TERRITORIAL INNOVATION AND GOVERNANCE: AN INTEGRATED RIS4 MODEL FOR THE TRANSITION OF SMART SPECIALISATION STRATEGIES TOWARDS SUSTAINABILITY

Territorial innovation and governance: An integrated RIS4 model for the transition of smart specialisation strategies towards sustainability

Élia Vieira [a, 1]

[a] *University of Aveiro, Portugal*

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ABSTRACT

This article proposes an Integrated RIS4 Synthesis Model as a framework for the transition from Smart Specialisation Strategies (S3) to regional innovation and sustainability (RIS4). The model brings together three theoretical pillars, the classical S3, the Purpose-Driven Smart Specialisation and the Challenge-Oriented Regional Innovation Systems to address the systemic disconnect between formal governance and transformative action, conceptualised as the "institutional black hole". Through a heuristic analysis of the Region of Murcia and the cross-cutting tourism sector, the study demonstrates how the "innovation-exovation" dynamic and collaborative leadership can reorient regional assets towards the European Green Deal. The article concludes that the successful implementation of RIS4 requires overcoming administrative formalism through rigorous asset audits and inclusive, resilient, place-based governance.

[1] Corresponding Author
E-mail address: eliavieira@ua.pt

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1. Introduction

The evolution of territorial innovation and governance, through Smart Specialisation Strategies (S3), has become central to sustainable regional development, particularly within the European Union. Formalised in the European context from the late 2000s onwards, the concept encourages regions to invest in areas of specific advantages. It promotes a place-based approach that prioritises stakeholder collaboration as a driver of growth and competitiveness (Barca, 2009; Foray et al., 2009; McCann & Ortega-Argilés, 2015). (EC, 2014) However, over the last decade, the paradigm has shifted from purely sectoral innovation policies towards integrated frameworks that incorporate social and environmental objectives, aligning with the European Green Deal and the UN Sustainable Development Goals (EC, 2019; Schot & Steinmueller, 2018; United Nations, 2015). This transition to a new generation of smart specialisation strategies for sustainability (RIS4) requires innovation to cease being viewed as an end in itself and instead become a driver of systemic and resilient change (Schot & Steinmueller, 2018).

Despite the widespread adoption of these policies, their practical implementation has revealed complex challenges. Firstly, studies on the implementation of RIS3 (Research and Innovation Strategies for Smart Specialisation) show that formal coordination structures do not, in themselves, guarantee effective processes of entrepreneurial discovery, which are often limited by formalism and low operational capacity (Capello & Kroll, 2016; Kroll, 2015). Secondly, the literature warns of the risks of strategic mimicry and weak territorial differentiation when regions copy others' priorities rather than basing their choices on local assets and technological proximity (Boschma, 2015; McCann & Ortega-Argilés, 2015). Furthermore, difficulties persist in effectively engaging civil society, despite the quadruple helix framework, which proposes the integration of academia, industry, government and the public in the production of innovation (Carayannis & Campbell, 2009, 2010). The integration of social and ecological dimensions also remains uneven in relation to economic objectives, reinforcing the need for a more adaptive and resilience-oriented approach to governance (Folke et al., 2005; Martin & Sunley, 2015).We propose the analytical category of the "institutional black hole", building on and extending Nieth's (2019) work, to characterise the systemic disconnect between formal governance architectures and the transformative administrative capacity required to translate priorities into action.

Given this transition scenario and the institutional obstacles identified, the guiding research question is how can S3 be reconfigured into sustainability agendas to promote territorial resilience and climate neutrality through adaptive governance models? This study seeks to demonstrate that the success of RIS4 depends on the ability of territories to overcome administrative rigidity and formalism by adopting collaborative leadership that aligns local competencies with global sustainability goals (Folke et al., 2005; Sotarauta & Beer, 2017).

To address this challenge, the primary contribution of this article is the proposal of the Integrated RIS4 Synthesis Model. As the central theoretical output of this research, the model articulates the normative direction of Purpose-Driven Smart Specialisation (S3+P) with the systemic response of Challenge-oriented Regional Innovation Systems (CoRIS). By integrating the "innovation-exovation" dynamic, the model provides a robust framework for asset auditing and ensuring that territorial agendas are inclusive and resilient.

To ground the conceptual argument, the article draws illustratively on the Region of Murcia and the cross-cutting domain of tourism. Murcia is used throughout as a heuristic mirror that helps visualise the tensions between formal governance ambition and implementation capacity that the paper theorises. Furthermore, tourism is presented as a paradigmatic laboratory for observing the quadruple helix in action and the transition to sustainability in sectors traditionally sidelined in innovation policy debates (Romão & Nijkamp, 2018; Weidenfeld, 2018).

2. Methodology

This article adopts a conceptual approach (Jaakkola, 2020), grounded in a narrative review of the literature on territorial innovation, regional governance, and S3 (Baumeister & Leary, 1997; Paul & Criado, 2020; Snyder, 2019). It constitutes an analytical synthesis that seeks to identify patterns, tensions and gaps in the existing theoretical framework, contributing to the debate on the transition towards regional sustainability agendas. The choice of a narrative review, rather than a systematic or integrative one, is consistent with the article's purpose of constructing a critical conceptual synthesis that articulates distinct theoretical traditions and supports the proposition of an integrated framework.

The selection of the literature was guided by the authors' familiarity with the fields of regional studies and innovation policy, prioritising: seminal works underpinning the conceptual development of S3, the EDP, and multi-level governance; more recent theoretical extensions, particularly S3+P and CoRIS; contributions addressing the integration of sustainability into regional innovation strategies; and works problematising institutional capacities and gaps in regional innovation systems, with particular attention to Nieth's (2019) formulation of the institutional black hole.

The analysis was interpretative and iterative, organised around four recurring thematic axes: EDP; multi-level governance and institutional capacities; sustainability and territorial transitions; and institutional tensions and gaps. The cross-reading of these axes across the S3, S3+P and CoRIS frameworks enabled the identification of convergences, tensions and omissions that underpin the proposal of the inte-

grated RIS4 model. The aim was to understand how the S3 paradigm has evolved, where the main implementation difficulties persist, and how the new conceptual frameworks address these limitations.

This approach is appropriate to the article's objective, which is not to test hypotheses but to construct a well-founded argument regarding the necessary reconfiguration of regional innovation strategies in the face of contemporary sustainability challenges. The Region of Murcia is mobilised throughout the article with an illustrative and heuristic function (Siggelkow, 2007) rather than as a strict empirical case study. Its selection was based on its representativeness as a Mediterranean, middle-income region embedded in the European S3 framework; the presence of institutional tensions consistent with the notion of institutional black hole; and the centrality of tourism and agri-food as strategic sectors, allowing the applicability of the RIS4 model to key sustainability domains to be illustrated.

3. Theoretical Framework

3.1. Origins and Principles of Smart Specialisation Strategy

S3 has emerged as the central pillar of regional development policy in the European Union and in various global contexts, reshaping the way in which regions approach growth based on innovation and competitiveness. Initially developed in 2008 by the "Knowledge for Growth" expert group and formalised in the publications by Foray et al. (2009, 2011, 2012). S3 encourages regions to identify and invest in areas where they possess unique strengths, promoting competitiveness through localisation, strategic prioritisation and the active involvement of local stakeholders. This strategy is grounded in a place-based approach, which utilises territorial assets and resources to define a limited set of investment priorities, representing a paradigm shift from generic, centralised (top-down) innovation policies (Barca, 2009; McCann & Ortega-Argilés, 2015).

The conceptual evolution of S3 reflects shifts in thinking about regional development. Unlike traditional policies, which treated innovation as an end in itself, smart specialisation positions it as a means of achieving sustainable and inclusive territorial development (Foray, 2014). It is recognised that knowledge and research are the pillars of smart growth, which requires each region to identify its distinctive characteristics and competitive advantages in order to achieve excellence. The designation of S3 as an 'ex-ante conditionality' for access to the Structural and Investment Funds has compelled regional governments to develop robust strategies (McCann & Ortega-Argiles, 2016), which has generated extensive academic attention on how to operationalise these policies to support regional transformation (Foray et al., 2012).

3.2. The Entrepreneurial Discovery Process: from the Triple Helix to the Quadruple Helix

The methodological core of S3 implementation is the Entrepreneurial Discovery Process (EDP), which puts into practice the principle that effective territorial development stems from systematic collaboration among strategically positioned actors (Foray et al., 2009). The EDP represents a break with purely technocratic policy-making; rather than central authorities determining priorities, the process emphasises bottom-up learning and the generation of collective intelligence, with a view to identifying latent comparative advantages and defining technological trajectories with growth potential.

In its original formulation, the EDP was based on Etzkowitz and Leydesdorff (2000) triple helix model, linking academia, industry and government as the central pillars of regional innovation. This tripartite architecture formed the conceptual basis of the RIS3 Guide (Foray et al., 2012), which provided the framework for the first generation of strategies during the 2014-2020 programming period. However, the guide itself acknowledged that this framework was insufficient in the face of the growing complexity of regional innovation systems and the need to capture perspectives from the demand side, users and civil society.

The conceptual evolution of the EDP has thus led to the gradual incorporation of the quadruple helix model (Carayannis & Campbell, 2009; Carayannis & Grigoroudis, 2016), which adds civil society as the fourth constituent vertex of the innovation system. This extension reflects the recognition that innovation is not limited to the dynamics between knowledge, the market and regulation, but also depends on social legitimacy and the democratic ownership of technological trajectories. In the 2021-2027 programming period, civil society participation has moved from being merely recommended to becoming one of the enabling conditions for access to structural funds. Carayannis and Campbell (2010) also proposed the quintuple helix, integrating the natural environment as the fifth vertex, an extension particularly consistent with the transition to RIS4 (Research and Innovation Smart Sustainable Specialisation Strategies) and with the centrality of ecological sustainability in contemporary regional agendas.

Despite this regulatory reinforcement, the literature shows that the implementation of the quadruple helix remains uneven. Civil society participation has remained low in many contexts, despite the strong rhetorical emphasis on this pillar (Valdmaa et al., 2021). Comparative studies in regions with high institutional capacity suggest that the success of the EDP depends on specific mechanisms that foster inclusion and translate engagement into effective policy outcomes, avoiding the risk of merely formal participation (Aranguren & Wilson, 2013). The EDP should therefore be understood as a continuous learning process, capable of reorienting strategies in response to contextual changes, rather than as a linear or exclu-

sively consultative procedure.

The tourism sector embodies this collaborative dynamic, as the provision of products in a destination requires the involvement of a diverse range of economic activities, institutional actors and local communities. This decentralised value chain enables the creation of deep links within local economic structures, making tourism a driver of social innovation and territorial networking that is particularly well-suited to the logic of the quadruple helix.

3.3. Multilevel Governance and Coordination

The successful implementation of RIS3 depends on a governance model capable of coordinating actions across multiple institutional levels and policy domains. The multi-level governance framework is fundamental to understanding how these policies are designed in contexts where responsibilities are distributed amongst national, regional and local governments, as well as amongst non-state actors (Barca et al., 2012). Strong, harmonious and balanced synergies between stakeholders and across levels of government are necessary conditions for the success of S3 (Wibisono, 2022).

The literature reveals that governance challenges often manifest themselves in institutional readiness, vertical and horizontal coordination, and the alignment of policy objectives (Capello & Kroll, 2016). In contexts of institutional fragility, these challenges are exacerbated by barriers such as the fragmentation of legal regulation and the purely formal nature of EDP. The impact of these policies depends on the quality of public administration and the ability to integrate S3 into unified strategic planning systems, thereby overcoming the conceptual ambiguity surrounding priorities such as competitiveness and sustainability (Di Cataldo et al., 2022).

3.4. Theoretical Extensions: S3+P and the CoRIS Framework

To address the complex problems of sustainability, the academic literature has expanded the conceptual boundaries of S3 through two main models:

Purpose-Oriented Smart Specialisation (S3+P): this framework, developed by Silva et al. (2026), incorporates "shared purpose" as an organising principle to strengthen the direction and legitimacy of regional strategy. S3+P operates through five catalytic mechanisms (plasticity, temporality, identity, memory and relational networks) that link individual and territorial dimensions to macro-policy objectives, preserving the logic of discovery whilst imbuing it with greater social intent. The framework also proposes a six-stage policy cycle and a set of indicators that extends evaluation beyond conventional innovation metrics.

Challenge-oriented Regional Innovation Systems (CoRIS): this approach, introduced by Tödtling et al. (2022) and developed by Trippl et al. (2024), reorients innovation systems towards addressing territorial sustainability challenges. The model emphasises the need to pursue economic competitiveness, environmental sustainability and social equity simultaneously. A central concept in CoRIS is the innovation-exovation dynamic, which focuses both on the development of innovative solutions and on the deliberate phasing out of unsustainable practices and technologies, requiring a reconfiguration of existing innovation systems.

3.5. The Transition to Sustainability and the RIS4 Paradigm

The integration of sustainability into regional innovation strategies represents the current frontier of territorial policy. This development, referred to as the path to RIS4 (Meyer, 2022) aligns regional strategies with global frameworks such as the European Green Deal and the 2030 Agenda (Lankauskiene et al., 2022). This transition is particularly relevant for the recovery of sectors severely affected by the pandemic crisis, such as tourism. Integrating the sustainability dimension enables destinations to reduce their economic volatility by promoting diversification into non-tourism sectors and increasing the territory's overall resilience. This transition means that S3 ceases to be a strictly sectoral policy and instead becomes an integrated framework that addresses competitiveness alongside social inclusion and climate neutrality.

The literature emphasises that regional innovation and the green transition can mutually benefit from the transformative and collaborative nature of S3. The integration of these goals is uneven. The discourse on economic and environmental sustainability is there but the social dimension and social innovation are integrated less consistently (Meyer, 2022). Moreover, the application of sustainability-oriented frameworks faces problems of justice (distributive, procedural and recognition-based), requiring place-sensitive approaches that recognise communities' non-monetary connections to their territories. The success of this transition depends on overcoming deep mimicry, whereby regions copy their neighbours' priorities (Deegan et al., 2021; Di Cataldo et al., 2022), in favour of rigorous capacity audits that confirm the actual potential of regional assets for sustainability whilst also overcoming the difficulties in implementing complex diversification strategies (Balland et al., 2019).

4. Discussion

The reconfiguration of S3 into sustainability-oriented agendas (RIS4) does not constitute a simple incremental adjustment to the previous paradigm, but a change in the logic behind territorial innovation policies. This section articulates this transformation around six analytical axes that address the research question set out in the introduction, drawing on the

theoretical framework presented earlier and using the case of Murcia merely as an illustrative example, in keeping with the conceptual nature of the article.

4.1. From Innovation as an End to Innovation as a Means

The first analytical shift concerns the epistemological status attributed to innovation. In its original formulation, S3 treated innovation as the central objective of regional policies, based on the assumption that the identification of latent comparative advantages and their mobilisation through the EDP would be sufficient to generate growth and competitiveness (Foray, 2014; Foray et al., 2009). Transitioning to RIS4 means that innovation plays an instrumental role, no longer being an end in itself, but a vehicle for systemic transformations towards climate neutrality, social inclusion and territorial resilience (Meyer, 2022).

This reorientation corresponds to what Schot and Steinmueller (2018) refer to as the transition from the second to the third framework of innovation policy, in which the focus shifts from national innovation systems to transformative change. Meyer (2022) emphasises precisely that the integration of social innovation governance into S3 constitutes the decisive step towards the emergence of a RIS4, in which the social dimension takes on a central role equivalent to that of the economic and environmental dimensions. This reinterpretation is in line with the CoRIS framework (Tödtling et al., 2022; Trippl et al., 2024) that realigns regional innovation systems towards addressing societal challenges and introduces the innovation-exovation dynamic as a structuring element: innovating at the same time means phasing out unsustainable practices and technologies in a deliberate manner.

The transition to RIS4 is therefore not merely additive. It requires a reconceptualisation of the EDP itself, which must incorporate criteria guiding where innovation takes place and for what purpose, rather than merely criteria of allocative efficiency.

4.2. The Asymmetry Between Governance and Implementation and the Institutional Black Hole

The second analytical axis concerns one of the most persistent tensions in the literature, the asymmetry between formally sophisticated governance models and effective implementation capacities. Capello and Kroll (2016) and Kroll (2015) demonstrate that the existence of formal coordination structures does not, in itself, guarantee substantive processes of entrepreneurial discovery. In many contexts, the EDP was institutionalised as an exercise to comply with the ex-ante conditionality imposed by the European Commission (2014) without having effectively induced collective learning or strategic reorientation.

Di Cataldo et al. (2022)This phenomenon can be interpreted through the lens of what Nieth (2019) termed the "strategic black hole" in regional innovation coalitions, originally identified in her study of the Twente region as a gap between coalition rhetoric and actual strategic agency. We extend this notion into the concept of an institutional black hole, broadening its scope beyond coalition dynamics to encompass the wider administrative, coordination and monitoring architecture of RIS3/RIS4. In our reformulation, the institutional black hole designates a systemic space where strategies are formally produced, but where administrative capacities, vertical and horizontal coordination mechanisms, and monitoring arrangements are insufficient to translate priorities into transformative action. This extension connects Nieth's coalition-level insight with the governance-implementation asymmetries documented by Capello and Kroll (2016) Aranguren et al. (2019) and Di Cataldo et al. (2022).

Aranguren et al. (2019), in their analysis of the EDP, note that actual governance practices rarely align with the participatory model envisaged in the founding literature. This asymmetry is exacerbated by difficulties in coordinating the multiple levels of governance (Barca et al., 2012; Wibisono, 2022; Wibisono et al., 2025). In practice, however, multilevel governance often faces overlapping competences, time lags between political cycles and deficits in technical capacity within the regional administrations, in particular in less developed regions.

4.3. Strategic Mimicry

The third strand addresses a recurring phenomenon in S3 evaluations, namely strategic mimicry. Boschma (2015) and McCann and Ortega-Argilés (2015) were among the first to warn of the risk that regions copy the priorities of neighbouring territories or of models considered successful, without conducting a rigorous analysis of their technological proximity, relationality, and asset density. Deegan et al. (2021) and Balland et al. (2019) demonstrate empirically that successful regional diversification depends on the relationship with pre-existing capabilities, rather than on adherence to fashionable technological agendas.

A prime example of this dynamic is the proliferation of regional priorities linked to green hydrogen in the post-2020 European context. Following the launch of the European Union's Hydrogen Strategy (EC, 2020), numerous regions incorporated hydrogen into their specialisation strategies without possessing the industrial assets, research capacity or energy infrastructure that would credibly underpin such a commitment. The result tends to be a dispersal of resources, the overlapping of competing initiatives and a loss of territorial coherence, exactly the opposite of what S3 sought to avoid.

Mimicry is particularly problematic in the context of the transition from RIS3 to RIS4, because sustainability priorities carry high political visibility and symbolic appeal but require very specific material and cognitive assets. Without rigorous

capacity audits (Balland et al., 2019), the transplantation of priorities turns RIS4 into a rhetorical exercise, exacerbating the institutional black hole described in the previous section.

4.4. Purpose and Challenge-Driven Frameworks as Responses to Wicked Problems

The fourth analytical axis examines the two most relevant theoretical extensions for addressing complex sustainability problems: S3+P and CoRIS.

Both frameworks share a common diagnosis: S3, even when well implemented, is insufficient to tackle problems that are, by their very nature, cross-cutting, contested and long-standing. The wicked problems of sustainability (climate change, biodiversity loss, territorial inequality) do not respect sectoral boundaries or political cycles, requiring explicit direction and greater social legitimacy. S3+P introduces shared purpose as an organising principle, operationalised through the five catalytic mechanisms that link the individual, territorial and macro-political scales (Silva et al., 2026). CoRIS, for its part, reconfigures regional innovation systems to simultaneously pursue competitiveness, sustainability and equity, recognising that this involves not only creating the new but also dismantling the unsustainable, as well as the innovation-exovation dynamic (Tödtling et al., 2022; Trippl et al., 2024).

The complementarity between the two frameworks is striking: while S3+P provides the normative framework (why and for what purpose), CoRIS offers the systemic framework (how to reorganise existing systems). Figure 1 synthesises this complementarity in an Integrated RIS4 Model, illustrating the transition from traditional sectoral innovation to purpose-driven, sustainable territorial governance.Together, they address the criticism raised by Schot and Steinmueller (2018) regarding the need for transformative innovation policies and engage directly with Meyer's (2022) proposal on the path towards RIS4.

The model articulates three components namely a foundation in the S3 paradigm; a theoretical integration engine in which S3+P provides normative direction (shared purpose, social legitimacy, identity and memory) and CoRIS provides the systemic response (challenge-driven governance, innovation-exovation dynamic); and a resulting RIS4 paradigm grounded in the quintuple helix and oriented towards climate neutrality, territorial resilience and social equity. The entire framework is based on a key governance principle: the transition from administrative formalism to territory-centred leadership, supported by collaborative leadership, asset audits and coordination at various levels.

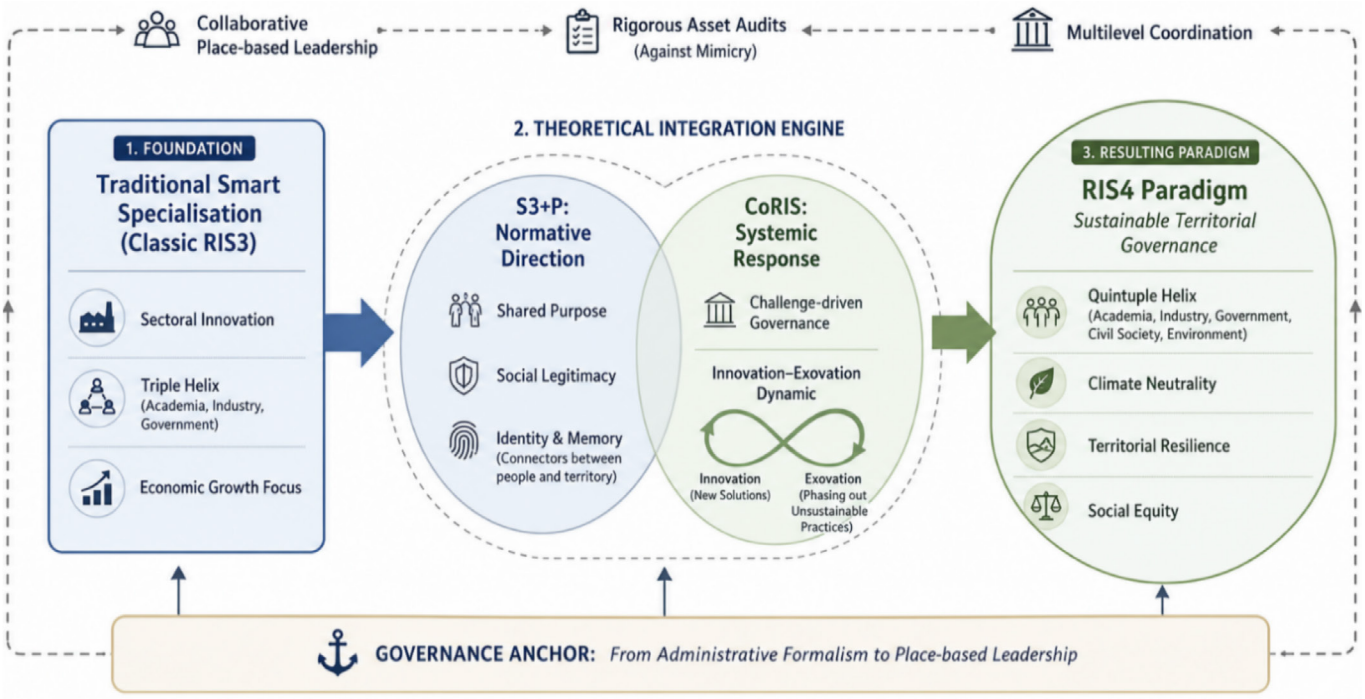

Figure 1: The Integrated RIS4 Synthesis Model.
Source: Developed by the author.

4.5. The Case of Murcia as an Illustration of the RIS4 Paradigm in Practice

By way of illustration, the case of the Region of Murcia provides a useful example for visualising the tensions discussed. Murcia developed one of the first regional strategies to explicitly integrate sustainability objectives[1], linking its traditional agri-food specialisation to priorities relating to water resources, the environment and maritime energy (Región de Murcia, 2022). The strategy sought to align itself with the European Green Deal, attempting a transition from the RIS3 approach to one closer to RIS4.

The Murcian case study illustrates three dimensions discussed in the previous sections. Firstly, it highlights how pre-existing specialisation (in the agri-food sector) can be reoriented towards sustainability objectives without abrupt disruptions, in line with the logic of technological proximity advocated by Balland et al. (2019). Secondly, reading the case through the lens of Silva et al.'s (2026) S3+P framework, the integration of the water dimension (critical in a region historically affected by water stress) can be understood as serving a mobilising, purpose-driven function within the strategy. Thirdly, although the RIS4 documentation presents its governance model as highly participatory, the broader literature on institutional "black holes" (Nieth, 2019) and on uneven civil society engagement (Valdmaa et al., 2021) suggests that such coordination challenges are likely to persist in practice, even where they are not explicitly acknowledged in official strategy documents.

Murcia thus functions as a mirror of the possibilities and limitations of the RIS4 paradigm, not as proof of its effectiveness but as a heuristic case study that brings to life the analytical categories employed.

4.6. Cross-Cutting Domains for RIS4: The case of Tourism

The sixth strand illustrates how the RIS4 paradigm operates in cross-cutting sectoral domains, taking tourism as one representative example. Despite being one of the most frequently cited areas of specialisation in European regional strategies, tourism has been treated as a marginal issue in the theoretical debate on S3 (Biagi et al., 2021; Weidenfeld, 2018). This marginalisation reflects a narrow conception of innovation, still rooted in technological and industrial models , and offers a useful lens through which to observe the categories developed above.

The decentralised nature of the tourism value chain gives the sector a cross-cutting character, making it particularly well-suited to the sustainability paradigm. Tourism naturally links the four helices (Carayannis & Grigoroudis, 2016), mobilises local economic sectors and generates territorial externalities that extend beyond its sectoral boundaries.

Within the transition to sustainability, tourism presents itself as both a problem and a solution. It is a source of significant environmental and social pressures, but it is also a potential lever for diversifying dependent economies, enhancing heritage, and fostering social innovation. The COVID-19 pandemic has highlighted its volatility and reinforced the need to reorient it towards resilience and diversification, as proposed by Martin and Sunley (2015). Integrating tourism into strategies, through criteria of exovation (phasing out unsustainable mass tourism models) and targeted innovation (regenerative, decarbonised, community-based tourism), represents one of the most promising avenues for implementing the RIS4 paradigm (Meyer, 2022).

5. Conclusion

This article proposed an Integrated RIS4 Synthesis Model as its central theoretical contribution, articulating the normative direction of S3+P with the systemic response of CoRIS under a governance anchor of place-based collaborative leadership. The analysis organised around six key areas, the reconfiguration of the status of innovation, the governance-implementation asymmetry, strategic mimicry, purpose and challenge-oriented frameworks, the Murcian case study, and cross-cutting domain, such as tourism , supports the argument that the transition from S3 to RIS4 constitutes a paradigm shift rather than an incremental adjustment.

The reconfiguration to RIS4 is only viable if three conditions are met. Firstly, innovation must be explicitly repositioned as a means to serve societal ends, drawing on the S3+P and CoRIS frameworks to provide direction for policies. Secondly, multilevel governance must overcome formalism and the institutional black hole by investing in administrative capacity, substantive public-private engagement mechanisms, and collaborative local leadership (Sotarauta & Beer, 2017). Thirdly, regions must resist the temptation to follow others blindly, basing their priorities on rigorous asset audits and realistic technological development pathways.

The transition to sustainability, far from being a cosmetic overlay on existing policies, requires the effective integration of economic, social and environmental dimensions as a prerequisite for any robust, inclusive and resilient territorial agenda.

5.1. Theoretical and Policy Contributions

From a theoretical perspective, the article makes three contributions. Firstly, it develops the Integrated RIS4 Synthesis Model which offers a coherent architecture for understanding,

[1] https://www.ris4regiondemurcia.es/en/

designing and evaluating the RIS3 - RIS4 transition. Second, it brings together three bodies of literature that are usually treated in isolation: the founding literature on S3, S3+P, and CoRIS. Thirdly, it recovers and extends the concept of the "institutional black hole" from Nieth (2019), integrating it with the governance-implementation asymmetry mechanisms identified by Capello and Kroll (2016), Aranguren et al. (2019), and Di Cataldo et al. (2022) to propose a broader analytical framework for multilevel coordination failures in S3.

From a policy perspective, three main implications arise. Firstly, regional authorities should subject sustainability priorities to rigorous capacity audits before incorporating them into strategies, thereby avoiding the mimetic transplantation of agendas. Secondly, the EC and national authorities should strengthen administrative capacity-building mechanisms, particularly in less developed regions, where the risk of an institutional black hole is higher. Thirdly, the evaluation frameworks for regional strategies should be broadened to include indicators of exovation, rather than merely indicators of the addition of new innovative activities.

5.2. Suggestions for Future Research

The conceptual nature of this article opens up several avenues for empirical and theoretical research. Firstly, comparative studies should be conducted across regions that have adopted similar priorities (e.g., hydrogen) to empirically test the hypothesis of mimicry and identify the mechanisms that distinguish substantive commitments from rhetorical exercises. Secondly, empirical research is needed to examine the concrete operationalisation of S3+P's catalytic mechanisms across different regional contexts. Thirdly, it is recommended that evaluation methodologies be developed to capture the innovation-exovation dynamics proposed by the CoRIS framework, which has so far been scarcely operationalised. Fourthly, tourism merits an in-depth study as a laboratory for RIS4 transition, particularly in regions with strong sectoral dependence and high climate vulnerability. Finally, it would be valuable to investigate the relationship between collaborative place-based leadership and overcoming the institutional black hole, linking the framework of Sotarauta and Beer (2017) with recent assessments of administrative capacity in a European context.

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