

Valentina Ivanič

Overcoming Regional Disparities in Serbia through Regional Innovation Systems at the NUTS II Level

Abstract

The objective of this research is to reveal and understand the strengths and weaknesses of the two groups of regional innovation systems in Serbia – those operating in Belgrade and Vojvodina region, with strong administrative capacity, and those operating in Šumadija and Western Serbia and Southern and Eastern Serbia, operating without administrative capacity at the regional level. Data were collected from existing databases, and interviews with members of the focus groups. The action research methodology was used also.

The findings show that regions without administrative capacity have RDAs with cooperative culture, more externally oriented, and more devoted to building economic software and economic orgware axis instead of the regions with administrative capacity. The mature RIS is present in the regions without administrative power in Serbia (Šumadija and Western Serbia, Southern and Eastern Serbia) in comparison to two NUTS II regions (Belgrade and Vojvodina region)

Keywords: regional disparities, regional system of innovation, culture, Serbia,

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Introduction

The subject of this research is the analysis of the maturity of the systems on innovation at the regional level in Serbia. The conceptual and theoretical framework of this research is the Regional innovation system theory as well as Institutionalism.

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RISs were conceptualized by Cooke et al. (Cooke, Uranga, & Etxebarria, 1997, p. 480) as a “collective order based on micro constitutional regulation,” and this general associational, cooperative, and trust-dependent character of RISs is what makes them valuable and interesting to learn. According to Asheim and Coenen, “The regional innovation system can be thought of as the institutional infrastructure supporting innovation within the production structure of a region” (Asheim & Coenen, 2005, p. 1177).

In the history of regional economic development theory, regional innovation systems have been thought of as key factors in reducing regional disparities in post-socialist economies (Radosevic, 2002). Regional innovation systems are fast becoming key instruments in low-coordinated societies and economies.

The trust which is at the heart of our explanation of low-coordinated societies, as well as economies, can be revealed and explained by using some of Hofstede's dimensions of culture. The definition of culture by Hofstede allows the application of this concept both to nations and regions, as well as to companies. Culture is defined as “a collective programming of the mind which distinguishes members of one group or category of people from another” (Hofstede, 2001:9).

The institutional environment of Western Balkan countries was observed as low-coordinated, marked by low degrees of cooperation and trust (Hofstede, 2001, p. 501), (Eriksen, „Institution Building in Central and Eastern Europe: Foreign Influences and Domestic Responses“, 2007). In such an environment, a participatory regional development policymaking approach such as smart specialization can serve to mitigate institutional asymmetries but is likely to face major

challenges, leading to an institutional smart specialization paradox (Lehmann, Benner, & Kapo, 2022, p. 2). It should be noted that some authors show how, in the past, smart specialization was mainly concerned with the development of the R&D infrastructure per se, instead of observing R&D infrastructure as just one of the types of regional infrastructure that forms the backbone of any regional development strategy (Radosevic & Ciampi Stančova, 2018), (Pike, Rodriguez-Pose, & Tomaney, 2006).

Most studies in the field of regional development have been devised based on industrial location theories, with the general policy frameworks created to be reactive to shocks, with a sectoral approach, targeting lagging regions, based on exogenous investments and transfers, incentive schemes with subsidies and state aid, with focus on hard infrastructure and business aid, based only on supply-side policies, and top-down policy development, inherent for the old, classic regional development paradigm (Bachtler & Yuill, 2001).

Barquero structures the regional economic development around the scheme that covers the development of economic hardware, software, and orgware. In other words, the sequence of activities, policies and instruments that need to be undertaken in the scheme is clear: first you need hardware (computer), followed by software (regional development strategies, dense R&I infrastructure) and in the end at the time of networked society the key determinant of competitiveness is your position within the business network, therefore you need an orgware (ability to form partnerships) (Pike, Rodriguez-Pose, & Tomaney, 2006, p. 17) Orgware stage emphasizes the capacity of governments to manage processes (governance) and develop both vertical and horizontal partnerships (Ivanić, 2010, p. 15). However, much uncertainty still exists about the relation between the economic hardware, software, and orgware.

Although some research has been carried out on regional development, the mechanism by which the sequence of activities, policies, and instruments that need to be undertaken in low-coordinated regions, in centralized countries, has not been established.

Moreover, Serbia has over 100 adopted strategies or strategic plans, which place it in the so-called “software” stage of economic development. The next step in Serbian economic development should be centred on more precise, short-term and medium-term plans inherent for the “orgware” stage of economic and social development. (Ivanic, 2020, p. 74). Very little is known about regional orgware, notably early-stage regional innovation systems in countries where the R&I system is centralized at the national level (Ranga, 2018). This paper seeks to remedy these problems by analyzing the examples of early-stage regional innovation systems

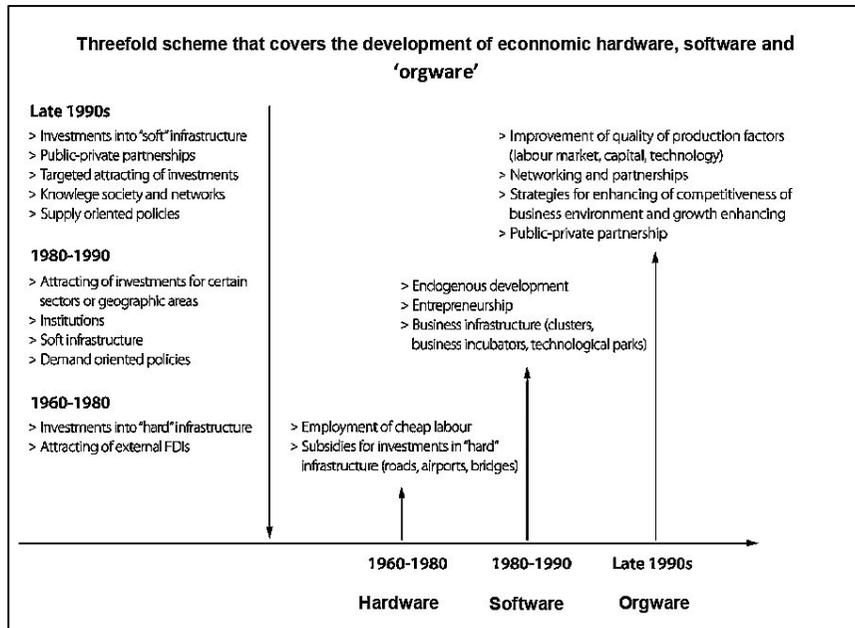


Figure 1. Development of economic hardware, software, and orgware

Source: author's work, adapted based on

(Pike, Rodriguez-Pose, & Tomaney, 2006), (Vázquez Barquero, 1998)

The key variables that will be observed as relevant to our research questions are dimensions of the societal culture of Serbia, research and development expenditure per region, GDP per capita, GVA per region, and type of regional development policies.

Based on the above-mentioned research questions the following hypothesis can be stated:

- 1) Regions with a cooperative culture, formal institutions marked by innovation-related policies strong collaboration networks, will exhibit a more mature regional innovation system
- 2) Regions with a competitive culture, formal institutions marked by adaptation-related policies, and reacting policies will exhibit a more early-stage regional innovation system.

In the following sections, an overview of relevant literature will be presented. Chapter Two begins by laying out the theoretical dimensions of the research. The third chapter is concerned with the methodology used in this research. The fourth section was dedicated to the data and analysis, while chapter five presents the findings of the research. Chapter Six presents the conclusions. In the end, recommendations for future research will be revealed and presented. Areas for future research are identified. Finally, the list of the references cited in this paper is presented.

Literature review

The theory of regional development has evolved, shaped by various disciplines and changing perspectives on regional economy, economic geography, sociology, and policy. In this article, we will analyze regional inequalities in Serbia, using Innovation, knowledge, and learning theory, especially its regional innovation perspective (Pike, Rodriguez-Pose, & Tomaney, 2006). Also, we will observe inequalities in Serbia through the lens of the Institutionalist theory, notably by using its networks and trust perspectives.

In regional development theories, institutionalism highlights the importance of institutions (formal and informal) in shaping regional development trajectories (Amin, 2004), (Asheim & Coenen, 2005) (Bachtler & Yuill, 2001), (Benner, 2019), (Cooke, Uranga, & Etxebarria, 1998), (Fitjar & Rodriguez-Pose), (Keating, 2000), (Fritsch & Slavtchev, 2011), (Cooke, Uranga, & Etxebarria, 1998), (Eriksen, 2006), (Rodriguez-Pose, 2013), (Vázquez Barquero, 1998) (North, 1991).

Understanding the institutional context of a region is crucial for designing effective policies and strategies that promote sustainable and inclusive regional development (Amin, 2004), (Benner, 2019), (Gallego-Álvarez & Pucheta-Martínez, 2021).

In the neo-classical model, regional output growth is dependent upon the growth of three factors of production: capital stock, labour force, and technology (Pike, Rodriguez-Pose, & Tomaney, 2006, p. 63). Regional output growth as suggested by the institutionalist and socio-economic theories is dependent upon the coordination of collective action in a social process of innovation, guided by intermediate institutions (Amin, 2004), (Asheim & Coenen, 2005), (Cooke, Uranga, & Etxebarria, 1997), (North, 1991), (Radosevic, 2002), (Potocnik, 2009) etc. Figure 2 below illustrates some of the main characteristics of the informal, and formal institutions and policies inherent in the strong versus weak regional system of innovation (hereinafter RIS).

	Informal institutions	Formal institutions	Policy
Strong RSI potential	Cooperative culture Associative learning disposition Change orientation Public-private consensus	Trustful labour relations Workplace cooperation Worker-welfare orientation Mentoring Externalisation Innovation	Inclusive Monitoring Delegation Consultative Networking
Weak RSI potential	Competitive culture Individualistic 'Not invented here' Conservative Public-private dissension	Antagonistic labour relations Workplace division 'Sweating' 'Sink or swim' Internalisation Adaptation	Exclusive Reacting Centralisation Authoritarian 'Stand-alone'

Figure 2. Elements for a Strong and weak regional system of Innovation (RSI)

Source: Adapted from (Cooke, Uranga, & Etxebarria, 1998), (Pike, Rodriguez-Pose, & Tomaney, 2006)

The objectives of this research are to determine whether innovation systems at the regional level in Serbia are marked by strong or weak RSI potential. This research aims to shine new light on the RIS debates through an examination of institutions, firms and policies situated in NUTS II regions in Serbia. When it comes to the trust and network perspective it should be noted that we use Hofstede's model of dimensions of culture as a theoretical framework (Hofstede, 2001). Also, A large and growing body of literature has investigated the role of informal institutions in creating cooperative and competitive culture, as well as regional innovation culture. Numerous authors have attempted to explain the links between informal and formal institutions (Eriksen, 2006), (Gallego-Álvarez & Pucheta-Martínez, 2021), (Hofstede, Hofstede, & Minkov, 2005), (Ivanic, 2020), (Keating, 2000), (Eriksen, 2007), (Švarc, Lažnjak, & Dabić, 2019), (Paunovic & Ivanic, 2018) etc.

Economic issues make up a large part of the EU, but they are discussed incomparably less than political ones. Two-thirds of the negotiations on joining the EU are economic chapters, but different actors spend more than 90 per cent of their time talking about political criteria. Regional development policy is one of the most important and complex EU public policies.

Serbia is moderately prepared when it comes to regional policy and the coordination of structural instruments. Regarding programming, a development plan, which is a legally defined basis for its regional development policy, has yet to be adopted. It should valorise the

development potentials of all regions in Serbia and reduce regional and local disparities. (COMMISSION STAFF WORKING DOCUMENT Serbia 2022 Report, 2022, p. 122)

When it comes to the legislative framework, it should be pointed out that there is the Law on Regional Development of Serbia (2009), but a large number of legal solutions are partially or not implemented at all. There is no strategic framework since the validity of the Strategy and Policy of Regional Development of Serbia 2007-2012 expired and a new strategic document has not been adopted yet.

The institutional framework consists of actors between whom there is no vertical or horizontal connection and who deal with this topic sporadically (Focus, 2022). In the period 2014-2016, the Ministry of Regional Development was shut down, as well as the National Agency for Regional Development and the Office for Sustainable Development of Underdeveloped Areas. At the local level, there are 17 accredited regional development agencies whose potentials are insufficiently used vertically and horizontally in the implementation of Serbia's regional policy (Focus, 2022)

The Development Agency of Serbia is primarily focused on attracting foreign direct investment and de facto, does not serve as a regional development actor (Focus, 2022), (Bartlett, Krasniqi, & Ahmetbašić, 2019), (Uvalić & Bartlett, 2021) etc.

More balanced regional development policies based on subsidies have had little effect in reducing regional disparities as the subsidies have not been effectively targeted on firms in the least developed regions. Nevertheless, local self-governments have not been recognized as key stakeholders in the formulation and implementation of the local economic development policy (Uvalić & Bartlett, 2021, p. 15), (SARRA, 2022), (Focus, 2022), etc.

A new model of development based on policies on attracting human capital seeks new actors, a holistic approach and an integrative approach when it comes to capacity building of the existing actors and their networking (Warnke & all, 2016), (Sasaki & Yoshikawa, 2014), (Bachtler & Yuill, 2001) etc. The need to formulate new partnerships should aim to overcome the problems of the silo phenomenon, present not only in the fragmented approach of ministries to regional development but also in research institutions and non-governmental organizations. To overcome above mentioned problems, implementing the Quadriplex helix approach in its preparation, a Smart specialization strategy for Serbia was adopted in 2020. Unfortunately, as one interviewee put it “Regional development agencies in Serbia, SARRA notably was excluded from the entrepreneurial discovery process” (Focus, 2022). Also, some researchers stated that Strategy favours a monocentric type of development.

Serbia has adopted a Smart Specialisation Strategy from 2020 to 2027 which aims to develop a knowledge-based and innovation-based economy. This strategy, however, also favours those districts endowed with higher education institutions and a high share of scientific personnel in the labour force (Uvalić & Bartlett, 2021, p. 16).

Methodology

When it comes to Quantitative Research Methodology, it should be noted that statistical analysis was applied, notably descriptive statistics. Qualitative Research Methodology has been also used (Focus Groups). Groups of participants were engaged in a facilitated discussion to explore a smart specialization concept as a tool for regional development in Serbia. Interaction among participants generated insights and uncovered shared perspectives about the quality of the regional innovation systems in Serbia, situated at the NUTS II level.

This study systematically reviews the data for NUTS II regions in Serbia, aiming to provide what are the key factors driving the transition from a nascent to a mature RIS. The methodology allows us to collect data on the indicators of RIS maturity. Data were collected from existing databases, and interviews with members of the focus groups.

The action research methodology was used also. The researcher works closely with participants to identify problems, develop interventions, and assess their effectiveness, to generate

knowledge that can lead to social change. In this study, the researcher actively participated in various stages of the focus group research process. Their role encompassed conceptualizing the study, planning and organizing focus groups, and directly facilitating the focus group discussions as a moderator during the data collection process. Additionally, the author was involved in data analysis, interpretation, and writing of the scientific paper.

Regarding ethical considerations, it is essential to address the specific situations where formal ethical approval was not deemed necessary and could potentially harm the results due to the nature of the topics discussed. Notably, the focus group discussions revolved around non-sensitive topics, ensuring participants' anonymity, and their identities remained confidential. Consequently, the study was exempted from formal ethical approval requirements, considering the low risk and the absence of potential harm to participants.

Data and analysis

The analysis was guided by hypotheses and research questions. Quantitative data were collected based on Secondary Data Analysis. Data were collected by analyzing existing datasets that have been collected by other researchers, government agencies, or organizations. Secondary data sources included survey data, administrative records, and publicly available datasets such as datasets provided by the Statistical Office of the Republic of Serbia, Eurostat, Serbian Business Registers Agency etc.

When it comes to the qualitative part of the analysis, the target groups for the study were selected regional development agencies (RDA) in Serbia, as well as participants of the focus groups, experts and practitioners in the field of regional development.

The meeting of focus groups was organized in 2021 and 2022, in a structured setting to engage in a facilitated discussion on regional development and smart specialization, to elicit in-depth insights, opinions, and perspectives from participants. Focus group meetings were recorded. The moderator asked open-ended questions. Participants' confidentiality and privacy during the recording process were ensured.

The insights and data collected from the focus group meetings were transcribed, analyzed, and interpreted to extract meaningful themes, patterns, and insights relevant to this research. The insights were of utmost importance in setting up the research questions as well as the hypothesis. This research, according to the authors' knowledge, was the first of its kind in terms of its subject of research; therefore, it can be considered a «baseline» survey for which there can be no strong and comparable parameters, especially because attitudes (and not objective parameters) were explored.

Results and discussion

Informal Institutions

Institutions in strong regional innovation systems are marked by cooperative culture, associative learning, change orientation and public-private consensus, while institutions in the weak regional system of innovation are marked by competitive culture, individualistic behaviour, „not invented here“ attitude, conservative behaviour and public-private dissension (Cooke, Uranga, & Etxebarria, 1998), (Hofstede, Hofstede, & Minkov, 2005).

Innovation is a key factor in regional economic performance and interactive innovation based on collective learning and associative practices is becoming increasingly significant (Cooke & Morgan, 1999), (Donatiello & Ramella, 2017), (Muscio, Reid, & Rivera Leon, 2015), (Hall, 2014), (Švarc, Lažnjak, & Dabić, 2019), (Warneke & all, 2016), (Sweeney, 1995), (Sasaki & Yoshikawa, 2014) etc.

The national culture is certainly an important characteristic of the environment in which the Serbian smart specialization strategy has been implemented (Smart Specialization Strategy of the Republic of Serbia for the period 2020 to 2027, 2020, p. 18).

The Serbian societal culture is characterized by a high power distance (index 86) which indicates that the managing structure in both organizations and state administration tends to be centralized and difficult to change. The uncertainty avoidance index for Serbia (index 92) indicates small tolerance to ideas and actions that deviate from the usual one.

There is no research proving that Serbian regions are culturally heterogonous. Here, we assume the cultural homogeneity of Serbin regions.

To reveal the links between national as well as organizational culture concepts introduced by Hofstede, it should be noted that the two dimensions of national culture affect implicit models of organizations.

The Power Distance (hereinafter PDI) and Uncertainty Avoidance (UAI) affect the structuring and functioning of organizations, whereas the dimensions of Individualism vs. Collectivism (hereinafter IND). Other dimensions of culture such as Masculinity vs. Femininity (hereinafter MAS) affect the person's self-concept, while individualism vs Collecitism affects the group dynamics. We will not observe these here. Here, we will focus on UAIxPDI Matrix. Figure 3 provides an overview of the UAIxPDI Matrix and innovation leaders, strong innovators, and moderate and emerging innovators in Europe. Thanks to the high Power Distance Index (PDI) and high Uncertainty Avoidance Index (UAI), companies in Serbia tend to be organized in the form of „family“ (Ivanić, 2017) (Ivanić, 2020). As a result, Serbia positions itself as an emerging innovator (EC, 2021)

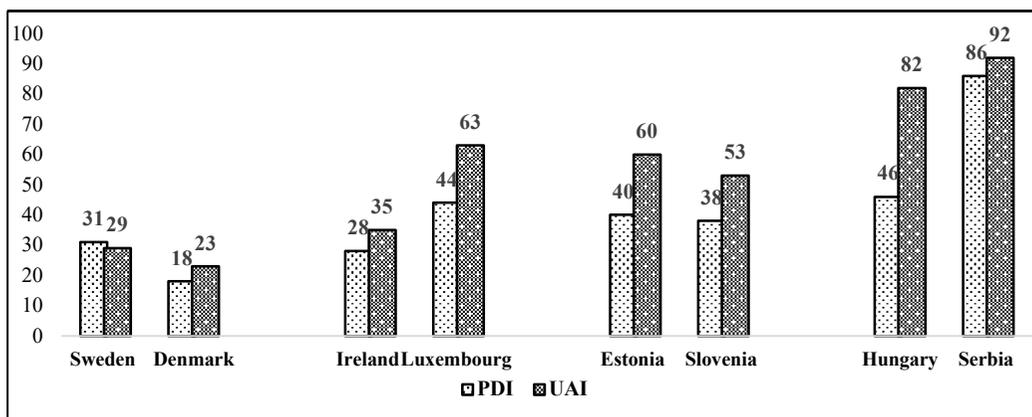


Figure 3. Innovation leaders, Strong innovators, Moderate innovators and Emerging innovators and UAIxPDI Matrix

Source: author's calculation, based on (Hofstede, 2001, p. 501); (European innovation scoreboard 2022, 2022)

When it comes to the best Innovation performers, Sweden continues to be the best performer in the EU. Other Innovation Leaders are Finland, Denmark, the Netherlands, and Belgium. All these Innovation Leaders are characterized by a low distance power culture and low avoidance of uncertainty, which affects institutions to be structured in the adhocracy forms, with mutual adjustments as a preferred coordination mechanism. Cooperative culture, associative learning and change orientation are inherent in an adhocracy. EU's innovation divide remains (European innovation scoreboard 2022, 2022). The competitive culture among SMEs in Serbia was revealed (Paunovic & Ivanic, 2018).

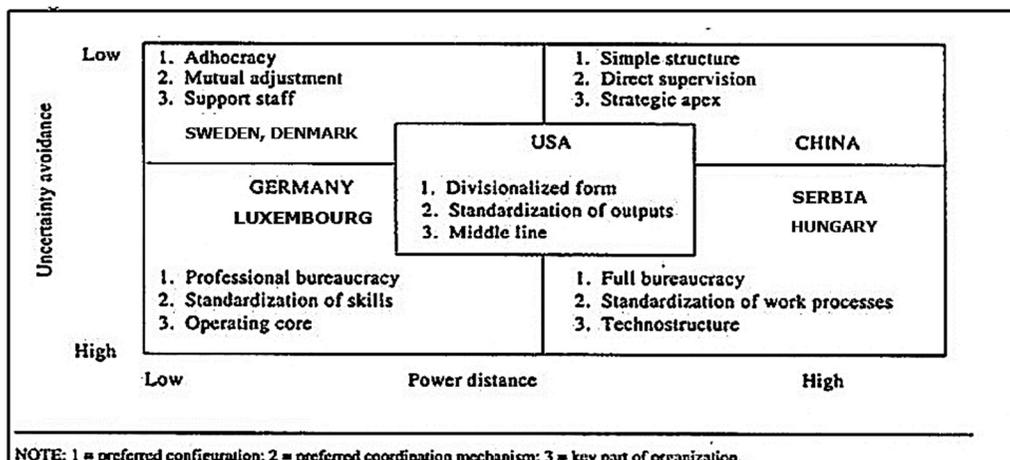


Figure 4. Mintzberg's Preferred Configurations of Organizations Projected on the UAIXPDI Matrix, with a Typical Country for Each Configuration and with Serbia
Source: author's adaptation, based on (Hofstede, 2001, p. 375)

Based on their scores, EU countries fall into four performance groups: Innovation leaders, Strong innovators, Moderate innovators and Emerging innovators. Sweden continues to be the best performer in the EU. Other Innovation Leaders are Finland, Denmark, the Netherlands, and Belgium. Ireland, Luxembourg, Austria, Germany, Cyprus, and France are Strong innovators, performing above the EU average. Estonia, Slovenia, Czechia, Italy, Spain, Portugal, Malta, Lithuania, and, Greece are Moderate innovators. Hungary, Croatia, Slovakia, Poland, Latvia, Bulgaria and, Romania are Emerging Innovators. Serbia positions itself as Emerging Innovator (EIS 2022 - RIS 2021, 2021)

As an Emerging innovator, Serbia is culturally divergent in comparison to the UAIXPDI matrix inherent for Innovation Leaders as well as Strong Innovators.

Power distance is defined as “The extent to which less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally“ (Hofstede, 2001, p. 79). People in societies exhibiting a significant degree of power distance take a hierarchical order in which everybody has a place, and which needs no further justification. That is not a solid ground for building cooperative culture.

Bearing in mind that Serbian society has been perceived as a high-power distance culture (from now on PDI), it is proven that Serbian high PDI dimension is negatively correlated with openness to experience as well as cooperation (Ivanic, 2020, p. 57).

When it comes to the PDI and associated behavioural patterns at the corporate level, it should be pointed out that an autocratic-benevolent management style is acceptable, notably, among low-skilled and low-educated workers. Among them, it is not strange to hear the advice: “It is always best to keep one’s mouth shut.“ (Ivanic, 2020, p. 58). Some interviewees argued that “surviving“ is the primary motivation at the local level, among public officials and business representatives, and that people from local self-government. They do not have time to spend money on something related to new technologies, innovation, smart specialization activities and on something which was not approved by the central level (Focus, 2022).

Many top-ranked people in Serbia usually perceive themselves as above the law. One of the characters from the “Member of the Parliament” written by Nusic said: “When I reach for the law, it screams!” They are not above the law. They feel that they can change it in any case if they need it. (Ivanic, 2020, p. 64)

Uncertainty avoidance (from now on UAI) “expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity (Hofstede, 2001, p. 145). Countries

exhibiting strong UAI cultivate rigid codes of behaviour and are intolerant of unusual behaviour and ideas. The higher the UAI index, the more formal way of communication should be applied actually at first sight. The higher the UAI index, the lower aspiration to be innovative as well as the lower level of trust. The behaviour described directly hampers the involvement of Serbian SMEs in relational global value chains (Paunovic & Ivanic, 2018).

Taken together, the above-mentioned findings suggest the presence of a competitive culture, top-down initiatives for innovation, the absence of associative learning, low level of trust. We can conclude weak RSI potential when it comes to the nature of Serbia's informal institutions (values).

Also, it should be noted that countries with higher GDP per capita generally exhibit a higher degree of 'R&D intensity' compared to those with lower GDP. At the same time, countries with higher degree of „R&D intensity“ exhibit a lower degree of power distance, as well as higher level of trust. In 2021, Serbia allocated 1.0% of its GDP to Research and Development (R&D) expenditure, marking an improvement from 0.7% ten years earlier, representing a growth of 0.3 percentage points since 2011. However, in comparison, the EU's R&D intensity in 2021 was 2.3% of GDP, demonstrating a significantly higher level of investment in research and development compared to Serbia (Eurostat, 2023).

In 2020, the sources of funding for research and development (R&D) differed between Serbia and the EU. In Serbia, the higher education sector was the primary contributor, financing 44.7% of the total expenditure. The government sector closely followed, covering 43.4% of R&D spending, and funding from abroad accounted for 9.6%. However, business enterprises played a relatively smaller role, constituting only 2.1% of the total funding.

In contrast, the EU's R&D funding landscape in 2020 showed that business enterprises were the main financial contributors, funding 57.9% of the total expenditure. The government sector provided 30.2% of the funding, and foreign funds contributed another 9.6%. The higher education sector had a more modest share of 1.2%, while the non-profit sector accounted for the remaining 1.1% in 2019. Overall, the distribution of funding sources for R&D between Serbia and the EU demonstrated some notable differences, with the higher education sector being a significant source in Serbia and business enterprises playing a more prominent role in the EU.

In 2021, R&D personnel constituted 1.50% of the total employment in the EU, showing an increase from 1.24% five years ago and 1.11% ten years ago. In Serbia, the proportion of R&D personnel in total employment rose from 0.58% in 2011 to 0.70% in 2021, with a slight decline between 2016 and 2021. While Serbia's R&D share has shown positive advancement, it's important for the country to address the decline observed between 2016 and 2021 and continue fostering a supportive environment for research and development to ensure long-term growth and competitiveness in the global arena.

Formal Institutions

If we try to observe the quality and maturity of the regional innovation systems situated in Serbia at the NUTS II level, it should be noted that one of the assessment-related criteria should be the behaviour of formal institutions placed in the observed regions. Based on the "Quadruple Helix" incorporated in the preparation of the Serbian Smart Specialization Strategy (Hereinafter 4S) formal institutions which should be observed are academia, industry, government, and society. However, the quadruple helix model recognizes the important role of society as a fourth helix. Society encompasses citizens, communities, non-governmental organizations, and other social groups that actively participate in and influence the innovation process. As we mentioned earlier the entrepreneurial development process inherent in the preparation of S4 RDAs in Serbia was excluded. Here, we will analyze their position in the Serbian regional ecosystem, as well as RIS at NUTS II levels.

The strength of a regional innovation system is evaluated based on the capacity of the institutions in it to innovate. There is strong evidence from the regions of Europe of a link

between the quality of institutions and the capacity of regions to innovate (Rodríguez-Pose, 2013); (Rodríguez-Pose & Di Cataldo, 2015). Also, strong RSI potential can be revealed in regions with strong networking and mentoring institutions, devoted to externalisation. On the contrary, institutions marked by internalisation, and adaptation, with the „sink or swim“ behaviour and „sweating“ culture will create weak RSI.

According to Keating, if we will take four ideal types of regional development strategy (bourgeois regionalism, sweatshop economy, social democratic project, as well as nation-building project), then RSI with weak potential will generate a sweatshop economy growth pattern. The sweating culture is inherent for the regions that are „policy takers“, with a low-cost route to competitiveness emphasising low wages and taxes, to accept their role in the global division of labour rather than trace fashion it (Keating, 2000, p. 158). Regions in Serbia are statistical (EC, 2014), two regions have administrative capacities, and the other two do not have capacities at the regional level. So, regions in Serbia can be considered policy takers. The existence of the RDAs at the NUTS II level can be considered as an opportunity for developing capabilities for creating tailor-made regional policies.

The development drivers are not only universities and research institutions, but also regional development agencies (hereinafter RDA), companies, as well as civil society organizations (Bachtler & Yuill, 2001), (Halkier, Danson, & Damborg, 1998), (Potocnik, 2009), (Pike, Rodríguez-Pose, & Tomaney, 2007), (Benner, 2019), (Foray, Morgan, & Radošević, 2020)etc. Here, we will take a look at RDA in Serbia, per region, as well as scientific institutions per region.

Looking at the NUTS II regions in Serbia (Administrative territorial division and NSTJ levels 1, 2, 3), it is evident that there are two types of regions: those that have the administrative capacity (Belgrade, and Vojvodina) and those that do not (Šumadija and Western Serbia, Southern and Eastern Serbia).

It should be noted that when it comes to the classification of statistical regions, Serbia does not yet comply with Regulation (EC) 1059/2003 (NUTS – Nomenclature of Territorial Units for Statistics) (Screening report Serbia Chapter 18 - Statistics, 2014, p. 7)

In those regions that do not have the administrative capacity, regional development agencies try to fill the gap at the regional level. The gap tried to be filled by the development of a dense network of local municipalities. By filling the institutional gap at the regional level, agencies are becoming an important factor in integration between national, local and donor institutions (SARRA, 2022)

It should be noted that RDA situated in AP Vojvodina, does not need to fill the gap at the regional level. Vojvodina Development Agency (Abbreviated RAV) was established to cover the NUTS II level, in an analytical sense, as well as investment support sense. RAV was established under the auspices of the Government of AP Vojvodina. The Figure below illustrates the results of the preliminary analysis of the concentration of the RDAs at the NUTS II level. As the administrative capacity at the regional level increases, the number of Regional Development Agencies (RDAs) tends to decrease (Vojvodina, Belgrade region).

When a region has a higher level of administrative capacity, it implies that the regional government or administration is more capable of directly handling regional development initiatives and policies. In such cases, there may be less need for separate RDAs to coordinate and implement development activities.

In regions with limited administrative capacity, RDAs play a crucial role in bridging the gap and providing the necessary expertise and resources for effective regional development. They can assist in strategic planning, project management, funding acquisition, and networking activities.

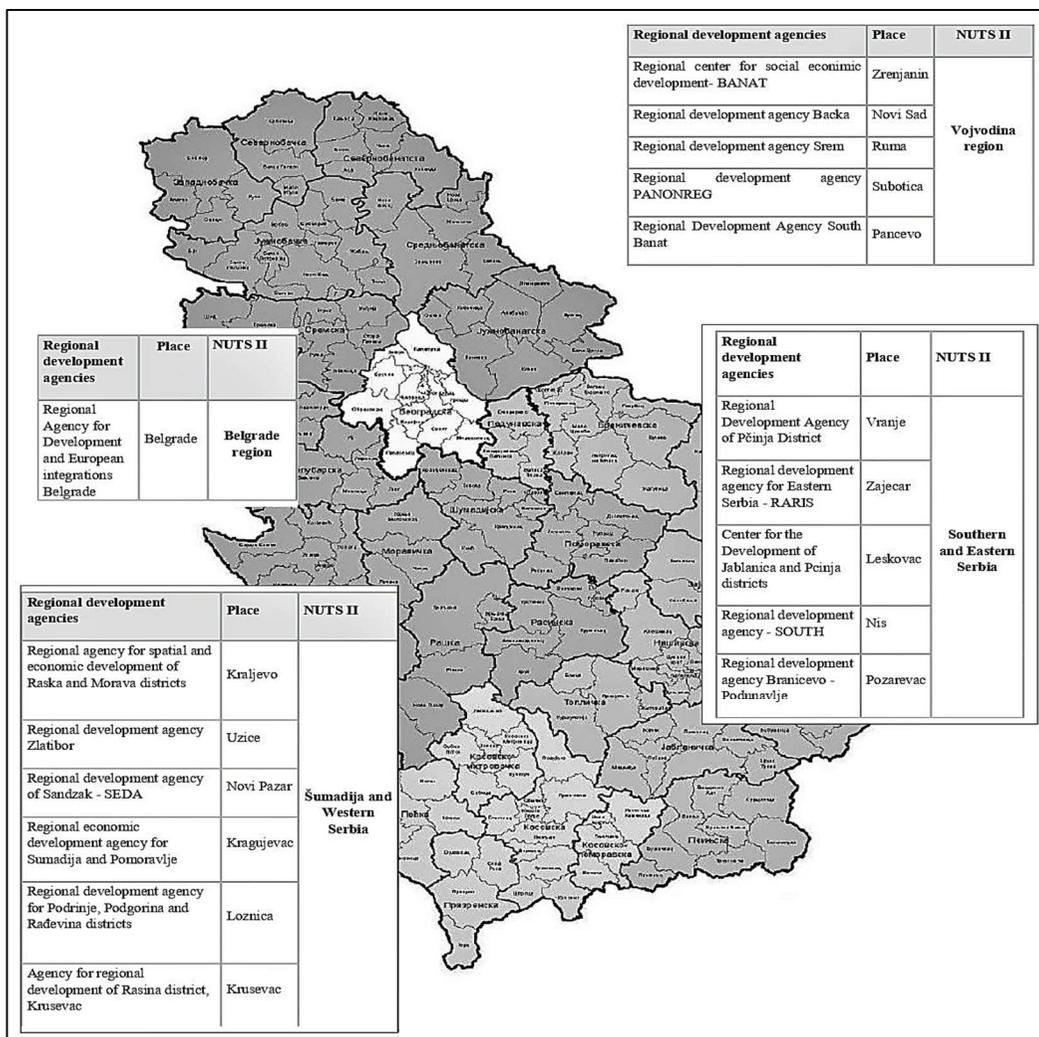


Figure 5. Regional development agencies in Serbia

Source: (SARRA , 2022)

If we look at the structure of services provided by the Serbian Association of regional agencies (hereinafter SARRA), we can find limited mediation and promotion competence, no control over strategic infrastructure, piecemeal innovation projects, as well a „normal state training system“ instead of the regional tailor-made training pieces of training. Under the Ministry of Economy exists a „standard set of services“ instead of a tailor-made set of services, was set up. The RDAs expected to provide support to local governments and businesses in preparation for development projects, (Razvojna agencija Srbije, 2022). Figure 6 provides the breakdown of RDAs activities according to hardware, software and orgware lines. RDAs (Regional Development Agencies) can indeed serve as a fourth helix at the NUTS II (Nomenclature of Territorial Units for Statistics) level, contributing to the development of the economic software axis. Certainly, in regions without administrative capacity, RDAs can serve as the driving force or "spiritus movens" in building the economic orgware axis.

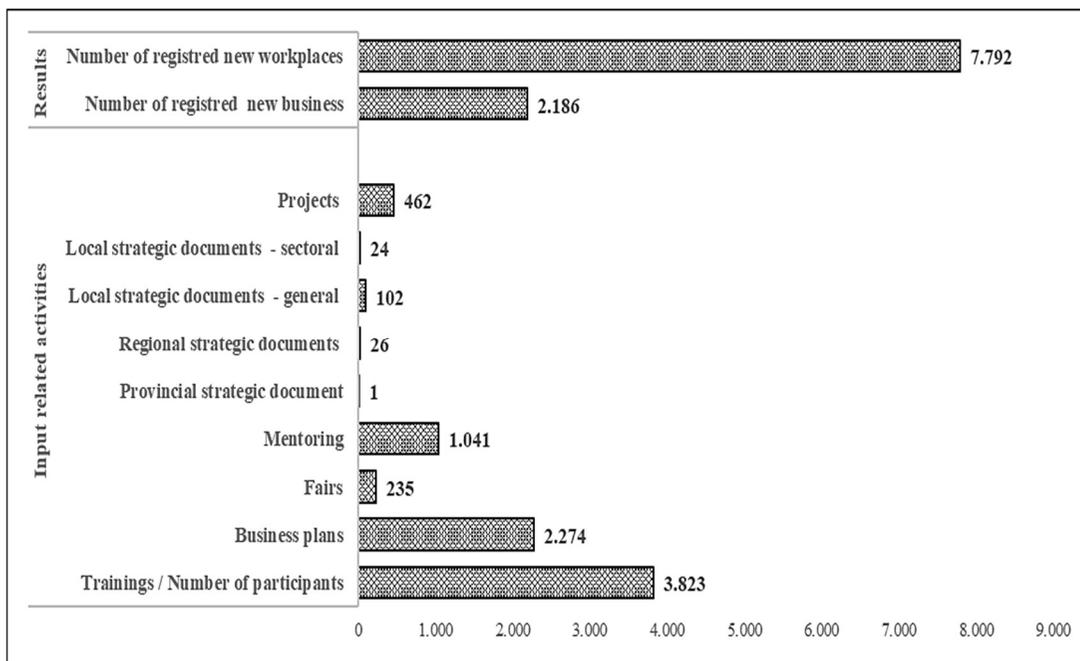


Figure 6. SARRA Input-related activities and results

Source: SARRA Profile

A 'culture of cooperation' is necessarily more highly valued in a context where innovation is conceived as institutionally interactive and learning-influenced. Thus openness, willingness to learn, and the sharing of information are now seen as characteristics distinguishing progressive from nonprogressive firms and other organisations (Sweeney, 1995). In Serbia, the existence of the culture of cooperation between SMEs has not been confirmed (Paunovic & Ivanic, 2018). Serbia has 17 accredited RDAs, primarily founded by local self-government units, and with significant discrepancies among them in terms of human resources, financial capacities, delivered activities and scope of work. The total value of 462 projects implemented by SARRA is 136,552,607.20 EUR.

In one of the interviews with the experts in the field of smart specialization, RDA was described as a “heavily reliant institution on donor-funded projects, with lack long-term planning in terms of identifying additional sources of funding. RDAs could take a stronger role in pursuing regional development and, in particular, lead the implementation of complex regional projects if they were more financially sustainable, improved their strategic planning, and developed their capacities further (including human resources)”. Improving the RDAs’ partnerships with other regional development actors would be another key determinant of their ability to take on a leadership role in regional development. (Bertolini, 2023)

A partnership was observed as one of the preconditions for the stronger role of the RDA in regional development in Serbia and as a precondition for improving the creation of the RIS, notably in the regions in Serbia, which does not have administrative capacity at the regional level.

In focus group discussions, participants described their experience, including the emotions associated with leading RDAs in Serbia. Several participants described the lack of regional administration in Šumadija and Western Serbia as a problem in preparing the region for the preparation of regional smart specialization strategy, etc. (Focus, 2022). Also, participants expressed their intentions to communicate directly with the line ministries, to be recognized as the drivers of the regional development at the NUTS II level. When it comes to the RDAs

situated in Vojvodina (the exception is RDA from Srubotica) and Belgrade, they do not show any kind of intention to be involved in the Focus groups.

It should be noted that the type of partnership between RDAs in Serbia in Belgrade and the Vojvodina region, within the Serbia is mainly horizontal by nature. RDAs located in the mentioned regions, are open to sustainable and long standing cooperation with the stakeholders located in the external borders. It is worth to mention, DKMT Euroregion, as one of the “ model from the point of view of participatory governance, including in its structure the representatives of universities, chambers and civil associations“ ((Benczi & Ocskay, 2021, p. 60).

On the other hand, the partnership between the RDAs in Šumadija and Western Serbia and Southern and Eastern Serbia has a more vertical nature, with the tendency to create direct links with the ministries of the central government as well as with the donors. We can say that RDAs in regions without administrative capacities are more externally oriented. By adopting an externally oriented approach, RDAs in regions without administrative capacities can leverage external resources and expertise to compensate for their internal limitations.

Regional development policies

When it comes to policies inherent in the strong RIS, it should be noted that they are inclusive, consultative, and marked by monitoring, delegation and networking (Bachtler & Yuill, 2001), (Fritsch & Slavtchev, 2011), (Pike, Rodriguez-Pose, & Tomaney, 2006), (Kocziszky, 2007). By analysing regional development incentives according to the purpose, and regions in Serbia, incentives for R&I, by region, the share of type of innovation in enterprises-innovators, by territory, the share of export/import by region, regional GVA by activity, we will assess the RIS potentials in Serbia.

It is apparent from the table below that regional development incentives in Serbia, are centred around the hardware-related axis, as well as the partly orgware-related axis. The regional development incentives in Serbia were not directed at building and improving economic as well as institutions infrastructure (software-related axis). If we now turn to economic software, described by Barquero, marked by the ability to innovate, (Vázquez Barquero, 1998) this finding suggests the presence of the weak policy-related features of regional innovation systems in Serbia.

Table 1. Regional development incentives according to purposes and regions in Serbia, 2022, %

Policy	Sector	Belgrade	Vojvodina	Šumadija and Western Serbia	Southern and Eastern Serbia
Hardware	Transport infrastructure	64,74	6,78	6,08	1,14
	Energetic infrastructure	0,79	0,81	2,07	3,71
Software	Economic infrastructure	0,00	0,90	0,00	0,42
	Institution building and development	0,00	0,00	0,00	0,00
Orgware	Export	2,86	4,44	4,45	13,15
	Production	8,14	22,62	44,41	28,15
	Agriculture	1,09	20,52	20,23	16,42
	R&D	15,77	4,89	3,09	5,98

Source: author's adaptation based on <https://pretraga2.apr.gov.rs/APRMapePodsticaja/>

The figure below illustrates some of the main characteristics of the regional development incentives and regional policy in Serbia. What is interesting in this data is lack of the regional

incentives in Serbia, devoted to the software axis (economic infrastructure and institution building and development).

Data from this table can be compared with the data in Figure 7, which shows types of regional development incentives (policies) directed to the national as well as regional level (NUTS II). In Fig. 7. is a clear trend of decreasing regional development incentives inherent for the development of the economic software and orgware infrastructure.

The most striking result to emerge from the data is that regional development incentives are directed at the building of transport infrastructure (economic hardware). Notably, the most surprising aspect of the data is that regional development incentives in transport infrastructure were highest in Belgrade region in comparison to other NUTS II regions.

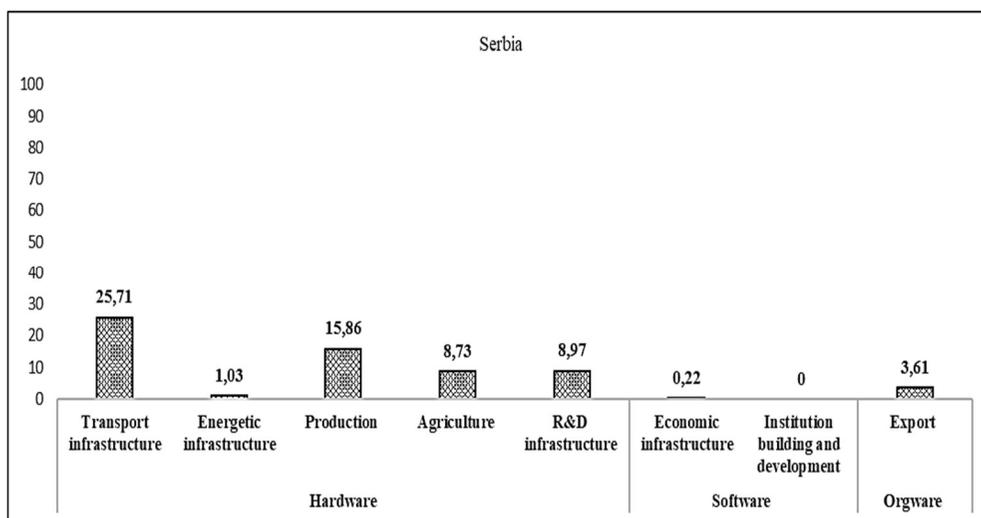


Figure 7. Regional development incentives in Serbia, 2022, %, grouped by hardware, software and orgware scheme

Source: author's adaptation based on <https://pretraga2.apr.gov.rs/APRMapePodsticaja/>

A common view amongst interviewers was that Serbia has a „monocentric type of development“, based on the creation of the „exclusive“ IT hubs, without R&D infrastructure at the NUTS III level, without the capacity for generating „spillover effects“ from the capital town to the periphery (Focus, 2022).

This table is quite revealing in several ways. These results suggest that Belgrade region generates 40,2% of Serbian GDP, Vojvodina 25,8% while regions without administrative capacity at the regional level generate 18,7% (Šumadija and Western Serbia), and 15,3 (Southern and Eastern Serbia). Monitoring the type of innovation in enterprise innovation, the higher share of process-related innovation tells us about the presence of „stand-alone “ logic and more reactive type of policies.

Table 2. The key indicators for NUTS II regions in Serbia; %

	The share of the region in the gross domestic product of the Republic of Serbia [%], 2021	Regional GDP per capita, 2021, EUR	Incentives for regional development, by region for 2022; %	Incentives for R&I, by region for 2022, %	Share of type of innovation in enterprises-innovators, by territory, 2020		Export/import by regions, %, 2021	
					Innovation of products/ services	Process innovation %	Export	Import
Belgrade	40.2	12.752	36.16	63.54	42.0	46.0	23.8	45.7
Vojvodina	25.8	7.564	20.7	11.16	37.2	45.2	34.8	30.1
Šumadija and Western Serbia	18.7	5.368	38.30	4.66	33.9	39.6	21.8	13.8
Southern and Eastern Serbia	15.3	5.650	39.45	5.38	37.6	38.3	19.5	9.6

Source: <https://pretraga2.apr.gov.rs/APRMapePodsticaja/#>

GVA by activity provides a quantitative basis for evaluating the effectiveness of regional development policies and initiatives and making data-driven adjustments to their strategies to enhance regional development outcomes (export). Also, the composition of GVA in the Belgrade region, tells us about single sector type of development (Wholesale and retail trade, Professional, scientific activities, construction). Regions with higher GVA in sectors such as manufacturing, services, or agriculture may have a competitive advantage in those areas (Vojvodina, Šumadija and Western Serbia, Southern and Eastern Serbia). To support the development of GVA in sectors that are considered high-growth or high-value-added industries it should be important to increase investments in economic software infrastructure in those regions. In Table 6 there is a clear trend of decreasing GVA by regions with administrative capacity, generated from the Professional, scientific activities to the low level of GVA in Šumadija and Western Serbia and Southern and Eastern Serbia. On the contrary, it is clear then of increasing GVA by regions without administrative capacity generated from Public administration activities. Disparities in GVA have suggested that regions without regional administration require more investment in Professional, and scientific activities as well as in Information and communication-related activities to reduce disparities in investment patterns, and also disparities in export patterns.

Table 3. Regional GVA by activity

Regional GVA by activity	Republic of Serbia	Belgrade region	Vojvodina region	Šumadija and Western Serbia	Southern and Eastern Serbia
Agriculture, forestry and fishing	7,61	1,03	14,38	11,76	8,43
Mining and quarrying; Manufacturing;	23,0	13,0	28,7	27,1	34,43
Construction	7,3	9,7	5,5	6,2	5,11
Wholesale and retail trade	19,9	23,6	18,0	18,9	14,88
Information and communication	6,2	11,7	3,5	1,8	1,69
Financial and insurance activities	3,8	6,0	2,8	2,1	1,92
Real estate activities	8,2	8,1	7,2	9,3	8,52
Professional, scientific activities;	7,0	11,5	4,9	3,1	3,16
Public administration, Education;	14,3	12,1	12,5	17,0	19,57
Arts, entertainment and recreation	2,8	3,2	2,4	2,7	2,28

Source: authors own adaptaion based on

<https://publikacije.stat.gov.rs/G2023/PdfE/G202310123.pdf>

Conclusion

The hypothesis that we set is partially supported by analysis. The present results are significant in at least several respects.

- 1) The findings show that regions without administrative capacity have RDAs with cooperative culture, more externally oriented, and more devoted to building economic software and economic orgware axis instead of the regions with administrative capacity. The mature RIS is present in the regions without administrative power in Serbia (Šumadija and Western Serbia, Southern and Eastern Serbia) in comparison to two NUTS II regions (Belgrade and Vojvodina region)
- 2) Regions with administrative capacity have RDAs with competitive culture, internalized, not involved in the building software and orgware-related axis. The early stage RIS is present in the regions with administrative capacity.

Generally, it can be concluded that regions do not yet have the necessary institutional and organisational characteristics fully to justify the status of maturity RSI, but that actual processes may already possess key elements for that status, notably in those regions without the administrative capacity (Šumadija and Western Serbia, Southern and Eastern Serbia).

To boost regional export structure towards high-technology development in Serbia, a range of regional innovation infrastructure tools can be employed. These tools include technology transfer centers (Hudec, 2007), business incubators, innovation hubs, export promotion agencies, and regional innovation clusters. They will foster innovation, research, and development, enhancing technological capabilities and global competitiveness. Additionally, medium-term tools like research and technology parks, centers for advanced manufacturing, technology training centers, venture capital, collaboration with universities, and technology upgradation programs will further support technological advancements. For long-term success, Serbia should establish smart specialization academies at NUTS II levels, enabling the bridging of regional disparities and overcoming institutional barriers. Combining these infrastructure tools will enable swift progress towards high-technology development in less developed regions, with sustained commitment from regional stakeholders playing a vital role in successful implementation and lasting economic growth driven by innovation.

Limitations of research

The main limitation of the research was the lack of relevant time-series surveys of Serbia's national culture as well as the culture of regions in Serbia, also lack statistical data at the NUTS II level, and its regional cultures, besides the very small number of comparative studies made in this field.

These findings cannot be extrapolated to all NUTS II regions in Serbia. Although, the exclusion of Kosovo and Metohia region (Statistical Office of the Republic of Serbia SORS) did not reduce the effect on policies devoted to the above-mentioned NUTS II regions in Serbia.

As regards the classification of statistical regions, Serbia does not yet comply with Regulation (EC) 1059/2003 (NUTS – Nomenclature of Territorial Units for Statistics), (EC, 2014, p. 7)

Suggestions for further research

Cultural homogeneity vs heterogeneity of the Serbian region should be researched. Also, further research activities should be devoted to the role of the informal institutions, a more emic-oriented approach in observing the regional innovation paradox phenomenon.

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