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METHODOLOGY APPROACH ON BENCHMARKING REGIONAL INNOVATION ON SMART SPECIALISATION (RIS3): A JOINT MACRO-REGIONAL TOOL TO REGIONAL PERFORMANCE EVALUATION AND MONITORING IN CENTRAL EUROPE*

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Abstract. The current funding period of the European Union 2014 – 2020 advocates the application of the Smart Specialisation approach that has to be implemented on regional level. European NUTS-2 regions shall evaluate and reconsider their regional strategies for the upcoming funding period. Due to the high differences among the regions in terms of existing monitoring systems and policies, the performance measurement lacks a solid basis for a sufficient comparison, exemplification and transfer. In order to reduce this research gap, within this paper, the authors developed a comprehensible methodological tool using a given number of NUTS-2 regions with their distinctive monitoring systems and indicators in Central Europe. The benchmarking process is focusing on deploying existing performance indicators

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from each regional strategy, analysing them and aiming at developing one common set of indicators. As a result, the developed methodology approach enables sufficient performance comparison in terms of RIS3 implementation in the current funding period on the one hand, and provides a crucial input for the future monitoring system design. As a result, the novel methodological tool yields contribution to both scholarly literature and practitioners. Furthermore, the benchmarking method provides various selection and combination options that allow direct insights in different fields' performance, such as regional spending to facilitate RIS3 implementation and Entrepreneurial Discovery process implementation as well. With this tool concerned, policy recommendations for the upcoming funding period and updates on the regional strategies can be drawn up.

Keywords: RIS3; Smart Specialisation; Benchmarking; Central Europe; Regional Innovation; Monitoring, Methodology; Common Set of Indicators

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JEL Classifications: R11, R58, P25

1. Introduction

In a rapid pace of transformation (digital, policy and environment driven) Europe is facing with, sustainability is a key towards Europe's future. Strengthening capitalisation of Smart Specialisation gets even more importance, when it comes to sustainable development in Europe and worldwide. Smart Specialisation and Regional Innovation Strategies on Smart Specialisation (RIS3) were used to serve for implementation of the Europe 2020 strategy and its goals, among them to harness the potential for Smart Growth from targeted support to areas with investments, thus prioritising direction and contribution for achieving Smart Growth ((COM(2010) 546 final). It was also used to serve as a methodology contributing to Sustainable Development Goals (SDGs) of the UN in the EU Member States and countries outside the EU. Indeed, the futured European concept of Smart Specialisation for the next programming period 2021-2027 highlights the sustainability dimension, which is regarded as a key driver in achieving and sustaining European competitive edge, in line with the European Green Deal (COM(2019) 640 final).

Though, the implementation of the next-generation sustainability strategy for Europe, the so-called "European Green Deal" as the new growth strategy for the EU requires strong policy report and significant investment plans. Yet, little is said about specific steps on how the strategy should be implemented on local and regional levels. In this light, the integration of Smart Specialisation as an EU policy to demonstrate efforts and potentials towards place-based innovation achievements for transformation and secure sustainable development becomes significant (Larosse et al., 2020). In this light, a strong knowledge and experience back-up – evaluation and monitoring – are crucial for the forthcoming funding period of 2021-2027, where the EU expects better performance and advancement of regional innovation. Therefore, monitoring is a key delivering relevant information base, supporting policy decision making and facilitating stakeholders' and citizens' engagement (Gianielle & Kleibrink. 2016, p. 95; Kleibrink et al., 2016, p. 1438; Mehta et al. 2019; Mazzanti et al., 2020; Mazzoni, 2020, Cismas et al., 2020; Khan et al. 2020). From the future perspective, this makes the current research *very topical*, as monitoring allows to counter measurement or steering related actions if they appear not to meet future perspectives.

Despite the recognised value of monitoring and evaluation within Smart Specialisation policy, in which monitoring and evaluation mechanisms build up the so-called 6th step of the RIS3 methodological framework, the related literature remains still scattered. Only few research and policy paper tracks support unfolding literature on RIS3 evaluation and monitoring (Arnold, 2004; EC, 2014; Gianelle & Kleibrink, 2015; Magro & Wilson, 2013; Masana et al., 2019; Panori et al., 2020; Prause, 2014). Literature on design and modelling (Boschma, 2014; Woronowicz

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et a., 2016) as well as implementation of Smart Specialisation, i.e. process-based approach, is mounting, whereas monitoring and evaluation related issues are scarce (Gianelle & Kleinbrink, 2015). Indeed, this observation can be linked to an ex-ante conditionality the Smart Specialisation concept implies, where innovation policies are generated and implemented based on prioritised plans and follow in advance structured ways. Yet, monitoring and evaluation are crucial, as they foster policy learning, facilitate adaptation capability within a changing system, provide a solid basis for sustainable policy implementation (Aranguren et al. 2017; Gianelle & Kleibrink, 2016; Kroll et al., 2014; Magro & Wilson, 2015) and enable to reduce gaps in network structures (Virkkala et al., 2017).

Considering the fact that regional development remains at the core of each innovation policy, and regions should turn into learning ones by continuous improvement, knowledge region, facilitation of knowledge flow, ideas and learning (Florida, 1995, p. 532), monitoring and evaluation mechanisms appear to be crucial in order to make policy making in terms of Smart Specialisation solid and sustainable for the future (Kuznetsow & Sabel, 2003). Bearing this in mind, the research is driven by this *research problem* of the missing link between Regional Innovation Strategies for Smart Specialisation and their monitoring and evaluation mechanisms. Indeed, the existing evidence underlines that linking monitoring to the strategy's intervention logic places a significant challenge for policy makers and public programme officers (Farole et al., 2011, p. 1107; Kleibrink et al., 2016, p. 1456). A challenging nature bears also availability of data and identification of indictors to measure as well as a shared understanding and action among involved stakeholders (Kleibrink & Magro, 2018, p. 6). Indeed, indicators are important for sustainable development and planning performance measurement, thus implying positive changes at the end of the journey (Brugmann, 1997, p. 59). As a result, there is a huge emerging need for a systemic and holistic approach involving different governance mechanisms stakeholders.

Indeed, a marginalised focus on the monitoring and evaluation of RIS3 bears a rational academic and management practice-oriented researchers' response to provide a particular knowledge and data contribution in this rather porous research and policy field regarding RIS3. In that, the authors aim at giving more topical substance to RIS3 evaluation and monitoring by addressing and reducing the missing theoretical and practical foundations. When it comes to practice, evaluation and implementation of RIS3 on the regional level gets more blurred. Here, at is clearly stated, a common concept toward and a common set of indicators enabling benchmarking and thus monitoring of RIS3 on regional level are missing (Guzzo & Perianez-Forte, 2019, p. 18). This finding clearly postulates the research gap. As a result, the present research tackles the place-bound *research-to-practice gap*, where missing conceptual frameworks on RIS3 evaluation and monitoring on the regional level on the one hand dovetail with management tools regarding practical RIS3 evaluation and monitoring marshalled on the other hand.

The literature delivers only a limited number of records setting about regional dimension of RIS3 evaluation and monitoring, in particular within the cross-border, macro-regional perspective (INTERREG) and applied research orientation (regional development, SMEs competitiveness) (Angelidou et al., 2017; Bagienska & Rogowska, 2002; Woronowicz et al., 2016). Though, evaluation and monitoring efforts regarding RIS3 often remain in the design phase and usability of being deployed for tracing progress of RIS3 implementation is unexplored (Griniece et al., 2017, p. 4), followed by missing tools and methods reflecting the way in which the evaluation and monitoring can be used for the future policy revision and application (ibid., p. 6) and go beyond a narrow focus on meeting just audit requirements (Kleibrink et al., 2016, p. 1455). Finally, missing interlinking of policy approaches with theories frame the scientific research gap the authors want to address and reduce (Boschma, 2014; Foray et al., 2011).

The concerned research and practical management gaps were fuelled within the cross-border transnational (INTERREG) research project "SMART_watch" aiming at improving the links and between RIS3 monitoring and needs of end-users and involved stakeholders in RIS implementation. Within the framework of the Central Europe

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Programme 2014-2020, the authors acting as work package leader for the design of policy recommendations pertaining to RIS3 evaluation and monitoring and future path of development. The research target groups include governance actors, like policy makers, triple or quadruple helix approach stakeholders (academia & research, government, industry and society) as well as current and potential users of RIS3, namely Small and Medium-Sized Enterprises (SMEs) and other businesses that build up the backbone of the regional economy. In this nexus, the present research raises two research question:

1) *How to compare and benchmark RIS3 performance of individual NUTS-2 regions within one European macro-region to enable cohesive and integrative future regional development driven by innovation?*

2) *How can a viable macro-regional and harmonised methodological and conceptual tool be constructed for comparison and benchmarking of individual NUTS-2 regions' performance in RIS3 implementation that goes beyond individual quantitative monitoring systems and indicators in Central Europe?*

As a result, using the empirical data from the participating Central Europe regions within the "SMART_watch", the researchers aim at developing qualitative conceptual and methodological frameworks that facilitate and enable policy actors and other stakeholders to undertake evaluation and monitoring of RIS3 implementation and equip them with toolkit enabling a reasonable decision-making. In particular, the authors propose a so-called common set of indicators dedicated to enable evaluation of RIS3 performance in a macro-regional perspective. In addition, the research proposes a benchmarking tool that can be transferred to and employed to other European regions. Indeed, the recent research is calling for more qualitative approaches and their use in participatory evaluation and monitoring (Kleibrink & Magro, 2018, p. 6). It is about harmonising conceptual frameworks and practical tools across EU NUTS 2 regions and making them functional in practice, thus empowering human capabilities to increase effectiveness of design and monitoring procedures in the future. By aiming at delivering the answer to the research question, the authors dovetail the research goals with the largely marginalised theoretical setting, which underpins the research scope and scale (evaluation and monitoring of the RIS3 implementation). Afterwards, the paper proceeds with the methodological considerations that are followed by comprehensive result presentation and discussion. Finally, implications for governance and stakeholder bodies involved in RIS3 evaluation and monitoring are displayed as well as research body on this particular field enhanced.

2. RIS3 evaluation and monitoring in policy and theory nexus

The overwhelming literature on Smart Specialisation, RIS and Innovation in Europe belong to the key building blocks that drive currently both researchers and practitioners. Yet, since Smart Specialisation refers to "policy running ahead of theory" (Foray et al., 2011, p. 1), academic approaches towards the conceptualisation have been so far highly marginalised, thus leading to missing manifestation of the concepts in the theoretical realm. Indeed, paramount scientific contributions on Smart Specialisation and RIS3 deliver rather policy-driven contributions that lack the dovetailing of the research with the existing and developing theories (Boschma, 2014; Fellnhofer, 2017). Paradoxically, as further development of RIS3 is subject to review for future improvements, current discourses shall highly demand strong proved theoretical foundations and not only focus on practice-driven approaches. In this regard, as well as with the aim to support topical discussion on RIS3 implementation evaluation and monitoring, the authors call for a solid systematic understanding deploying a bunch of applicable existing concepts and theories. For that reason, the researchers adopt a novel approach in the literature review of this paper by, first, conceptually linking up the intertwined policy discourses on RIS3 evaluation and monitoring province with applicable theoretical

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treatises, and, second, providing a comprehensive but a simplified matrix with applicable theories that support and links research scope and scale through keywords.

2.1 Positioning RIS3 evaluation and monitoring in policy discourses

In order to make European economy more competitive against economies of US, Japan and other emerging world regions, such as China and South-East Asia, Europe made further attempts in advancing Europe's performance and regional development with the proposed strategy on smart, sustainable and inclusive growth in Europe – Europe 2020 strategy by the EC, followed by recent agendas to advance manufacturing and key enabling technologies "For a European Industrial Renaissance" (EC, 2014), and to prioritise community and customer experience in European innovation policy (EC, 2015). In this light, Smart Specialisation concept has moved from focusing solely on Research & Development (R&D) array towards a more *networked approach*, based rather on specific EU policy areas prioritisation and achievement of specific targets with the Europe 2020 strategy.

More than last three decades, discourses on Regional Innovation Systems (RIS) and strategic approaches towards Regional Innovation are ruling scholarly discourses as well as practical papers. A myriad of research papers and studies have evolved to underline the increasing role of innovation for European economy, in particular, cohesion, competitiveness and growth by means of RIS (Asheim et al, 2007; Asheim and Isaksen, 2002; Cooke & Morgan, 1997, Cooke, 2001). Following regional innovation agendas, in 2007-2008 a concept of "Smart Specialisation" was born, which addresses realisation of the European Research Area by means of development of *specialised clusters*, agglomeration of *knowledge resources* and building *knowledge hubs*, accompanied by *policy and institutional reforms*. It was launched by a team of experts working for the European Commission (EC) with the aim to provide new ways for recovery of European economy from the economic crisis and acceleration of European integration, including reduction of differences, assurance of more balanced evolvement of European regions as well as creation of the right conditions for *competition and cooperation* (EC, 2009; Foray et al., 2009; Giannitsis & Kager, 2009).

Smart Specialisation yields *integration of various stakeholders* from both public and private sector and postulates a complex *multi-level governance*. In the current funding period of 2014-2020, a concept of "Smart Specialisation" enjoys a growing interest on the European agenda, especially in order to safeguard sustainable and accountable use of EU Structural Funds (Iammarino et al., 2018), advance an outdated perception of regional innovation policy (Landabaso, 2014) and to bring more structured and legitimised way of proceeding by distributing EU funds (Foray, 2014; Kroll, 2019; McCann & Ortega-Argiles, 2013, 2015, 2016a, 2015b, 2015c) as an ex-ante conditionality for involved stakeholders (Griniece et al., 2017; Kroll, 2015; Martinez-Lopez & Palazuelos-Martinez, 2015). Not to forget, it is intended to streamline an *interplay and coordination* of the involved actors and stakeholders (Grillitsch, 2016; Larrea et al., 2919; Morgan, 2017; Panori et al., 2017).

Although evidence on Smart Specialisation and its growing popularity among policy makers is tremendous, majority of topical research and policy records appear to be circled around smart specialisation strategies and foresight (Paliokaite et al., 2015; Piirainen et al., 2017), consideration of place-based approaches (Kroll, 2015; Magro & Wilson, 2019) the role of institutions (Grillitsch, 2016), involvement of different level of governance (Arangunen et al., 2019) and regional institutional frameworks (Mazzucato, 2014; Krammer, 2017; Rodriguez-Pose et al., 2014). Within the evaluation and monitoring dimension of the EU RIS3 methodological framework, the key research streams also confirm the distribution of the keywords pertaining to governance, institutions, cooperation, collective learning, resource pooling and discovery. When it comes to the overview of keywords and their tailoring to specific theoretical approaches, concepts and theories, the following Table 1 heralds the key concepts driving the specific RIS3 area – evaluation and monitoring and their principal allocation to key theoretical foundations.

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Table 1. Conceptual Keywords and their Provinces Driving RIS3 Evaluation and Monitoring Discourses

Keyword	Application Field	Application Meaning / Value	Conceptual Province	Research Record
(Re-) Definition of RIS3 outputs	Academics Policy makers Businesses	+ RIS3 governance improvement for future	+ Balanced scorecard + Business model innovation	+ Panori et al. (2020)
Decision-making (evidence-driven)	Policy makers	+ Strategic RIS3 management + RIS3 revision + Reducing information asymmetry, uncertainty and risk	+ Decision theory + Principal-agent theory + Game theory	+ Kleibrink et al. (2016) + Panori et al. (2020)
Participatory policy making and cooperation	Academics Policy makers Businesses	+ Informing about policy responses + Ensuring accountability & transferability of results + Participatory and inclusive approaches towards stakeholders	+ Network-based innovation theory + Open innovation	+ Kleibrink et al. (2016)
Entrepreneurial Discovery Process (EDP)	Businesses	+ Strengthening user-driven innovation + Engagement new actors in the EDP + Open platforms for cooperation + Attraction of talents	+ Open innovation + User-driven innovation + Design thinking + Service design	+ Cvijanovic et al. (2020)
Evaluation methods and criteria for RIS3	Policy makers	+ Means of learning & improvement for the future + Regional observation + Harmonised tools and data availability	+ Organisational learning + Absorptive capacity	+ Pires et al. (2019)
RIS3 Priority identification & investment horizons	Policy makers Businesses	+ Long-term prioritisation and planning + Anticipating long-term industrial and technological trends for transformation & emerging industries	+ Strategic foresight + Decision theory + Transaction Cost Theory	+ Ranga (2018) + Vezzani et al. (2018)
Policy learning and stakeholder communication	Policy makers	+ Learning from failure + Learning about transformation + Sustainable self-improvement cycles + Building & reinforcing trust and cooperation	+ Collective learning + Absorptive capacity + Path dependency	+ Bellini et al. 2020 + Kleibrink et al. (2016)
Stakeholders involvement and coordination in RIS3	Academics Policy makers Businesses	+ Developing programme for RIS3 monitoring improvement + Consultation, engagement and bottom-up participation + Support economically weaker regions with limited capacity for RIS3 monitoring through open engagement	+ Network-based innovation theory + Open innovation	+ Magro et al. (2014) + McCann (2015) + McCann & Ortega-Argiles (2016)

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The table above presents keywords and main concepts that are dominating in the literature and policy discourses when it comes to RIS3 evaluation and monitoring. The keywords and their interplay with the concepts and positioning with the theories are displayed in an alphabetic order not giving any specific weight to one or another. As this paper also serves for practical policy applications, it is intended to provide an overview and access to a basket key resources and theoretical foundations underpinning theoretical understanding.

2.2 Positioning RIS3 evaluation and monitoring in theoretical setting

The previous section contributes to embeddedness of the current research within the discourses of RIS3 evaluation and monitoring. In contrast to a myriad number of papers that deal with RIS3 and touch upon different aspects of RIS3, this paper concentrates on both understanding of RIS3 evaluation and monitoring from the conceptual and theoretical perspectives as well as delivering practical participatory tools. However, in order to easily trace and grasp key fundamental principles guiding RIS3 an especially its evaluation and monitoring is a colossal job. This is partly because of highly missing theoretical considerations in most of the scrutinised research literature, partly because of RIS3 standing for a highly complex phenomenon.

Innovation as the backbone of RIS3 is a theory and policy province showing intertwining of and integration with different concepts and theories. Because of its nature, innovation requires a tremendous understanding from different disciplines. Therefore, it is assumed that the most research misses a clear pinpointing of key applicable concepts and theoretical considerations by focusing mainly on general policy discussions. In order to facilitate the understanding and simplify the overview of the theoretical background, this present research has departed from the policy discussion and marshalling topical keywords that enable to trace the links with driving concepts and theories, innovation being the flagship and umbrella term. As a result, the authors of this paper argue, theoretical considerations can be circled around the following key building blocks bridging the gap in a comprehensive theoretical manifestation regarding RIS3 evaluation and monitoring, as compiled by the authors:

- Innovation (innovation generation, creative potential, openness, entrepreneurial discovery)
- Institutions, institutional arrangements and organisational culture (clusters, networks, hubs)
- Governance (multi-level horizontal cooperation, participatory inclusive stakeholder participation)
- Cognition, knowledge and learning (policy learning, participatory learning, absorptive capacity).

The core idea behind a systemic approach towards *innovation* is ex-ante strategic approach, a policy-driven way to spin off processes that enable both diversification, differentiation and new development paths. Already Schumpeter recognised the power of innovation for entrepreneurial activities by incessantly revolutionising economic structures in order to get better or more effective processes and products, the process known as “creative destruction”. While doing so path dependency is an important precondition when defining strategy and patterns of organisational innovations (Schumpeter, 1947). Innovation and research in the 21st century both are increasingly becoming international endeavours and most innovations originate from multiple sources, with many drawings in components or technologies developed in multiple locations (Hayek, 2002). Potential evolutionary pathway of this innovation system is dependent on inherent structures and existing dynamics that have to do with the adaptation of radical transformation (Foray et al., 2012). Indeed, within the RIS3 multiple streams of insights on innovation intertwin. Whereas in early discourses innovations were regarded as those emerging only in firms, networks and clusters as well as multi-level and multi-cultural communities became sources in innovation process and enabled to combine internal and external knowledge bases (Pavitt 1984; Chesbrough 2003; Cooke, 2016; Asheim & Gertler 2005; Malerba 2005; Prause & Thurner 2014), approach actors at various spatial scales (Smith 2000; Tödtling et al. 2006), maintain different types of interactions and transfers (Gilsing et al. 2011) and focus on locally available capacities

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and capabilities (Gertler & Levitte 2005; Boschma & Ter Wal 2007). As a result of differentiating socio-economic setting in Europe and especially on the regional level, in order to accelerate innovative capacity and overcome socio-economic obstacles there emerged a stronger need to address local and regional challenges (Courchene 1995; Porter 2000; Wolfe 2002).

By addressing key existing challenges in Europe, experts advocated use of smart specialisation process, i.e. particularise knowledge base in European regions (Foray & van Ark, 2008, p. 14). Actually, the idea of knowledge-based growth can be traced back also to learning and specialisation, which implies an interlinkage with the birth of evolutionary economics pointing out specialisation and learning as key drivers, e.g. within Adam Smith's "Wealth of Nations". Followed by profound treatises bridging learning and specialisation, like that of Schumpeter (1947), knowledge, technology and innovation are key sources enabling place-based specialisation (Fagerberg et al., 2004, Tiits et al., 2015; Ferreira & Seixas, 2019). In this light, an institutional perspective is important, since institutions play a crucial role in facilitating learning, knowledge spill-overs and specialisation itself. The key current challenges that jeopardise RIS3 evaluation and monitoring pinpoint a lack of matching needs between regional governance and actors involved in innovation discovery processes, lack of implementation of bottom-up approaches enabling participatory processes, lack of capability to design and implement RIS3 policies as well as capability to engage actively in the processes of entrepreneurial discovery (Capello & Kroll, 2016, p., 1397).

Indeed, local and regional challenges have been increasingly addressed by deploying the concept of RIS and clusters, which have seen a high rise among the place-based concepts (Aranguren et al., 2019). On the one hand, these concepts are bound to prevailing market forces, on the other hand, they presuppose a clear intertwining with the province of *governance* (Sotarauta, 2018). Indeed, in order to enable a smooth RIS3 implementation, actors from different sectoral arrangements are involved, like academic & research, policy, businesses (entrepreneurs) and society in large (quadruple helix-approach). Furthermore, a smooth RIS3 implementation is deemed to be bound to interaction and intra-institutional interplays among regional, national, supra- and subnational levels. Moreover, an efficient governance is deemed to be bound to path dependency. Certainly, when it comes to governance improvement for RIS3 evaluation and monitoring, ex-ante experiences gathered are crucial in shaping future decisions and future monitoring mechanisms (Aranguren et al., 2019; Boschma, 2015).

Governance easiness and level thereof is highly dependent on the institutional thickness and territorial capital. The last one makes a clear interlinkage to capacity and capabilities of institutions, which, in turn, are highly dependent on *knowledge base and absorptive capacity* (Cohen & Levinthal, 1990) or collective learning (Bellini et al, 2020). In this matter, absorptive capacity is crucial not only for RIS3 implementation but also for absorbing supply of research and innovation by local enterprises (SMEs) when designing and undertaking RIS3 evaluation and monitoring. In the same vein, the dovetailing of supply and demand sides, e.g. academic & research with local and regional SMEs and their needs might have a huge impact on the desire and ability of both sectors to work in the future (Kempton et al., 2013, p. 14). Certainly, lack of absorptive capacity for new knowledge and innovation as well as missing articulation of demand frequently results in less-innovative regions. It limits capacity and capabilities to access, acquire and apply new and external knowledge, cross-fertilise and making use of it on the market (Asheim et al., 2017, p. 9; Barzotto et al., 2019, p. 215). In fact, lack of strong governance structures and thin institutions without strong industrial clusters, networks and industry associations capable to supply with the needed information, knowledge and inputs (Fotakis et al., 2014, p. 35). In this regard, governance is crucial for connecting or reconnecting participants in RIS3 implementation to enable following evaluation and monitoring, as smooth cooperation among them is a key precondition for delivery of innovative, desirable and sustainable innovation outputs as well as generate a shared value. In addition, the integration of policy makers and experts within this dialog is also persuasive.

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An overview of key theoretical concepts applicable for RIS3 evaluation and monitoring reveal that key challenges' blocks result from thin institutions and institutional arrangements covering governance, cognition and innovation processes. At the core of the challenging nature, there shall be discussed social aspects of actors' interactions pertaining to value delivery, shared value principals, leadership, asymmetric information flows, uncertainty, ambiguity, volatility, opportunism, bargaining power as well as transaction and monitoring costs issues. As a result, the authors call for the future research to build upon sound theoretical foundations, e.g. New Institutional Economies and related concepts and put the topic of RIS evaluation and monitoring in the tailored theoretical framework that enables to find practical challenge and problem-solving solutions.

3. Methodology

In the present research, the authors set out to forge a methodological / conceptual tool that supports RIS3 evaluation and monitoring on a macro-regional level by provide a practical method for benchmarking RIS3 implementation performance across the regional boundaries, i.e. by providing a harmonised tool. By scrutinising the topical literature, the researchers highlight that RIS3 evaluation and monitoring is to a great extent lacking conceptual foundations. As a result, the study applies hybrid research approach (Fereday & Muir-Cochrane, 2006, p. 80). Hereby, a combination of both inductive and deductive perspectives is done. From a deductive perspective, the research builds upon RIS3 evaluation and modelling approaches and traces key conceptual tenets. Subsequently, an inductive approach is used, since key insights from theory and practice are deployed to develop the methodological tool for practical applications. Indeed, the present research determines key building blocks and employs a specific structured approach by means of the developed outline (Fereday & Muir-Cochrane, 2006, p. 80; Crabtree and Miller, 1992, pp. 93-109). As a result, a methodological framework (common set of indicators) is constructed that is used for analysis and measurement as a certain template.

The research journey (design) encompasses the following key steps:

- Participating in the applied research project "SMART_watch" as key researchers regarding RIS3 evaluation and monitoring as well as policy recommendations.
- Developing tools for data gathering and monitoring within the project context, where the project serves as an overall case study.
- Gathering data from all 10 participation NUTS-2 regions from RIS3 reports (cases).
- Conducting expert interviews and making field notes in the frame of the project events (2018-2019).
- Analysing the gathered data by using thematic analysis method, social network analysis and memos.
- Undertaking thematic analysis of RIS3 evaluation and monitoring discourses and its positioning within the context.
- Distilling research streams and locating applicable concepts on RIS3 evaluation and monitoring only.
- Providing conceptual meanings of RIS3 evaluation and monitoring in the policy and theoretical nexus.
- Synthesising, comparing, smoothing and amalgamating data and presenting research results – set of indicators as a methodological tool for macro-regional RIS3 performance benchmarking.
- Validating research results.

Furthermore, the present scholarship has chosen a qualitative research approach. As noted by Kleibrink & Magro (2018), "*there is still a long way to go to systematically cope with this issue. This opens up room for the use of more qualitative approaches of participatory monitoring and evaluation*" (p. 6). By examining and interpreting data as well as determining key building blocks, the present research is able to comprehend the research phenomenon –

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RIS3 evaluation and implementation within the regional discourses. With the qualitative research, a case study method is applied here (Yin, 2009, 2012), serving as an umbrella method and followed thematic analysis method (Braun & Clarke, 2006). Given the nature of the case study, the case study can be referred to as "building block" study on a phenomenon identifying common patters (Thomas, 2011, p. 515). In this, the research in hand is explorative, at it aims at contributing to the research field (RIS3 evaluation and monitoring, which seems to be underdeveloped (Shields & Rangarajan, 2013, pp. 26-27). In order to undertake an exploration, both integrative and interpretative syntheses techniques were introduced. Indeed, a synthesis has been achieved through pooling topical concepts in the research streams into higher-order conceptual approach (Dixon-Woods, 2005, p. 46).

In sum, it can be argued here that the present research was comprehensive, by addressing different aspects and combining diverse methodological perceptions applicable to the current research. Since the present research deals with innovation – a very complex phenomenon, research methodology needs also to underpin the comprehensive research nature. Yet, the authors made sound attempts in crystallising out research steps and endeavours.

4. Data synthesis – a way towards developing collective methodological tool

Reviewing the monitoring systems and especially the used indicators has shown, that the approaches in each participating region are overlapping in the methods. Namely, the following NUTS-2 regions were included in the analysis: Del-Alföld / Észak-Alföld (Ferenc et. al., 2013), Lubelskie (Sosnowski et. al., 2014), Mecklenburg – Western Pomerania (Strategierat Wirtschaft – Wissenschaft, 2014), Piemonte (Regione Piemonte, 2016), Slaskie (Matusiewicz, 2012), Slovenia - Eastern (Republika Slovenija, 2014), Styria (Kohrgruber, s.a.) and Veneto (Regione del Veneto, 2015). Regarding the indicators, in most regions two different types are used: output and result indicators. The labels may differ, some regions use the terms of performance or strategy indicators, but the idea behind is equal. One category of indicators refers to the results of the RIS3 implementation. They try to measure the direct impact of the implementation for the whole region by using key indices for innovation, research or economics – often measure in percentage. In some cases, the Regional Innovation Strategy provides a base value from 2011 and a target value for 2020. While Mecklenburg-Western Pomerania only published base values for 2011, the region of Silesia doesn't use base and target values.

The second category of indicators are related to outputs. They measure project specific values and provide a certain amount as target value to be reached in the funding period 2014 – 2020. All regions follow the idea to use such kind of indicators, but their definition or actual label can differ widely. Those indicators can be number of patents, EU financed projects, persons employed in a specific sector, companies with new business products, cluster, R&D subsidies, supported networks and so on. In preparation of the common set, some overlapping indicators could be identified, but considering the working steps after developing the set, this kind of indicators may lead to high challenges in the benchmarking.

To develop a joined set of indicators, the authors follow a conceptualisation influenced by various articles, such as Yazday et. al. (2009), Shahin & Mahbod (2007), Schwemlein et. al. (2016) and Maes et. al. (2016). In the first step, considered indicators have to be used at least in six regions. Since the indicators of the regions are not exactly labelled and measured the same. The resulting common set will be used as basic structure. In the second step, indicators which appear at least four and five times will be analysed individually. This second group can improve the amount and quality of the final set. But, for these indicators an explanation has to be provided to justify their contribution, since the amount of integration in the respective regions as reason is not feasible enough.

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5. Displaying research results: methodological framework and harmonisation endeavours

As a result of research conducted, the authors analysed RIS3 documentation of 10 participating regions and provide the result overview in Table 2. The macro-regional indicator matrix, as showed in the table below, results from the comparison of the monitoring system in each region and the respective indicators. To create more add-value and flexibility regarding the upcoming benchmarking tool, the second set will be developed out of indicators, which are used by half of the regions. Both sets can be seen as final Common Set of Indicators.

The explained methodology leads in the first step to the following Table 2 with 15 indicators:

Table 2. Mapped Indicators in 10 analysed Central European regions

Name of indicator		
Expenditures on R&D at universities on GDP	Incidence of R&D expenditure on regional in GDP	Private investments to facilitate public support for R&D
Expenditures on R&D in private sector on GDP	Industrial SMEs introducing innovations as % of SMEs	Private sector spending on R&D as % of GDP
Expenditures on R&D in public sector and universities	No. of businesses with product and service innovations in % of SMEs	Public sector expenditure on R&D funded by business sector
Expenditures on R&D in public sector on GDP	No. of companies supported & cooperate with research institutes	Scientific employees
Incidence of R&D expenditure on national GDP	No. of patents and protection rights granted to national entities	Share of innovation-active companies

Source: Compiled by authors

To improve this set, the authors highlight the following indicators, which are used in at least four or five regions of the project consortium's regions:

- Spending on innovation in companies in the industry and service sectors other than R&D
- Share of R&D employees in private sector
- Number of companies supported diversifying product portfolio
- Number of companies supported introducing new products to the market
- Increase in business innovation activities.

The listed indicators are highly related to the Entrepreneurial Discovery Process and are able to measure the performance of it in the regions. Entrepreneurial Discovery Processes are one of the main phases of implementing Smart Specialisation Strategies. It is seen as a potential specialisation in which the knowledge contributed by the entrepreneur does not concern a technical invention (Larosse, 2013). Rather, it will relate to a new area of specialisation beneficial for the locale, given its existing productive assets (Forey, 2012). To cover this crucial part of the implementation process, the mentioned indicators will be added to the Common Set.
Therefore, the suggested Common Set of Indicators can be listed as in Table 3 below:

With the derived Common Set of Indicators, the Benchmarking of the chosen regions can be implemented. The set is used as required database for the benchmarking. For regions, the necessary (and available) data was collected and

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standardised to create one final index for comparison of the implementation of regional Smart Specialisation Strategies.

Table 3. Common Set of Indicators

List of Indicators			
Expenditure on R&D in public sector and universities	Incidence of R&D expenditure on regional in GDP	No. of companies supported and diversifying product portfolio	Private sector spending on R&D as % of GDP
Expenditures on R&D at universities on GDP	Increase in business innovation activities	No. of companies supported and introducing new products to the market	Public sector expenditure on R&D funded by business sector
Expenditures on R&D in private sector on GDP	Industrial SMEs introducing innovations as % of SMEs	No. of patents and protection rights granted to national entities	Share of innovation-active companies
Expenditures on R&D in public sector on GDP	No. of businesses with product and service innovations in % of SMEs	Number of scientific employees	Share of R&D employees in private sector
Incidence of R&D expenditure on national GDP	No. of companies supported & cooperating with research institutes	Private investments to facilitate public support for R&D	Spending on innovation in companies in industry & service sectors other than R&D

Source: Compiled by authors

Additionally, we estimated a structure index covering the regional starting points in 2013 and 2014. This allows a better assessment of the final benchmarking index and comparison between relatively different regions.

Since the indicators are not available via one well-known dataset, scoreboard or scientific paper, different sources were taken into consideration for gaining necessary values. This also leads to different approaches to standardise the data as written in the following subchapters.

Following the idea of the methodology that yields to create a Common Set of Indicators, all indicators will be weighted depending on their frequency of use in the regions. Together with the normalised value, we receive a score for each indicator in all participating regions (ref. to Rickman & Schwer, 1995). However, the final benchmarking index will be estimated by the mean of all scores, as shown in the equation:

$$b_r = \frac{\sum_{i=0}^{n} m_i * x_{ri}}{n}$$

where b_r is the benchmarking index for the region r, m_i describes the multiplier for the indicator i and x_{ri} the normalised value for indicator i for the region r. The sum in the counter will be divided by the number of indicators n to achieve the final benchmarking index for the region.

In the following subchapters, the methodology for the multiplier, the normalised values and the structure index will be explained in detail.

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Indicator Multiplier

Following the presented idea of collecting a common set for indicators to measure the implementation of Smart Specialisation Strategies, we can differ between different classes of indicators due to their frequency of appearance in the different regional monitoring systems. As an example, we want to take out the indicators "private sector spending on R&D in percent of GDP" and "share of R&D employees". While the first one is used as indicator for RIS3 implementation in all regions or is at least adoptable to one used indicator, the second one is only used in around 60%. Therefore, the value of the first indicator will have a higher influence on the final benchmarking score due to the mentioned multiplier m_i. The following Table 4 shows the multiplier for every indicator of the common set:

Table 4. Common Set of Indicators

Name of indicator	Weight
Expenditures on R&D at universities on GDP	1,2
Expenditures on R&D in private sector on GDP	1,2
Expenditures on R&D in public sector and universities	1,2
Expenditures on R&D in public sector on GDP	1,2
Incidence of R&D expenditure on national GDP	1,2
Incidence of R&D expenditure on regional in GDP	1,2
Increase in business innovation activities	0,6
Industrial SMEs introducing innovations as % of SMEs	1,0
No. of businesses with product and service innovations in % of SMEs	1,2
No. of companies supported & cooperate with research institutes	1,2
No. of companies supported diversifying product portfolio	0,6
No. of companies supported introducing new products to the market	0,6
No. of patents and protection rights granted to national entities	1,0
No. of scientific employees	1,2
Private investments to facilitate public support for R&D	1,0
Private sector spending on R&D as % of GDP	1,2
Public sector expenditure on R&D funded by business sector	1,2
Share of innovation-active companies	1,0
Share of R&D employees in private sector	0,6
Spending on innovation in companies in the industry & service sectors other than R&D	0,8

Source: Compiled by authors

Basically, indicators that are taken into consideration in all regional monitoring system receive a multiplier of 1,2. The weights are fixed according to the amount of appearances (Berger & Bristow, 2009). Whenever a region is missing, we subtract 0,2, which means that a multiplier of 0,6 is given to an indicator, that is not used by three regions.

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Introducing a multiplier helps to generate a more feasible final benchmarking score, since a good performance in an often-used indicator in monitoring systems is appreciated in the final score as well. On the opposite a low used indicator doesn't prosecute bad performance that much.

Normalised Values for Indicators

To yield comprehensible values for all indicators across the respective regions, the authors collected the necessary data through four different methods by using different data sources. All four ways of data gaining are presented in the following subchapters. However, the authors preferred the first option that follows directly the regional monitoring system of each region. Nevertheless, only a few normalised values could be taken out from this option. This results in a lack of information out of the regional strategy papers, which do not provide all necessary information to trace the idea of the respective region on how to get the data / values.

Values from regional Smart Specialisation Strategy Documents

By analysing the regional strategy documents in the frame of the development of a Common Set of Indicators, a collection of the used values for all regions was developed. In some regions, the responsible institutions for implementing the Smart Specialisation Strategy defined start and target value of the indicators used in the monitoring system for the current funding period. This allows an easy measurement of the implementation by comparing the defined target value for 2020 with the latest value, that is provided for the respective indicator.
Having this in mind, the value x_{ir} can be obtained as follows:

$$x_{ir} = \frac{t_{ir} - s_{ir}}{y_{ir} - s_{ir}}$$

where t_{ir} and s_{ir} are the target (2020) and starting value (2014) defined by the regions. y_{ir} is the latest value the authors were able to collect for the respective indicator. Therefore, equation (2) describes the resulting value as rate of the difference between planned performance and actual performance. If the region is able to achieve the planned target value, the value for the indicator would be $x_{ir} = 1$, while underperformance yields in $x_{ir} < 1$. However, $x_{ir} > 1$ is also a possible value, but it should be reminded, that the target values are defined for 2020 and the latest values are mostly accessible for 2018, which means that the data demands a two years gap.

Normalised Data via Regional Innovation Scoreboard 2019

Since not all regions provide the necessary information to follow previous options and / or the strategy paper do not present the methodology how the data was normalised or from which sources it was taken, another option has to be considered to get the necessary data for a useful benchmarking.

As it is shown in the Annex I, some indicators of the common set can be represented via indicators that are used in the Regional Innovation Scoreboard. The scoreboard is provided by the European Commission on a yearly basis, by analysing the NUTS2 regions. This allows us, to use the latest available data from a validated data source (Hollanders et. al., 2019).

The Scoreboard provides three information to create the normalised values for the respective indicators. Therefore, we can use different approaches to obtain the demanded normalised value. The first option is used, whenever the Scoreboard provides the data in relation to the European and national level of the respective indicator:

$$x_{ir} = \frac{(e_{ir} + l_{ir}) * 0{,}007}{2}$$

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where e_{ir} is the score taken out from the Regional Innovation Scoreboard for the respective region in relation to the European level and l_{ir} the score in relation to national level. The values are multiplied with 0,007, since we assume 0,7 as value for the mean performance in the frame of Smart Specialisation implementation. By dividing the score in the counter with 2, we obtain the normalised value for the indicator of the respective region.

As second option, we use the provided value for some indicators, which are not related to European and National level. In this case, the mean of all European NUTS2 regions was calculated by the authors from the Regional Innovation Scoreboard. Having the European mean value and the regional value, we can obtain the normalised value for the benchmarking by using:

$$x_{ir} = 0{,}007 * \frac{z_{ir}}{m_i}$$

where z_{ir} is the value taken out from the Scoreboard and m_i the calculated European mean for the respective indicator *i*. Again, we are multiplying 0,7 since we assume that this is the value for mean performance. This assumption follows the Lithuanian Ministry of Education and Science (2010) labelling 67 – 74 % as an average performance.

Normalised Data via Regional Competitiveness Index
In addition to the Regional Innovation Scoreboard 2019, data from the Regional Competitiveness Index were used to fulfil the database for the benchmarking tool as shown in the Annex I. The Competitiveness Index is also a yearly provided source for NUTS regions to measure the competitiveness performance and readiness in business sectors (Annoni & Dijkstra, 2019).

The Index provides a value for every European NUTS2 region. Therefore, the same method can be used as earlier in option two for the Regional Innovation Scoreboard. Therefore, we use again

$$x_{ir} = 0{,}7 * \frac{y_{ir}}{m_i}$$

where y_{ir} is the value taken out from Competitiveness Index and m_i the calculated European mean of all regions for the respective indicator *i*. As mentioned before, we are multiplying 0,7 as value for mean performance.

Normalised Data via EuroStat
As third validated data source, EuroStat as official statistical institution of the European Commission located in Luxembourg was used to obtain the remaining data (European Commission, 2019). Once again, for every region and the respective indicator, a value could be taken out from the database. Therefore, the equation is nearly the same as before:

$$x_{ir} = 0{,}7 * \frac{a_{ir}}{m_i}$$

where a_{ir} is the value taken out from EuroStat and m_i the calculated European mean of all regions for the respective indicator *i*. The fraction is multiplied with 0,7 due to the mentioned assumption of mean performance.

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Normalised Data using a combination of data sources

For some indicators, none of the shown methods were feasible. This results in a lack of information / data or in the understanding of the indicators content. Therefore, the authors conduct for the following indicators an individual approach to obtain normalised data:

- Incidence of total R&D expenditures on GDP.

To achieve a normalised value for this indicator, we use a combination of the previous shown methods. This includes data from the Regional Innovation Scoreboard and Eurostat. The equation is built as follows:

$$x_{4r} = \frac{(0{,}007 * (l_{5r} * l_{6r}) + x_{7r})}{3}$$

where l_{5r} is the value from the Scoreboard in relation to national level for the indicator "expenditures on R&D in private sector referring to GDP", l_{6r} the value from the Scoreboard in relation to national level for the indicator "expenditures on R&D in public sector referring to GDP" and x_{7r} the value for "expenditures on R&D at universities referring to GDP" taken from EuroStat by using the presented method.

Incidence of R&D expenditures on regional GDP

The normalised value for this indicator follows directly from the presented above. To obtain the normalised value additional data from the Regional Innovation Scoreboard is used.

$$x_{3r} = x_{4r} * \frac{GDP_n}{GDP_r}$$

where GDP_n is the national and GDP_r is the regional Gross Domestic Product taken out from the Regional Innovation Scoreboard. That means, we multiply the value for indicator No. 4 with the relation between national and regional GDP to obtain a normalised value for this indicator.

Structure Index

The Structure Index is based on an idea and tool published on the S3-platform by the European Commission. It tries to identify the characteristics in terms of structural conditions for the participating regions at the beginning of the Smart Specialisation funding period 2014 – 2020 (Navarro et. al. 2014). Those characteristics are seen as fixed in the short term and reflect the way innovation and economic evolution happen in the region. However, for the developed benchmarking tool described in this report, the provided structure benchmarking tool is not sufficient, since it shows the 35 nearest regions from all European NUTS2 regions to the selected one. This doesn't allow a comparison between the participating regions which are highly different what excludes them in the provided tool.

To solve this problem, we access the data from Regional Innovation Scoreboard and Regional Competitiveness Index. The database described for the European structure tool can be covered in a sufficient way by the two mentioned data sources. To obtain a structure index, we use the final scores from 2013 and 2014 from the data sources. Therefore, the structure index u_r can be written as

$$u_r = \frac{(RIS_r^{2013} + RCI_r^{2014})}{2}$$

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where, RIS_r^{2013} is the total index score for the region from the Regional Innovation Scoreboard in 2013 and RCI_r^{2014} is the total score for the region taken from the Regional Competitiveness Index.

6. Methodological framework in practice – benchmarking RIS3 performance in Central Europe

By using the described methodology, the research yields the following result table for the regions:

Table 5. Benchmarking results

Region	Structure Index	Benchmarking Index
D./E.-Alföld	-0.19425	0.4841
Jihozápad	0.1928	0.5383
Lubelskje	-0.1297	0.5135
Mecklenburg Western-Pomerania	0.53495	0.6689
Piemonte	0.3194	0.8307
Silesia	0.05105	0.4425
Slovenia – Eastern	0.3407	0.6158
Styria	0.63685	0.8965
Veneto	0.29255	0.6333

Source: Compiled by authors

As best performing region Piemonte can be indicated with the highest performance value, followed by Styria and Mecklenburg Western-Pomerania. Latter regions have the highest Structure Index compared to all regions, but obviously lose their front positions to Piemonte, which is starting from an average point in the frame of the Structure Index with 0.3194. Slovenia – Eastern possesses a well comparable Structure Index with 0.3407, but can't provide the same level of performance according to the Benchmarking Index.

Furhermore, the regions Lubelskje and D./E.-Alföld provide a negative Structure Index due to the negative value taken from the Regional Competitiveness Index. However, both regions obtain an average score overtaking Silesia, which started with a value of 0.05105 and is indicated as region with the lowest performance.

In the following, we will edit the benchmarking in two scenarios to create an analysis on specific fields. We will compare the Benchmarking Index from Table 5 as standard value with the yielding index after editing. An increase of the Benchmarking Value leads to the interpretation that the respective region is under-performing in the chosen field, since we exclude low values. In return, if the Benchmarking Index decreases, we can assume that the respective region is well performing, since we excluded high values.

To provide a clearer performance measurement, the indicators related to the GDP shall be excluded. Due to their measurement, that is relying on spending compared to regional and / or national GDP, it could lead to a bias in the performance measurement. Therefore, the seven respective indicators are excluded to obtain the Benchmarking Index. Table 6 shows the results.

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Table 6. Benchmarking results after excluding GDP related indicators

Region	Structure Index	Benchmarking Index	Benchmarking Index (without GDP indicators)
D./E.-Alföld	-0.19425	0.4841	0.4000
Jihozápad	0.1928	0.5383	0.4985
Lubelskje	-0.1297	0.5135	0.3873
Mecklenburg Western-Pomerania	0.53495	0.6689	0.5633
Piemonte	0.3194	0.8307	0.6674
Silesia	0.05105	0.4425	0.4396
Slovenia – Eastern	0.3407	0.6158	0.6431
Styria	0.63685	0.8965	0.7965
Veneto	0.29255	0.6333	0.6235

Source: Compiled by authors

Table 6 shows that only Silesia and Slovenia – Eastern can increase their score after excluding GDP-related indicators. The remaining regions suffer a decrease. The highest decrease can be seen for the region Piemonte, that leaded the first measurement with all indicators. The interpretation behind the realised scores is as follows, regions with a decreased score spend an amount of money to facilitate Smart Specialisation implementation that is not corresponding to the realised performance. On the other way around, those regions – Silesia and Slovenia – Eastern – have an over-performing related to their spending in relation to the GDP.

In another scenario, we exclude those indicators that are linked to Entrepreneurial Discovery Processes (EDP) (Larosse, 2013). As mentioned earlier, we identified five identified five indicators which are directly connected to EDP. Table 7 shows the yielded results.

Table 7. Benchmarking results after excluding EDP indicators

Region	Structure Index	Benchmarking Index	Benchmarking Index (without EDP indicators)
D./E.-Alföld	-0.19425	0.4841	0.5526
Jihozápad	0.1928	0.5383	0.6054
Lubelskje	-0.1297	0.5135	0.6057
Mecklenburg Western-Pomerania	0.53495	0.6689	0.7804
Piemonte	0.3194	0.8307	0.9556
Silesia	0.05105	0.4425	0.4878
Slovenia – Eastern	0.3407	0.6158	0.6758
Styria	0.63685	0.8965	1.0321
Veneto	0.29255	0.6333	0.6808

Source: Compiled by authors

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Those regions, that suffer from a decrease can be attested a good performance in EDP implementation since their high values are excluded in this scenario. However, only Lubelskje provides a mentionable decrease of the value and can be identified as best performing region in terms of EDP. In return, Styria, Piemonte and Mecklenburg Western-Pomerania provide the highest increase in their Benchmarking Index. The logical interpretation leads to an under-performance in terms of EDP in those regions, since we excluded low values measuring EDP.

7. Conclusions

The first research objective of this paper was to elaborate and analyse how a comparable benchmarking of NUTS-2 regions for their Smart Specialisation implementation can be established as a crucial step for future regional development and innovation policies. Given the topicality of the transition to the new funding period and launch of European growth strategies such as the European Green Deal, monitoring and evaluation of RIS3 and its missing theoretical concepts and scientific foundation was analysed within the undertaken research. The introduced methodological framework including a common set of indicators steps in to the gap of missing collaborative approaches of European NUTS-2 regions.

As a second research objective, the paper in hand provides a conceptual and methodological tool for performance comparison of individual NUTS-2 regions RIS3 implementation. The conducted research analysed and elaborated the positioning of RIS3 monitoring in contrast with latest policy discourses and theoretical settings. So far, a unified concept as well as the link between Smart Specialisation policy approach and theoretical concepts for monitoring was missing. The tool fills in this gap and contributes to the current political discourse on innovation policy governances and policy learning for future Smart Specialisation Strategy development and implementation.

The benchmarking methodology is considered for a limited number of regions in the frame of the Regional Implementation on Smart Specialisation Strategies (RIS3). After a detailed review of the published regional strategy documents, the presented monitoring systems and their indicators were used for a comparison and measurement of the appearance for each indicator. We emphasised a set containing 20 indicators to measure Smart Specialisation. To collect the necessary data, we focused on the provided measurement in the regional strategy documents. However, due to the fact, that regions partly did not provide detailed explanation how they collected the data (ref. to Ferenc et. al., 2013, Sosnowski et. al., 2014 and Strategierat Wirtschaft – Wissenschaft, 2014) we introduced a method to receive the necessary data from well-validated databases. To enlarge the result analysis, enable sufficient data interpretation and provide a better performance comparison, Structure Index of each regions are included, which shall cover the "starting point" for each region at the beginning of the Smart Specialisation funding period 2014 – 2020.

By using the explained Benchmarking method, we received first results on the performance, indicating Piemonte with the highest value. After editing the set of indicators by excluding GDP related values, we provided the assumption, that except Silesia and Slovenia – Eastern have a spending to facilitate the implementation of Smart Specialisation, which is not corresponding to the measure outcomes / performance. This is a crucial insight in the development of political recommendations for adjustments of the current regional strategies.

Furthermore, we analysed the implementation of EDPs by editing the indicators. The result table has shown, that Lubelskje region is best-performing of the analysed regions. For the weak performing regions such as Silesia, Slovenia – Eastern and D./E.-Alföld the implementation of EDP in the funding period was not successful and should receive a higher focus in the development of the upcoming regional strategies.

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The presented approach for Benchmarking provides a flexible methodology, which can be generalised on every NUTS-2 regions and even on smaller and larger scale. However, the methodology is limited in the number of regions that are considered to develop a set of indicators. Since regional development in terms of innovation and the regional policies behind are highly different, the methodology will not provide a sufficient set if the number of regions is too high. Nevertheless, it is a valid measurement to benchmark a certain number of different regions. The methodology may be used especially for neighbour regions to derive recommendations in the implementation processes and facilitate cross-border insights.

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