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Social Innovation Governance in Smart Specialisation Policies and Strategies Heading towards Sustainability: A Pathway to RIS4?

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Abstract: (1) Background: Regional Innovation Strategies on Smart Specialisation (RIS3) receive higher attention due to the start of the new European funding period 2021–2027. Compared to the previous period, RIS3 will focus more attention towards social needs and challenges in their design and implementation to commit themselves towards sustainable regional development and contribute to the European Green Deal and UN Sustainable Development Goals. Nevertheless, RIS3 as innovation policy has not yet incorporated social innovation concepts or socio-ecological demands on its pathway within the constant transition of Europe's society to become more sustainable. (2) Methods: A systematic literature review has been conducted to identify key insights and gaps in existing literature. (3) Results: The review exposed clustering as a policy tool for sustainable development, a lack of integration of social capital and regional assets to RIS3 design to overcome societal challenges and missing political capabilities to utilize social innovation governances under RIS3 towards sustainability. (4) Conclusions: Future research should pick up these gaps to contribute to a better understanding of social innovators in designing RIS3, meeting social needs and forging the pathway towards sustainability.

Keywords: RIS3; social innovation; smart specialisation; sustainability; RIS4; regional development; regional innovation; systematic literature review

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1. Introduction

The current funding period of the European Union 2021–2027 has just started, whereas Smart Specialisation Strategies determine the regional innovation and developmental governance pathways for the next years. On the same track, ambitious goals have been set by announcing the European Green Deal to push Europe's sustainable transition and contribute to the global UN Sustainable Development Goals (SDG) (European Commission 2010b). All three initiatives require an on-going adjustment of regional governance to design the strategic development towards sustainability by incorporating the affected stakeholders from entrepreneurial, academic, political and social spheres (Aranguren et al. 2019; Larosse et al. 2020).

The Regional Innovation Strategies on Smart Specialisation (RIS3) policy was introduced by the European Commission as a governance concept to accelerate regional economic development and growth in accordance with the Europe 2020 Strategy (European Commission 2010a, 2010b, 2010c), but also to ensure sufficient fund distribution among European regions One of the key concepts for RIS3 development and application are individually applied strategies including key priority areas for European regions (McCann and Ortega-Argilés 2015). The strategy implementation for 2014–2020 is currently evaluated and updated on an individual basis by the regions to determine the regional innovation and development for the next funding period from 2021 to 2027 (Gianelle et al. 2020a), based on experiences made and insights gained from the previous funding period (Boschma 2015).

Hence, the "new" strategies are seen as accelerators for sustainable competitiveness in Europe's regions (especially in the context of the European Green Deal) (Gianelle et al. 2020a; Meyer 2021), improvement for an outdated perception of regional innovation and sustainability governance (Landabaso 2014) as well as an introduction into a better structured and justified distribution of European funds (Foray 2014). Based on these aspects, the current research tendency is highlighting and elaborating on the impact of RIS3 on a sustainable development (Kogut-Jaworska and Ociepa-Kicińska 2020; Veldhuizen 2020), resulting in an upgrade towards Smart Specialisation Strategies for Sustainability (S4) (Laranja 2021). Another mushroomed research stream in the particular field is recognizing the increasing relevance of social dimensions in the post-2020 Smart Specialisation discourse towards RIS4, emphasizing the acronym as Research, Innovation and Social Strategies for Smart Specialisation (Neto et al. 2018; Neto and Santos 2020).

One of the core elements on the regional and local level of the Smart Specialisation governance is Entrepreneurial Discovery Processes (EDPs), which aim to optimize the usage of limited resources for certain domains of specialization (key priority areas of the regions) (Mieszkowski and Kardas 2015). An EDP benefits from regional actors being involved in innovation processes and tries to establish multilevel combinations of stakeholders to transform the innovation strategy into reality (Grillitsch 2016). In addition, selected priority areas may support the application of EDPs, while, vice-versa, EDPs have the potential to identify completely new specialization domains (Deegan et al. 2021). The involvement of affected stakeholders on horizontal and vertical levels is very much highlighted by researchers of Smart Specialisation concepts (Aranguren et al. 2019; Roman et al. 2018; Uyarra et al. 2014). However, in the RIS3 discourse, EDPs are often linked to the industry and market-oriented products and services (Coffano and Foray 2014; Del Castillo et al. 2015; Pinto et al. 2019). Nonetheless, EDPs shall be seen as potential specialization mechanisms, whereas available knowledge of academics and research, business, policy (entrepreneurs) and society (quadruple-helix approach) (Gerlitz et al. 2020) will rather be used for a technical invention (Foray and Goenaga 2013) than for the exploration of new fields of innovation and sustainable usage for given regional assets (Foray 2012). Smart Specialisation approaches are still embedded in science and technology-focused mindsets of innovation (policies), which is not in line with the current societal focus on sustainability (Benner 2020). Hence, the concept of social entrepreneurship should be taken into account for RIS3, noting the creation of new combinations of products, services, organizations or processes (Defourny and Nyssens 2010)—regional assets—resulting in innovation approaches (Noruzi et al. 2010). However, social-ecological and social innovation concepts and their impact on RIS3 have been only implicitly mentioned in this context (Hassink and Gong 2019, p. 2049). Noting the lack of scientific justification for RIS3 concepts and implementation (Andersons and Bushati 2019), conducted research offers an approach to overcome this gap of social innovation integration into RIS3 towards sustainability.

In this regard, RIS3 as a place-based approach supports economic and social development at the local and regional level resulting from altering competition conditions (Neto 2020). Consequently, this innovation policy bears great potential for and should be better embedded in peripheral regions (Barzotto et al. 2020; Hassink and Gong 2019; Morgan 2019). However, such regions experience higher challenges in capitalizing on RIS3. For overcoming this, innovation policies shall focus on socio-ecological models for innovation in order to directly affect the quality of life, underpin experimental learning, design and implement business capacity building, encourage social innovation and revitalize coalitions of regional actors (Morgan 2019). Hence, lagging and peripheral regions show even higher potential for efficient social innovation governances since they are composed of smaller communities sharing close social, political, integrative, cognitive and institutional proximity (Balland et al. 2015; Georgios and Barraí 2021).

Whereas existing research promotes entrepreneurial ecosystems covering profit-oriented needs (Stam and van de Ven 2021) and fostering regional knowledge creation and innovation (Carayannis et al. 2018), only little is known about the characteristics of social innovators

(Audretsch et al. 2021) and their incorporation to the RIS3 concepts (Hassink and Gong 2019) as well as the theory background for ecosystem governance (Wurth et al. 2021), underlining the introduced research gap. In this context, social innovation, being defined as "innovative activities and services that are motivated by the goal of meeting a social need" (Mulgan 2006, p. 146), is connected to social entrepreneurship (Phillips et al. 2015), indicating "activities and processes undertaken to discover, define and exploit opportunities in order to enhance social wealth by creating new ventures or managing existing organizations in an innovative manner" (Zahra et al. 2009, p. 519). Considering social innovation as an existing challenge for regional planning (Zahra et al. 2009) but as a potential relevant competitive advantage as well (Castro-Arce and Vanclay 2020), social innovation can be a key driver for sufficient RIS3 implementation (Taliento et al. 2019).

Following the introduced research gap, the research proposes the following research questions:

1. What interdependencies between social innovation and RIS3 have been exploited in existing literature towards sustainable regional development?
2. What is the conceptual background of social innovation on RIS3 implementation and sustainable regional development?
3. Which research gaps can be identified from current literature for future research on social innovation governance under RIS3?

To answer the research questions, a systematic literature review will be introduced for in-depth analysis of existing literature streams towards a better understanding of social innovation as a regional capacity alongside RIS3 towards sustainable development or, in other words, alongside the transformation from RIS3 towards S4 and/or RIS4. Hence, this conceptual paper theoretically contributes to existing research in this particular field, but also provides a sufficient background for future research design and implementation, which means that this article shall be treated as an appeal for more research exploitation in this specific research area, as well.

The article is structured as follows: after introducing the research gap and questions, the upcoming chapter points out the applied research method and assumptions made as well as the inclusion and exclusion criteria for the literature review. Afterwards, main results will be illustrated and answers given for the research questions. Lastly, the yielded insights will be put into context of current and previous literature for discussion.

2. Materials and Methods

Even though the particular fields have been exploited in existing research studies, resulting in several literature reviews on social innovation (Pomaquero-Yuquilema et al. 2019; Phillips et al. 2015) and Smart Specialisation (Fellnhofer 2017; Janik et al. 2020; Komninos et al. 2014; Lopes et al. 2019) themselves, no attempts have been made yet to provide a systematic review of existing literature on their potential interplay towards sustainability. As the main research method applied, a systematic review is based on transparent, reproducible and iterative processes, which allow for overcoming or minimizing the researchers' bias (Phillips et al. 2015). In addition, systematic reviews as evidence-based practices are able to identify key scientific contributions to a particular research area or questions (Tranfield et al. 2003), making them suitable for the introduced research objective of this article.

In the first stage, exclusion and inclusion criteria have been set up to set the research scope for applicable literature to be included in the review. Table 1 introduces the exclusion and inclusion criteria and their justification.

Table 1. Exclusion and inclusion criteria.

Exclusion Criteria	Justification
Pre-2010	The Smart Specialisation Policy was officially introduced in 2010 and conceived within the reformed Cohesion policy of the European Commission, hence, previous research articles are excluded from the systematic review process (European Commission 2010a, 2010b).
Non-European publications	As RIS3 as part of the European Cohesion policy is examined in this research, articles with a focus on non-European territories are excluded from the research scope (European Commission 2010c).
Analysis on national level	National strategies for Smart Specialisation only partly exist for European countries (Meyer 2020); potentially identified articles on national strategies cannot be considered to fill in the research gap.
Conference paper, presentations, books, workshop results	Only peer-reviewed articles in the English language are considered for the systematic review (Phillips et al. 2015).
Inclusion Criteria	**Justification**
Quantitative, qualitative and mixed methods	The applied research approach does not affect the analyzed fields of interest and the developed conclusions. Hence, to receive a broad view of social innovation under RIS3, all types of conducted researches are covered.
Theoretical and empirical studies	The aim of the systematic review is to cover all existing studies; hence, the data background does not affect the selection.
All sectors and areas	One key part of RIS3 implementation is the decision-making on key priority areas. However, all sectors, areas and priorities are included to provide a boundary-less analysis.

For the conducted research, the seven principles for systematic literature reviews were applied (Transparency, Clarity, Integration, Focus, Equality, Accessibility and Coverage (Pittaway 2008)). Based on the identified research field, gap and questions, the search strings were identified to cover the fields of social innovation and RIS3 towards sustainable development. As the different concepts shall be present in the analyzed literature at the same time, the key words are connected using the Boolean operator AND (Boell and Cecez-Kecmanovic 2014) using bilateral and trilateral combinations.

The systematic literature review has been implemented using SCOPUS and Web of Science databases, as utilization of different databases improves the coverage of the conducted search (Kitchenham et al. 2015). Yielded results have been streamlined based on introduced exclusion and inclusion criteria. For remaining articles fulfilling the criteria and search strings, a descriptive analysis has been applied on a first glance to examine the available literature in the scope of the research field, followed by a thematic analysis using the available abstracts of the articles for answering the introduced research questions as well as to provide existing research gaps in current status of the research (Xiao and Watson 2019).

3. Results

Based on the introduced methods, the systematic literature review in both databases has brought up the initial results, shown in Table 2, by using different combinations of keywords without considering the exclusion or inclusion criteria.

Table 2. Search strings and quantification of literature in SCOPUS and Web of Science databases.

Search Strings	SCOPUS	Web of Science
"social" AND "RIS3"	15	11
"sustainable" AND "RIS3"	17	12
"sustainability" AND "RIS3"	3	4
"social innovation" AND "RIS3" (AND "sustainability")	0	1
"social innovation" AND "smart specialis(z)ation"	8	4
"social innovation" AND "smart specialis(z)ation" AND "sustainability"	3	1

As Table 2 already indicates, a low number of research items have been elaborating interdependencies between social innovation and Smart Specialisation or RIS3 in general. By adding the perspective of sustainability, the records are consequently decreasing. However, for the final results in literature quantification of this systematic review, the illustrated exclusion and inclusion criteria (Table 1) narrow down the incorporated research items, as shown in Table 3.

Table 3. Keywords and quantification of literature in SCOPUS and Web of Science databases using exclusion and inclusion criteria.

Search Strings	SCOPUS	Web of Science	Net
"social" AND "RIS3"	7	7	8
"sustainable" AND "RIS3"	9	10	11
"sustainability" AND "RIS3"	2	3	4
"social innovation" AND "RIS3" (AND "sustainability")	0	0	0
"social innovation" AND "smart specialis(z)ation"	1	1	2
"social innovation" AND "smart specialis(z)ation" AND "sustainability"	0	1	1

Whereas the values in SCOPUS and Web of Science illustrate the resulting number using the search strings in the databases after application of the exclusion and inclusion criteria, the Net value illustrates the final number of research items identified after comparison of both database results (excluding duplicates). After eliminating duplicates across the search strings, 20 research articles were identified covering the field of interest as a result of the implemented systematic review. After reviewing the article contents, two research items have been excluded according to their non-relevance for the specific research objective. Therefore, in total, 18 research articles can be selected from the systematic review for further descriptive and thematic analysis.

3.1. Descriptive Analysis

Initially, the identified articles were categorized according to their origin. Table 4 illustrates countries of the institutions with which the authors are associated, according to the information provided in the articles. In three articles (Meyer 2021; Pavone et al. 2021; Secundo et al. 2017), at least one author represents institutions from different countries at the same time, which, in those cases, have been fully included. Furthermore, for articles with authors from different countries jointly published (Barzotto et al. 2020; Montresor and Quatraro 2020; Paiva et al. 2018; Pavone et al. 2021; Pudzis et al. 2018; Secundo et al. 2017), all countries mentioned are recorded.

Table 4. Quantification of origin countries in selected articles.

Number of Appearances	Country/ies
1	Belgium, Estonia, Finland, Greece, Lithuania, Norway, Poland
2	Austria, Latvia
3	Germany, Ukraine
5	Portugal, United Kingdom
8	Italy, Spain

The numbers indicate a stronger interest of the respective research fields in southeastern parts of Europe, with Spain (8), Italy (8) and Portugal (5) leading the statistic together with the United Kingdom. In addition, 7 out of 18 research items were conducted by an international author team, suggesting a tendency to benefit from transnational approaches when elaborating RIS3 research and implementation (Meyer 2020). However, due to the low number of identified articles, a generalizable conclusion should not be drawn from these statistics.

Furthermore, the articles are categorized according to their publishing year. As no records were identified earlier than 2016, the systematic review covers the recent six years in which the number of published articles in the research field slightly increased, indicating a higher scientific interest in social innovation under RIS3 with a focus on sustainability in recent years, as it is illustrated in Figure 1 below.

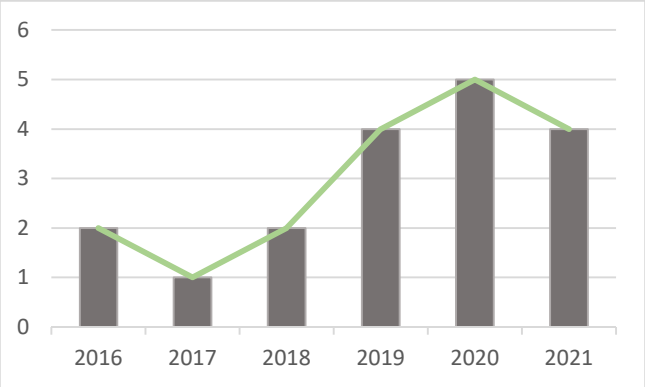

Figure 1. Number of publications identified in timeline (compiled by author).

In addition, the respective research fields might be used as indicators for elaborating the concepts and theories behind in the articles later on (Phillips et al. 2015). The most research items could be identified in Social Sciences (8) followed by Economics and Management (5). Urban Studies (2) as well as Environmental Science, Geography and Engineering, having one record each, are at the end of this sequence. In addition, the journals of *Regional Studies* and *European Planning Studies* are the only ones appearing more than once, indicating a broad distribution of the concepts across different disciplines and research areas, as well.

Lastly, the applied research design and methodologies in selected articles is mainly of a qualitative nature, offering only one quantitative article and three using mixed-methods, whereas only two articles claim to be an empirical study. Six articles used interview (structured and semi-structured) to gather primary data. From a theoretical point of view, mainly place-based, cluster and stakeholder theories have been the background of published articles. In addition, 12 articles applied case studies to create knowledge and insights for the research field, indicating a high share of inductive approaches as well.

3.2. Thematic Analysis

The thematic analysis reveals two different trends of the articles to contribute theoretically to the respective research field. On the one hand, articles analyze a certain phenomenon in a research field and provide interlinkages to social challenges and innovation, RIS3 and/or sustainable development. On the other hand, RIS3 policies are in the center of the studies elaborating the effects on sustainable development with regards to social innovation aspects. Following the thematic analysis as a result of screening the identified articles according to the presented systematic literature review methodology, clustering as a policy tool, social capital and regional assets, as well as social innovation governance, can be identified as key content themes resulting from the systematic review.

3.2.1. Clustering as a Policy Tool for Sustainable Development under RIS3

The conceptualization of clustering is a well-known theoretical concept in RIS3 literatures (Cooke 2001; Meyer 2020; Pavone et al. 2021), which follows Porter (1998)'s definition of cluster as an interconnection of companies and institutions in a particular field with geographic concentration—in the case of RIS3, the respective European region.

In addition, the articles yielded by the systematic literature review indicate clustering as an important theoretical concept to underline public policy measures tackling and over-

coming regional societal challenges (Del Castillo et al. 2021) and, therefore, it is also a sufficient concept for regional governance approaches (Meyer 2020) with a link between cluster policies, social innovation and RIS3 (Trillo 2016). For policy making with a focus on societal challenges of a region, socio-economic clustering is emphasized as a sufficient and applicable method facilitating an increase in regional competitiveness (Del Castillo et al. 2021) as well as policy learning towards sustainable development (Pavone et al. 2021).

3.2.2. Social Capital and Regional Assets

In identified research studies, social innovation is also seen as utilization of available social capital in a region which can contribute to regional development (Estensoro and Larrea 2016). As social capital is strongly connected to social engagement (Secundo et al. 2017), it is a key success factor to ensure the application of the quadruple-helix approach in policy-making towards RIS3, which includes on-going knowledge competence exchange among the actors (Trillo 2016). Thus far, social innovators and actors tend to be incorporated into such processes as outsiders or external experts rather than incorporated as direct actors for sustainable development, e.g., universities as knowledge drivers for the society and policy-learning (Secundo et al. 2017).

When it comes to sustainable development under RIS3 policies, a lack of incorporating available regional assets can be supported (Meyer 2021)—e.g., social capital, which holds great economic potential for sustainable development and therefore should be a core part of regional policy making (Pudzis et al. 2018) rather than available innovation infrastructure (Steen et al. 2019). Nevertheless, positive relations can be identified between the dominating support of technical innovation processes (Barzotto et al. 2020) and social needs (Paiva et al. 2018), especially when regions apply (green) Key Enabling Technologies connecting smart and sustainable growth through RIS3 (Montresor and Quatraro 2020). However, it is worth mentioning that a focus on regional assets only carries the risk of missing new or emerging innovation streams for radical changes needed for regions to move towards sustainability (Steen et al. 2019).

3.2.3. Social Innovation Governance

In general, innovation policies such as RIS3 need to pay more attention to social and environmental challenges towards sustainability. Hence, explicit social needs and contributions to SDG should be at the center of policy making, as well (Hassink and Gong 2019). To achieve this commitment on the policy level, it is necessary to encourage social contribution in innovation processes, utilizing public and regional resources towards sustainable development in RIS3 (Panagiotopoulou et al. 2019; Regueiro-Picallo et al. 2020). The reviewed literature indicates that this process is mainly lacking through insufficient communication and translation of the spatial idea by RIS3 into place-based policies reflecting (social) innovation frameworks, especially for regions failing to clearly emphasize and update their regional policy strategies (Trillo 2016). On the one hand, changes have to be made in the mind-set of political decision makers in terms of the role of social innovators, which are seen as external experts in regional innovation processes rather than as an active part of innovation government models to be applied towards sustainable development (Estensoro and Larrea 2016). On the other hand, policy makers should modify their communication towards social actors and society in general to clearly offer potential contribution at different stages as a supporting measures for successful EDP application (Roman et al. 2020). Following these arguments, and considering aforementioned incorporation of all affected actors to sustainable development processes for European regions, social innovation and social innovation governance foster the development of regional innovation ecosystems, enabling all communities and actors to be involved in the policy process for social and environmental sustainability (Barzotto et al. 2020).

However, the governance capabilities tend to be rather low when it comes to the inclusion of social capital and social innovation (Marques et al. 2019). This bears the risks of denoting less promising priorities for regional Smart Specialisation Strategies,

resulting in an increasing gap for sustainable development under RIS3 (Kogut-Jaworska and Ociepa-Kicińska 2020). To minimize such risks, improving social innovation governance through policy learning can be a key concept to be applied under RIS3 (Barzotto et al. 2020; Pavone et al. 2021).

4. Discussion and Concluding Remarks

The conducted research has shown that the trilateral discourse of RIS3 as an innovation policy as well as the concepts of social innovation and sustainable development have been nary or only partly elaborated on jointly in existing literatures. Nevertheless, several works investigated the concepts themselves, e.g., through a literature review for RIS3 (Fellnhofer 2017; Janik et al. 2020; Komninos et al. 2014; Lopes et al. 2019) and social innovation (Dionisio and de Vargas 2020; Eichler and Schwarz 2019; Pomaquero-Yuquilema et al. 2019; Phillips et al. 2015) as well as sustainable development (Bolis et al. 2017; Mensah 2019; Murphy 2012). The systematic review on their interdependencies has revealed three key themes as being appropriate for conceptualization: cluster as a policy instrument, social capital and regional assets, as well as social innovation governance.

Cluster conceptualizations or cluster theories have already been taken up by several research activities when it comes to regional development (Ablaev 2018), competitiveness (Tallman et al. 2004) and sustainability (Pozdnyakova et al. 2017; Prause 2014). It is well accepted in existing literature that cluster initiatives bear a high innovative environment or ecosystem (Bittencourt et al. 2019). In regard to RIS3, cluster theories are seen as a useful tool for strategy development and implementation on a political level (Citkowski 2020). Even though cluster concepts are strongly and closely related to Smart Specialisation, critiques of this argument have to be mentioned, emphasizing a lack of added value of Smart Specialisation policies in comparison to cluster policies (Hassink and Gong 2019). Other research studies stress the political path dependency of decision-makers, resulting in a mere re-labeling of previous cluster policies (Morgan 2017; Pugh 2018). However, social innovation concepts have the potential to break such policy path-dependencies towards sustainable transition (Olsson et al. 2017).

Whereas the social component in the regional cluster or policy cluster has been narrowed down to social network theories (Neumeyer and Santos 2018; Reid et al. 2008), the conducted research is promoting clustering as a connector between social innovation and RIS3 towards sustainable development. Hence, cluster theories contain the potential to step into the missing scientific conceptualization for RIS3 implementation in the particular research field. This is underlined by recognizing the fact that cluster policies are an appropriate approach for applying challenge-driven innovations (Cooke 2012). Therefore, it is well justified to consider cluster policies for tackling societal challenges towards sustainable development under the innovation policy RIS3. However, following these arguments, the question of how to design such a regional cluster for social innovation under RIS3 can be derived. Even though the conducted research cannot provide a clear answer, the results clearly indicate an active integration of social innovators as being highly important for cluster initiatives under RIS3.

Subsequently, social innovators in regions are a crucial aspect for RIS3 application towards sustainability. The research results have uncovered the lack of utilization of social innovators and social capital as available regional assets. This problem is already well-known from other areas when it comes to the design of RIS3 (Aranguren et al. 2019; Meyer 2020, 2021). Therefore, the yielded results from the systematic review demand new concepts for social innovation governance to efficiently integrate innovators and social capital into RIS3 for complying with the rising social and environmental challenges—or, in other words, to foster the transition towards sustainability. To achieve this, the literature proposes concepts such as transformative governances (Visseren-Hamakers et al. 2021), social mindfulness (Komatsu et al. 2022), co-creation (Ansell and Torfing 2021) or corporate social responsibility (Tibiletti et al. 2021; Triantafyllidis 2022). However, whereas social innovation governance is often used in the context of environmental aspects

towards sustainability (Lagasio and Cucari 2019; Widyawati 2020), its relevance and impact for RIS3 has not been exploited yet, whereas the conducted research clearly indicates linkages between both concepts to accelerate and support regional sustainable development, especially through the concepts of policy learning and EDPs.

Policy learning is a consistently reoccurring concept throughout the discourse of this research, describing the ability or skill of a regional policy maker to transform concepts and strategies from theory into practical policy implementations and changes to support regional innovation and sustainable development (Gianelle et al. 2020b). As the conducted research has exposed, social innovation governance application requires improvements in policy communication and actor involvement. In addition, learning effects, from failures and transformation effects, but also self-improving activities, are the backbone of effective policy learning (Bellini et al. 2021; Kleibrink et al. 2016); hence, policy learning is also driven by path-dependency—just like social innovation (Moulaert and Mehmood 2010).

The conducted research has exposed quite low literature records, elaborating the social innovation idea in RIS3. As the systematic review shows (Table 3), only some records were identified in both SCOPUS and Web of Science databases using the search strings with "social" and "sustainable" towards RIS3, whereas only few items could be identified using "sustainability" in connection with RIS3, as well. In terms of the search string for "social innovation" AND "RIS3", no published research item in both databases could be identified. Only the substitute of "smart specialis(z)ation" for RIS3 yielded a research item in combination with social innovation. Hence, the trilateral search by adding sustainability did, of course, not provide further insights, as the results did not change. Hence, in regard to the first research questions, the research undertaken clearly indicates a lack of incorporation of social innovation into the RIS3 concept. Even though a positive trend can be identified in increasing research interest of social and sustainable elements among RIS3, social innovation has not yet been well conceptualized to narrow down the potential impact for regional sustainable development under RIS3.

However, it shall be mentioned that the relationship between social innovation and policies as well as sustainability in general has been developed and exploited in several research articles (Borzaga and Bodini 2014; Haxeltine et al. 2013; Marques et al. 2018; Repo and Matschoss 2019). However, the research scope is clearly set to RIS3, limiting the amount of potential research items in the systematic literature review.

From a methodological point of view in line with research question two, the systematic literature review has exposed a high share of place-based theory applications for the research field. Taking into consideration place-based activities under RIS3, knowledge, technology and innovation capabilities are key factors to foster sustainable development (Fagerberg et al. 2004; Ferreira and Seixas 2019), demanding the active involvement of social innovators as main actors, being the drivers for knowledge creation, learning facilitation and spill-over identification. Putting this into the context of RIS3, place-based theories demand social innovation governance concepts as multilevel approaches involving all actors of the (social) innovation ecosystem, according to the quadruple-helix perspective (Aranguren et al. 2019). In this light, place-based theories considering multilevel (social) governance approaches are able to affect and explain the transition towards sustainability under RIS3, setting the scene to upgrade the paradigm towards RIS4—Research, Innovation and Social Strategies for Smart Specialisation or Regional Innovation Strategies on Smart and Sustainable Specialisation.

The thematic analysis has underlined the lack of focus on regional assets or, in this particular field of research, social innovators and social capital. Referring to research question three, research gaps drawn from this analysis indicate missing capabilities and competencies at the political level to sufficiently include regional social innovators into designing RIS3, setting up new communication and participation concepts for them, as well as utilizing social innovation governance ideas towards sustainable development under RIS3. Therefore, it is also recommended to include these aspects into future research

to better understand the role of social innovators and social innovation governances for designing RIS3 towards sustainability.

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