The Implementation of the Smart Specialization Approach in the Peripheral Region of Galicia

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Abstract:

Smart specialization is a key element of the EU regional policy. This chapter analyzes the experience of Galicia, a peripheral region in northwest Spain, and it addresses two main issues: to identify the main drivers and barriers in the prioritization of Galician Smart Specialization Strategy (S3) and to understand the implications of the smart specialization approach on the

policy-making process and effectiveness as well as on institutional learning. This research combines a literature review on smart specialization with a case study of the Galician experience, using in-depth semi-structured interviews and the analysis of the Galician innovation system and the innovation policies implemented so far. Our results show that the main weaknesses of the Galician Regional Innovation Smart Specialization Strategy are its limited prioritization, a poor development of the entrepreneurial discovery process, the limited coordination with innovation plans and, finally, the poor evaluation process. This research uses the Galician experience as an illustration of the implementation of the S3 on peripheral regions, providing policy recommendations. This chapter discusses how the S3 is formally implemented in the peripheral region of Galicia, and how the innovation performance and the policy design and implementation have hardly improved. The research highlights some relevant aspects for a proper definition and implementation of S3, which are regional singularities, the level of granularity on prioritization, the inclusiveness of discovery entrepreneurship process, the need for the evaluation and impact, a better coordination and governance, and finding policy synergies. It should also be considered the time required for a strategic definition and prioritization.

Keywords: smart specialization strategy, S3, bottom-up approach, entrepreneurial discovery process, peripheral regions, Galicia

Introduction

Smart specialization (SS) has become a key pillar of the EU regional policy; thus, the regions must develop their own smart specialization strategies (S3) as a condition for accessing European funds. This fact poses opportunities for place-based regional policies founded on local capabilities, but also relevant challenges, which are higher for peripheral regions. In this regard, peripheral regions are characterized by a low innovation performance, lack of critical mass, and institutional thinness (Tödtling & Trippl, 2005; Copus, 2011).

This chapter addresses the implementation of the S3 in Galicia, a northwest Spanish region, which can be considered a peripheral region in geographical, economic, and innovation

terms. This region presents a high degree of regional autonomy concerning innovation policies. It is considered an example of implementation of the S3 by the European Commission (EC) (Gianelle et al., 2016). In particular, this research addresses two main aims: first, to identify the main drivers and barriers which affect the Galician S3 implementation; second, to understand the implications of the SS approach in the policy-making process, effectiveness, and institutional learning.

This research combines the literature review about SS, the analysis of the Galician innovation system (GIS), and policies with in-depth semi-structured interviews carried out with 12 policymakers and other stakeholders involved in the process of design, definition, and implementation of the Galician Research and Innovation Smart Specialization Strategy (Galician RIS3).

This chapter provides useful inputs to improve the design and implementation of the regional innovation policies and S3. This diagnosis might also foster policy making and institutional learning. Furthermore, it may help understand the particularities of the S3 implementation in peripheral regions. Although some works deal with the Galician innovation system and policies (Vence, 2001; González-López, 2019, 2020), the Galician RIS3 is not analyzed enough. It is worthy of study due to the mixed character of this case: it is a good example in the formal S3 implementation, but it presents poor results concerning innovation performance. Moreover, this case study is an illustration of peripheral region, meaning that the conclusions could also be extended to other structurally similar regions in Europe. However, it should be regarded as a general frame, which needs specific adaptation to each regional singularity. This chapter focuses mainly on the policy and learning processes, as well as the results of Galician RIS3 implementation. The information collected in the interviews also provides useful insights for improving the design, implementation, and effectiveness of the innovation policies.

The chapter is organized as follows. After this introduction, the second section deals with the SS from a theoretical perspective and focusing on the relevance of these strategies for peripheral regions. The methodological section describes the process of design and implementation of the Galician RIS3, after approaching the main characteristics of the regional innovation system and policies. The next section analyzes the Galician RIS3 case study, focusing on the main drivers and barriers. Finally, the last section presents conclusions and implications.

Literature Background

The Smart Specialization as a New Approach in the Framework of the European Union Regional and Innovation Policies

The EC policy-making experience was important for adopting the SS concept. Thus, different Innovation Actions funded by the Structural Funds, such as Regional Technological Plans (RTPs), Regional Innovation Strategies (RIS), or Regional Innovation and Technology Transfer Infrastructures and Strategies (RITTS), had already been implemented during the 90s and 2000s, aiming at establishing and strengthening regional innovation capacities in less favored regions and involving all regional innovation actors in the definition of local priorities (Landabaso & Reid, 1999; Fernández et al., 2007; Morgan & Nauwelaers, 2003; Zabala-Iturriagagoitia et al., 2008; Sánchez-Carreira, 2020). In this sense, they could be considered the basis of the current S3 (Sánchez-Carreira, 2020). The process is similar because it is based on a strategic and bottom-up approach, interaction with regional stakeholders, and assessment by the EC and experts; as well as the phases of building consensus, identifying and selecting prioritized projects in the framework of the strategy and evaluation (Landabaso & Reid, 1999; Morgan & Nauwelaers, 2003; Zabala-Iturriagagoitia et al., 2008; Sánchez-Carreira, 2020).

The SS approach is rooted in a report commissioned by the EC Directorate General of Research and Innovation (DG RTD) to the Knowledge for Growth Expert Group in 2005, within the framework of the Innovative Europe initiative. The purpose was to explain and confront the EU productivity and technological gap with the US and Japan. At that time, different studies and reports highlighted the good EU R&D and technological basis; but it showed evident problems with translating technologies into products due to intrinsic deficiencies within many sectors (Kroll, 2017).

The SS concept, first launched by Foray and Van Ark (2007), refers to “the capacity of an economic system (a region for example) to generate new specialties through the discovery of new domains of opportunity and the local concentration and agglomeration of resources and

competences in these domains" (Foray, 2014, p. 1). SS should not be confused with S3. SS refers to structural changes that happen in economic systems, which take different forms, such as transition, diversification, modernization, or radical change (Foray, 2014). Nevertheless, S3 refers to those actions and measures (policies) that promote this kind of process (Foray, 2014; McCann, 2015). The policy should involve productive and institutional stakeholders that, from a bottom-up perspective, identify and develop potential domains for SS that governments could support. S3 is committed to concentrate and prioritize resources on a few initiatives.

Two crucial concepts concern SS: entrepreneurial discovery and critical mass. The goal of SS policies could be understood as a successful replication of market-driven structural transformation. Therefore, it is important to replicate the actions of entrepreneurs, understood in a broad sense, in launching such processes. It means that the policy should involve productive actors (firms) and other institutional actors (universities, public agencies, etc.). They can identify and develop potential domains for SS from a bottom-up perspective, which governments will eventually support. Secondly, the policy should aim at generating critical mass; otherwise, the structural change will not be achieved. This idea explains why S3 is committed to concentrating resources on (relatively) few initiatives (Foray, 2014).

It should be underlined that SS was not originally a spatial concept but also a science, technology, and innovation-related concept. However, its rationale was quickly translated into regional policy when the EC Directorate-General for Regional and Urban Policy embraced the concept (McCann, 2015). Its rationale was used as an enabling principle for investing Structural Funds more efficiently (Foray, 2014). When translating the SS logic into spatial and economic geography terms, McCann (2015) indicates the relevance of concepts as relatedness, embeddedness, and connectivity, which mainly come from the evolutionary economic geography. Relatedness describes the technological proximity among different activities. The more related are activities the easier is to switch between them and provoking structural change, through adjusting production systems, organizational changes, and so on. Embeddedness refers to "the extent to which particular activities display depth linkages with a broad range of other local activities, local skills or local institutions" (McCann, 2015, p. 174). The key point is that structural changes do not happen "in the air," but in specific places where there are multiple linkages with existing activities and institutions. Finally, connectivity concerns the ability of actors to absorb knowledge from a wide range of connections, both with internal and external

actors. Based on these three spatial concepts, McCann (2015) notes that "the smart specialization logic argues that in order to foster innovation and growth regions should aim to prioritize those activities fostering and enhancing entrepreneurial search initiatives in activities which are aimed at technologically diversifying those activities which are both highly embedded within a region and also highly connected to other regions" (McCann, 2015, p. 175).

S3 rationale fitted well with the EU cohesion policy due to two reasons (McCann, 2015). First, it provides a policy prioritization framework aligned with the Europe 2020 Strategy. Secondly, it follows a place-based logic, like the Cohesion Policy. The place-based approach assumes that policy priorities should vary in different types of regions (Tödtling & Trippl, 2005). It also suggests that regional policies should build on local capabilities and promote innovative strategies based on local and nonlocal actors and knowledge (Rodrik, 2005; Barca et al., 2012; Varela-Vázquez et al., 2019; Hassink, 2020). This is the case of the S3 bottom-up entrepreneurial discovery process.

The SS approach has become the main link, theoretical and practical, between the EU regional development and innovation policies. Thus, SS became a key pillar for the EU cohesion policy in the programming period 2014–2020. It was also implicitly admitted by the EU institutions. For instance, the European Council recognized SS as a key concept in its conclusions of the "Innovation Union" flagship initiative (European Commission, 2012). This understanding also has a practical expression with the establishment of the Synergies Expert Group by the DG RTD, which argues that "the concept is an important instrument for ensuring synergies between Horizon 2020 and the Structural Funds in the interest of building and providing a stairway to excellence" (European Commission, 2012, p. 8). SS is viewed as the existing most complete European industrial and decentralized innovation policy.

The practical implementation of S3 faces different challenges. One of the common misunderstandings was to confuse specialization with sectorial specialization, when the SS approach referred to knowledge domains, which are mainly cross-sectorial, at the interfaces of technologies and economic activities. Thus, relevant domains are activities, tasks, or specific technological functions in firms and production processes rather than sectors or industries. For the same reason, specialization does not refer to an opposite trend to diversification. This process refers to choosing the right domains for policy support that can lead to more specialized or diversified structures, depending on the region. Thus, specialization and diversifications are

complementary, arising different combinations, such as related variety, unrelated variety, specialized diversification, or diversified specialization (Foray, 2014; McCann, 2015; McCann & Ortega-Argilés, 2015; Foray et al., 2018; Asheim, 2019; Hassink & Gong, 2019). In this regard, finding the right granularity level in the selection of priorities becomes a crucial aspect related to the S3 implementation (McCann & Ortega-Argilés, 2015; Foray et al., 2018).

Smart Specialization Strategies in Peripheral Regions

Another recurrent debate about S3 concerns the aforementioned apparent incompatibility between innovation and cohesion. The argument is that aiming at creating technological hubs at the European level, SS favors concentration of capabilities on a limited number of regions. This objective seems contradictory with the cohesion policy aims, particularly with the need to improve socioeconomic well-being in less developed regions. There is mutual interaction between innovation and regional development. As it has already indicated, the S3 adoption has come together with a change (at least rhetorically) in the rationale of the cohesion policy toward promoting competitiveness and effectiveness of investments. Nevertheless, this change does not imply the exclusion of the cohesion perspective, as in practice, the main beneficiaries of cohesion funds continue to be lagged regions. As Kroll (2015) indicates, the logic is that the ex ante conditionality obligates these regions to develop and adopt a coherent, prioritizing, and place-based innovation strategy, which otherwise they might not have embraced.

The S3 adoption raises opportunities as well as challenges. The S3 implementation has been quick and often ignoring its experimental nature (Morgan, 2017; Foray et al., 2018; Gianelle et al., 2020). This fact, together with the lack of experience, makes difficult its effectiveness; it is in an ongoing policy process. The complex and innovative approach also requires resources and competences to identify local assets and potential domains for specialization. In addition, the strategy should be flexible enough to adapt to a changing context and the emergence of new combinations of knowledge and capabilities. It involves an effective and diagnostic monitoring (Kuznetsov & Sabel, 2017; Foray et al., 2018).

The challenges inherent to S3 are higher for peripheral regions. The existence of some features help identifies them, such as locational disadvantage, deficiencies in infrastructures, slow economic growth, institutional thinness, low innovation performance, or limited absorption

capacity (Landabaso & Reid, 1999; Copus, 2011; Morgan & Nauwelaers, 2003; Tödtling & Trippl, 2005). Concerning innovation, Fernández et al. (2007) identify the following characteristics of peripheral regional innovation systems: low effort on R&D&I, high weight of public sector, low R&D business innovation pattern, small firms, traditional sectors, and low skilled works.

For peripheral regions, S3 provides an opportunity of identifying their specific development path based on local assets and capabilities (McCann & Ortega-Argilés, 2016). A more prioritized approach constitutes a good opportunity for designing and implementing tailored policies for the specificities and challenges of each region. Moreover, the recent financial crisis and the consequent reduction of resources leads to a new approach of policies, seeking to achieve the higher returns of public resources, through a strategic approach, prioritization, cooperation, and generating synergies.

The process of setting up S3 priorities is based on identifying capacities, potential, and opportunities to transform economic structures. Thus, the right information is key to construct own regional competitive advantages (European Commission, 2012; Asheim et al., 2020). In this sense, the specific regional preconditions are different, given that the regional innovation policies differ in several aspects. The causes of these differences are multiple; however, they can be summarized in three dimensions (OECD, 2011): the institutional context, the regional innovation system, and the strategic choices. There are notable differences concerning the institutional context in the degree of autonomy, level of competences, and governance among EU regions. Governance is a crucial issue to design and implement regional innovation policies. Accordingly, the regional capacities differ in several aspects, such as legislative autonomy, budget autonomy, national framework, human resources, competences, tradition, and experience in the design and implementation policies, the existing institutions and their role, relations and interactions with policy makers of other levels; the horizontal and vertical coordination; and the sociocultural aspects (Uyarra et al., 2007; Walendowski et al., 2011; Baier & Zenker, 2020). Concerning regional innovation systems, the different features result from several factors, such as development paths; productive structure; historical and cultural patterns; institutional capacity; knowledge creation, diffusion, exploitation and absorption; connectivity and internal and external linkages; sources of funding; innovation actors and institutions (OECD, 2011). Finally, the strategic choices lead to identify challenges and opportunities for regional development and

setting key priorities, which should be tailored to the regional context singularities (OECD, 2011).

The shortcoming on regional capabilities, competences, and resources can limit and hinder the definition and adoption of an appropriate regional S3. Peripheral regions are precisely those that present more weaknesses concerning the institutional context and capacities because they have less competences, resources, capabilities, and experience to deal with this complex policy process. In such cases, the mismatch between the policy ambition and the policy delivery process widens (McCann & Ortega-Argilés, 2015; Foray et al., 2018; Trippl et al., 2019). Since the EU embraced this policy approach, tools and concepts and support in the S3 policy process were provided, through different ways: experts, S3 Platform1 or Vanguard Initiative for New Growth through Smart Specialization2 (Foray et al., 2018). Moreover, because the process of setting up S3 priorities is based on identifying capacities, potential, and opportunities to transform economic structures, the need for right information is key. The experimental nature of S3 and the need of prioritization as a result of a discovery entrepreneur process is more challenging for less developed regions (Foray et al., 2018; Kroll, 2019). Building capacities for design and implementing strategic bottom-up place-based regional innovation policies is needed, which conflicts with the rapid implementation of the process, limiting the operationalization of SS (Balland et al., 2018). However, it provides capabilities and learning useful for the next policy implementation (McCann & Ortega-Argilés, 2016).

Methodological Approach

The Context of the Design and Implementation of the Galician Smart Specialization Strategy

This section describes the process of design and implementation of the Regional Innovation Smart Specialization Strategy (RIS3) in Galicia. Before that, the main characteristics of the Galician innovation system and policies are briefly approached. This contextualization, as well

as the description, are based on the revision of the limited literature about the Galician case and the own analysis of the policy documents and evolution of the indicators of the GIS.

An Approach to the Galician Innovation System and Policies

Galicia is a northwest Spanish region, which can be considered peripheral in geographical, economic, and innovation terms. This region has a high level of autonomy, specifically concerning innovation. It involves a multilevel level governance system with the national and EU levels. According to the Regional Innovation Scoreboard, the region is considered a moderate innovator, ranking 190 out of the 238 regions (European Commission, 2019).

The Galician Regional Innovation System (GIS) can be considered weak. Its main characteristics before launching the Galician RIS3 are the following ones: low efforts in inputs (R&D expenses, personnel); predominance of public efforts; limited cooperation, interaction, and articulation; low weight of intensive technology activities; and low absorption capacity. Thus, the GIS presents the typical pattern of peripheral regions (Vence, 2001; Fernández et al., 2007; González-López, 2019, 2020).

Concerning innovation policies, the level of regional competences is high, as well as in education or industrial fields, according to the Spanish Constitution and the Galician Statute of Autonomy. The general framework for innovation policy is completed by the regional Law on the Promotion of Research and Innovation in Galicia, approved in 2013. The regional government plays a key role in the GIS, which follows a top-down approach (González-López, 2020). The research plans are the main instrument of the innovation policy. Since the first plan, which was running in the period 1999–2001 until the current Galicia Innova 2020, there were five plans. The Galician innovation policy evolves, showing certain continuity patterns in a path-dependent process, albeit affected by external shocks and interaction with other governance levels (Spain and EU), highlighting the imitation path of the national innovation policies and governance structure (González-López, 2020).

Design and Implementation of the Galician Smart Specialization Strategy

The SS policy process involves effort and resources, and it was leaded by the Galician Innovation Agency (GAIN), the entity responsible for regional innovation policies in Galicia. The Galician RIS3 implementation follows the methodology established by the EC Guide Research and Innovation Strategies for Smart Specialization (European Commission, 2012). The process is divided into the following six steps (European Commission, 2012; Xunta de Galicia, 2014).

Results and Discussion of Research Findings

Analysis of the Regional Context and Potential for Innovation

The first step consists of a diagnosis of the regional context and the potential for specialization in economic, technological, and scientific fields. It covers the three dimensions indicated in the EC Guide (European Commission, 2012): regional assets, entrepreneurial environment dynamics, and the region position within the European and global economy. It focuses on the interaction among different players and the identification of systemic failures. The elaboration of a map of available resources and capacities regarding the productive system, the identification of agents and infrastructures by specialization areas, make it easier to identify the potential and competitive advantage (Xunta de Galicia, 2014; European Commission, 2012).

Governance: Ensuring Participation and Ownership Collaborative Leadership

The second step refers to the creation of a formal governing structure for the S3, attempting to be participative and representative of the GIS. It was established in 2013 pivoting around GAIN. It is composed of an Executive Board, a Management Team, seven Working Groups, and Forums (Xunta de Galicia, 2014; European Commission, 2012).

The Executive Board manages and supervises the SS process, as well as review the strategy and coordination with other national and regional S3. This board, named GAIN Governing Council, is comprised of 12 members, one from each Xunta de Galicia Department, and one from the Galician Universities System. The Management Team conducts the daily strategy development, encourages Working Groups, and organizes the Forums. Several Working Groups were created in different areas for strategic reflection and participation of the GIS agents (enterprises, science, and knowledge sector, as well as users, citizens, and organizations) in the S3 definition. These groups attempt to identify the current and future situation of their activity areas, propose of potential niches and priority lines of action in such areas, from a cross-specialized approach and open policy focused on practice. Finally, several Forums were organized to obtain wider participation of the GIS agents and citizens.

There are other two supporting tools, which are consulting councils: the S3 Advisory Council and the S3 International Advisory Council. The S3 Advisory Council addresses the supervision and evaluation of the Galician RIS3 implementation. It is composed of members from knowledge-generating agents (Galician University System, technological centers, health foundations, or others, accounting for 40% of the representation), renowned business sector representatives (20%), public sector representatives (20%), and citizens' representatives (20%). Thus, there is a predominance of knowledge members. The S3 International Advisory Council contributes to give a global strategic vision of interregional cooperation within the framework of S3. It consists of national and international regional representatives that cooperate in the innovation field and a representative from DG Regio.

Elaboration of an Overall Vision for the Future of the Region

This step focuses on defining a shared vision of the Galician economy. The process followed to define it is relevant, being crucial to the involvement of different agents. Three milestones in that process are the prioritization of niches, the proposal of the challenges, and the building of the shared vision (Xunta de Galicia, 2014; European Commission, 2012).

Based on the diagnosis of the first step, seven working groups were created to think about key ideas and opportunities for a regional development path from a participatory perspective. There are three thematic working groups in the following fields: Health, Welfare and Life; Food, Agriculture, Fishing and Biotechnology; and Energy, Environment and Services. Moreover, two working groups are focused on Facilitators Technologies, one devoted to ICT Facilitating Technologies, and another related to Nanotechnologies, Materials, and Manufacturing Technologies. Moreover, two transversal working groups were created: Citizen Participation and Horizontal Policies. Following the participatory method, each Working Group was formed with different profiles: a coordinator, which leads the group; participants, which are between 4 and 10 representatives of the regional administration, steering the political leadership; interlocutors, which are between 15 and 25 representatives from enterprises, science and knowledge sectors, citizens and transversal organizations; and a motivator, from the management team, which is responsible for supporting the coordinator, encouraging and guiding the meetings. The followed methodology consisted of eight sequential actions, including meetings, round tables, and surveys.

As a result of the working groups and forums, 30 potential niches were identified. They were fined-tuned and reduced to 18 prioritized niches, which serve as a basis for finding the regional transformative path. Moreover, five capacities inventories were prepared by each thematic working group (Xunta de Galicia, 2014).

In the light of the previous steps, the work of the GAIN technical team, a crossing sectorial approach, and the relation with S3 strategies, three challenges were proposed for regional specialization. There was a validation process by the interlocutors and GIS agents involved in the Galician RIS3 participatory process. As a consequence of this step, the vision is defined as follows: “to consolidate the economy of Galicia for 2020 on a socially recognizable route for improving growth and competitiveness based on transformation of the production model from a medium–low technological intensity production model to a model characterized by medium–high technological intensity, via absorption of Key Enabling Technologies (KET) into

settled sectors, and by positioning the region as a benchmark in Southern Europe in providing knowledge-intensive services and products related to active aging and a healthy lifestyle" (Xunta de Galicia, 2014, 66).

Identification of Priorities

The fourth step consists of defining the Galician RIS3 priorities. The prioritization process was based on the criteria set by the Management Team to structure, coordinate and make convergent the identified priorities. These criteria are three: value chain, beneficiaries, and instruments. (Xunta de Galicia, 2014; European Commission, 2012). Thus, the priorities were appraised based on the capacities and ranked.

There were meetings among motivators from GAIN technical team to validate the results, homogenize the sources of scores, and calibrating the results depending on the specific sector weight. Moreover, there were meetings among GAIN technical team, GAIN political heads, and Working Group coordinators, to involve them in the result of the process. The selected objectives were validated by the political heads from the different Regional Departments. The process culminated in a list of 10 priorities aligned with the defined vision and grouped into three challenges (Xunta de Galicia, 2014). Table 2.1 shows these challenges and priorities.

Table 2.1 Challenges and priorities of GRIS3

Description	***Priorities***
Challenge 1: New model for management of natural and cultural resources based on innovation	
Modernization of traditional Galician sectors by introduction of innovations that provide higher yield and efficiency in the use of endogenous resources and their reorientation toward alternative high added value uses in energy, aquaculture, drug, cosmetic, food, and cultural activities	—**Valorization sea**: Valorization of by-products and waste generated by production chains linked to the sea, through the use of their components for cosmetic products; food additives; pharmaceutical applications; in order to achieve a significant decrease in generated waste and attain a position in the market for innovative products with added value —**Aquaculture**: Development of the Galician aquaculture sector to convert the region into an international reference for the generation of new technology-based products and services applied to aquaculture —**Biomass and marine energies**: Diversification in the Galician energy sector in order to gain significant improvement in the efficiency of natural resources use in Galicia, giving priority to biomass and marine energy

	—**Primary sectors modernization**: Modernization of the Galician primary sectors (agriculture, fishing, livestock, and forestry) aimed at sustainable improvement of the efficiency and profitability indicators for operations and creation of innovative products and services —**ICT–tourism**: Modernization of the tourism sector and Galician cultural industries by means of intensive use of ICTs to achieve a tourist sector that is competitive at a European level based on cultural and nature tourism
Challenge 2: New industrial model based on competitiveness and knowledge	
Increase the technological intensity of the Galician industrial sector through hybridization of Key Enabling Technologies	**—Diversification of driving sectors**: Diversification in the Galician driving sectors and its auxiliary sectors via an intensive use of Enabling Technologies (KETs), geared toward the supply of new processes and high value-added products that enable us to explore new markets based on hybridization, knowledge, and technology —**Competitiveness in the industrial sector**: To promote the competitiveness of the Galician industrial sector under the concepts of the "Factory of the Future" and Eco-innovation to improve efficiency and environmental behavior in the industry —**Knowledge economy: ICT and KETs:** Boost ICTs as the driving sector of the Galician knowledge-based economy just like in the case of other KETs
Challenge 3: New healthy lifestyle model based on active aging of the population	
Position Galicia in 2020 as a lead region in Southern Europe that offers knowledge-intensive products and services linked to a healthy lifestyle model: active aging, therapeutic application of fresh and marine water resources, and functional nutrition	**—Active aging**: Galicia as the leading region in Southern Europe in the implementation of new technologies in the field of active aging and healthy living, and in the promotion of personal autonomy —**Food and nutrition**: Diversification of the Galician food sector in order to position it as an international reference around innovation in nutrition as the key for healthy living

Source: Own elaboration based on Xunta de Galicia (2014).

Definition of Coherent Policy Mix, Roadmaps, and Action Plan

This step refers to the policy-mix definition, specifically the programs, instruments, and action plan. The proposal was drawn by GAIN, based on a consultation process through questionnaires to representative GIS agents, and three dialogue round tables (Xunta de Galicia, 2014; European Commission, 2012).

The Working Group Horizontal Policies works on the identified potential niches to define the support measures. This working group held an initial meeting with 27 aid beneficiaries and 15 fund managers to present the methodology and the questionnaires. The aim is to assess the appropriateness of different support instruments and measures used in previous budget periods

and gather proposals for new instruments. Once validated, the instruments considered most appropriate, the GAIN management team group the instruments on Strategic Axes, and Programs, depending on their influence in the different stages of the innovation value chain or their final purpose. As a result, the policy mix is composed of four programs and 20 instruments (Xunta de Galicia, 2014). They are grouped into five strategic axes: Knowledge Generation, Knowledge Transfer, Knowledge Absorption, Entrepreneur Discovery, and Commercialization.

Integration of Monitoring and Evaluation Mechanisms

The last step addresses the definition of the Galician RIS3 evaluation and monitoring system. The proposed system follows a dual approach, but also complementary: the process of implementation of the own strategy or follow-up; and the evaluation of the effects of the undertaken actions.

A panel of indicators is proposed to measure the progress to achieve the Galician RIS3 objectives. It is composed of 74 implementation indicators, 50 for results, and 12 for impact. These indicators are divided into three groups, following the EC recommendations (European Commission, 2012): performance indicators, which address the progress in the strategy; result indicators, which measures the outcomes concerning the strategic priorities; and impact indicators, which aims at innovation progress regarding Galician RIS3 challenges and vision (Xunta de Galicia, 2014). In addition, qualitative methods may complement the evaluation system through questionnaires or focus groups. This proposal will be updated considering the periodic evaluation and monitoring to enhance the effectiveness of the policies, the synergies, and the achievement of the goals. It is planned an interim evaluation and a final evaluation, an annual follow-up to assess the ongoing implementation, and an assessment report about the achieved results and the qualitative information gathered about the application of the Galician RIS3 through surveys and discussion groups (Xunta de Galicia, 2014). The monitoring concerns the Management Team of the Galician RIS3. It is planned an external team to evaluate at different times: at the beginning, middle, and end (Xunta de Galicia, 2014).

The estimated budget for the overall 2014–2020 period accounts for 1,624 million euros, considering the own regional funds, the EU Structural and Investment Funds (the main resources), the national funds, and other resources expected from European and national programs (Xunta de Galicia, 2014).

Once described the process of Galician RIS3 implementation, this subsection analyses and discusses some relevant issues, identifying its main drivers and barriers. This analysis is based on the former section, and the case study of the Galician RIS3, based on the revision of the policy documents, as well as the qualitative information provided by the in-depth semi-structured interviews. This input is useful to identify the main drivers and barriers, the successful and failed policy tools, as well as sources for improving the design and implementation of RIS3. The implementation of the Galician RIS3 was considered a good practice by the EC in 2014. However, it is needed to differentiate the process of implementation of the strategy and its impact.

Concerning the first issue, the Galician RIS3 process follows well the formal approach, procedures, and recommendations established by EC Guide (European Commission, 2012). The first driver is the EU cohesion policy, which puts S3 as an ex ante condition. The high regional autonomy concerning innovation policy and the tradition of implementing innovation policies can help the Galician RIS3 definition and implementation. It can also contribute to make easier the political commitment to the Galician RIS3. Nevertheless, a deep analysis raises critical issues to the implementation. As a result of the desk and field research, the main concerns involve the entrepreneurial discovery process, the prioritization, the coordination with existing innovation plans, and the evaluation.

A key element in the SS approach is the entrepreneurial discovery process to identify the strengths and appropriate domains for the regional specialization path (Foray, 2014; Gianelle et al., 2019; Trippl et al., 2019). Around 240 GIS agents were involved in the working groups and the forums, together with public participation. However, some doubts arise about its representativeness and inclusiveness. Table 2.2 presents the composition of working groups, showing the predominance of scientific and technological fields. Beyond clusters, the business sector appears underrepresented in a landscape where there are around 200,000 firms, being 99.9% of them SMEs (mainly microenterprises, 96%).

Moreover, the selection of participants in each working group followed a coherent way, depending on their relationship with regional activities for generation and exploitation of knowledge, interrelation, and connectivity (Xunta de Galicia, 2014). In addition, questionnaires were sent to 42 GIS agents. However, the process does not allow an active role within the workings group or build consensus. This is due to the coordinating role concerning the results of the working groups and the selection of priorities by the Management Team, which later are validated together with the coordinators of working groups. Although a strong institutional leadership is needed in this process, it seems that GAIN assumes a dominant and interventionist role. Thus, the bottom-up approach is contested by this technical leadership.

Table 2.2 Involvement and participation in the working groups

Working Group	Participants*	Interlocutors
Participation of Citizens Horizontal Policies Commission	Regional Dept. of Finance & Industry Vice president's Office Deputy Directorate-General for Emigration Regional Dept. of Finance &Industry Galician Institute for Economic Promotion Regional Dept. of Labour and Welfare Regional Dept. of Taxation Regional Dept. of Education and Culture Vice president's Office Agency for Technological Modernization of Galicia	Universities (3) Technological Centres (6) Clusters (13) Local Entities/FEGAMP (1) Business (1) Xunta de Galicia-Funds Managers (15) Others (2) Citizens (180)

Working Group	Participants*	Interlocutors
Health, Welfare, and Life	Regional Dept. of Health Regional Dept. of Labor and Welfare Regional Dept. of Education and Culture Agency for Technological Modernization of Galicia Deputy Directorate-General for Sports Regional Dept. of Rural and Marine Affairs	Universities (3) Clusters (2) Hospital Foundations and health-related ones (3) Technological Centers (1) Health experts (3)
Food, Agriculture, Fishing and Biotechnology	Regional Dept. of Rural and Marine Affairs Regional Dept. of Education and Culture Regional Dept. of Health Agency for Technological Modernization of Galicia	Universities (3) Technological Centers (9) Clusters (4) Enterprises (4) Galician Agency for Rural Development (1)
Energy, Environment, and Services	Regional Dept. of Finance & Industry Regional Dept. of Environment, Infrastructures, and Territory Deputy Directorate-General for Tourism Agency for Technological Modernization of Galicia Vice president's Office Regional Dept. of Rural and Marine Affairs, and Galician Energy Institute	Universities (3) Clusters (3) Associations (9) Technological Centers (4) Foundations (2) Enterprises (11) Experts on Tourism and ICC (2)

Working Group	Participants*	Interlocutors
ICT	Agency for Technological Modernization of Galicia Galician Innovation Agency Galician Institute for Economic Promotion Regional Dept. of Education and Culture	Universities (3) Clusters (1) Associations (5) Technological Centers (3) Other Centers (4)
Nanotechnologies. Materials and Manufacturing Technologies	Regional Dept. of Finance & Industry Regional Dept. of Environment, Infrastructures, and Territory Regional Dept. of Education and Culture Galician Institute for Economic Promotion	Universities (3) Clusters (5) Associations (2) Technological Centers (5) Spin-offs (2) Independent Expert (1)

* The participant who appears first on each list is the coordinator of the working group.

Source: Own elaboration based on Xunta de Galicia (2014, p. 26).

Concerning the citizen participation, 140 people attended the Forum to present the Galician RIS3 process and starting the citizen consult, representing GIS 119 agents. Regarding the Forum focused on presenting the Galician RIS3 policies proposal, 36 people attended, representing 27 GIS agents. They are not open events because the attendants to the forums were selected. Therefore, the participatory process seems more formal and technical than inclusive. It should be noted that there is no tradition of participatory processes for citizens or specifically for designing policies. The involvement of the stakeholders should be widened and engaged to avoid vested interests (Gianelle et al., 2016; Foray et al., 2018; Trippl et al., 2019), as well as the inclusiveness of the governance system (Trippl et al., 2019).

The limited time available to define the strategy can be considered a barrier for a more participatory, interactive, dynamic, and deliberate process, as well as to narrow the priorities.

Thus, the participative process was undertaken in approximately 3 months and the prioritization in approximately 1 month. Moreover, this entrepreneurial discovery process is limited to the time of designing the strategy. The entrepreneurs and participants in the initial discovery process have not been involved in its development. The discovery and experimental process do not sustain during the implementation to improve the process or evaluation, as sources for updating and fine-tuning the priorities and instruments, as Trippl et al. (2019) highlight.

Another foundation of the SS approach is prioritization. In this sense, the Galician RIS3 identifies ten priorities aligned with the three challenges (see former Table 2.1). This selection shows a high number of priorities; and overall, they are generic. Apart from the broad nature of the Key Enabling Technologies, most of the priorities are wide, defined for at the sector level, or even more aggregated. Only a few priorities show a right granularity level, such as Valorization–Sea (1.1), Aquaculture (1.2), ICT–Tourism (1.5), Food and Nutrition (3.2). Two main issues arise concerning the SS rationale: the granularity is not appropriate, and the concentration of resources on the prioritized niches is discussed. Thus, the resources invested from 2014 until mid-2019 are mainly aimed at challenge 2 (New industrial model based on competitiveness and knowledge), which accounts for 72% of the total Galician RIS3 investment. Challenge 1 (New model for management of natural and cultural resources) represents 16.1% of the investment, and challenge 3 (New healthy lifestyle model based on active aging of the population) the remaining 11.9%. This distribution is uneven, concentrating most of the resources on one challenge, which comprises three generic priorities. This fact together with the low resources allocated to two challenges (and seven priorities) contests the rationale of concentration and the potential benefits of reaching critical mass. This threatens the SS rationale: specialization in local domains as a potential path for regional development and concentration to search for complementarities, and synergies. Moreover, those trends hinder the identification of regional assets and potential (Iacobucci, 2014; McCann & Ortega-Argilés, 2016).

It should highlight that the Galician RIS3 priorities are mainly linked with the traditional specialization of the Galician economy. Only very few priorities target new domains with future potential, in line with the trend outlined by Trippl et al. (2019). The Galician RIS3 priorities are aligned with the existing specialization campuses in the Galician University System, which can contribute to generate synergies.

The coordination of the strategy with other policies, and specifically with innovation plans, is limited. It should underline that the Galician RIS3 design and implementation of the strategy concentrates most of the GAIN resources and efforts. Thus, when the Galician RIS3 started, the innovation plan then in force was the Galician Plan for Research, Innovation, and Growth 2011–2015, known as I2C. The new plan Galicia Innova 2020 was presented in 2018. According to the 2013 law, the R&D Plans are the "fundamental instrument" for planning and coordinating innovation policies in Galicia. The long delay in approving the current plan seems to be to the concentration of resources and efforts on the Galician RIS3, as most of the interviewees suggest. Because the Galician RIS3 has completely absorbed the innovation efforts of the regional government, the plan was left in a secondary place, which is contrary to the 2013 law. Indeed, the plan and Galician RIS3 were not understood as complementary and synergic, but also as substitutes. Therefore, Galician RIS3 undermines the principle of prioritization because it attempts to cover all the sectors, confusing with the purpose of the plan. Although a plan must consider all sectors, and S3 must select and prioritize. Thus, a relevant barrier was the absence of regional innovation plan during most of the strategy's duration because the plan should be instrumental for achieving the Galician RIS3 goals. Beyond the links of the new plan with the Galician RIS3, there are not found changes in the definition of this plan, taking advantage of the S3 methodology, the entrepreneurial discovery process, and the institutional learning. The regional innovation policy has traditionally followed a rationale opposite to the S3. Thus, it lacked well-defined and strategic aims, spreading, and dispersing the limited resources among a multitude of beneficiaries without targeted goals, instead of the SS logic of concentration resources on priorities. In this sense, the Galician RIS3 involves the main shift in the Galician innovation policy.

Concerning policy instruments, the Galician RIS3 proposal comprises 20 instruments, most of the new ones. However, there is a mismatch between those planned instruments and the implemented ones. The majority of the utilized instruments previously existed, and they were reformulated, being most of them horizontal. The key issues are the effectiveness of the instruments, which are not assessed, and their alignment with the Galician RIS3 priorities and with regional, national, and EU policies. Most of the annual calls mention RIS3 priorities, however, it seems more a formal issue than a requirement to get funds. This can be at least partially explained by some unusual circumstances, such as not having a new plan until 2018;

and that the strategy has not differentiated their instruments from the innovation plans. However, this merger does not necessarily imply coordination, but rather an uneven competition in the calls between initiatives aligned with Galician RIS3 and others that are not. It can also affect the results on Galician RIS3 prioritization, undermining this logic due to part of its resources are allocated without considering the Galician RIS3 priorities. Thus, it shows limited embeddedness in regional policies (not only innovation policies), such as Hassink and Gong (2019) underline.

Some policy instruments can be underlined in the Galician RIS3 implementation, despite most of them are not in the proposal of linked instruments. Innova SME and Innovator Accelerators are interesting initiatives focused on strengthening business innovation. Public procurement of innovation is an emerging instrument with potential to develop new activities and useful within the S3 framework (Uyarra et al., 2017; Sánchez-Carreira et al., 2019). In this sense, Galicia has a pioneer experience in health mainly developed by the Galician Health System (SERGAS) since 2012 through three plans. The regional government used public procurement to tackle active aging as one of the Galician RIS3 challenges. This challenge represented an opportunity for regional enterprises to develop innovations for the Galician Healthcare System (GHS) through the public demand pull (Sánchez-Carreira et al., 2019). Based on this former experience, GAIN leads the development of the Civil UAVs (Unmanned Aircraft Vehicle Initiative) to develop an aerospace industrial pole. Galicia has no specific industrial capabilities in this field but in other branches of transport equipment manufacturing, such as automobiles or shipbuilding. For promoting this industrial pole, public procurement of innovation is one of the policy tools utilized, together with other industrial and innovation tools. Thus, the investment of around 164 million euros in the field develops about 400 high-skilled employments, 35 R&D&I projects with more than 50 stakeholders involved in the initiative. Thus, it can be aligned with the Galician RIS3 becoming a new domain and transformative activity of the Galician economy with a growing global market. Concerning collaboration among the agents of the innovation system, two initiatives highlight: the Mixed Units, aimed at promoting cooperation between research entities and the business sector to develop joint and coordinated research, innovation, and development activities; and Connecta SME, which addresses to promote cooperation among SMEs and other agents in the regional innovation system, through support for market-oriented research, development and innovation projects. Finally, but not least, the current plan includes the tool Innovation Digital Hubs, a new

instrument enhanced by the EC. It aims at grouping and organizing all the agents of the R&D&I ecosystem in strategic areas through generating open and intelligent public–private collaboration dynamics. There are two Innovation Digital Hubs since 2019 in the fields of biotechnology and automotive, in which there are strengths and alignment with the Galician RIS3 priorities.

Another relevant issue to analyze is the Galician RIS3 evaluation. Nowadays, evaluation of any policy is needed in different moments to know the impact, to propose changes and improvements, and to learn to design and implement more effective policies. The Galician RIS3 proposes an evaluation and monitoring system. However, advances in this area have been limited. There were no meetings of the working groups to follow the progress or assess the needed adjustments or entrepreneurial process during the implementation. There are no published reports about the annual follow-up of the implementation or the evolution of the indicators or some assessment of the impact. It should be assessed the changes in the innovation performance and its relationship with the Galician RIS3 implementation, as well as the results of the policy actions (e.g., additionality), focusing on the prioritized areas and the main beneficiaries. Thus, the monitoring system is more formal than focused on results and impact. Only three forums were celebrated in mid-2019, as part of a wider process of monitoring and interim evaluation of GRIS3. The aims of this evaluation process, which follows a formal participatory process, are to identify deviations in the execution of RIS3 that allow introducing corrective measures or refining the priorities. It will also serve to lay the foundations for starting the process of defining the next RIS3 for the period 2021–2027.

Therefore, the Galician RIS3 implementation does not follow a dynamic and interactive process. Thus, the strategy has not been updated and adapted to a changing context in economic or innovation terms. It avoids improvements and adaptations derived from the reflection and analysis of the progress, difficulties, and hindrances, as well as strengthening the commitment of the stakeholders involved in the initial entrepreneurial discovery process.

Concerning the evaluation, the Galician RIS3 experience has been recognized as good practice by the European Commission, due to its participation as leader of the European Interreg project MonitorRIS3, aimed at improving the S3 policy delivery through the exchange of experiences and policy learning on monitoring strategies on policy instruments among regional relevant actors on S3. This project is relevant for building the monitoring indicators system, only approached in the definition of the Galician RIS3.

Although the efforts and the resources devoted to Galician RIS3, the changes in the economic structure and innovation performance are not sufficiently noted. The recent economic recession started in 2008 has affected the Galician RIS3 implementation and the expected effects on innovation. Thus, the own innovation performance in Galicia has not improved in the last years and its situation worsened in the EU context, as the Regional Innovation Scoreboard shows. Galicia scores 58.3 in innovation index in 2019, belonging to the group of moderate innovators, showing a negative trend in the last years (European Commission, 2019).

Finally, three additional considerations should be raised. First, the definition of the Galician RIS3 is supported by external assessment, both from a DG REGIO external expert and consultancy. This helps the implementation but can also lead to select broad and common priorities, in the face of local priorities. Second, the Galician RIS3 was designed and implemented in the context of a financial crisis, which reduced public and private resources for innovation and hits the GIS severely. However, the SS rationale gives an opportunity to allocate resources more efficiently. Third, to assess the Galician RIS3 impact is required more quantitative and qualitative information. Beyond the impact in the innovation system, the building of capabilities and institutional learning can improve the performance of innovation, the effectiveness of policies, and upgrade the regional development. The new EU programming period, becoming SS an enabling condition, is a good opportunity to use these capabilities and learning.

SS is a strategic bottom-up approach that has been adopted for the EU Cohesion Policy. S3 seems a good tool to combine innovation and regional development. It involves a shift on the regional policy rationale, following a place-based perspective. This result-oriented approach provides an opportunity to optimize resources, concentrating them on local strengths to achieve critical mass in a context of limited resources due to the recent financial crisis. However, this complex policy process, which is innovative, faces several challenges (McCann & Ortega-Argilés, 2015; Kroll, 2017; Foray et al., 2018; Gianelle et al., 2019; Trippl et al., 2019; Hassink & Gong, 2019).

This chapter analyzes these challenges in the light of the Galician experience, which is interesting because it is a good example in S3 implementation from the formal perspective, but it presents poor results concerning innovation performance. Moreover, other relevant features of

the region are its nature as a peripheral region, and it has own competences concerning innovation.

The main drivers of the Galician RIS3 have been the cohesion policy rationale and the existence of regional innovation policies with the intrinsic resources and competences, which makes easier the Galician RIS3 definition. Thus, the region has followed in right terms the different steps set by the EC. However, the results in the innovation performance are not promising. This suggests the existence of a mismatch between the definition and the implementation, raising deficiencies in the implementation. Besides the economic crisis, the main barriers that hinder the SS rationales arise. One of the most relevant is limited prioritization. There are a high number of priorities and most of them are generic and broad, with an inappropriate granularity level, based on sectors and traditional specializations. The high degree of generalization poses the risk of losing the local specificities, as well as the specialization rationale (Foray, 2014; Gianelle et al., 2019; Trippl et al., 2019). The entrepreneurial discovery process is formally followed in the definition of the strategy, but it is not an inclusive process. The engagement of the stakeholders is not high, mainly due to the novelty of the approach and the lack of experience in participatory processes (Gianelle et al., 2016; Foray et al., 2018; Trippl et al., 2019). Likewise, it seems that the university system is overrepresented in the policy-making process. The regional government assumes a leading role that challenges the bottom-up approach. In this sense, the process seems more technocratic and open to consults than truly participatory.

Another shortcoming refers to the limited coordination with other policies because there are no specific instruments to achieve the goals and priorities (Hassink & Gong, 2019). Moreover, the evaluation process is focused on formal issues and implementation, more than on results. An ongoing monitoring that helps to refine priorities or instruments has not developed, as it happens in other cases (Trippl et al., 2019).

Although Galicia made significant efforts in the Galician RIS3, the results are not promising. Thus, the innovation system performance and the policy design and implementation have hardly improved in the light of the Galician RIS3, which undermines the result-oriented approach. It is true that it coincides with a context of economic crisis. Apart from its own shortcomings, the approach presents several challenges for any region, which can be higher in the peripheral regions, as happens in this case. In this sense, one of the critical aspects is that the

practical implementation of the RIS3 does not undermine the rationale of regional specialization and concentration of resources to achieve critical mass and scale economies. It is advisable to carry out a dynamic process of reviewing, adapting, and updating the strategy, as an element of flexibility. It can help to leverage the RIS3 efforts, as well as to target new opportunities that may arise during the 7-year period of implementation of the strategy. Thus, the risk of not identifying potential interesting specialization fields can be overcome with this dynamic approach.

Some relevant insights from the Galician case study are the following ones: the prioritization structure is based on challenges, which is a strength of the Galicia RIS3, that can facilitate the process of intersectoral and interdisciplinary entrepreneurial discovery; and the existence of a specific entity, such as GAIN, responsible for innovation policies and RIS3 is considered positive because it has the experience and necessary capacities to design and implement policies and strategies.

Conclusion

Implications for Theory

Given common characteristics in peripheral regions, this chapter contributes to understanding the challenges of S3 for regions and, in particular, for peripheral regions both from the theoretical and implementation perspectives. It identifies the main drivers and barriers of this new approach, and it focuses on the policy and learning processes. Despite these singularities, suggested policy recommendations should be regarded as general frame because there could be more missing or additional elements and interactions. A minimum adaptation is usually required due to endogenous dynamics.

Implications for Policy

The Galician experience is useful to improve the design and implementation of the regional innovation policies and S3 in peripheral regions. The need to adapt the S3, as well as to continue

with the entrepreneurial process during all the implementation arises. In addition, the process of discovery process and prioritization need more time to think strategically and to find synergies. The search for synergies among S3, as well as with other regional, national, and EU policies is also suggested.

Limitations and Future Research

Concerning the main limitations of this research, more time is needed to find the long-term results and to improve the implementation. Moreover, there is a lack of sufficient data to evaluate the impact of the Galician RIS3, and the available information concerning the different policy tools is not homogeneous to compare its effectiveness. In addition, the intermediate evaluation has started in mid-2020 and it has not yet been published. In this sense, new research is needed to assess the long-term impact of Galician RIS3, as well as the learning of this process for the design and implementation of the new Galician RIS3 for the period 2021–2027. The next programming period provides an opportunity to put in practice the learning and the capacities built in this process and assess if the S3 can provoke structural change, a process that requires time and it is path dependent.

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