digital transformation of societies is a complex multidimensional phenomenon that needs to be addressed through the application of a systemic approach across sectors and across domains. Our societies are rapidly changing due to a multitude of factors, which have to do with the penetration of technologies across all sectors. To this end, the effect of this 'digital transformation', due to its cross-cutting nature, is not easy to estimate. Some of the effects, such as the minimisation of inefficiencies and better services, would be beneficial. However, many 'traditional' jobs will inevitably cease to exist. That is why the digital transformation is to be seen as both a threat and an opportunity for the Western Balkan region.

One of the pertaining challenges has to do with the need to establish policy measures that (i) lay down the foundations of digital transformation (including among others market openness and appropriate digital infrastructures), and (ii) promote an appropriate thematic focus, which would enable the effective use of heterogeneous technologies in a specific economic sector. Within this context, JRC is collaborating with actors on multiple levels on the introduction of innovative practices in Western Balkan economies that would help them tackle the challenges and adapt to the future. Among those, data-driven innovation plays a prominent role.

Data are an intangible asset, playing an increasingly important role in business development within the digital realm. Not only are the volumes of data bigger than ever, but their sources are also diverse. Data are produced by many actors including public authorities, private companies, and increasingly by citizens and sensors. The recently adopted EU Strategy for the Western Balkans[46] sets out new flagship initiatives, including the 'Digital Agenda for the Western Balkans'. The Strategy positions data at the heart of the Digital Agenda, as it is a precondition for the development of the Digital Single Market, innovative businesses, creating growth, boosting productivity, promoting innovation, transforming public services and finally, improving citizens' quality of life.

The implementation of the INSPIRE Directive[47] is also ongoing in EU Member States. The INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. This European Spatial Data Infrastructure will enable the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries. This process has led to multiple organisational and technical novelties. Even though Western Balkan economies are not legally obliged to implement the Directive, they are adapting their legislation in line with INSPIRE principles. In addition, an increasing number of public sector authorities make their geospatial data available on the internet. Apart from the transformative effect to public sector authorities, this creates new business opportunities for private sector innovators. The JRC in collaboration with other international actors, such as the World Bank and UN (FAO and United Nations Economic Commission for Europe), supports these developments by providing transfer of know-how, capacity building and assistance to stakeholders. The Former Yugoslav Republic of Macedonia and Serbia are already part of the INSPIRE 'Maintenance and Implementation' Groups.

46. https://ec.europa.eu/commission/sites/beta-political/files/communication-credible-enlargement-perspective-western-balkans_en.pdf.

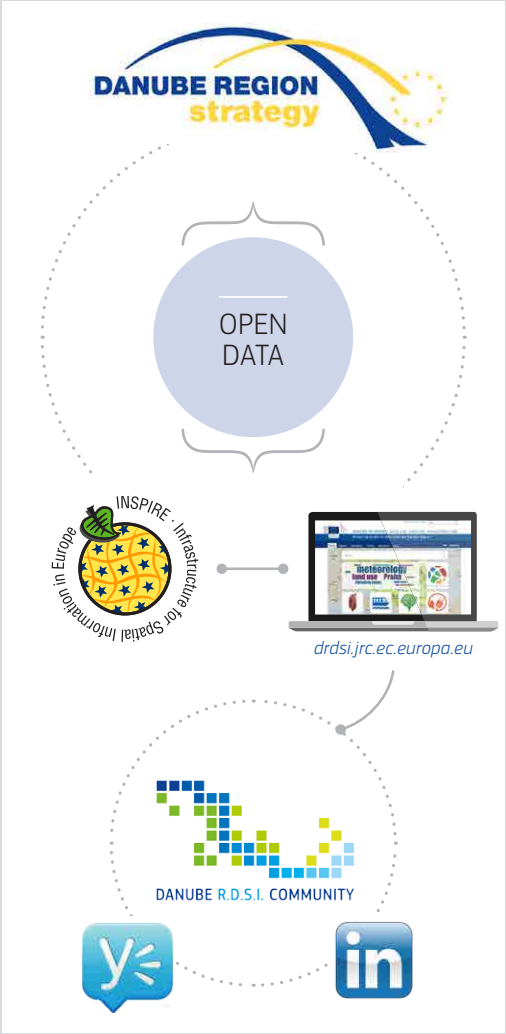
47. https://inspire.ec.europa.eu/whos-who-inspire/57734.

Establishing a data infrastructure for macro-regional development

The European Union Strategy for the Danube Region (EUSDR) relies on an integrated approach to encourage better policy development and the alignment of funding and resources through concrete actions and projects. Since the Danube economies share a common territory and face interrelated cross-border issues, the Strategy aims to propose common solutions to the challenges faced by these economies. However, to propose such solutions, policy-makers need first to be able to access clear and comparable information and understand better the issues involved. Many stakeholders have been collecting data for several years at the regional, national and local levels but at the moment there is still no common access point for harmonised data covering a wide-range of scientific issues and encompassing the whole Danube Region. Now is the time to fill this gap taking advantage of the investment made by Member States to implement INSPIRE and recent progress on ICT standardisation. For this reason, JRC with the support of scientific partners of the Danube countries launched this project to develop the Danube Data and Services Infrastructure (DRDSI) that facilitates access to comparable and harmonised data sets on various issues related to the Danube Region.

Thanks to its cross-cutting nature, this infrastructure contributes to the holistic scientific approach needed to tackle the interrelated and interdependent challenges that the Danube Region is facing.

Figure 19. Danube Reference data and services infrastructure



Source: JRC.

A big part of the ongoing activities is the unlocking of the public sector geospatial data. Within this framework, for instance, the Faculty of Civil Engineering at the University of Belgrade, in collaboration with the JRC, established the first research data portal for geospatial data in Serbia. This solution, based entirely on open source software and international standards, exposes research and public sector data. All datasets are documented through metadata, and links for their download are made available. Thus, the portal acts as a demonstrator for other organisations to share data by documenting the approach and experience gained, creating further reusable content.

Another example of data-focused support initiative is the Danube Reference Data and Services Infrastructure (DRDSI), developed as part of the JRC Scientific Support to the Danube Strategy (see also Challenge 6) and further detailed in Figure 19. DRSDI aims in particular at addressing the scientific challenges faced by the Danube Region from an integrated and cross-cutting perspective, taking into account the interdependencies between various policy priorities.

Data are also the core asset of the JRC's Territorial Modelling Platform LUISA[48] designed for the evaluation of EU policies with direct or indirect territorial impacts, which provides a comprehensive spatial analysis of environmental and socio-economic trends and changes. The LUISA platform produces spatial indicators in several fields in order to assess policy effects on various themes such as resource efficiency, environment or urban and regional development. Those EU-wide spatial indicators are publicly available via the Urban Data Platform[49] and the Territorial Dashboard[50].

The collection and sharing of regional data across the Western Balkan economies would enable the LUISA platform to compute the whole set of indicators for the region. The data could be readily incorporated into existing web platforms. This would allow a consistent contextualization of the regional and local conditions in the Western Balkans relatively to the EU and help identify priority areas where policy could promote measures leading to more innovative territories and systems.

Reaching/acquiring data and achieving robust analyses for a large set of cities and regions give an important opportunity to make territorial comparisons and provide the appropriate evidence to support place-based innovation policies. The availability of indicators would allow for instance the assessment of comparable situation potentially favouring cross-border investment (potential for resource production), understanding of transport networks, etc. It would also for cities and regions, in order to promote cooperation and exchange learning experience, and the dissemination of results of large-scale analysis (e.g. forecasting of agriculture production), which would increase the capacity of local business and communities to plan ahead.

48. https://ec.europa.eu/jrc/en/luisa.

49. http://urban.jrc.ec.europa.eu.

50. http://urban.jrc.ec.europa.eu/t-board/index.html.

Challenge 6: Nurturing transnational cooperation

Western Balkan economies are surrounded by the EU Member States and thus cross-border cooperation represents one of the key mechanisms of intervention for cooperation - among the WB economies themselves, but also with the surrounding EU Member States and regions, including the multilateral international cooperation supported by the European Commission through the EU macro-regional strategies. In addition to the European Commission, cross-border cooperation through investment projects in the WB have been supported by numerous organisations such as the European Bank for Reconstruction and Development, the European Investment Bank, the World Bank and OECD. In the EU enlargement context, the European Commission has been promoting cross-border cooperation in the Western Balkans through the Instrument for Pre-accession Assistance, an approach largely modelled on the structural funds' principles such as multi-year programming, strategic partnerships and co-financing, adapted to take into account the specificities of the EU's rules and regulations. With its Smart Specialisation Platform, JRC has been supporting the innovation-based cooperation among the WB economies and their collaboration with the EU countries and regions since 2013, especially in the context of the two EU macro-regional strategies covering the WB territory (Danube and Adriatic-Ionian).

Cooperation among the Western Balkan economies and with the EU

In the recent years, research and innovation cooperation among the Western Balkan economies has been rather cumbersome and has only started to recover recently. Despite the existence of bilateral scientific and technical cooperation agreements among the WB economies, the cooperation has often been deprived of strategic planning and was in practice limited to the ad-hoc small bottom-up projects. A major innovation of the cross-border cooperation between the EU and the WB can be seen in the fact that the programmes involving regions on both sides of the EU external borders share a single budget, common management structures, and a common legal framework and implementation rules, helping to balance partnerships between the participating countries.

Bilateral scientific collaboration of Bosnia and Herzegovina

Bosnia and Herzegovina has signed 32 bilateral legally binding documents with the economies on the territory of former Yugoslavia and taken over 74 agreements through succession after the dissolution of the former common country. These bilateral cooperation programmes have been particularly successful with Slovenia and Montenegro. The purpose of these bilateral agreements is to intensify international cooperation and mobility of researchers. Bilateral cooperation projects with Slovenia and Montenegro are coordinated through the Federal Ministry of Civil Affairs. The Montenegrin and Slovenian side also co-finance their researchers through small grants. Both bilateral cooperation programmes have started in 2012 and have since resulted in numerous projects deemed very useful by Bosnia and Herzegovina as they have supported various economic and scientific activities in the country.

Macro-regional strategies

The Western Balkans overlap with two EU macro-regional strategies: the Danube (operational since 2011) and Adriatic-Ionian (since 2014). Most of the WB region thus benefits from cooperation in both macro-regional strategies and their priorities that contribute to develop innovative, socially, economically and environmentally responsible territories that can better integrate into the European framework. The macro-regional strategies are reinforcing the commitments of the Europe 2020 strategy towards the three dimensions of smart, sustainable and inclusive growth and balancing

economic and societal needs with sustainable environmental management. The partners in both macro regions differ abundantly in terms of socio-economic development and R&D&I strengths, the countries and regions are still strongly interlinked and have a good potential for further integration and mutually reinforcing economic growth.

Since early 2013, the JRC has provided a robust integrated framework for the Danube countries and regions through a targeted 'Scientific Support to the Danube Strategy' which has helped addressing not only scientific needs but has also targeted capacity-building activities and governance practices by mutual learning methods, tools and skills which could not be tackled effectively by the individual partners. The JRC's initiative has been sub-divided into four flagship projects and three horizontal activities which together aim to address the scientific and governance challenges faced by the Danube Region from an integrated and cross-cutting perspective taking into account the interdependencies between various policy priorities. Over the period 2013-2017, scientific support to the Danube Strategy led to over 40 scientific publications and technical reports. It involved around 4,500 stakeholders and led to 50 thematic workshops, collected and made available more than 10,000 datasets. Thus, the cross-sectoral approach along with innovative policy approaches delivered through smart specialisation has achieved substantial progress in enhancing governance and fostering transnational cooperation across the whole macro region.

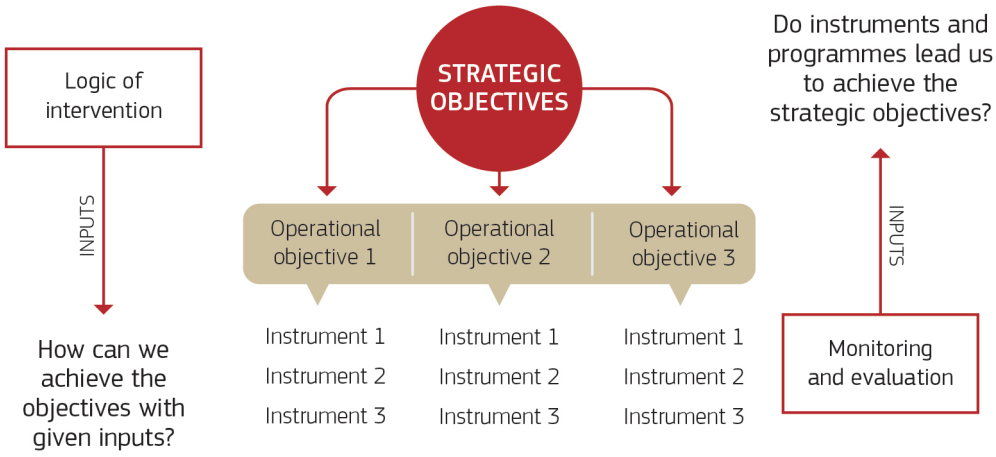
DANUBE-INCO.NET project: Creating linkages for Western Balkan partners within the EU Strategy for the Danube Region to reinforce and facilitate the design and implementation of research and innovation strategies based on the smart specialisation approach

This project project, funded by FP7 in the period 2013-2017, has been supporting the implementation of the EU Strategy for the Danube Region in the field of research and innovation. Among 19 partners from the Danube countries the project involved 4 Danube countries outside the EU and 3 partners from the WB (Serbia and Bosnia and Herzegovina). This strategic combination of partners provided opportunities to expand knowledge on research and innovation beyond EU borders through transnational policy learning. JRC represented by the S3 Platform led the task of fostering innovative and inclusive Danube societies through the support to the design and implementation of S3 strategies. As the less developed Danube regions outside the EU were urging for more support in reinforcing their research and innovation capacities and improving the policy governance, the S3 Platform has launched a series of events and discussions aiming at broadening the knowledge on the S3 concept, raising awareness and facilitating initiation of S3 activities in non-EU partner economies, which in the case of Serbia has developed into continuous efforts to develop a smart specialisation strategy. The final report of the task has assessed the conditions for developing S3 in five Western Balkan economies. The project Regional Centre for Information and Scientific Development in Hungary has complemented this by reinforcing research and innovation policies in Serbia and Bosnia and Herzegovina through policy peer reviews with international experts who provided recommendations to make existing research and innovation policies more efficient.

Challenge 7: Understanding what works

Innovation policies need not only to be well designed and implemented, but also monitored and evaluated in order to understand if they bring the desired effects. The general approach suggested by the European Commission is to follow the logic of intervention[51] (see Figure 20) in order to see if the instruments implemented in order to achieve the objectives of innovation policy bring the intended results. It means monitoring the progress of the implementation process but also evaluating the impacts.

Figure 20. Monitoring and evaluation according to logic of intervention



Source: JRC.

Assessment of potential impacts of public investment into R&I by industry sectors in Albania

As the first monitoring and evaluation systems for place-based innovation policies will be developed throughout 2018-19 in WB, with the purpose of understanding the potential impact of focusing public investment on a few, carefully chosen priority domains, the JRC has run a test assessment of potential impacts for two WB economies: Albania and the former Yugoslav Republic of Macedonia. For Albania, the analysis has been focused on the economic impact assessment of Instrument for Pre-accession Assistance (IPA) II investment activities within the 'Competitiveness and innovation' priority[52] as a proxy for public R&I investment. For this exercise, a dynamic global CGE (computable general equilibrium) model of the JRC Regional Economic Modelling Team[53] was employed[54]. The CGE model follows the standard structure of GTAPinGAMS modelling framework[55], which can be flexibly extended and tailored for the evaluation of specific policy objectives. The modelling assumptions adopted can be found in Annex 3.

51. **Logic of intervention** embodies the 'theory of change' behind the public intervention. It assumes that specific actions (instruments/policy mix) are needed in order to achieve the planned strategic and operational objectives.

52. European Neighbourhood Policy and Enlargement Negotiations. Instrument for Pre-accession Assistance. European Commission, https://ec.europa.eu/neighbourhood-enlargement/instruments/overview_en.

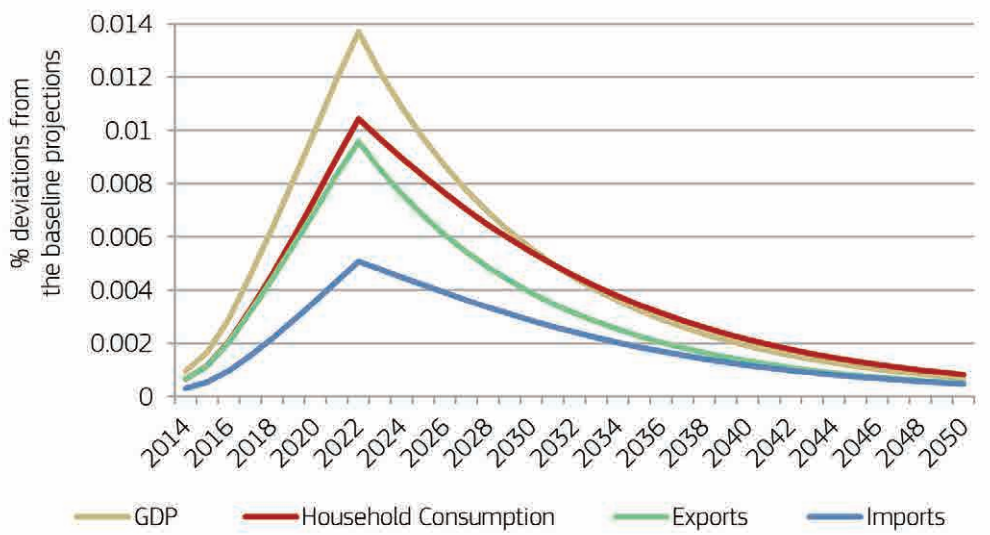
53. https://ec.europa.eu/jrc/en/research-topic/regional-economic-analysis-and-modelling.

54. The model is based on the Global Trade Analysis Project (GTAP) version 9 dataset (https://www.gtap.agecon.purdue.edu/databases/v9/default.asp) that covers 140 countries and 57 sectors interlinked with bilateral trade and factor flows. The model permits flexible aggregation or disaggregation of the accounts (see more in Annex 3).

55. Lanz, B., Rutherford, T.F., 'GTAPINGAMS, Version 9: Multiregional and Small Open Economy Models with Alternative Demand Systems', *IRENE Working Papers* 16, No 8, IRENE Institute of Economic Research, 2016.

The results of computer simulations show that although having a quite moderate share in the economy's GDP[56], the IPA II 'Competitiveness and innovation' investments provide a positive stimulus to the recipient economy, increasing the GDP, household consumption, exports, and imports in Albania (Figure 21). The expected policy effects are the strongest in 2022 when the *direct policy intervention phase* terminates with full absorption of investment funding.

Figure 21. The key macroeconomic indicators in Albania, % deviations from the baseline projections

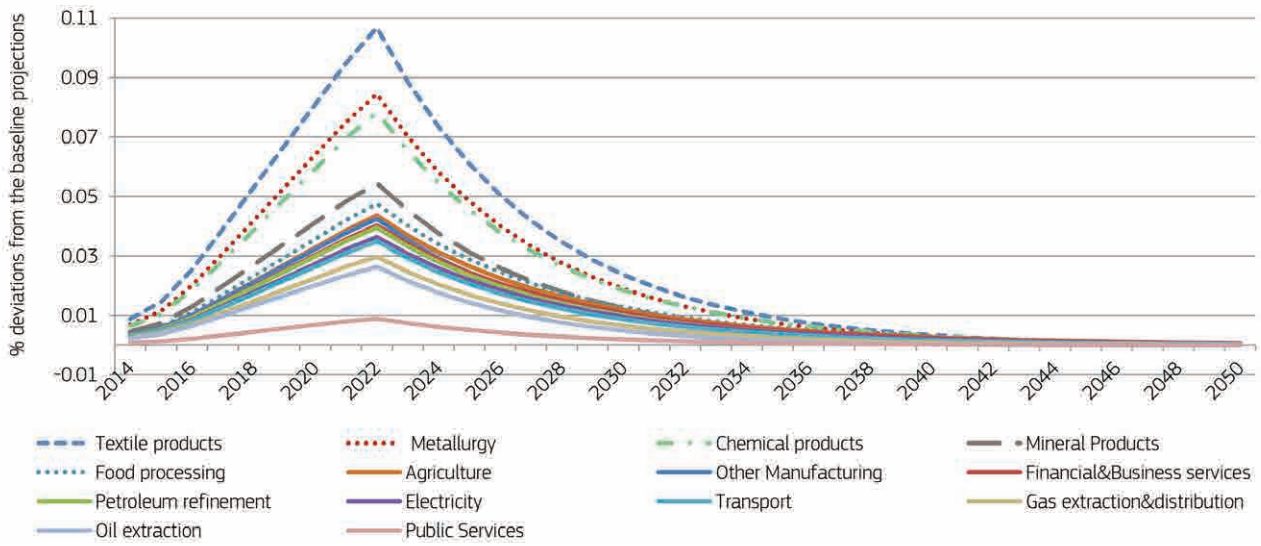


Source: JRC - computer simulations with the CGE model.

All the key macroeconomic indicators continue to record a positive impact after policy funding is over because of the gradual depreciation of the capital stock and total factor productivity (TFP) improvements that were achieved due to the policy interventions. In the post-2022 period the lagged investment effects become the main determinants of the results and last up until 2050. We refer to the post-2022 period as the *lagged investment-induced phase*. Although all sectors in Albania are positively impacted by the investment support, the textile, metallurgical, chemical, mineral, and food processing industries experience the most pronounced growth (Figure 22), both due to the direct policy intervention and price-demand effects. These results coincide with the export strengths identified in Chapter 2, which supports the idea of focusing investments on those priority domains where the potential impact is greatest. However, it has to be taken into account that the analysis of the economic potential presented in Chapter 2 is only preliminary and needs national statistical datasets to deliver a full picture.

56. During the commitment period, the average annual policy funding does not exceed 0.058 % of Albanian GDP.

Figure 22. Sectors' output in Albania, % deviations from the baseline projections



Source: JRC - computer simulations with the CGE model.

Input-Output analysis of a demand shock in the former Yugoslav Republic of Macedonia

The second example of analysis is based on analysing the potential effects of any public investment (not only R&D&I) for the sectors where the former Yugoslav Republic of Macedonia shows an economic specialisation (see Chapter 2). The Input-Output (IO) modelling approach is commonly used to assess the economic benefits/losses induced by a given project or investment and it can be very useful whenever the objective is to evaluate the impacts generated by linkages along supply chains. Moreover, as in this example, IO analysis approach provides deeper insights about the former Yugoslav Republic of Macedonia economic structure allowing the study on the knock-on effects throughout the economy of a change in final demand. The key assumptions of the model are presented in Annex 3.

In Table 13, the former Yugoslav Republic of Macedonia total Type-I and Type-II multipliers together with the transmission mechanism of indirect effects in the rest of the economy[57] are reported. We use official Supply and Use tables, related to the 2014 (latest available) and published by the national statistical office of former Yugoslav Republic of Macedonia[58], to calculate the symmetric IO table and related multipliers. Note that we are reporting only results for those sectors, which show a higher level of specialisation.

57. In qualitative terms, the same transmission mechanism related to Type-I applied to Type-II multipliers.

58. Available at: http://www.stat.gov.mk/IOTabeli_eng.aspx.

Table 13. Type-I and Type-II Input Output Multipliers of the former Yugoslav Republic of Macedonia

No.	Sector	Final demand change	Sector indirect effect	Industrial support effect	Type-I output multipliers	Type II output multipliers	Type I Value Added multipliers	Type II Value Added multipliers
1	Agriculture, Forestry and Fishing	1	0.223	0.393	1.616	1.931	0.676	0.761
2	Textiles, wearing apparel and leather products	1	0.282	0.204	1.486	3.473	0.449	0.987
3	Pharmaceutical products and preparations	1	0.008	0.280	1.288	1.923	0.257	0.429
4	Electrical equipment	1	0.057	0.407	1.464	1.864	0.022	0.232
5	Machinery and equipment	1	0.180	0.843	2.023	2.344	0.018	0.232
6	Constructions and construction works	1	0.039	0.772	1.811	2.763	0.071	0.740
7	Wholesale and retail trade and repair services of motor vehicles and motorcycles	1	0.003	0.632	1.634	3.538	0.131	1.277
8	Retail trade services	1	0.004	0.733	1.737	3.303	0.089	1.160
9	Wholesale trade services, except of motor vehicles and motorcycles	1	0.122	0.592	1.714	3.631	0.156	1.365
10	Freight transport by road and removal services	1	0.158	0.679	1.837	2.969	0.073	0.704
11	Accommodation and food services	1	0.024	0.806	1.830	3.604	0.128	1.113
12	Real estate services	1	0.003	0.557	1.559	3.179	0.074	1.239
13	Business support services	1	0.009	0.665	1.673	4.839	0.199	1.615
14	Gambling and betting services	1	0.006	0.946	1.952	3.863	0.140	1.228

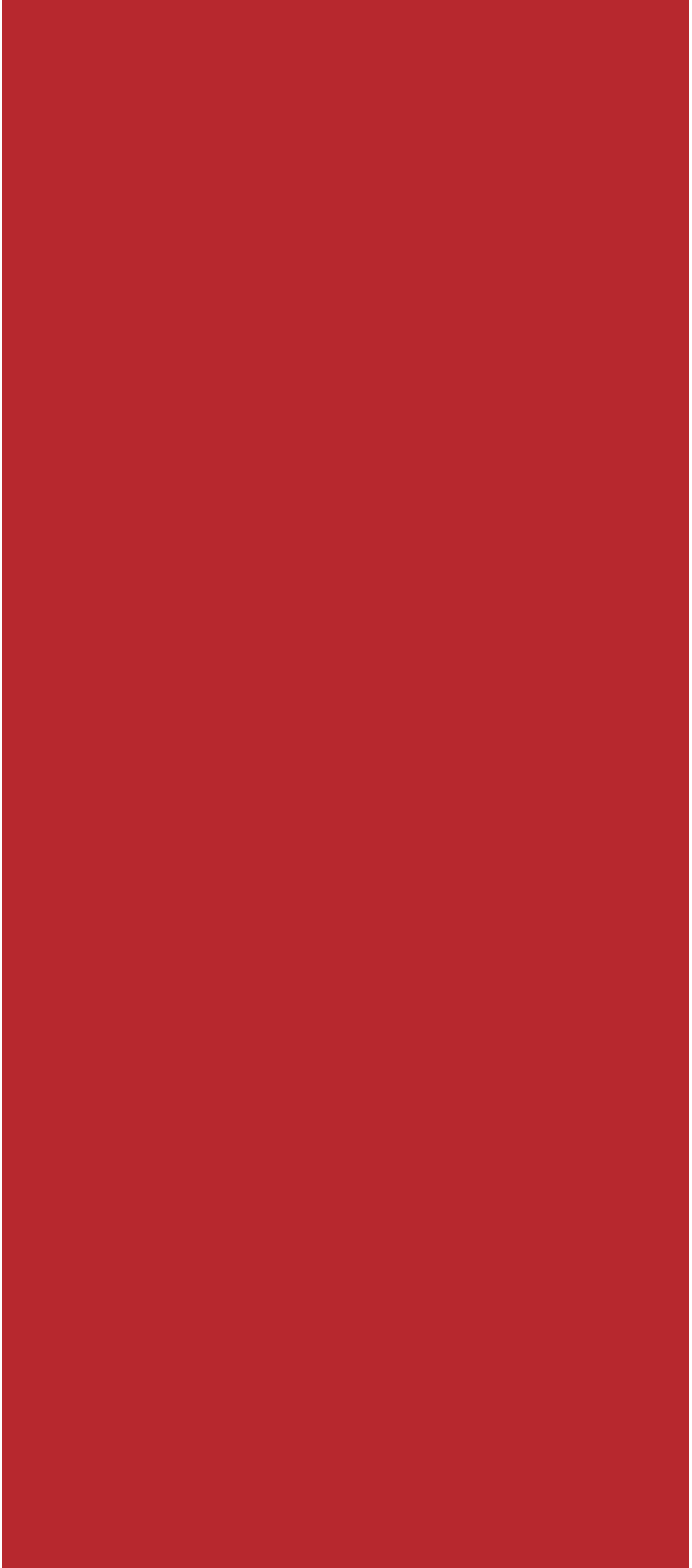
Source: JRC elaborations based on official Supply and Use tables published by the national statistical office of former Yugoslav Republic of Macedonia (http://www.stat.gov.mk/IOTabeli_eng.aspx)

Looking at 'Type-I output multiplier' we can see that the *Machinery and equipment sector* has the highest multiplier (2.023), meaning that investments in this sector may be expected to have the greatest impact on the rest of the economy. When Household final demand is endogenised, so that *induced effects* are included in the analysis (Type-II) the sector with the highest multiplier is the *business support services sector* (4.839). Conversely, the *Machinery and equipment sector, when* Type-II multiplier is considered has only the 11th place. Clearly, the choice on which is better to use depends on the analysis that has to be made and, more important, which kind of strategies policy-makers want to implement.

As an example of the multipliers' interpretation, consider an increase of €1 in final demand of the *Machinery and equipment sector.* The Type-I multiplier for this sector shows that a change in final demand of €1 induces an increase in total output of €2.023. In other words, to produce an additional unit of output in the target sector, the national economy's output must increase by an additional €0.18 in order to provide inputs to the sector itself, and in turn an increase of €0.843 in all stages of the supply chain to provide inputs to the suppliers of the sector under concern is needed. The effects encompassed by the Type-I multiplier are the direct effect (1.00), the indirect effect (0.180) on the sector where a change of final demand is assumed and the industrial support effects (0.843). The sum of all these effects gives us the Type-I output multiplier and stress the importance to consider the inter-industry linkages in an economy (at national and regional level) in an economic impact analysis. The same logic applies for all the other sectors of the economy as well as for Type-II multipliers. Considering the same example of €1 in additional demand, when households' consumption is taken into account the final effect of the disturbance would be of €2.344.

It is generally more interesting to analyse the economic impacts of changes in final demand in terms of increased household earnings and value added rather than simply in gross output by sector. Hence, also Value Added multipliers are included in Table 15. Looking at Type-II multipliers, the effect of €1 invested in the *business support services sector* generates an increase in total value added of €1.615 (direct, indirect and induced effect).

Finally, the IO analysis gives an initial idea of the impact of a positive and negative demand shock, provides some insights on the behaviour of the former Yugoslav Republic of Macedonia internal demand and gives to the policy maker a first intuition of the economic effects, in the short and medium term, of the strategies and polices that will be implemented.



Conclusions and path forward

The efforts to increase the competitiveness of the Western Balkan economies, strengthening their skills-base, modernising their industry and addressing structural weaknesses via adequate reforms, is at the core of the new 2025 EU accession perspective. The development of a robust private sector led by entrepreneurs both from within the region and from the EU will better harness the dynamism of the region's youth and foster mutually beneficial economic integration. In order to boost entrepreneurship and innovation, engagement with EU initiatives, programmes and projects is increasingly important. At the same time, the WB are committed to jointly build a strong Regional Economic Area.

As stated at the Trieste Summit in 2017, the Regional Economic Area will include initiatives for improving regional smart specialisation and creating value chains as well as accelerating innovation and technology transfer. To achieve this, it is important to understand the commonalities and differences across the region to design placed-based innovation policies for economic transformation that are inclusive, participatory, transparent and based on strong evidence.

In line with the goals of the Sofia summit of May 2018, the WB will aim to boost cooperation in areas of mutual interest. Already in 2017, the Prime-Ministers of the WB pledged to focus on economic development and competitiveness by stimulating entrepreneurship in the region and accelerating inward investment.

This report puts forward a targeted contribution to the numerous challenges linked to these ambitious goals, highlighting a number of themes where scientific, analytical and practical support by the European Commission has already been deployed through its JRC. This relates principally to capacity-building for the design and implementation of participatory, place-based and evidence-based innovation strategies, data availability and quality enhancement, as well as technology transfer in the WB region and strengthening the connections with the EU and within the region in terms of R&I capacity and performance.

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Ensuring the sustainability of these R&I strategies will depend on the timeliness and coordination of policy measures as well as on effective and inclusive governance that engages stakeholders in a meaningful and transparent way.

Several steps need to be taken, but it appears that things are moving in the right direction. Some smart specialisation strategies are being prepared; a number of technology transfer activities have already involved many businesses and support organisations in the area; some WB economies have taken up the challenges of the INSPIRE directive; there is a constant development of collaboration opportunities in the framework of the EU macro-regional strategies; and these are all encouraging signs that cannot be neglected.

Further sustainability of a virtuous policy making cycle will depend mainly on government commitment and action in the WB, as well as the development of innovation ecosystems built on trust, transparency, inclusiveness and focused on a limited number of key priorities for policy support. This effort is closely related to concrete steps to be taken in the domains identified as challenges in this report: creating institutional frameworks; providing evidence for policy priorities; building innovation communities and systems; supporting transformative and innovative projects; enhancing data-driven innovation; nurturing cross-border cooperation avenues; and understanding what works through monitoring and evaluation.

The adoption of a place-based approach to these challenges allows for the exploitation of untapped potential in the WB territories in terms of innovation – be they in terms of strategies, projects, ideas, applications, actors and people. It will eventually shape a Western Balkan way to design and implement innovation strategies and projects, ensuring broader ownership of both goals and tools by local innovation communities, and ultimately by citizens.

This innovation agenda will have to reflect regional diversity by promoting closer cooperation across borders and opening up new opportunities and combinations of innovation potentials. To tap the full innovation potential, efforts should be coordinated and knowledge should flow more freely across the Western Balkans and the EU. If this is achieved, it will be an important step in bringing the Western Balkan economies closer to the EU.

ANNEXES

Annex 1: Smart specialisation framework for Enlargement and Neighbourhood countries

Phase	No.	Stage of the process	Explanation	Role of national/ regional administration	Research input (local and international experts)
Institutional capacity building	**1**	**Decision to start smart specialisation process**			
	1.1	Formal request	A country has to formally express interest in developing smart specialisation strategy. The support is given on the basis of readiness assessment	Prepare and send the request	Not needed
	1.2	Analysis of context – country specific conditions	The context analysis should provide basic information concerning the administrative and political issues and the level of development of country/region	Providing information	
	1.3	Discussion with public administration	Discussion with public administration is a technical step that allows to determine mode of cooperation and a preliminary roadmap	Identifying appropriate representatives	Not needed
	1.4	Awareness event	Awareness event can be targeted to internal or external stakeholders (depending on needs) and helps explaining the smart specialisation approach and its benefits	Organization of logistics and inviting participants	Can support the event
	1.5	Establishment of national/ regional S3 team/s	National/regional team should include: • the representatives of all ministries/departments whose mandate includes is regional policy, scientific and innovation policy, economic development • representatives of national statistical office • representatives of national patent office • external stakeholders (representatives of business and research sector and NGOs)	Appointment of the team	Can be participants
	1.6	Participation in S3 training	The training is organized by the JRC according to needs and prepares the national and regional S3 teams to manage and organize the strategy development process	Sending appropriate representation	Not needed
	1.7	Agreement with JRC	Agreement with JRC includes a roadmap, mutual obligations and criteria for common work and assessment of final document.	Co-designing and signing the agreement	
Institutional capacity building	**2**	**Analysis of strategic mandates**			
	2.1	Overview of existing policies and priorities relevant for S3	The purpose of this stage is to identify the existing economic, scientific or innovative priorities and domains present in strategies and policies together with instruments for their implementation	Providing the overview of the strategies, policies and instruments	Not needed
	2.2	Decision on the place of S3 in the strategic framework	The national/regional S3 team should decide how smart specialisation strategy will be adopted and how it will be coordinated with other relevant policies	Adopting a decision	
	2.3	Decision on the national/ regional dimension of S3	Depending on the size of the country and existing subnational administrative structure, a decision should be taken on the territorial dimension of S3 – it is always recommended to have a regional approach, if possible	Adopting a decision	

Phase	No.	Stage of the process	Explanation	Role of national/ regional administration	Research input (local and international experts)
Diagnosis (mapping exercise)	**3**	**Analysis of existing economic, scientific and innovative potential (quantitative)**			
	3.1	Provision of statistical data	For quantitative mapping following data is needed: **industrial subsectors** (NACE rev. 2, 3 or 4 digit, 5-10 year period): * Employment * Value added * Number of companies * Wages * Share of innovative companies (CIS indicators) **product groups or subsectors** * Exports **areas of science** * Scientific publications * Patents **education profiles** * Number of students/graduates at vocational schools * Number of students/graduates at HEI * STEM graduates The data should be provided by national statistical office and national patent office	Arranging the data provision	Quantitative mapping on the basis of: • Statistical data • Literature • International databases • Representative surveys (combination of sources to be agreed)
	3.2	Mapping of economic, innovative and scientific potential	Mapping is a statistical analysis of main strengths and specialisations in terms of economic, innovative and scientific potential.Its objective is to indicate preliminary areas of smart specialisation based on the expert assessment of matches between the three types of potential. JRC provides relevant methodology for this exercise.	Supporting data collection, providing additional sources and consulting the process	Performing the analysis
	3.3	Creation of the local expert team	Local expert team cooperates with the international expert in order to understand the methodology and help adjust it to the country profile and needs. It is made of scientists with relevant expertise in economics, economic geography, scientometrics and patent analyses.	Identifying and mobilising local experts	Cooperation between local and international experts
	3.4	Additional analyses	Additional analyses can provide better understanding of the priority domains. They can include international benchmarking, analysis of value chains, revealed comparative advantage and other relevant issues	Identifying existing analyses that can be useful or commissioning new ones	Performing the analyses
	3.5	Consultation with stakeholders	The results of the mapping exercise must be consulted with internal and external stakeholders. Internal stakeholders include all the ministries and departments that have competences concerning the analysed potentials. External stakeholders are representatives of business, academia and NGOs relevant from the point of view of the preliminary smart specialisation domains.	Organization of the consultations and invitation of appropriate stakeholders	Should be participants
	3.6	Publication of the report	The smart specialisation process has to be transparent. The mapping report should be made available to the public minimum in electronic version and made available (in English) on the S3 Platform portal. If necessary it should also be translated to the local language.	On-line publication of the report and providing an electronic version for S3 Platform	Not needed

Phase	No.	Stage of the process	Explanation	Role of national/ regional administration	Research input (local and international experts)
Diagnosis (mapping exercise)	**4**	**In-depth analysis of priority domains (qualitative)**			
	4.1	Expert interpretation of the results of mapping exercise	The qualitative interpretation of the results is necessary to overcome the constraints of existing industry and scientific classifications and uncover real sectors and value chains they represent. Specific value chains for priority domains have to be identified together with challenges and trends. It can be done on the basis of in-depth interviews, focus groups or case studies with experts representing the key and most innovative companies, sectorial experts and researchers cooperating with business. If interviews are considered, minimum 10-15 interviews with key organisations should be conducted per preliminary priority domain. The result of this analysis is the better definition of preliminary priority domains for the purposes of entrepreneurial discovery process.	Organization of the qualitative analysis	Performing the analysis
	4.2	Publication of the report	The smart specialisation process has to be transparent. The qualitative report should be made available to the public minimum in electronic version and made available (in English) on the S3 Platform portal. If necessary it should also be translated to the local language. Mapping report and qualitative report can be published together.	On-line publication of the report and providing an electronic version for S3 Platform	Not needed
	4.3	Decision on priority domains for EDP	After the quantitative an qualitative analysis, a common panel should be organized involving national smart specialisation team, experts and JRC representatives in order to establish the priority domains for the entrepreneurial discovery process.	Organization of the panel and inviting experts	Should be participants
Stakeholder dialogue	**5**	**Entrepreneurial discovery process (EDP)**			
	5.1	EDP training	Training of EDP coordinators and facilitators is organized by JRC and designed to prepare the teams of national coordinators and facilitators (moderators) of the EDP workshops. The coordinators represent National Smart Specialisation Teams and facilitators are experienced moderators with business experience.	Appointing and mobilising coordinators and moderators	Not needed
	5.2	Identification of stakeholders for each priority domain	For each priority domain, relevant stakeholders need to be identified. They include key players in value chains, innovative companies, cluster members, chambers of commerce and other business associations, researchers and organizations from related fields. They can be identified by desk research and interviews or a more objective network analysis of scientific and innovation cooperation.	Coordination of the identification exercise	Can assist with the analysis
	5.3	EDP plan and working rules	Before the EDP is formally launched, clear rules should be defined for participation and decision-making process. They need to be communicated to the members of working groups together with the invitation or at the first meeting. As the EDP includes a series of workshops, often organized in different regions, a plan has to be developed and communicated to the participants.	Definition and communication of the working rules and plan	Not needed
	5.4	Definition of EDP working groups	The working groups should well represent the value chains identified in qualitative mapping for each priority domain, researchers from relevant domains, intermediaries and government agencies active in the priority domain. Representatives of companies should constitute minimum 50% of participants of each working group.	Inviting and mobilising the working groups members	Not needed
	5.4	EDP workshops	A series of workshops should be organized for each priority domain. The deliverables of the EDP workshops are: • EDP kick-off conference presenting all priority domains • SWOT analysis • Vision for the future and final name of priority domain • Policy mix (objectives and actions with indicators)	Organization of the workshops	Should be participants
	5.5	EDP input for S3	The results of the EDP process should be the main input for the smart specialisation strategy. The coordinators and facilitators should cooperate to provide written conclusions from each workshop and consult them with the participants.	Coordination of the delivery of written input	Not needed

Phase	No.	Stage of the process	Explanation	Role of national/ regional administration	Research input (local and international experts)
Institutional capacity for implementation	**6**	**Design of monitoring, implementation and financing system**			
	6.1	Monitoring guidance	Monitoring guidance is given during a meeting of National Smart Specialisation Team with JRC. It concerns the rules for the design of indicators and reporting.	Arranging a guidance meeting	Can support the process
	6.2	Design of monitoring system	The National Smart Specialisation Team prepares the indicators and designs the monitoring system according to received guidance.	Design of the monitoring system for S3	Can support the process
	6.3	Implementation and financing guidance	Implementation and financing guidance guidance is given during a meeting of National Smart Specialisation Team with JRC. It concerns the organizational and financing rules for effective implementation.	Arranging a guidance meeting	Not needed
	6.4	Design of implementation system	The National Smart Specialisation Team prepares the organizational and financing scheme for S3 according to received guidance.	Design of the implementation system for S3	Not needed
Final strategy	**7**	**Preparation of S3 strategy document**			
	7.1	Preparation of the S3 strategy draft	The National Smart Specialisation Team prepares the draft of S3 strategy including: the results of mapping exercise, description and justification of priority domains, SWOT analysis, vision for the future, strategic goals, operational objectives and action plans, monitoring and evaluation system and implementation system including financing sources.	Preparation of the S3 strategy draft	Can support the process
	7.2	Consultation with stakeholders	The final draft has to be consulted with the EDP working groups and wider group of stakeholders of regional or national innovation systems. It can be done during a final conference.	Organization of consultation process	Can support the process
	7.3	EC approval	The National Smart Specialisation Team requests EC approval of the S3 strategy. If necessary, changes are introduced.	Sending the document for approval	Not needed
	7.4	Formal approval	The relevant authorities formally approve the S3 strategy. Implementation should start shortly after that.	Launching the approval process	Not needed

Annex 2: Data quality and thresholds for economic specialisations

Table 14 shows how missing values from the Orbis database have been imputed. First, averages between observed data points for which information is missing was calculated. Second, the last observed values for each enterprise in each economy were carried forward, provided the enterprise is still active. Third, the first observed values using the enterprise's date of incorporation as the baseline were carried backwards. Table 5 describes the dataset before and after imputing missing data showing that overall data availability has improved significantly for both employment and turnover.

Table 14. Orbis data availability at enterprise level for WB

	Data availability before imputing missing data		Data availability after imputing missing data	
	Employment	Turnover	Employment	Turnover
Albania	17.1 %	27.6 %	62.8 %	91.0 %
Bosnia and Herzegovina	64.2 %	65.3 %	98.1 %	98.6 %
Kosovo	16.4 %	31.4 %	56.8 %	72.9 %
Former Yugoslav Republic of Macedonia	62.4 %	45.8 %	92.0 %	93.5 %
Montenegro	29.0 %	29.2 %	79.9 %	80.6 %
Serbia	62.1 %	62.1 %	79.5 %	84.9 %
WB	**60.1 %**	**57.0 %**	**86.2 %**	**89.5 %**

Source: UNU-MERIT calculations based on Orbis data (project for JRC).

Table 15 reports the thresholds used to define current and emerging strengths. These different thresholds are needed to arrive at comparable numbers of specialised industries.

Table 15. Thresholds used for identifying economic specialisations

	Current strengths		Emerging strengths	
	Degree of specialisation	Relative size	Change in degree of specialisation	Change in relative size
Albania	1.5	0.5 %	0	0
Bosnia and Herzegovina	1.5	0.5 %	0.1	0.0005
Kosovo	1.5	0.5 %	0.1	0.0005
Former Yugoslav Republic of Macedonia	1.5	0.5 %	0.05	0.00025
Montenegro	1.5	0.5 %	0.05	0.0005
Serbia	1.5	0.5 %	0.05	0.00025

Source: UNU-MERIT for JRC.

Annex 3: Modelling assumptions of impact assessments

a) Modelling assumptions for the assessment of potential impacts of public investment into R&I by industry sectors in Albania

For this specific test, the key economic sectors of the EU-28 and Albania were modelled in full disaggregation. Because of the detailed representation of spatial interactions, the model captures both the direct internal effects of policy interventions in Albania and external spillover effects that affect economies of other regions. The dynamics of the model was kept relatively simple: expectations of economic agents were assumed to be myopic and the model is solved recursively year by year. The IPA objectives related to the implementation of 'Competitiveness and Innovation' priority in Albania require absorption of EUR 16M during 2014-2017, and of EUR 28M until the end of the commitment period. In line with the N+2 rule for EU budget execution, an assumption was made of gradually increasing absorption of funding that peaks in 2020-2022.

The next assumption is that the 'Competitiveness and innovation' priority is financed through the income tax levied during 2014-2020 on the Member States that are net contributors to the EU budget. The current contributions were calculated proportionally to the average net contributions during the previous budget commitment period[59]. This assumption was employed in order to isolate the IPA policy effects from the other structural policies that are financed and implemented in the EU Member States.

The policy experiment was grounded on econometric estimates that relate R&D investments with total factor productivity improvements[60]. Consequently, the policy interventions under the 'Competitiveness and innovation' priority were modelled as contributing to total factor productivity (TFP) improvements to all industries of Albania excluding fuel extraction, electricity generation and provision of public services[61]. TFP improvements decrease expenditures on labour and capital per unit of output, which gives producers a comparative advantage in terms of price setting.

Considering the high research and innovation content of the policy intervention, the achieved improvements in technological efficiency and productivity of labour in Albania that constitute TFP improvements are expected to continue at a declining rate in the absence of policy funding. Therefore, it is considered that after peaking in 2022, TFP will decline annually by 20 %. All policy impacts were evaluated in terms of percentage deviations from the baseline projections. The baseline projections consider business-as-usual evolution of the economy without policy perturbations.

59. EU expenditure and revenue 2007-2013. European Commission, http://ec.europa.eu/budget/figures/2007-2013/index_en.cfm.

60. Kancs, d'A., Siliverstovs, B., 'R&D and Non-linear Productivity Growth', *Research Policy* 45, No 3, pp. 634-646, 2016.

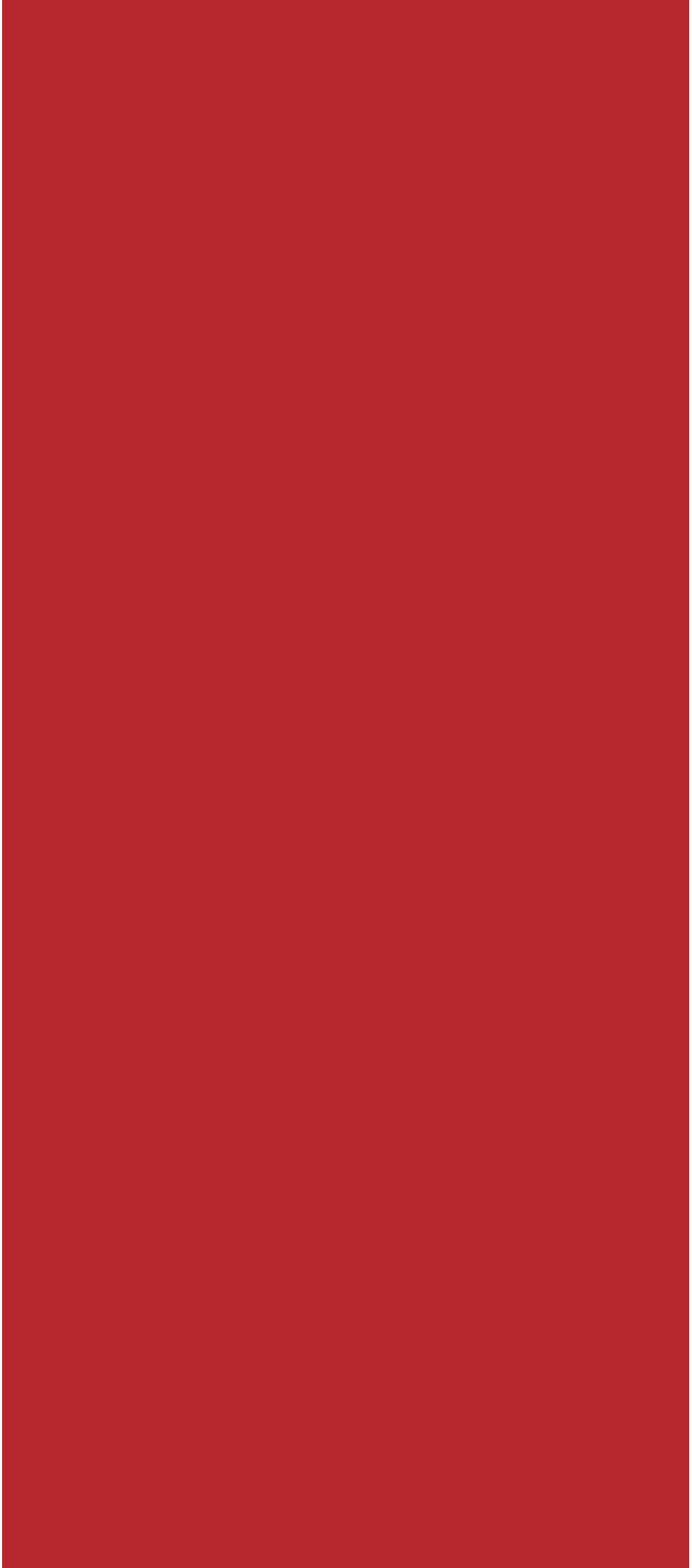
61. Electricity generation is not liberalized in Albania, and therefore, it is not subject to the IPA funding under the Competitiveness and innovation category, together with provision of public services. Fuel extraction strongly depends on specific fuel resources that have limited possibilities of substitution with other inputs; however, reflecting these issues is outside the scope of this modelling exercise.

b) Modelling assumptions of the Input-Output analysis of a demand shock in former Yugoslav Republic of Macedonia

The two key assumptions in IO modelling are: (a) the supply-side of the economy is entirely passive to the level of demand and, (b) the production technology for all sectors is represented by fixed coefficients (i.e. an increase/decrease in the production of any one sector's output means a proportional increase (or decrease) in that sector's input requirements.

A key output from the Input-Output (IO) analysis is the calculation of the industry linkages (defined as multipliers). IO multipliers[62] allow us to measure how an increase in final demand for the output of one sector entails expansionary effects on the output of intermediate sectors which, correspondingly, increase their demand for their own intermediates inputs and so on. The activity generated by the sum of these demands for intermediate inputs is known as the *indirect effect*. Two types of multipliers can be computed. The simpler multiplier (Type-I) treats household consumption as an exogenously determined final demand category. A more complete multiplier (Type-II) can be obtained by estimating the total effect of a demand side disturbance linking consumption to employment income. Based on the assumption of constant savings rate for different levels of income, the latter multiplier allows us to capture in the model the additional effects of household income generation through payments for labour and the associated consumer expenditures on goods and services produced by the various sectors: this additional expansionary effect is known as *induced effect*. Notice that IO multipliers, describing average effects, do not take account of economies of scale, unused capacity or technological change. Thus, IO multipliers could be used to quantify the economic impact derived from a demand-shock assuming that the average relationships in the IO table apply at the margin.

62. IO tables and multipliers focus on the supply and use of products having a distinct *micro* focus. This feature distinguishes them from other multipliers like fiscal (or Keynesian) multipliers which focus on macroeconomic relationships.



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List of abbreviations and definitions

CGE	Computable general equilibrium
DRDSI	Danube Data and Services Infrastructure
EBRD	European Bank for Reconstruction and Development
EDP	Entrepreneurial discovery process
EIB	European Investment Bank
ERDF	European Regional Development Fund
EU	European Union
EUSDR	The European Union Strategy for the Danube Region
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investments
FP7	7th Framework Programme for Research and Technological Development
GCI	Global competitiveness index
GDP	Gross domestic product
ICT	Information and communications technology
IO	Input-Output
IPA	Instrument for Pre-accession Assistance
IPC	International Patent Classification
NACE	The Statistical classification of economic activities in the European Community
OECD	Organisation for Economic Co-operation and Development
PoC	Proof of concept
PRO	Public research organisation
S3	Innovation strategy for smart specialisation

R&I	Research and innovation
R&D	Research and development
R&D&I	Research, development and innovation
SME	Small- and medium- sized enterprise
TFP	Total factor productivity

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