Mapping of economic, innovative and scientific potential in Serbia

Henning Kroll, Esther Schnabl, Djerdj Horvat

Fraunhofer ISI

Together with the Analytical Team of the Inter-ministerial Working Group for Smart Specialisation of the Republic of Serbia

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Contact information

Name: Dr Alexander Kleibrink Address: Joint Research Centre, C/ Inca Garcilaso 3, 41092 Seville, Spain Email: Alexander.KLEIBRINK@ec.europa.eu Tel. +34 954488484

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Executive Summary

This report is prepared to identify **potential priority domains for smart specialisation** in Serbia. It will does this **based on an approach following the smart specialisation approach by** mapping the economic, scientific and innovation potential at subnational level as a preparation for prioritising domains and activity areas for public investments and beginning stakeholder mobilisation (entrepreneurial discovery process, in short EDP). Mapping is a crucial first step in this to identify preliminary priority domains and the relevant stakeholders for discussing them.

All analytical approaches outlined in this report show that relative specialisation vary substantially across Serbian regions and the AP Vojvodina. This strongly suggests that government objectives and activities should take account of the differences in innovation systems. An overall picture of regional strengths, weaknesses and possible leverage points in the form of potential priority areas has emerged.

This, however, can only be the basis for a further discussion of actual political prioritisations in the upcoming entrepreneurial discovery process. Quantitative data alone cannot sufficiently indicate what is desirable and feasible within both the political and the economic domain.

However, the quantitative analysis gives clear indications on which economic sectors the Serbian population depends for growth and jobs and where there dynamic development is more likely. Less than pre-determining its outcome, it thus clearly indicates which areas may not be overlooked in future stakeholder consultations.

As one bottom line message, it is essential that an economy like Serbia's that still strongly depends on agriculture and various light industries also leverages on these potentials, rather than focusing on classic high-tech sectors alone. The following potential priority areas can be identified on the basis of the data and could serve as a basis for further consideration in a later, stakeholder-based process.

RS11: Belgrade / Београд

- Computer Programming and ICT
- R&D and Technical Consultancy
- Creative Economy
- Monetary Intermediation

potentially emerging innovative

• Beverages, Pharmaceuticals, Electrical Components, Transport Equipment Science

• various

RS12: Vojvodina / Војводина

- Automotive
- Agricultural Economy (including processing industries)
- Petrochemical Industry
- Plastics Industry

potentially emerging innovative

Agricultural Machinery, Measurement Instruments

Science

• Computer Science, Telecommunications

RS21: Šumadija and Western Serbia / Шумадија и западна Србија

- Agri-/Horti-/Silvicultural Economy (including processing industries)
- Automotive
- Textile Industry
- Plastics Industry
- Metal Industry
- potentially emerging innovative

• Special Purpose Machinery

Science

• (mechanical engineering, pharmacy)

RS22: Southern and Eastern Serbia / Јужна и источна Србија

- Agri-/Horticultural Economy (including processing industries)
- Textile Industry
- Rubber Industry
- (Electrical Engineering)

potentially emerging innovative

• Food Products, Medical and Dental

Science

• (electrical engineering)

1. Methodology

Description of the Analytical Approach in the Context of S3 Policy Concept

This report is prepared to identify **potential priority domains for smart specialisation** in Serbia. It will do so **based on an approach following the smart specialisation approach.** The following principle tenets of this policy approach form the basis of this report:

A) On sectors and technologies:

It is the basic premise of the smart specialisation approach that growth will be triggered by the application of technologies in diverse, often as such traditional, sectors rather than by the support for specific "technology sectors". It is based on the by now undisputed empirical finding that the competitiveness of economies does usually not depend on the (overall still small) share of specific "high-tech sectors" but on the extent to which they are successful in increasing productivity and competitiveness across the entire economy. Naturally, it does not deny the benefit of supporting "high-tech sectors" where potential exists. However, its core ambition lies in identifying alternative economic leverage points for the majority of regions where high-tech sectors do not constitute an obvious point of departure, including strategies based on process, organisational or marketing innovations that this report cannot directly measure or cover. In sum, smart specialisation strategies shall be strategies of place-based economic transformation, less of economic replacement.

B) On evidence based policy-making:

The smart specialisation approach underlines that, to be credible and legitimate, the development of economic strategies for economic transformation should be grounded in a robust framework of empirical analysis rather than anecdotal impressions, situational opportunity or idiosyncratic decision making alone. It demands that empirical realities are tabled and discussed rather than used partially and selectively. This report is a contribution to that objective. However, all quantitative analysis comes with certain limitations and can hence only constitute input to subsequent "entrepreneurial discovery" processes in which final decisions are deliberated with important internal and external stakeholders and a deeper understanding of concrete activities that merit future support ("domains") can be gained. It is a necessary contribution to priority definition without any ambition of being exhaustive. For example, the following analysis is limited by the fact that it is conducted based on NACE categories. Obviously, these can only serve as first anchor points to identify future areas of support such as "automotive" or "agro-food sector". Moreover, policy decisions will have to consider a number of practical insights on structures and opportunities in the "real economy" that purely data-based analyses cannot pre-empt.

Data Accessibility

For this exercise the Ministry of Education, Science and Technological Development, the Statistical Office of the Republic of Serbia, Intellectual Property Office, Faculty of Physics, and Mihajlo Pupin Institute provided good quality data on various analytical dimensions, for all three relevant domains of analysis that need to be considered in a RIS3 analysis: economic structure and dynamism, innovative activities and related scientific basis.

In terms of substance, the received data can be subdivided in two main types.

1) data without or limited subdivision by economic/scientific field of activity or limited subdivision at relatively coarse levels.

These data will be considered in an introductory background study, which gives a first general overview of the level of activity in the first section of this report.

 data with detailed subdivision by economic/scientific field of activity, for most indicators according to NACE 3-digit categories, for scientific activity according to Web of Science/Frascati classifications.

These data will be considered in the following sections of this final report, addressing all three main domains of analysis separately (economy, innovation, science) and then, in a final step integrating them again in the last chapter.

In technical terms, the latter data can be into two groups

- a) full coverage data: available for the complete range of NACE categories from A to U, including LFS employment data, export data and data from the innovation surveys.
- b) structural business statistics data for the "business economy" (SBS): covers industry and selected services but not - agriculture (NACE A), financial services (NACE K) and largely public or household oriented services (NACE O-T)

Future Needs in Terms of Data Collection

The data that the Ministry of Education, Science and Technological Development, the Statistical Office of the Republic of Serbia ,Intellectual Property Office, Faculty of Physics and Mihajlo Pupin Institute provided are comprehensive, topical and of a high quality. Hence, there are no specific future needs for data collection other than that to update the provided data if future analysis should be conducted. The collaboration between the different units and organisations in charge of individual data has been exemplary. Technically, a first review would appear commendable at the earliest, when all central indicators have been updated i.e. around 2019 when the next rounds of biannually collected indicators is available.

To enable the Serbian Analytics team to continue this - or a similar - process in the future, it will be necessary to organise a methodologically and structurally permanent, obligatory and functional collection and analysis of input data.

Regional Structure of (most) Datasets

Since 2011, the statistical system of the Republic of Serbia subdivides the country into five main regions (NUTS 2):

- RS11: Belgrade / Београд
- RS12: Vojvodina / Војводина
- RS21: Šumadija and Western Serbia / Шумадија и западна Србија
- RS22: Southern and Eastern Serbia / Јужна и источна Србија
- RS23: Kosovo

These regions are of relatively equal size in terms of population (between 1.6 million and 2.0 million inhabitants) while their economic size differs more notably between an annual GDP of 12.5 billion \in in Belgrade compared to 4.5 million \in in Southern and Eastern Serbia and Kosovo.¹ The levels of per capita income differ respectively. In relative terms, however, the five Serbian regions do not differ more substantially in economic capacity than would, for example, regions in Germany, Poland or France. In the following analysis, they can therefore by and large be addressed with the same approach and methodology, making specific provisions for size in a limited number of cases only.

Brief Overview of Regions

National Perspective

Belgrade is the strongest region with a GDP per capita of about \in 7,500. Southern and Eastern Serbia has the lowest GDP per capita of \notin 2,900. Across Serbia, Gross Value Added mainly stems from service industries. In Belgrade services account for 80.6% of GVA. In the NUTS 2 region Šumadija and Western Serbia the share of services is 70.6% on GVA. In all regions, the GVA share of agriculture is below 1%. However, while it is 0.3% in Belgrade, it is 0.9 in the NUTS 2 region Vojvodina.

Unemployment is lowest Vojvodina (17%) and highest in Southern and Eastern Serbia (20.0%) (see following map). Although agriculture does not have a high share on Gross Value Added, it has high shares on employment. In Šumadija and Western Serbia 30.9% of employees are in agriculture, while it is 18.0% in the NUTS 2 region Vojvodina. Only in Belgrade, dominated by service activities, it is only 2.6%.

For the following considerations, these very general findings are of great importance as they illustrate that, in rural Serbia, structures of employment and value added do not at

¹ 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.

all overlap. While agriculture remains highly important to ascertain employment and income for many, its contribution to national GDP is not significant.



Figure 1: GDP per capita and shares of sectors on GVA (2014, in EUR and %)

Source: Statistical office of Serbia, own analysis, ESRI ArcGIS



Figure 2: Unemployment and employment shares of sectors (2016, in %)

Source: Statistical office of Serbia, own analysis, ESRI ArcGIS

Moreover, an analysis of Serbia's regions' human capital basis, the data show that while a significant share of the population has a medium (i.e. high school) level across the country, most university graduates remain located in Belgrade and Vojvodina.

While these are positive finding for regional strategy building and specialisation with respect to the broadly available a pool of workers with an adequate level of training the obvious regional concentration of university graduates (e.g. engineers) cautions that Serbia's Southern regions will face difficulties in developing science- or technology based growth poles in isolation.



Figure 3: Human Capital Basis (2016, share of workforce with higher education)

Source: Statistical office of Serbia, own analysis, ESRI ArcGIS

In summary, the obvious disparities with regard to the different regions' overall level of economic development (which will later be mirrored for innovation and science) suggest that Serbia's regional specialisations and priority domains, once identified, need to be developed in an integrated manner at the national level. In particular in Serbia's Southern regions, the sourcing of national level (or even international) capacities will be indispensable to build and develop local smart specialisations.

RS11: Belgrade / Београд

The NUTS 2 region Belgrade has 1.68 million inhabitants (2016) and spreads over an area of 3,234 km². Between 2011 and 2016 the population grew by 1.56%.

In 2014, total GDP amounted to €12.5 bn so that GDP per capita was €7,460. Total exports amounted to €7.77 bn in 2016. Overall, the region contributes 25.8% to total exports of Serbia. In 2016, the working-age population (aged between 15 and 64) was 1.13 million. Thereof, about 642,700 persons are employed while 121,300 persons are unemployed. The unemployment rate is 15.9% of the active working-age population. Monthly gross earnings amounted to RSD 79,242 per employee in 2016 (net RSD 57,717). Due to its character as capital city region, services play an important role for employment in this region. The prevalence of employees with university education is particularly high in the ICT sector, in financial services, scientific and technical activities, public administration and education where it reaches more than 60%. Overall, Belgrade has the on average most qualified workforce in Serbia. While the share of persons participating in vocational education and training is above national average in business, administration and law (19%/15%), it is below national average in engineering, manufacturing and construction (26%/30%).

RS12: Vojvodina / Војводина

Vojvodina has 1.88 million inhabitants (2016). It spreads over an area of 21,614 km². Between 2011 and 2016 the population decreased by 2.67%.

In 2014, total GDP amounted to €8.8bn so that GDP per capita was €4,647. Total exports amounted to €3.46bn in 2016. The region contributes 32.1% to total national exports. In 2016, the working-age population (aged between 15 and 64 years) was 1.3 million. Thereof, about 690,400 persons are employed while 126,300 persons are unemployed. The unemployment rate is 15.5% of the active working-age population. Monthly gross earnings amounted to RSD 61,498 per employee in 2016 (net RSD 44,646). In simple terms, the region is can be characterised as part industrial, part agricultural. Also, it is the most externally oriented regional economy in Serbia. The prevalence of employees with university education is particularly high in the in the ICT sector, in financial services, scientific and technical activities, public administration and education where it partially reaches around 60% and, thus, does not significantly fall short of Belgrade. Contrary to Belgrade the share of persons participating in vocational education (31%/30%) while it is below national average in business, administration and law (13%/15%).

RS21: Šumadija and Western Serbia / Шумадија и западна Србија

Šumadija and Western Serbia has 1.96 million inhabitants (2016). It spreads over an area of 26,493 km². Thus, it is the biggest region in terms of population and surface. Between 2011 and 2016 the population decreased by 3.76%. In 2014, total GDP amounted to €6.4bn so that GDP per capita was €3,194. Regional exports amounted to €3.52bn in 2016, contributing 26.3% to Serbia's exports. In 2016, the working-age population was 1.3 million. Thereof, about 724,700 persons are employed while 135,500 persons are unemployed. The unemployment rate is 15.7% of the active working-age population. Monthly gross earnings amounted to RSD 52,767 per employee in 2016 (net RSD 38,315). Šumadija and Western Serbia remains a region strongly characterised by agriculture. Compared to Northern Serbia, the regional share of employees with high education is below national average in most industries. Only in financial services, scientific and technical activities, public administration and education does it reach the typical sectoral standard. In the ICT sector, to the contrary, the share is 32%, hardly half the level found in Belgrade or Vojvodina. Also, more than 55% of agricultural workers have less than high-school education (Vojvodina 39%). On a positive note, the share of people involved in vocational education and training is above national average in engineering, manufacturing and construction (32%/30%).

RS22: Southern and Eastern Serbia / Јужна и источна Србија

The NUTS 2 region Southern and Eastern Serbia has 1.54 million inhabitants (2016). It spreads over an area of 26,248km². Between 2011 and 2016 the population decreased by 4.71%. Total GDP amounted to €4.5bn in 2014 so that GDP per capita was €2,906. Total exports amounted to €2.12bn in 2016. The region contributes 15.8% to the total exports of Serbia. In 2016, the working-age population (age between 15 to 64) was 979,300. Thereof, about 521,600 persons are employed while 105,300 persons are unemployed. The unemployment rate is 16.8% of the active working-age population. Monthly gross earnings amounted to RSD 55,333 per employee in 2016 (net RSD 39,959). The regional share of employees with high education is below national average even in financial services, scientific and technical activities, public administration and education and certainly in many other industries, including ICT. Involvement in vocational education and training is around national average, somewhat above only in agriculture, forestry, fisheries and veterinary and natural sciences.

RS23: Kosovo / Косово

For the Autonomous Province of Kosovo, no reliable data could be made available.

Concrete Methodological Approach for Overview Assessment

The following three sub-sections will develop a first overview of potential priority domains for smart specialisation in the Serbian regions with a view to three main analytical dimensions. Each of these analytical dimensions will be substantiated be one or several indicators which are by nature suitable to calculate specialisation and available at a sufficient level of thematic disaggregation to make a calculation of specialisation technically possible:

Economic Potential

- employment, according to 2011-2016 labour force survey data
- exports, according to 2012-2016 national export statistics.

Innovative Potential

- innovating firms, according to the 2010-2014 national innovation survey
- patents, according to indicators developed by the Mihajlo Pupin Institute, based on data provided by the Intellectual Property Office.

Scientific Potential

• publications, according to indicators developed by the Faculty of Physics and Mihajlo Pupin Institute based on data collected by the Faculty of Physics.

As a first necessary condition, potential priority domains should display the following main characteristics in all three main analytical dimensions.

- Specialisation proper, i.e. an in relative terms higher importance of the sector in the regional economy than is standard for the economy. A typical measure to determine this specialisation is the *Location Quotient* (*LQ*)² that contrasts the share of a sector in the local economy with the share of a sector in the national economy.
- **Absolute Size**: the mere fact that a sector is in relative terms more important than on national level can be irrelevant for regional economic policy if it is in absolute terms too small, i.e. only employs a few hundred people. Hence, absolute size is an important necessary criterion.
- **Growth**: While growth is not a necessary condition to qualify as a specialisation provides important additional information on the relevance of a sector. Is this an emerging field that has already gained momentum or is it rather a legacy of earlier years which would require efforts directed at economic transformation?

² the formal expressing of the "location quotients" is: $LQ = [e_{NACE X} / e_{total}] / [E_{NACE X} / E_{total}]$ with e = (sectoral) employment in region and E = (sectoral) employment in nation

Drawing on this approach, the following three subsections will analyse Serbia's regions with regard to the structure of local **economic**, **innovative and scientific activity**. They will predominantly use a form of illustration ("bubble charts") that permits a summary assessment of all three analytical dimensions (specialisation, size & growth) at once while at the same time allowing for an initial filtering of those sectors or field that do not meet basic threshold criteria for either of them.

Following the notion of identifying potential priority domains for smart specialisation by focusing on those in which a region is specialised, the bubble charts below only include NACE sectors with a **location quotient of more than 1.5** i.e. such that hold at least 1.5 times the share in a regional economy than they do in the national economy.

- in the case of employment (*key indicator for baseline economic relevance*),
 employment over 2,000 (4,000 in Belgrade). Furthermore, sectors with a location quotient between 1.0 and 1.5 are included as long as they employ more than 2,000 people individually (4,000 in Belgrade) and growth in the 2011-2016 reference period exceeded 75%. Finally, some sectors are generally excluded from the employment diagrams: 46 (wholesale), 47 (retail), 80-84 (security, administration, public services), 85 (education), 92 (gambling), 94 (associations), 96 (personal services), 97 (activities of households) as they are either standard economic functions, very specific (gambling) or more suitably addressed elsewhere in this report (education).
- in the case of exports (*key indicator for international competitiveness*), export volume of over € 100,000
- in the case of innovating firms (*key indicator for innovative potential*), an overall number of over 25 firms
- in the case of patents (*key indicator for latent innovative potential*), an overall number of over 5 applications
- in the case of publications (*key indicator for scientific potential*),
 an overall number of over 10 publications (in fractional count)

Beyond these selection criteria, the following identification of specialisations in the bubble charts will follow a visual approach.

For each dimension (economy, innovation, science), NACE fields that visibly reach high values in all relevant criteria of specialisation, absolute size and growth will be identified as "obvious specialisations" in final overview tables. In the same tables, NACE fields which stand out in some dimensions but in a less obvious manner will be listed as

"partial or tentative specialisations" in brackets.

Figure 4: Illustration of Bubble Chart



 \leftarrow **growth** in indicated time period \rightarrow

Source: Own figure

Synoptic Analysis of Indicators of Economic, Innovation and Scientific Potential

Following the provisions of the European Commission, this first analytical section of the report will analyse specialisations of economic, innovation and scientific potential sequentially and, concluding, provide a synoptic review of them.

Initially, the synoptic review is conducted in a "manual" manner using expert judgement as the classifications of economic, innovation and scientific indicators (NACE, WoS) are not alike and hence do not allow for a technical integration.

Later on, Section 3 will present an approach based on technical integration of all variables that are available in NACE classification and hence mutually compatible.

2. Economic Potential

RS11 - Belgrade

With a view to employment, several potentially relevant sectors can be identified in Belgrade's regional economy, including

- Computer programming,
- Technical testing and analysis,
- R&D activities (established in natural science and growing in social science), and
- Medical and dental practice activities.

as well as with a slightly less prominent growth

- Television and broadcasting,
- Wired telecommunication, and
- Architectural and engineering activities.

The analysis of export data yields an at first sight less understandable picture in which only "manufacture of electric motors and generators" seems to relate to activities actually located in Belgrade. Apparently, many of the service sectors in which Belgrade is specialized do not demonstrate a strong export orientation. While this is typical for some of them, it is a relevant missing strength in the area of computer programming. With respect to iron and steel as well as weapons and ammunition, it seems likely that exports are accounted for by company headquarters in Belgrade while most production is effectively located elsewhere (see below).

RS12 - Vojvodina

With a view to employment, several potentially relevant sectors can be identified in Vojvodina's regional economy, including

- Parts and accessories for motor vehicles (by far most prominently),
- Extraction of crude petroleum,
- Technical testing and analysis, as well as
- Manufacturing of apparel and textiles.

as well as with notably less growth but a substantially larger contribution to overall employment a large agricultural sector (non-perennial crops, i.e. cereals) and associated industries like grain mills, meat processing, animal feeds, bakery products etc. Further, minor specialisations can also be identified in metal and plastics products.

Export data underline the role of generally less prominent but apparently internationally rather competitive activities in the chemical industry and reveals a general-purpose

machinery sector that does not show in the other dimensions due to its split over three NACE categories (28.1-28.3).





Source: own analysis, thresholds: LQ: 1.5, abs.: 4000 employees, selected sectors excluded



Figure 6: RS11 - Belgrade - Exports (2015)



Source: own analysis, thresholds: LQ: 1.5, abs.: € 100,000 export volume





Source: own analysis, thresholds: LQ: 1.5, abs.: 2000 employees, selected sectors excluded

Figure 8: RS12 - Vojvodina - Exports (2015)



Source: own analysis, thresholds: LQ: 1.5, abs.: € 100,000 export volume

RS21 - Šumadija and Western Serbia

With a view to employment, several potentially relevant sectors can be identified in Šumadija and Western Serbia's regional economy, including

- the growing of perennial crops (e.g. wine, fruits),
- mixed farming,
- animal production, as well as
- the production of weapons and ammunition.

Different from that in Vojvodina, the agricultural sector in Šumadija and Western Serbia grows dynamically.

With a view to export data, "manufacture of motor vehicles" features strongly as the more or less only industrial sector that demonstrates visibly international competitiveness in the regional economy. Locally, however, its contribution to employment is rather small and has in recent years been shrinking.

RS 22 - Southern and Eastern Serbia

With a view to employment, several potentially relevant sectors can be identified in Southern and Eastern Serbia's regional economy, including

- manufacture of parts for motor vehicles,
- manufacture of wiring and wiring devices,
- subsistence agriculture, mixed farming, and
- the growing of perennial crops (e.g. wine, fruits).

the traditionally strong mining and associated basic iron and steel processing sector continues to stand out as a specialisation, yet one with very moderate growth rates.

With respect to exports, several specialisations can be identified

- tobacco and tobacco products,
- rubber products,
- iron and steel, and
- furniture.

Interestingly, these are – with the exception of iron and steel processing – by and large different from those identified above, suggesting that automotive and electrical supplies are being used elsewhere in the country, rather than being exported. Local industries with international visibility, to the contrary, do not really show strongly as regional employment specialisations.





Source: own analysis, thresholds: LQ: 1.5, abs.: 2000 employees, selected sectors excluded



Figure 10: RS21 - Šumadija and Western Serbia - Exports (2015)

Source: own analysis, thresholds: LQ: 1.5, abs.: € 100,000 export volume





Source: own analysis, thresholds: LQ: 1.5, abs.: 2000 employees, selected sectors excluded

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Figure 12: RS22 - Southern and Eastern Serbia - Exports (2015)

Source: own analysis, thresholds: LQ: 1.5, abs.: € 100,000 export volume

With a view to the two indicator dimensions considered for **economic potential**, potential priority domains can be identified as follows:

	Employment	Export
Belgrade	Software Industry Technical Testing R&D Natural & Social Science Advertising Medical and Dental Services	Electric Motors
Vojvodina	Agro-economy Petrochemical Industry Automotive Textiles & Apparel Engineering & Design	General Purpose Machinery Basic Chemicals Refined Petroleum Agro-economy
Šumadija and Western Serbia	Agro-economy Forest economy (Weapons & Ammunition) (Automotive)	Motor Vehicles Domestic Appliances Fruit & Vegetables
Southern and Eastern Serbia	Mining & Metallurgy Agro-economy Electric Industries Textiles & Apparel	Tobacco Products Rubber Products Non-Ferrous Metals Furniture

Note: NACE areas listed in brackets are tentative or partial specialisations (see above, p. 15) Source: own analysis

Or, in an overview map, as follows:

Figure 13: Potential Priority Domains from an Economic Point of View



Source: own analysis

Associations and Clusters

In Serbia, a number of clusters and associations in the different regions aim to support and organise most business activities that the above analysis identified as potential priority domains, among them:

RS11 - Belgrade

- "IT Krug", Klaster za razvoj informacionih tehnologija
- ICT Net
- Digitalna Srbija (http://www.dsi.rs)
- Association (Cluster) of Serbian Aeronautical Industry- UVIS
- Automotive Cluster Serbia ACSerbia
- Bipom Cluster Balkan Black Sea Farm Machinery Cluster
- Cluster of Designers and Printers "DESIGN & PRINT"
- Cluster RE:Crafts
- FACTS CLUSTER FASHION AND SERBIAN CLOTHING INDUSTRY
- Cluster manufacturers and retailers ornamental plants "Plants United"
- GALENIT Cluster for the organized collection and recycling of waste batteries
- Green Chamber of Serbia
- KLASTER NEKRETNINE (Real-estate Cluster) Association
- Klaster zdravstvenog, velnes i spa Turizma Srbije
- "Medical Cluster PRO VITA" Regional Association
- Medical Turisam Cluster
- Serbia Film Commission

RS12 - Vojvodina

- Cluster "Agroindustrija"
- VOGANJ 2011 Cluster Breeding of Pigs
- Zeleni Sto (Green Table) Cluster
- Vojvodina Organic Cluster
- Vojvodina Metal Cluster
- Vojvodina ICT Cluster
- ECOPANONIA Cluster for Ecological Energy and Ecological Culture
- Cluster ISTAR 21 Tourism
- Fond turistički klaster mikroregije Subotica Palić
- FUND CLUSTER FOR HEALTH TOURISM OF VOJVODINA
- VOJVODINA MEDICAL TOURISM CLUSTER
- Creative Industries Cluster of Vojvodina

RS21 - Šumadija and Western Serbia

- "Srce Šumadije"
- "Šumadijski cvet" Cluster of flower producers
- Agency for Wood woodindustry cluster of Serbia
- Construction cluster Šumadije and Pomoravlja
- NETWOOD Cluster Furniture manufacturers
- Pešter Agro klaster
- Regional Automotive Cluster of Central Serbia
- Turistički klaster Radanskog područja

RS22 - Southern and Eastern Serbia

- Cluster "Cheese Cluster SOUTH"
- Cluster "Agro start-up"
- Association of strawberry producers and producers of other fruits "Jagoda" Gredetin
- Nisava District Agricultural Advisory Association
- Association of Fruit Growers Matejevac
- Agricultural Cooperative AGRO-BLACE
- The Association of Agricultural Cooperatives of Nis, Pirot and Toplica Counties Nis
- General Association of Entrepreneurs in Information Technology
- MEDIANUM (Engineering & Production)
- ZENIT Engineering Association
- "Ni CAT Cluster" Cluster of Advanced Technologies
- SITON Union of Engineering-Technical Organizations of Nis
- Cluster "Medical start-up"
- Construction Cluster OPEKA-BRICK
- GREEN BUILDING ASSOCIATION
- Cluster 'START UP UNION CONSTRUCTION'
- Dundjer Construction Cluster Nis Serbia
- Nisava District Textile Cluster
- CLUSTER "TEXTILE START-UP"
- Serbian Furniture Cluster
- KLASTER EKO TURIZMA "BANJAC"
- Turistički klaster jugoistočne Srbije STARA PLANINA
- NIS REGION START-UP CLUSTERS UNION
- CLUSTER "SERVICES START-UP"

While this list may not be exhaustive, it shows that a certain level of prior organisation exists in most relevant fields in all regions, even though it can be relatively low, as in Šumadija and Western Serbia, and Serbian experts report that many clusters are in practice not very functional and/or fit for purpose.

3. Innovative Potential

Overall, the share of Serbian firms that invest in innovation has been quite high in recent years, according to the innovation survey. The share of those earning income with innovation is lower, but still at a robust level. While the share of those engaging in innovative activities had decreased somewhat between 2010 and 2014, it has recovered in 2016. While only about 50% of all innovators invest in R&D and less than 25% collaborate for innovation, these relations seems to be improving in recent years and,

in any case, is not too different from those reported from other countries.

	2010	2012	2014	2016
Firms Investing in Innovation	47.9%	44.6%	40.5%	41.2%
Firms Earning Income with Innovation	26.9%	20.6%	19.2%	26.0%
Firms Investing in R&D	20.0%	10.9%	13.3%	17.1%
Firms Collaborating for Innovation	8.3%	6.6%	5.0%	8.0%
Source: own analysis				

Table 1: Innovative activity in Serbia, according to surveys

Interestingly, the share of innovators in the respective regional economies is comparatively similar, even though the total number of innovating firms is of course quite different (more than 3,000 in Belgrade, close to 1,800 in Vojvodina, more than 1,300 in Šumadia and Western and less than 800 in Southern and Eastern). While this raises some need for further interpretation it at the same time underlines that some sort of innovation can indeed be a relevant point of reference for all regions.



Figure 14: Innovative activity in Serbia's regions, according to surveys

Source: own analysis of data provided by the Statistical Office of Serbia

With a view to patents the data illustrates a clear concentration of inventive activity and thus technology-based innovative potential - in Northern Serbia; that is in Belgrade and Vojvodina. Even aggregated across several years, the total number of patents in the Southern regions of Serbia is rather limited - in particular in Šumadija and Western Serbia. With regard to all following analysis, therefore, it should be borne in mind that while there may be some specialisations the question of critical mass remain a critical one with regard to all of them, including those in Belgrade and Vojvodina.



Figure 15: Patents and average patent intensity per 100,000 inhabitants (2010-16)

Source: own analysis of data provided by the Intellectual Property Office and Mihajlo Pupin Institute

Since 1990, the number of domestic patent applications at the Serbian patent office has dropped substantially to about a third of earlier activities. In Belgrade and Vojvodina this trend has been more continuous and, in the most recent years seems to demonstrate nascent signs of recovery. In the Southern regions, to the contrary, earlier activities could be maintained and even expanded in the 2000s, but have dropped dramatically since. After the financial crisis, there has been no recovery.

RS11 - Belgrade

Innovation Survey data underline the picture developed in the section on economic potential, in particular with a view to

- Computer programming,
- Architectural and engineering activities, and
- Advertising

in which most relevant activities are concentrated, indicating a strong emphasis on the service sectors as the local carrier of innovation.
The analysis of patent applications, in contrast, suggests specialisations on chemistry and derivatives, pharmaceuticals, the manufacture of beverages and electronic components. As in all countries, however, Belgrade's capital function may entail that company headquarters apply for intellectual property in the region even though relevant production sites are located outside of the region (in Vojvodina).

RS12 - Vojvodina

Innovation Survey data underline the picture developed in the section on economic potential, in particular with a view to

- Agricultural products (non-perennial crops),
- Instruments and measurement appliances, and
- Plastic products.

in which most relevant activities are concentrated, indicating an emphasis on agriculture and light industries.

The analysis of patent applications is more or less in line with these findings, indicating key specialisations in communication equipment, agricultural machinery as well as instruments and appliances for measurement.

RS21 - Šumadija and Western Serbia

As in Vojvodina, the agricultural sector in Šumadija and Western Serbia features prominently in the results of the innovation survey, not least through a high prominence the two agri-food industries "processing of fruit and vegetables" and "manufacture of other food products." Additionally, activities can be identified in the area of "instrument and appliances for measurement", "engineering services", "wearing and apparel" and "furniture". This suggests that most relevant activities in the region are concentrated in selected light industries and agriculture.

The analysis of patent applications does not reveal strong specialisations, only two weak ones in agricultural and special purpose machinery - which resonate with the agricultural focus of innovative activities at large.

RS22 - Southern and Eastern Serbia

The analysis of the innovation survey reveals findings only if the threshold is lowered to 15 firms. It then underlines the relevance of technical testing, manufacture of computers, some food industries (bakery) and, to some extent, wearing & apparel. Otherwise, it suggests that the overall level of innovative activity in Southern and Eastern Serbia is rather low and that no significant concentrations of innovation activity can be identified.

The analysis of patent applications reveals one specialisation in medical and dental instruments and one in food products





Source: own analysis, thresholds: LQ: 1.5, abs.: 25 firms



Figure 17: RS11 - Belgrade – Firms Achieving Income with Innovation, according to 2016 Innovation Survey

Source: own analysis, thresholds: LQ: 1.5, abs.: 25 firms

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Figure 18: RS11 - Belgrade - Patents by NACE Sections, According to IMP&IPO Data

Source: own analysis, thresholds: LQ: 1.25, abs.: 5 patent applications





Source: own analysis, thresholds: LQ: 1.5, abs.: 25 firms



Figure 20: RS12 - Vojvodina – Firms Achieving Income with Innovation, according to 2016 Innovation Survey

Source: own analysis, thresholds: LQ: 1.5, abs.: 25 firms



Figure 21: RS12 - Vojvodina – Patents by NACE Sections, According to IMP&IPO Data

Source: own analysis, thresholds: LQ: 1.25, abs.: 5 patent applications

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Figure 22: RS21 - Šumadija and Western Serbia – Innovating Firms (2016 Innovation Survey)

Source: own analysis, thresholds: LQ: 1.5, abs.: 25 firms



Figure 23: RS21 - Šumadija and Western Serbia – Firms Achieving Income with Innovation, acc. to 2016 Innovation Survey

Source: own analysis, thresholds: LQ: 1.5, abs.: 25 firms



Figure 24: RS21 - Šumadija and Western Serbia – Patents by NACE Sections, According to IMP&IPO Data

Source: own analysis, thresholds: LQ: 1.25, abs.: 5 patent applications

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Figure 25: RS22 - Southern and Eastern Serbia – Innovating Firms (2016 Innovation Survey)

Source: own analysis, thresholds: LQ: 1.5, abs.: 15 firms (at 25 and 20 no findings)





Source: own analysis, thresholds: LQ: 1.5, abs.: **15 firms** (at 25 and 20 no findings)



Figure 27: RS22 - Southern and Eastern Serbia - Patents by NACE Sections, According to IMP&IPO Data

Source: own analysis, thresholds: LQ: 1.25, abs.: 5 patent applications

With a view to the two main indicator dimensions considered for **innovation potential**, potential priority domains for future political support could be identified as follows:

	Innovators	Patents
Belgrade	Computer Programming Advertising R&D Natural Science	Pharmaceuticals Chemistry & Derivatives Electronic Components (Transport Equipment)
Vojvodina	Measurement & Testing Plastic Products Support to Agriculture Food Products (Non-perennial Crops)	Communication Equipment Measurement Instruments Agricultural & Forestry Machinery
Šumadija and Western Serbia	Measurement Instruments Engineering & Architectural Services Food Products Fruits & Vegetables (Furniture, Apparel)	(Special Purpose Machinery) (Agricultural & Forestry Machinery)
Southern and Eastern Serbia	Technical Testing Services Manufacture of Computers Bakery (Wearing & Apparel)	Medical and Dental Instruments (Food Products)

Note: NACE areas listed in brackets are tentative or partial specialisations (see above, p. 15) Source: own analysis

Or, in an overview map, as follows:

Figure 28: Potential priority domains from an Innovation Point of View



Source: own analysis

4. Scientific Potential

As the two figures below indicate, Serbia's scientific potentials are even more concentrated than its potentials with regard to innovation, which, as outlined above, include a strong non-technological component.

Figure 29: Researchers by Discipline (2016, FTE) and per Population



Source: own analysis, Maps, ArcGIS



Figure 30: Publications and average publication intensity per 100,000 inhabitants

Source: own analysis, Maps, ArcGIS

RS11 - Belgrade

The capital city region dominates with a view to science, technology and innovation. While its overall population share is 24%, 55% of Serbia's researchers are located in Belgrade. The capital region's strength becomes even more obvious with a view to R&D spending (64% of national total) and publication activities (63% of national total).

Since 2010, the number of researchers in Belgrade increased. This growth refers mainly to engineering and technology as well as to natural sciences. In agricultural sciences, the number decreased. During the same period, investment in research and development increased from slightly more than 15 million RSD in 2010 to close to 25 million RSD in 2016. While publication activity grew more or less steadily in the long term (since 1990) it reached a peak in 2012 and has decreased slightly since.

	Resea (FTE,	rchers 2016)	R&D expenditure (in 1,000 RSD, 2016)		Publications (2016)	
	number	% of nat. total	number	% of nat. total	number	% of nat. total
Agricultural Sciences	706	62.8	2,100,378	6.25%	186	56.8
Engineering and Technology	1,842	41.5	9,599,918	22.67%	850	57.9
Humanities	941	66.9	1,474,998	4.99%	64	71.3
Medical and Health Sciences	929	54.8	1,674,956	4.82%	576	72.2
Natural Sciences	2,572	66.0	6,564,373	21.71%	1,133	63.9
Social Sciences	1,278	52.1	2,982,737	8.46%	196	65.3
in total	8,269	55.1	24,397,360*	68.91	2,326**	63.1

Table 2: Scientific Activities in Belgrade

Note: * GERD ** total without overlaps

Source: own analysis of data provided by the Ministry of Education, Science and Technological Development, the Statistical Office of the Republic of Serbia and the Mihailo Pupin Institute & IE

Specialisations

Belgrade does not display significant scientific specialisations only two weak ones in polymer science and material science. In general terms, these two areas can be seen as resonating with the identified patent specialisations but that relation is not very clear. Predominantly, the overall picture underlines that that the capital region is the nation's academic centre. Belgrade is strong in many different areas and produces the bulk of national academic output. Compared to Serbia as a whole, therefore, Belgrade does not display any single, specific area of excellence. Instead, the academic profile of Serbia is quite often de facto constituted by the academic profile of Belgrade.

RS12 - Vojvodina

Vojvodina's share in all researchers of Serbia amounts to 27.5%. This is slightly above the region's population share of 26.7%. Likewise, R&D spending constitutes 28.8% of national total. However, the region accounts only for 18.1% of Serbia's publications.

Since 2010, the number of researchers in Vojvodina increased, especially in engineering and technology. In this area, the number grew from 684 in to 1,789 in 2016. In humanities, to the contrary, the number dropped heavily by 470. At the same time, R&D spending increased from about 4 million RSD to about 10 million RSD. While the growth of publications was moderate until 2006, it picked up until 2012. Since then, a short term decline becomes obvious.

	Resea (FTE,	rchers 2016)	R&D expe (in 1,000 RS	nditure SD, 2016)	Public (20	ations 16)
	number	% of nat. total	number	% of nat. total	number	% of nat. total
Agricultural Sciences	342	30.4	1,429,287	1.53%	105	31.9
Engineering and	1,789	40.3	4,017,272	7.30%		
Technology					303	20.6
Humanities	44	3.1	136,252	0.37%	21	23.2
Medical and Health	337	19.9	118,524	0.34%		
Sciences					91	11.3
Natural Sciences	950	24.4	3,512,022	8.73%	303	17.0
Social Sciences	667	27.2	1,721,481	5.19%	61	20.3
in total	4,128	27.5	10,934,838*	23.47%	666**	18.1

Table 3: Scientific Activities in Vojvodina

Note: * GERD ** total without overlaps

Source: own analysis of data provided by the Ministry of Education, Science and Technological Development, the Statistical Office of the Republic of Serbia and the Mihajlo Pupin Institute & IE

Specialisations

Contrary to Belgrade, Vojvodina displays clear scientific specialisations on telecommunications, various aspects of computer science and various aspects of agricultural science - well in line with its economic profile.

RS21 - Šumadija and Western Serbia

Compared to Northern Serbia, Šumadija and Western Serbia's overall scientific capacities are weak. While its population share is 27.7% in national total its share in researchers is only 6.4%. Likewise, publication activities account to a mere 6.3% of national total and the regions contribution to R&D spending is even lower with only 3.0% of national total.

Between 2010 and 2016 the number of researchers first dropped, then picked up again since 2013. Thus it is comparatively stable over this period. The most relevant increase can be observed in agricultural sciences - by 45 researchers (note the overall number). The development of R&D spending reflects the number of researchers in that it was almost stable over the period from 2010 to 2016 (around 1.1 million RSD). Publication activities increased in the long term and otherwise show a similar development as in Vojvodina. While the development was moderate until 2006, growth increased until 2012. Since then, a slight decline becomes obvious.

	Resea (FTE,	rchers 2016) (I	R&D exper in 1,000 RS	nditure D, 2016)	Public (20	ations 16)
r	number	% of nat. total	number	% of nat. total	number	% of nat. total
Agricultural Sciences	66	5.9	64,440	0.21%	22	6.8
Engineering and Technology	209	4.7	345,909	1.48%	76	5.2
Humanities	146	10.4	17,749	0.05%	0	0
Medical and Health Science	s 106	6.2	60,353	0.14%	57	7.1
Natural Sciences	184	4.7	477,387	1.30%	121	6.8
Social Sciences	243	9.9	174,274	0.45%	15	4.9
in total	954	6.4	1,140,112*	3.63%	231**	6.3

Table 4 Scientific Activities in Šumadija and Western Serbia

Note: * GERD ** total without overlaps

Source: own analysis of data provided by the Ministry of Education, Science and Technological Development, the Statistical Office of the Republic of the Serbia and the Mihajlo Pupin Institute & IE

Specialisations

Similar to parts of Vojvodina's scientific profile, Šumadija and Western Serbia displays specialisations on horticulture and agriculture which are in line with its rural economic profile and such in mechanical engineering that resonate with e.g. the traditional locations of the automotive sector in the region.

RS22 - Southern and Eastern Serbia

Like Šumadija and Western Serbia, Southern and Eastern Serbia is weak with regard to science and technology. The share of researchers on national total is 11.1% while the population share is 21.8%. In line with this, the regional publication share is 12.8%. R&D spending is even lower with only 3.9% of total national R&D spending.

Between 2010 and 2016 the number of local researchers grew. In particular, the number of researchers in medical and health sciences increased by 307 (FTE). At the same time, the number of researchers in agricultural sciences declined by 339. Accordingly, the R&D spending increased steadily from 800,000 RSD 2010 to 1.4 million RSD in 2016. As in all other regions, grow in publication was strongest since 2006, peaking in 2012 and stabilising since.

	Resea (FTE,	rchers 2016)	R&D expe (in 1,000	enditure 0 RSD)	Public (20	ations 16)
	number	% of nat. total	number	% of nat. total	number	% of nat. total
Agricultural Sciences	10	0.9	103,461	0.34%	15	4.5
Engineering and Technology	595	13.4	990,492	2.58%	239	16.3
Humanities	276	19.6	33,954	0.09%	5	5.5
Medical and Health Sciences	324	19.1	71,704	0.28%	74	9.3
Natural Sciences	193	5.0	115,692	0.32%	217	12.2
Social Sciences	266	10.8	168,662	0.38%	28	9.5
in total	1,664	11.1	1,483,965*	3.99%	471**	12.8

Table 5: Scientific Activities in Southern and Eastern Serbia

Note: * GERD ** total without overlaps

Source: own analysis of data provided by the Ministry of Education, Science and Technological Development, the Statistical Office of the Republic of Serbia and the Mihajlo Pupin Institute & IE

Specialisations

Southern and Eastern Serbia, finally, displays some specialisations on electrical and electronical engineering, mathematics and pharmacology that resonate with the patent specialisations in medical and dental instruments and technical testing found above.





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Figure 32: RS12 - Vojvodina – Publications by SCF – WOS Groups



Figure 33: RS21 - Šumadija and Western Serbia – Publications by SCF – WOS Groups





With a view to **scientific potential**, potential priority potential priority domains for smart specialisation can be identified as illustrated in the following overview map:



Figure 35: Potential Priority Domains from a Scientific Point of View

Source: own analysis

A particularly noteworthy point is the apparent decline of agricultural sciences across the whole country. Since research in this field is pertinent for the large parts of the economy, it is not immediately obvious why they appear to be in decline.

5. Potential Priority Domains

5.1 Integrated Two-Step Approach for Identifying Potential Priority Areas

In the above subsections, several current areas of current economy, innovative and scientific activity have been identified as typical and relevant for specific regions.

In short, an elaborated analysis of local specialisations has been conducted. What this analysis alone cannot establish, however, is whether it would really be "smart" to support these priority areas.

In line with this, the Serbian Analytical team suggested that potential priority domains should be put in perspective with a view to several additional socio-economic dimensions before publicly proposing them in a subsequent, stakeholder based EDP.

In short, it was agreed to provide further material as a basis for subsequent EDP discussions on whether the initially identified specialisations can be considered "smart" to invest in the future.

To that end, the following subsection will introduce a two-step approach:

- 1. Integrate all indicators available under a NACE 3 level classification to identify a final set of possible priority areas for smart specialisation,
- 2. Provide further material to gauge the "smartness" of investing in these priority areas based on additional economic data.

In the following, the technical implementation of this approach as well as the findings resulting from it under certain conditions will be presented in sequence.

The findings thus obtained are to a strong extent consistent with those of the "visual", synoptic assessment performed in Section 2 thus underlining the validity of the overall assessment methodology and approach of this report.

5.2 Technical Implementation: Excel Tool for Data Analysis

All information needed to perform this two-step analysis has been integrated in Excel datasheets designed to automatically identify specialisations based on treated raw data.

They indicate areas of specialisation based on specific threshold values and provide additional information for all NACE areas.

Based on agreements with the Serbian Analytical team, the specifically developed analytical tool can serve as a basis for future analysis as well as to gauge the effects of changing threshold values. It has been implemented in Excel so that central parameters in the selection equations can be modified by future analysts. As a result, more or less potential priority fields will be identified while the overall approach remains consistent.

The complete Excel tool is included in Annex to this Final Report.

Technical Details

Technically, data delivered by the Serbian Analytical team has been integrated and processed in the tool in three steps:

• Step 1: identification of basic specialisations on "Raw Data Pages" by Indicator

a) data for relevant indicators were pasted into the sheets after conversion in a suitable format

b) for each NACE area, region and year, a specific "location quotient" (i.e. specialisation indicator) is calculated

c) a NACE area in a certain region and year is labelled as "relevantly specialised" if it meets defined criteria for: specialisation, size, and share in regional economy

Criteria for step 1 c) can be centrally adjusted on a "**Criteria Adjustment Page**" the overall results at the end of the process will then dynamically change

• Step 2: aggregation of findings on "Regional Data Pages"

a) these pages aggregate the "1"/"0" specialisation information by region - sourcing information from the Raw Data Pages (through Excel references)
b) overall "1"/"0" (specialisation/no specialisation) decisions per NACE category are taken, based on whether they are continuous over time

• Step 3: synoptic presentation of findings and other data on "Overview Result Pages"

a) these pages directly quote the final specialisation information from the Regional Data Sheets and present them in a more legible manner

b) these pages present further information that may later on be relevant to assess these specialisations as worthy of support or not

5.3 Illustrative Findings for a Specific Set of Criteria

Step 1: Identifying Potential Priority Domains based on Overall Thresholds

For the following analysis, the following threshold levels have been set in the abovementioned Excel tool's **Criteria Adjustment Page**:

- LFS employment (share (in region): >1.5%, LQ>1.5/1.25, abs >5.000)
- Export (share: >1.5%, LQ>1.5/1.25, abs >250,000)
- Innovation Survey Data (share: >1.5%, LQ>1.5/1.25, abs >25)
- SBS Employment (share: >1.5%, LQ>1.5/1.25, abs >5.000)
- SBS Number of Enterprise (share: >1.5%, LQ>1.5/1.25, abs >250)
- SBS Value Added (share: >1.5%, LQ>1.5/1.25, abs >10 bn RSD)

Accordingly, specialisations were identified in the "Raw Data Pages".

The complete Excel tool is attached to the report in two separate versions; one with the LQ threshold set to LQ=1.5, one with the LQ threshold set to LQ=1.25. Otherwise, all threshold valued are identical.

Different from the earlier "bubble chart" chapters, no further, secondary selection criteria are applied and threshold values do not differ between regions.

ADJUST CRITERIA IN THE CELLS BELOV	V, DO NOT ADAPT THE ACTUAL SH	EETS			Belgrade	Vojvodina	Šumadija/W	South-East
			5	pec. LFS Employment	3	1	6	2
LFS EMPLOYMENT	Decision criterion (LQ >)	1,5	s	pec. Exports	0	2	1	0
	Minimum share of sector in region	1,5%	s	pec. Innovators (Innovating Firms)	3	1	2	0
	Mnimum size (absolute)	5.000	S	pec. Patents	0	0	0	0
					0	0	0	0
EXPORT	Decision criterion (LQ >)	1,5	5	pec. Structural Business Statistics	2	4	6	2
	Minimum share of sector in region	1,5%			0	0	0	0
	Mnimum size (absolute)	250.000	T	otal Potential Specialisations	8	5	8	4
 Innovation Survey	Decision criterion (LQ >)	1.5						
Firms with R&D	Minimum share of sector in region	152						
(currently not used)	Mnimum size (absolute)	25						
Innovation Survey	Decision criterion (LQ >)	1.5						
Innovating Firms	Minimum share of sector in region	1.5%						
	Mnimum size (absolute)	25						
Innovation Survey	Decision criterion (LQ >)	1.5						
Firms with income from innovative products	Minimum share of sector in region	152						
(currently not used)	Mnimum size (absolute)	25						
Employment (SBS, NACE C only)	Decision criterion (LQ >)	15						
	Minimum share of sector in region	1.5%						
	Mnimum size (absolute)	5.000						
 Number of Firms (SBS, NACE C only)	Decision criterion (LQ >)	1.5						
	Minimum share of sector in region	1,5%						
	Mnimum size (absolute)	250						
Value Added (SBS, NACE C only)	Decision criterion (LQ >)	1,5						
	Minimum share of sector in region	1,5%						
	Mnimum size (absolute)	10.000.000						
LFS Employment (NACE C only)	Decision criterion (LQ >)	1,5						
	Minimum share of sector in region	1,5%						
	Mnimum size (absolute)	5.000						

Figure 36: Setting Thresholds in the Excel Tool, overall thresholds

Source: RIS3 Excel Tool

The only element of less than full integration is that, for **patent specialisations**, fixed theresholds have been set (*share: >1.25%, LQ>1.5/1.25, abs >5*) and calculated in separate sheets. Subsequently, the results were manually transferred into the "Overview Result Pages". The scarcity of the data and its different format prevented its full integration and automised processing.

Subsequently, only those NACE3 sectors are kept as relevant specialisations in the "**Regional Data Pages**" that show as pertinent and stable specialisations

- for at least 3 times for single years in either of the "complete coverage" indicator dimensions (across the entire economy)
- for at least 3 times for single years across all indicator dimensions of structural business statistics data jointly (for the industrial sector NACE B only).

To emphasise the particular importance of employment and account for the different ways in which it is measured, the latter analysis covers not only SBS employment, SBS value added and SBS 'number of firms' data, but also LFS employment data for the industrial sectors covered by structural business statistics.

Should the need arise, the threshold criterion of "3 times" during the available period can be adapted in the sheet by future users (red circle in figure below) to increase or decrease the number of relevant specialisations identified. In practice, the threshold of "3 times" has proven neither too rigid nor too low.



Figure 37: Setting Thresholds in the Excel Tool, time dimension

Source: RIS3 Excel Tool

For the relevant dimension of **patents**, specialisations had to be identified separately based on aggregated figures from 2010-16 as their overall number was rather low. Hence, calculations implicitly (if less elaborately) already consider the issue of stability over time and do not need to be specifically reviewed.

The following boxes list the specialisations identified in the four Serbian regions (for which data is available), using the Excel tool.

In line with the two versions of the Excel tool provided in Annex to this report, the subsequent tables separate between specialisations that are obvious (LQ>1.5 level) and those that are less obvious but still detectable (LQ>1.25 level).

Additionally, specialisations that are only present in the measurement dimension of patents are listed separately. Typically, they do not amount to economic leverage points as is but instead will be considered with regard to their potential as emerging fields.

RS11: Belgrade / Београд

- C18.1 Printing and service activities related to printing
- C26.2 Manufacture of computers and peripheral equipment
- H49.3 Other passenger land transport
- J58.1 Publishing of books, periodicals and other publishing activities
- J62.0 Computer programming, consultancy and related activities
- K64.1 Monetary intermediation
- M72.1 R&D in natural sciences and engineering
- P85.4 Higher education

including those with LQ 1.25-1.5

- G46.7 Other specialised wholesale
- G47.2 Retail sale of food, beverages and tobacco in specialised stores
- I56.1 Restaurants and mobile food service activities
- M71.1 Architectural and engineering activities and technical consultancy
- O84.1 Administration of the state and the economic and social policy
- Q86.1 Hospital activities
- Q86.2 Medical and dental practice activities
- S96.0 Other personal service activities

Some further possible areas could be identified exclusively with a view to patent applications:

- C11 Manufacture of beverages
- C20.1 Manufacture of basic chemicals, fertilisers plastics and synthetic rubber
- C20.4 Manufacture of soap and detergents
- C21 Manufacture of basic pharmaceutical products
- C26.1 Manufacture of electronic components
- C30 Manufacture of other transport equipment

RS12: Vojvodina / Војводина

- A1.1 Growing of non-perennial crops
- C10.1 Processing of meat and production of meat products
- C19.2 Manufacture of refined petroleum products
- C20.1 Manufacture of basic chemicals, fertiliser, plastics and synth. rubber
- C22.2 Manufacture of plastics products
- C29.3 Manufacture of parts and accessories for motor vehicles

including those with LQ 1.25-1.5

- C10.7 Manufacture of bakery and farinaceous products
- C10.8 Manufacture of other food products
- G46.4 Wholesale of household goods

Three further possible areas could be identified exclusively with a view to patent applications:

- C26.3 Manufacture of communication equipment
- C28.3 Manufacture of agricultural and forestry machinery
- C26.5 Manufacture of instruments and appliances for measuring, testing

RS21: Šumadija and Western Serbia / Шумадија и западна Србија

- A1.2 Growing of perennial crops
- A1.4 Animal production
- A1.5 Mixed farming
- C10.3 Processing and preserving of fruit and vegetables
- C14.1 Manufacture of wearing apparel, except fur apparel
- C16.1 Sawmilling and planning of wood
- C22.2 Manufacture of plastics products
- C25.4 Manufacture of weapons and ammunition
- C29.1 Manufacture of motor vehicles
- C29.3 Manufacture of parts and accessories for motor vehicles
- C31.0 Manufacture of furniture
- G46.9 Non-specialised wholesale trade

including those with LQ 1.25-1.5

- C10.7 Manufacture of bakery and farinaceous products
- C25.9 Manufacture of other fabricated metal products
- F43.2 Electrical, plumbing and other construction installation activities

Two further possible areas could be identified exclusively with a view to patent applications:

- C28.9 Manufacture of other special-purpose machinery
- C28.3 Manufacture of agricultural and forestry machinery

RS22: Southern and Eastern Serbia / Јужна и источна Србија

- C22.1 Manufacture of rubber products
- C24.1 Manufacture of basic iron and steel and of ferro-alloys
- D35.1 Electric power generation, transmission and distribution
- T98.1 [agricultural] activities of private households for own use

including those with LQ 1.25-1.5

- A1.1 Growing of non-perennial crops
- C14.1 Manufacture of wearing apparel, except fur apparel

Two further possible areas could be identified exclusively with a view to patent applications:

- C10 Manufacture of food products
- C32.5 Manufacture of medical and dental instruments and supplies

Step 2: Matching of Results with Further Information on "Smartness"

To assess the relevance and potential promise of the identified economic priority domains, a number of further, qualifying sources of information will be synoptically listed in the Excel tool's "**Overview Result Pages**":

- total employment: Even though the selection of fields did as such consider a minimum threshold, concrete information on the absolute number of jobs involved can give additional information about the area's leverage with a view to growth and jobs for the regional economy in question.
- wages: While a sector can be relatively important for a regional economy it will only then be relevant as a future priority domain if it allows the local population to earn a sufficient living from sector-related jobs (rather than migrate). Where national wage levels are as low as in Serbia this aspect becomes even more important.
- **value added**: While an indispensable basis, employment as such does not guarantee national well-being. At the same time, it is important that the national industry is not only concerned with assembly but with relevant activities that generate actual value added within the country.
- **labour productivity**: Labour productivity differs by sectors according to capital intensity. As such, it is therefore no straightforward measure to "rank" priority domains. However, it may be a relevant aspect in considerations to understand whether additional employment in a sector will be more productive or not.
- growth in employment: sectors that have displayed positive development in recent years are more likely to display such a development in years to come and therefore more promising as future priority domains. Sectors that are visibly in decline may still be relevant, but in any case require a different approach.

This can be relevant both with regard to existing areas that seem to be current points of economic leverage or concern as well as areas identified through the patent analysis which could be considered as possible emerging areas.

The following tables quote the synoptic overview of additional information for Serbian regions' relevant specialisations as it is provided in the Excel tool's "Overview Result Pages".

RS11: Belgrade / Београд

	Empl 3	Exports4	Wages5 Value		Labour	Growth
	Empl.*	Exports	mages	Added ⁶	Productivity ⁷	Empl. ⁸
LQ > 1.5						
C18.1 Printing	4,936	183	41,352	3.91	1,359	24.6%
C26.2 Computers	240	41,038	136,745	4.15	2,191	19.6%
H49.3 Transport	16,463	0	47,674	13.66	1,303	21.8%
J58.1 Publishing	4,980	30,282	64,241	7.66	1,441	31.4%
J62.0 Programming	10,413	0	244,641	28.45	2,942	28.2%
M64.1 Monetary	15,931	0	104,359	Х	х	26.9%
M72.1 R&D Natural	5,116	0	75,938	8.97	2,271	31.6%
P85.4 Higher Educ.	10,765	0	77,967	Х	х	26.5%
LQ > 1.25						
G46.7 Wholesale	10499	0	122,572	16.55	2,028	24.1%
G47.2 Retail (food)	20036	0	24,859	1.37	730	18.0%
I56.1 Restaurants	16879	0	30,319	4.37	583	19.0%
M71.1 Arch/Tech C	6115	1,190	69,809	12.90	1,672	23.5%
O84.1Administration	18745	0	53,078	Х	х	19.3%
Q86.1 Hospitals	20490	0	45,152	Х	х	15.6%
Q86.2 Med./Dental	14940	0	40,583	Х	х	19.5%
S96.0 Pers. Serv	10212	0	28,300	Х	х	20.3%
Patents						
C11 - Beverages	2,210	51,839	109,352	7.85	3,512	83.1%
C20.1 Basic Chem.	421	34,584	110,855	3.49	5,981	31.2%
C20.4 Detergents	399	134,330	n/a	4.20	2,787	57.2%
C21.2 Pharma	2,634	28,659	61,548	3.57	1,748	220%
C26.1 Electr. Comp.	166	3,279	n/a	-0.22	1,215	82.1%
C30.1 Transp. Eq.	465	3,594	59,985	0.06	521	152%

Table 6: Additional Information on Potential Priority	ty Domains in Belgrade
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Source: Own analysis

Upon closer scrutiny, a review of "potential priority domains for smart specialisation " (to be verified during entrepreneurial discovery process) in the Belgrade region reveals the software sector as one clear candidate as it contributes significantly to value added, grows and pays high wages. The overall role of the hardware sector, to the contrary, remains tiny, although apparently characterised by a large number of smaller firms.

³ Number of Employed Persons, Head Count, 2016

⁴ Thousands of Euros, 2016

⁵ Net Annual Wages, RSD, 2016

⁶ Value Added at Factor Costs, billion RSD, 2015

⁷ Factor Productivity, 1,000 RSD, 2015

⁸ AAGR, 2011-2016

Overall, it is remarkable that none of the identified, mostly service, sectors displays substantial export volumes, as is common for most local services. With a view to these service areas, monetary intermediation, wholesale, architectural and technical consultancy, higher education, R&D in natural sciences can be considered relevant areas of attention as they too pay high wages, have grown at a notable pace and - insofar that is known - contribute notably to regional value added. In other areas like transport of medical & dental activities, potential is conceivable, but not obvious, given comparatively low wages and mid-range growth.

From those identified through patent analysis, beverages, pharmaceuticals, electrical components and transport equipment appear noteworthy candidates as emerging sectors based on their notable growth rates, basic chemistry and detergents less so. However, their overall employment potential is modest at best.

RS12: Vojvodina / Војводина

	Empl.2	Exports3	Wages4	Value Added5	Labour Productivity6	Growth Empl.7
LQ > 1.5						
A1.1 N-P Crops	61,889	486,872	40,624	Х	х	24.7%
C10.1 Meat Proc.	9,088	55,458	33,347	9.00	1,415	25.3%
C19.2 Refining	2,684	191,548	133,598	42.16	14,092	29.7%
C20.1 Basic Chem.	2,803	330,834	65,259	2.94	822	23.9%
C22.2 Plastics	6,396	234,372	52,938	8.42	1,738	20.2%
C29.3 Vehicle Part	9,351	274,958	39,358	6.92	938	21.9%
LQ > 1.25						
C10.7 Bakery	10,488	28,438	27,213	3.58	1,061	19.5%
C10.8 Food Prod.	6,347	213,260	57,331	7.54	2,996	19.4%
G46.4 Wholesale	1,855	0	28,614	3.99	1,012	15.1%
Patents						
C26.3 Com. Equip.	0	6,670	23,453	0.06	1,232	0%
C28.3 Agri. Machin.	1,253	14,613	19,927	0.62	915	239%
C26.5 Instruments	475	7,398	29,387	0.58	1,454	227%

Table 7: Additional Information on Potential Priority Domains in Vojvodina

Source: Own analysis

In Vojvodina, the refinery (petrochemical) sector stands out as very productive, pays high wages, has grown dynamically, and contributes significantly to value added and to exports. However, it only employs a very limited number of people. Nonetheless, it should be a relevant element in future strategies, in particular if the focus of the "petrochemical sector" is extended to the basic chemicals sector.

A second relevant industry is the vehicle parts sector that grows, pays reasonable wages, creates a relevant amount of value added and contributes relevantly to exports even though productivity, as in the basic chemicals sector, remains low. Additionally, similar findings can be put forward for the local plastics industry where - based on sectoral specifics - labour productivity is already higher.

Most prominently, however, Vojvodina continues to depend on its agricultural sector that employs large shares of the population, grows rather dynamically, constitutes the key source of exports from the region and, according to several surveys, and continuously develops further through innovation. By Serbian sectoral standards, wages are also relatively high. Any broad-based change introduced to that sector would have severe implications for the regional economy than that in any of the abovementioned sectors.

Among the three highlighted agro-food processing sectors depending on local farming outputs, "food processing" stands out as paying the best wages, contributing most to exports and reaching highest levels of labour productivity.

From those identified through patent analysis, agricultural machinery and measurement instruments appear noteworthy candidates as emerging sectors based on their notable growth rates, computer equipment less so. The overall employment potential of these sectors is modest, with the possible exception of agricultural machinery.

RS21: Šumadija and Western Serbia / Шумадија и западна Србија

	Empl.2	Exports3	Wages 4	Value Added5	Labour Productivity 6	Growth Empl.7
LQ > 1.5						
A1.2 P Crops	29,306	49,131	25,512	х	х	24.9%
A1.4 Animal Prod	47,146	26,876	25,747	х	х	25.7%
A1.5 Mixed Farm	136,707	0	25,890	х	х	24.0%
C10.3 Fruit Proc.	5,584	221,273	36,595	7.51	1,824	22.3%
C14.1 Apparel	11,022	91,073	24,367	4.32	668	26.3%
C16.1 Sawmilling	4,538	22,779	30,977	1.98	915	19.6%
C22.2 Plastics	6,626	177,013	38,466	8.39	1,844	19.2%
C25.4 Weapons	8,015	88,905	55,707	9.94	1,455	33.1%
C29.1 Vehicles	3,821	1,018,810	50,058	16.81	4,057	28.5%
C29.3 Vehicle Part	4,881	248,821	36,474	10.48	1,083	12.3%
C31.0 Furniture	7,084	113,788	30,689	4.72	1,029	16.9%
G46.4 Wholesale	2,454	0	28,582	10.95	1,302	13.3%
LQ > 1.25						
C10.7 Bakery	6,938	3,121	23,646	1.68	640	17.5%
C25.9 Metal Prod	2,631	96,877	41,376	5.24	1,507	11.6%
F43.2 Installations	2,884	0	28,290	1.79	1,121	13.1%
Patents						
C28.9 Sp. Purp. Mch.	978	31,309	46,256	0.79	744	112%
C28.3 Agri. Machin.	262	6,397	30,172	-0.07	892	44.8%

Table 8: Additional Information on Potential Priority Domains in Šumadija & Western S.

Source: Own analysis
Šumadija is the traditional centre of automobile production in Serbia. This specialisation still shows in close to all dimensions of the analysis, in particular with regard to exports and local value added. It pays the highest wages in the region and can be a leverage point for future support, in particular as the growth dynamics in the local supplier chain (vehicle parts) do not keep pace with the main OEM sites.

Beyond automotive, there are a number of other, smaller sectors like plastics, metal production, furniture, and apparel. These grow and deserve attention even if their value added contribution is lower and they export notably less than the automotive sector.

Furthermore, Šumadija and Western Serbia is characterised by a growing agricultural sector that is, however, more domestically oriented and sees less innovation than in Vojvodina. Accordingly, wages only reach about two thirds of those in Vojvodina and are among the lowest in absolute terms. Hence, the local agricultural sector should not as such be considered a "potential priority domain for smart specialisation" in its common structure, but its growth dynamics indicate that it may provide suitable leverage point for a transformation whose benefits would quickly reach large shares of the local population. Even today, for example, the fruit processing sector pays wages higher that of other local industries like apparel or furniture. In any case, the local agroeconomy is too large to be disregarded in any future strategy. Finally, the defence industry features prominently and pays the highest wages.

From those identified through patent analysis, special purpose machinery appears a noteworthy candidate as an emerging sectors based on its notable growth rates, agricultural machinery less so. The overall employment potential of both of these sectors is still relatively modest.

RS22: 8	Southern	and	Eastern	Serbia /	Јужна	и источна	Србија
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	Empl.2	Exports3	Wages4	Value Added5	Labour Productivity6	Growth Empl.7
LQ > 1.5						
C22.1 Rubber	4,711	313,158	60,348	14,88	4,708	27.0%
C24.1 Iron & Steel	4,830	135,201	70,212	-6,87	-1,364	39.0%
D35.1 Electr Power	9,711	0	84,252	0,27	1,725	22.7%
T98.1 Agriculture	53,929	0	Х	х	х	26.0%
LQ > 1.25						
A1.1 N-P Crops	30,046	15,392	35,030	х	х	17.4%
C14.1 Apparel	8,277	45,675	23,671	3.26	592	17.5%
Patents						
C32.5 Med&Dental	300	353	24,039	0,15	1,174	115%
C10 Food Products*	~13,400	~100,000	~30,000	~10,00	~619	~50%

Table 9: Additional Information on Potential Priority Domains in Southern & Eastern S.

* based on averages and sums over NACE 10.1-10.9

Source: Own analysis

In terms of industry, the local iron and steel and the rubber industry stand out as paying above average wages, growing at a relevant pace and contributing substantially to exports. While the rubber industry contributes significantly to local value added, however, the iron and steel industry makes losses, resulting in negative value added and negative labour productivity - insofar this can be concluded from the data. Hence, only the rubber industry can in a straightforward way be considered a potential priority domain for smart specialisation, while the iron and steel industry needs to be approached from a different angle, aiming at restructuring. In a region where few alternative economic leverage points are available, however, such efforts may well merit consideration.

Like Šumadija and Western Serbia, moreover, Southern and Eastern Serbia remains at its core an agricultural economy in which the respective sector displays even lesser dynamics. While there is growth, it is mostly in the informal sector, innovation remains absent and wages below national average. As in Šumadija and Western Serbia, business model modernisation and technology application in the agricultural sector would in principle be the best option to reach broader parts of the population. The current structure of the sector, however, seems to impose even further limitations than in that case, leave alone in Vojvodina, where it is a real option.

Finally, the region is home to a textiles and apparel sector that supports a relevant level of employment, even if at some of the lowest wages found in the overall earnings statistics. However, the innovation survey suggests that some of its firms may be updating their facilities and products so that it may merit some further attention.

Finally, Southern and Eastern Serbia is specialized in electric power generation, a sector that pays very high wages by local standards, but that with great likelihood cannot be substantially expanded with a view to employment and value added, as the number of (often hydraulic) power stations is given and limited.

From those identified through patent analysis, both medical and dental products and the food sector appear as noteworthy candidate for emerging sectors based on their notable growth rates. While the overall employment potential of the former is very modest, that of the latter is already substantial at the current point in time.

6. Conclusion

For communication to policy makers and stakeholders, the above degree of detail needs to be reduced to a simple, one page message as a basis for discussion.

To that end, it can be concluded that all analytical approaches outlined in this report do in summary lead to the conclusion that the following potential priority areas can be identified on the basis of the data and could serve as a basis for further consideration in a later, stakeholder based EDP.

RS11: Belgrade / Београд

- Computer Programming and ICT
- R&D and Technical Consultancy
- Creative Economy
- Monetary Intermediation

potentially emerging innovative

• Beverages, Pharmaceuticals, Electrical Components, Transport Equipment Science

• various

RS12: Vojvodina / Војводина

- Automotive
- Agricultural Economy (including processing industries)
- Petrochemical Industry
- Plastics Industry

potentially emerging innovative

Agricultural Machinery, Measurement Instruments

Science

• Computer Science, Telecommunications

RS21: Šumadija and Western Serbia / Шумадија и западна Србија

- Agri-/Horti-/Silvicultural Economy (including processing industries)
- Automotive
- Textile Industry
- Plastics Industry
- Metal Industry

potentially emerging innovative

• Special Purpose Machinery

Science

• *(mechanical engineering, pharmacy)*

RS22: Southern and Eastern Serbia / Јужна и источна Србија

- Agri-/Horticultural Economy (including processing industries)
- Textile Industry
- Rubber Industry

(Electrical Engineering)

potentially emerging innovative

• Food Products, Medical and Dental

Science

• (electrical engineering)

An overview of all potential priority areas for smart specialisation is given in the following map.

Figure 38: Illustrative Overview of Potential Priority Domains in Serbia



Source: yourfreetemplates.com; https://icons8.com/icon/pack/Industry

Source: own analysis

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7. Recommendations and Next Steps

This report has compiled a wealth of information on Serbia's regions' economies from various analytical perspectives. It has analysed next to all currently available datasets and very current information which is only about to become publicly available.

After casting light on economic, innovative and scientific activities from various angles the authors have gone some way to integrate the different perspective and to develop an actual tool with which potential areas of specialization can be identified based on adaptable premises and judged based on additional criteria.

Together with the Serbian Analytical team, the authors now feel safe to say that they have covered and interpreted all pertinent quantitative information to a degree that further analysis or the integration of additional data would not substantially affect the outcome of the analysis.

An overall picture of regional strengths, weaknesses and possible leverage points in the form of potential priority areas has emerged. The report provides a wealth of information for further assessment and analysis and suggests threshold values to identify specialisation domains.

This, however, can only be the basis for a further discussion of actual political prioritisations in the upcoming entrepreneurial discovery process. Quantitative data alone cannot sufficiently indicate what is desirable and feasible within both the political and the economic domain.

However, the quantitative analysis gives clear indications on which economic sectors the Serbian population depends for growth and jobs and where there dynamic development is more likely. Less than pre-determining its outcome, it thus clearly indicates which areas may not be overlooked in future stakeholder consultations.

As one bottom line message, it would seem essential that an economy like Serbia's that still strongly depends on agriculture and various light industries also leverages on these potentials, rather than focusing on classic high-tech sectors alone.

Annex 1 National and Regional Specialisations

Irrespective of their absolute economic relevance or dynamic, specialisations can in a further dimension be analysed with respect to the fact whether they are genuinely regional (i.e. affect one Serbian region alone, or close to alone) or whether they are relevant for at least two of the, or even more.

At a later stage, this will inform decisions on whether a strategy needs to foresee a national level effort for certain activities or if these can - and should - be delegated to regional stakeholders and policy makers. As such consideration will mostly be relevant from an impact perspective, the following analysis will focus on the distribution of employment in the preliminary priority areas that the prior analysis has identified.

In consequence, two different types of preliminary priority areas can be identified:

- such in which more than 50% of all employment is concentrated in one region,
- such in which there is an emphasis in one region, but further activities in others,
- such in which there is no particular regional emphasis.

The preliminary priority areas in which one region displays a share above 50% of national total and thus a dominant concentration are:

for Belgrade:	R&D	in	Natural	Science	es, Publish	ing of	Books,	Computer
	Progra	mmi	ng, M	onetary	Intermedia	ation,	Higher	Education,
	(Manu	ufacture of Communication Equipment)						
for Vojvodina:	Manufa Agricu of Nor of Mea	actur Itural n-Pei asurir	ring of I and Ho rennial C ng and T	refined rticultural Crops, (Ma esting Eq	Petroleum Equipment, anufacture o uipment).	Produc Process of Comp	nts, Manu sing of Mea outers, Ma	Ifacture of at, Growing Inufacturing

for Šumadia and Western Serbia: Manufacture of Weapons and Ammunition, Manufacture of Motor Vehicles, Sawmilling and Planing of Wood, Animal Production, Growing of Non-Perennial Crops, Mixed Farming, Processing of Fruit.

for Southern and Eastern Serbia: Manufacturing of Basic Iron or Steel.

While this is relevant in terms of underlining that each region has its own, very particular potentials or at least characteristics, it is equally relevant to underline that all other preliminary priority area concern at least two, not uncommonly three regions as illustrated in the Figures below. In some cases, capacities are very predominantly shared with one region. In the majority of cases, however, they exist across the country at different levels. It is peculiar, however, that the preliminary priority areas are more or less equally relevant for all regions. Currently, the only exception is the hospital and medical sector.

In line with earlier in-depth analyses for the individual regions, preliminary priority areas with relevance for more than one region and to be addressed at national level include:

- Pharmaceuticals (Belgrade & Vojvodina)
- Engineering and technical consultancy (Belgrade & Vojvodina)
- Parts and accessories for motor vehicles (Vojvodina & Southern and Eastern)
- Manufacture of food products (Vojvodina & Šumadia and Western)
- Manufacture of plastics products (Šumadia/Western & Southern/Eastern)
- Manufacture of special purpose machinery (Šumadia/Western & Belgrade)
- Manufacture of fabricated metal products (Šumadia/Western & Vojvodina)
- Manufacture of furniture (Šumadia/Western & Southern/Eastern)
- Manufacture of apparel (Šumadia/Western & Southern/Eastern)
- Manufacture of rubber (Southern/Eastern, Vojvodina & Šumadia/Western)

As the figures below illustrate, however, even priority areas in which one region binds more than 50% of all Serbian employment, a national level approach may be relevant, taking into account the other 50%.

Since Serbia does in hardly any field display a clear-cut, region-by-region specialisation, however, these decisions will ultimately have to be taken at policy level when the selection of priority areas has been finalised and a more in-depth investigation of the relevant ones can be launched.



Figure Annex 1: Preliminary Priorities with most Employment in Belgrade

Note: These will be mainly but not necessarily fully identical with the priority areas suggested for this region - it could be that this region has more employees than the specialised region

Figure Annex 2: Preliminary Priorities with most Employment in Vojvodina



Note: These will be mainly but not necessarily fully identical with the priority areas suggested for this region - it could be that this region has more employees than the specialised region



Figure Annex 3: Preliminary Priorities with most Employment in Šumadia and Western

Note: These will be mainly but not necessarily fully identical with the priority areas suggested for this region - it could be that this region has more employees than the specialised region

Figure Annex 4: Preliminary Priorities with most Employment in Southern and Eastern



Note: These will be mainly but not necessarily fully identical with the priority areas suggested for this region - it could be that this region has more employees than the specialised region

Figure Annex 5: Preliminary Priorities without clear regional focus



Annex 2 Illustrative Further Information on Potential Priority Areas

RS11: Belgrade / Београд



wages (left axis) vs. exports (right axis)







RS12: Vojvodina / Војводина



wages (left axis) vs. exports (right axis)









RS21: Šumadija and Western Serbia / Шумадија и западна Србија

wages (left axis) vs. exports (right axis)





wages (left axis) vs. employment growth AAGR (right axis)



RS22: Southern and Eastern Serbia / Јужна и источна Србија

wages (left axis) vs. exports (right axis)





