



ORIGINAL ARTICLE

Universities and institutionalization of regional innovation policy in peripheral regions: Insights from the smart specialization in Portugal

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Abstract

Regional innovation policies are currently influenced by a series of territorial innovation models, with the regional innovation system (RIS) approach being one of the prominent examples. The rationale of smart specialization strategies (S3s) is deeply influenced by the RIS concept and highlights the importance of entrepreneurial discovery and shared governance by different types of actors. Among them, universities are seen as crucial for the success of S3 design and implementation. This article, mixing a policy debate perspective with analysis of recent quantitative and qualitative information about the Portuguese case, highlights relevant aspects for understanding the institutionalization of regional innovation and the role universities have in it as crucial knowledge brokers. The results have implications for regional innovation policies and in particular for the challenges that peripheral regions face.

KEYWORDS

institutional fragmentation, institutional hijacking, knowledge brokers, peripheral regions, smart specialization

JEL CLASSIFICATION

I23, O33, O38, R58

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1 | INTRODUCTION

Today, many territories are facing the need for transformation. This is evident from the difficulties of many regions that are lagging behind and having trouble catching up or others that are in transition or creating new paths for development. This is now more evident due to the pandemic, which requires adaptation in many territories that were heavily affected by the socioeconomic crisis. Regional innovation systems (RIS) approach has been influential in the last two decades and continues to influence the design and implementation of regional innovation policies (Asheim et al., 2020; Cooke, 1998; González-López et al., 2019). RIS approach contrasts with the very influential linear model of innovation, anchored in the unidirectional process from fundamental research to the launching of new products and processes (Asheim, 2019). Similar to other territorial innovation models (Crevoisier, 2014), RIS avoids a one-size-fits-all approach (Tödtling & Trippel, 2005) and puts innovation at the centre of development, presenting it as a social process between a myriad of actors in which universities stand out (Unger et al., 2020). Regions were seen to be operating as innovation systems, namely a ‘geographically defined, administratively supported arrangement of innovative networks and institutions that interact regularly and strongly to enhance the innovative outputs of firms in the region’ (Cooke & Schienstock, 2000).

The term ‘regional innovation system’ came into policy use in the early 1990s, informed by in-depth research and experimental policymaking on a number of European industrial regions. The innovation system’s approach has since been a key regional innovation policy inspiration in the European Union (Uyarra & Flanagan, 2012), emphasizing a collective systemic perspective, compared with the former science and technology policy approach that sets the firm and knowledge market failures as the target of the policy process (Edquist, 2011). In the RIS approach, regional innovation policies mainly address the systemic failures (Klein Woolthuis et al., 2005; Weber, 2012), the support to effective relations of various actors, in particular firms that constitute a subsystem of knowledge exploitation, and universities and other research organizations that also constitute the subsystem of knowledge exploration and are seen as crucial for innovation and new path development (Cooke, 2008). The current dominant paradigm for regional innovation policies, at least in Europe, is the so-called smart specialization approach (González-López & Asheim, 2020).

Smart specialization strategies (S3s), developed since 2012 in the majority of European regions, have served as a crucial *ex ante* criterion to access European structural and investment funds (ESIF) in the period of 2014–2020 (Kroll, 2015). The S3 approach focusses on the organization of innovative activity and the creation of new connections among innovation actors within and beyond the region, enabling the transformation of socioeconomic structures and the development of new competitive advantages. It pressures regions to engage in transformation supported by endogenous specific strengths, potentials and opportunities, rather than emulating what other more successful regions are doing (Foray et al., 2021).

Nevertheless, there are several issues that require further questioning. First, this need for transformation is present as a justification in several prior European initiatives, such as the Regional Innovation Strategies, RIS+, regional innovation and technology transfer strategies (RITTS), regional technology plans (RTP), regional information society initiatives (RISI) – RISI1, RISI2 and RISI+ – inter-regional information society initiative (IRISI), and the regional technology transfer (RTT) (Zabala-Iturriagoitia et al., 2008). Second, doubts can also be raised about the extent of S3 success, particularly in terms of peripheral regions. The notion of peripherality is being used recurrently in S3 research and policymaking, but is quite far from being simple to comprehend (Kühn, 2015). Third, within these aforementioned policy initiatives from the 1990s, there were a number of participatory dynamics in several regional innovation initiatives, such as in Wales, Central Macedonia and the Basque Country (cf. Cooke, 1998). So, as far as the need for governance, what is really new in S3s for peripheral regions?

Higher education organizations, in particular universities, were one of these actors who were heavily engaged in the S3 process of design and implementation (Calza et al., 2019). In recent years, there has been emphasis on the importance of universities’ regional engagement.¹ This is mainly focused on success stories, with formalized

¹For the sake of clarity, in this text university is used as a synonym for higher education institutions (HEI and other public education and research organizations).



interactions embedded in market interactions with a strong financial component, such as patents and spin-offs, inspired by an entrepreneurial university agenda (Etzkowitz et al., 2000). These stories tend to neglect a significant part of the process on the basis of informal and incomplete institutional arrangements (Thomas et al., 2022). This article does not intend to argue that these aspects are not relevant – they obviously are – but they are a narrow perspective of what university–region interactions should be.

Universities are far from being only isomorphic institutions and should not be treated as homogeneous by policymakers in the formulation of innovation strategies. The university is changing, with its functions becoming more diverse and complex (Domínguez-Gómez et al., 2021). As a matter of fact, in a knowledge-based society, there are huge public expectations surrounding the results and impacts of the university. Their traditional role of training and the qualification of individuals has been expanded with the additional relevance given to scientific research and regional engagement.

Smart specialization is highly interrelated to institutional change (Trippel, Zukauskaitė, & Healy, 2020), as its design and implementation points towards transformation, and crucial aspects often exhibit an institutional dimension that is far from being well understood. Using an institutional perspective may bring useful concepts to focus on the reasons behind the S3 flaws. This article is part of similar efforts to frame S3s in the larger landscape of regional innovation policies taking an institutional approach (cf. Benner, 2022), and is also inspired by an emerging institutional agenda about the interplay between place-based (formal) structures and (informal) social interactions in shaping innovation dynamics and universities' regional engagement (cf. Sotarauta & Mustikkamäki, 2015).

This text briefly reviews the concepts concerning the importance of smart specialization for regional transformation and the debate regarding the role that universities may play in it. Then, using material from the analysis of Portugal as a case study, the text illustrates particular aspects that may be controversial regarding different understandings of the functions of universities and the diversity of regional economic fabrics. The article has policy implications for the institutionalization of regional innovation policies, the meaning of peripheral regions, and the roles that universities may play in regional engagement, particularly in S3s.

2 | SMART SPECIALIZATION AND UNIVERSITIES IN PERIPHERAL REGIONS

2.1 | Challenges for S3s in peripheral regions

The smart specialization approach is at the core of the current regional innovation policy debate (for a recent review, cf. Foray et al., 2021), but it is fundamental to differentiate two aspects, namely the concept from the policy instrument (Foray et al., 2011). “Smart specialization” is an academic concept. It refers to the socioeconomic structure of a region that has reached a selection of scientific, technological, and innovation domains where it can excel compared with similar regions. It is a place-based process that defines a notable diversification through the concentration of resources and capacities in a limited number of domains, which represent possible paths for the transformation of regional productive structures (Foray, 2016). These domains are those considered strategic for regional structural change. Smart specialization can be achieved spontaneously, but that is difficult and very uncertain.

To gain control over the process of transformation and change, preparing and implementing a Smart Specialization Strategy, that is, policy tools that employ the concept, is probably more effective than leaving the future of the region to chance. The notion of smart specialization has become an important part of the framework for European policy and an essential component of the 2014–2020 funding period, as S3s have become an *ex ante* conditionality for regions accessing European structural and investment funds (ESIF). S3s are also considered key enabling conditions for the 2021–2027 period. S3s are thus the policy instrument inspired by the smart specialization concept, using a variety of national and/or regional S3s and connections to use the financial resources from thematic and regional operational programmes to implement these innovation agendas (Gianelle et al., 2020; Kroll, 2015).



This S3 vision is well aligned with the proposal of Tödttling et al. (2021), who argued that the RIS approach requires a critical rethinking and reassessment to provide a solid basis for informing the next generation of regional innovation policies. Domains such as responsible innovation and mission-oriented and transformative innovation help to think of ‘challenge-oriented RIS’. It is relevant to underline that these novel concepts have not emerged directly from the implementation of S3s. They belong to the ‘transformative innovation policy’ (Haddad et al., 2022) or ‘mission-oriented innovation policy’ (Mazzucato, 2021) which have taken shape in recent years and have been used to improve S3s and bring them to the next level, sometimes mentioned as S4 – smart specialization strategies for sustainability (McCann & Soete, 2020) – or as the JRC recently proposed, ‘partnerships for regional innovation’ (Pontikakis et al., 2022).

This deeper role of regional innovation policy contrasts with conventional understandings of RIS, embracing a broader and more reflexive understanding of innovation, open to new innovation functions in other actors, such as universities, and a deeper role of new coordination mechanisms, such as shared and open governance among various stakeholders (Table 1).

There are two leading principles in S3 design (Foray et al., 2021). The first is that new industrial policies – those which include the S3 approach – combine in many cases a planning logic and a self-discovery logic. They must involve entrepreneurial discovery processes, where a variety of actors, HEIs and other research entities, businesses, governments and society gain relevance (Pinto, Uyarra, & Fernández-Esquinas, 2019). The second concerns granularity. An S3 is not a sectoral policy nor an individual project.; it must create relational density, synergies and complementarities among the RIS. The appropriate level is therefore a meso level of granularity, a set of related projects, oriented towards the same transformation priority, covering a multitude of market and systemic failures to be solved (Foray, 2020).

Today there is a broad range of literature that provides critical analyses and lessons from the exercise of S3 implementation at several levels (Benner, 2022). The difficulties for S3 are varied and concern several phases, from setting priorities, the involvement of stakeholders, monitoring and evaluation, to governance. Aspects such as the commitment of regional policymakers to promoting innovation, the bias towards design not in implementation, the withdrawal from the linear innovation model, the possibility of consensual perspectives between different actors, and the regional preparedness to develop participatory design and governance are quite asymmetrical in different regions. They are often taken as ‘heroic assumptions’ but in practice are very constrained by top-down policymaking and power struggles (Marques & Morgan, 2018).

One of the main difficulties in S3 stems from its conceptual fuzziness, from the focus on diversification instead of an actual specialization as its label suggests, and the difficulties in creating an S3 that is really transformative and

TABLE 1 Conventional and challenge-oriented RIS: key differences.

	Conventional RIS approach	Challenge-oriented RIS approach
Type of innovation	Innovation in the regional corporate sector: technological, organizational, marketing innovation	Innovation in the regional corporate sector and in other realms (public sector, civil society, regional and urban communities: technological, user, social, institutional innovations)
Purpose of innovation	Economic growth and competitiveness of the regional economy	Grand societal challenges and problems faced by the region
Effects of innovation	Focus on positive effects (strong pro-innovation bias)	Focus on multi-dimensional effects of innovation: bright and dark sides
Actors	Networks	Institutions
Production and application sides	Supply side (generation/production of innovation in the region)	Supply side and demand/application side (experimentation/diffusion/upscaling of innovation in the region)

Source: Tödttling et al. (2021).



not simply old wine in new bottles with the traditional sectoral approach or cluster policy with the risk of increasing regional lock-ins (Pugh, 2014). In general, S3 implementation has faced several challenges, the majority being well identified by Benner (2020). In this article, the author identified six questions that had weak responses in S3 practical implementation. The questions concerned how to overcome the narrow focus on research and development (R&D), how to define the appropriate spatial scale, how to depart from the methodological one-size-fits-all logic, how to focus more on the process than on the paper, how to ensure realistic expectations, and how to simplify and de-dogmatize regional innovation policy. The text also provided robust answers for criticisms: the need to widen the understanding of innovation, refocusing on the regional scale, allowing for eclecticism and pluralism, putting the process at the fore, refocusing on regional potential and encouraging regional experimentation. Foray (2020) also entered directly into this debate, answering these questions by reinforcing the narrow focus of S3 on R&D, the lack of a clear understanding of the appropriate spatial scale to intervene, the excessive attention to policy document formulation and branding and less on the process of implementing the S3 itself. Additionally, S3 planning took for granted that regions would have no complications in leaving their established 'planning and control' governance models and adopting a completely new approach that is more interactive, participative and inclusive (Laranja, 2022). This was not true. Many regions did not fully implement the participatory governance models that were planned with the necessary depth that was originally foreseen.

For peripheral regions, the challenges have been even greater in implementing a transformative strategy such as an S3 (Papamichail et al., 2022). There are doubts that this type of region might even benefit from strategies such as S3s (Hassink & Gong, 2019). For example, granularity as a leading principle in S3 design is a complex one. In peripheral regions, with low science and technology potential and limited absorption capacity, a lower granularity may be advisable in setting the S3 priorities and preparing related projects for increasing the absorption of available ESIF. A higher granularity may be detrimental as innovation actors may face difficulties in connecting to very specific projects. In this type of region, institutions are not mature or are inadequate; there exists a less diversified business fabric, dependency relationships with other levels of government and more fragile governance systems (McCann & Ortega-Argilés, 2016). Limitations in terms of technical capabilities and human capital also occur. This is because regions vary significantly in their structure and capacities to develop new paths. Metropolitan regions offer ideal conditions for new path development because of high levels of agglomeration and variety in their business fabric, thick RIS and strong knowledge absorption capacities. Peripheral areas are limited in terms of the generation of new growth paths because of lock-ins, a lack of variety, overspecialized economic structure, poorly developed RIS and weak absorption capacities (Tödtling & Trippel, 2018). HEIs and other public research organizations often dominate the relations within the RIS and hijack the priority setting when private firms and other economic actors have much less influence and weight in policymaking and in the entrepreneurial discovery process (Pinto, Nogueira, et al., 2019). The innovation paradox is present in peripheral regions (Oughton et al., 2002): they need more innovation but have fewer opportunities to promote it.

HEIs are quite important in path creation and regional transformation. In particular, institutional-change-driven new path development, as defined by Grillitsch et al. (2022), highlights the relevance of institutions as central catalysts for regional development, especially through institutional entrepreneurship sparking change by stimulating place-based leadership – with the identification of common interests and the mobilization of different resources and actors – legitimizing new paths, changing institutions and supporting the formation of networks.

2.2 | Universities and their potential in unlocking S3s

Universities are considered to have a fundamental role in the success of any S3. They are expected to fulfil several functions in a place-based strategy such as this, in addition to their 'traditional' role of education and research. Universities are considered factors of territorial regeneration (Pinto & Fernández-Esquinas, 2014), providers of infrastructure and knowledge-intensive services (Pinto et al., 2015), local connectors with knowledge and external



markets (Richards-Kennedy & St Brice, 2018) and even animators of innovation systems (Vallance et al., 2018). The expectations concerning their role in S3s has been stressed since one of the first policy briefs promoted by the Joint Research Centre (cf. Goddard & Kempton, 2011; Kempton et al., 2014).

The evolution of higher education and regional development linkages has been intense. Following the analytical summary scheme proposed by Uyarra (2010), in the last century universities have changed in several steps from knowledge factories to relational, entrepreneurial universities and systemic and engaged universities. Today it is universally accepted that universities play a significant role in their regions' dynamics, not only for their contribution to human capital training and knowledge production, but also to civic engagement (Boyer, 1996). This results from a series of interconnected influences, the aforementioned RIS approach (Cooke, 1998), and also the triple helix (Etzkowitz & Leydesdorff, 1997), the mode 2 of knowledge production (Gibbons et al., 1994), the third mission (Molas-Gallart et al., 2002) or more recently open innovation (Chesbrough, 2003), which have heavily underlined the transformation that universities were facing in this need for a deeper contribution not only to innovation but also to society in general.

Increasing the regional impact of universities is challenging, particularly in peripheral regions. Edwards et al. (2020) analysed the factors that influence the potential of European universities to contribute to place-based innovation. These factors can be grouped according to the perspective of authors into two main types which interact. The first concerns the supply-side factors, outputs from education, research and other knowledge services. The quality and quantity of these outputs are a result of the institutional architectures that shape universities and their individual members' behaviours and expectations. While some aspects are local, such as the university's type of leadership, universities are strongly constrained by national institutions, such as specific regulations, as well as broader trends in the higher education international context. The second is a demand side, concerning the knowledge absorptive capacities of firms and other organizations. This is a fundamental aspect for the potential for HEIs to have an impact on innovation and for growth to materialize.

The incorporation of skills within the S3 approach has only recently attracted attention and is still underdeveloped. Integrating skills policy within a regional perspective is critical for ensuring an effective path development. Corradini et al. (2022) highlighted this importance, underlining the need to manage two distinct layers. The first layer uses the notion of horizontal skills platforms to stimulate skills' combinatorial opportunities for resilience, regional adaptation and structural change. The second layer concerns the active role of skills policy in supporting regional industrial path development. This incorporation of skills development in the interaction of S3s and university repertoires may motivate human capital creation for identified S3 priorities knowledge needs of regions. This would support the dynamic application of S3s, in particular in peripheral regions that do not evince industrial competitive advantages.

Finally, considering, for example, the different ideal types proposed by Uyarra (2010), many are still influential today in different spheres, characterizing the numerous overlapping domains of the daily life of higher education and stimulating institutional incongruences and tensions among different types of actors and goals (Pinto, 2017a). Universities often play a key role in supporting regional diversification but have received only limited attention (MacKinnon et al., 2019). In fact, knowledge generation in the areas identified as a priority in new industrial policies such as S3 appear to rely on universities whose characteristics are more akin to the model of the entrepreneurial university, that is, formal mechanisms such as patent licensing or spinning off as a sort of informal linkage are also key (Aksoy et al., 2022; Johnston et al., 2021). The attention given to universities' regional engagement remains excessively centred on large-scale, attention-grabbing and financially impressive activities, such as patent licensing and spin-off creation, with a tendency to focus on individual cases of success (Thomas et al., 2022). This contradiction is especially visible when the research strengths of local universities are not completely aligned with the economic fabric of the region.

This emphasizes the growing importance of the perspective of the civic university (Goddard, 2009), which can be understood as an expansion of the regional engagement model in which higher education institutions are organizing their functions towards the capacitation of future citizens, their reflexive potential and entrepreneurial capacities



(Goddard & Vallance, 2012). For new path development, especially those paths that are considered innovative – such as those that use S3s and point towards regional transformation and transition, such as green sustainable transitions (Veldhuizen, 2020) – universities are crucial to consolidating common worldviews by promoting learning through a myriad of mechanisms in the region (Trippi, Baumgartinger-Seiringer, et al., 2020). Universities may be knowledge brokers in the S3 process according to four perspectives: the social dimension of networks, decision-making and control, cluster building and exchange elements (Kangas & Aarrevaara, 2020). Universities also demonstrate the capacity to absorb public funds and are crucial to supporting education in less developed regions in fields connected to the specific S3 priorities, dedicated training programmes to mitigate specific knowledge or skills gaps in regional labour markets. These measures, commonly applied during S3 implementation, have transformative potential and have also resulted in a higher intensity of university–business collaboration (Vallance et al., 2018). There are, therefore, clear and broad benefits linked to the involvement of universities in the S3 process (Fonseca & Salomaa, 2020).

3 | LEARNING FROM THE PORTUGUESE S3 EXPERIENCE

3.1 | S3 as a strategic research material in the institutionalization of regional innovation policy

This study considers S3 implementation a type of strategic research material (Merton, 1987) that exhibits the gradual institutionalization of regional innovation policy with clarity. It is particularly relevant to pay attention to the participatory governance and the new roles of universities in regional engagement. A ‘strategic research material’ is, in the view of this author, any place, object or event that presents particular phenomena to be explained or interpreted with such an advantage and in an accessible way that allows for the research to understand problems previously inaccessible. The processes of institutionalization are often difficult to follow as they involve the modification of rules and legislation, as well as of practices, implicit behaviours and other latent aspects that are less evident, for example, through analyses that do not pay sufficient attention to time dynamics, adaptation and change.

S3 may benefit from an institutional approach for better understanding. A recent example is the contribution of Benner (2022), who used an institutional repertoire to show that S3 is heavily anchored in symbolic dimensions, where ‘myths’ and ‘ceremony’ are crucial in its legitimization in regional innovation policymaking. These myths tend to oversimplify reality and the goodness of the S3 approach, even if in terms of results they do not show a substantial difference regarding the former implementation of innovation projects in many places (D’Adda et al., 2022). In a context of high uncertainty, many characteristics of S3 may impact the generalization of isomorphic pressures. These influences consider, among others, the emulation of practices identified as successful, the overreliance on guidelines, the normative influence of roles of experts and other key influencers, the coercive nature of ex ante and enabling conditions and the competition for access to ESIF (Di Cataldo et al., 2021).

In this article, institutionalization is understood as a gradual and often incomplete process of change intended to regulate societal behaviour, that is, supra-individual behaviour, within organizations, communities or societies (Keman, 2022). Institutionalization has different dimensions, namely regulative, normative, cultural or cognitive, which reflect the multifaceted nature of institutions. Institutionalization is a complex process that occurs whenever there is a reciprocal typification, available to all players, evolving from pre-existing frameworks of thought and action, which results from the combination of two central aspects: habituation and legitimization (Berger & Luckmann, 1967). At least three levels of action can be distinguished in the process: institutions’ creation or instalment, institutions’ adaptation or development of best practices, and institutions changing or being replaced by new ones. This is in line with the perspective that advocates that institutionalization is commonly incremental and a continuous institutional change process in socioeconomic systems (Streck & Thelen, 2005), affecting the university



landscape (Colyvas & Powell, 2006) and stimulating the consolidation of relations between government, industry, and universities and the creation of new actor-networks (Pinto, 2017b).

At the core of our understanding of institutionalization is also actor-network theory (ANT) (Latour, 2005) and the relevance given to the formation of a network of relationships between entities through translation. There are four overlapping phases proposed: problematization, intersement, enrolment and mobilization. Problematization concerns the definition of the problem. In S3, it fits well with the initial launching and design of the strategy. Intersement is convincing other actors that the problem is relevant to them and involves the creation of common views and consensus, which in S3 may mainly encompass the phase of targeting priorities and the creation of a roadmap. Enrolment is the moment that roles are attributed to different actors, resulting in a system committed to a shared goal. In S3, it involves the definition of functions related to S3, in particular the animation and implementation of multilevel governance mechanisms. Mobilization is an advanced moment in which the actor network is stabilized, with a translation enabler as a spokesperson surrounded by a relatively passive network of actors. It concerns advanced steps of the S3, where it is accepted as relevant in the constellation of regional policies. At the same time, understanding institutionalization implies considering a normative turn in innovation policy (Uyarra et al., 2019), in particular, S3s that have to make the tensions arising from top-down rationales and societal challenges and bottom-up understandings and place-based capabilities compatible.

Portugal can be a relevant case study to examine this institutionalization process. It was one of the EU member states that implemented a multilevel governance system for the development of its S3. At the regional level, the CCDRs (*Comissões de Coordenação de Desenvolvimento Regional*), that is, the regional agencies that manage the regional operational programmes, were fast in adapting to the S3 movement and adopting the principles of smart specialization to develop more or less robust place-based strategies. At the country level, national agencies, such as IAPMEI (*Agência para a Competitividade e Inovação*), FCT (*Fundação para a Ciência e a Tecnologia*) and ANI (*Agência Nacional de Inovação*), tried to retain for themselves some control of the S3 process and presented a national strategy, the so-called ENEI – *Estratégia nacional de especialização inteligente* (ANI, 2014), which worked to fulfil the ex ante criteria for ESIF access during 2014–2020 in this member state. Regional S3s were presented as an appendix to the ENEI.

In the case of Portugal, an S3 was used as an opportunity to strengthen regional innovation dynamics, with the participation of a wider group of actors, in particular HEIs not only in the design of the policy but also in its implementation. From several studies and evaluations concerning the Portuguese S3 implementation (for a recent evaluation of S3 in Portugal, cf. Quartenaire Portugal, 2019), this is one of the main positive aspects retained. Examples of relevant steps for a more distributed mode of governance can be found in almost all regions.

Clearly this was not done fully, as the entrepreneurial discovery process (EDP) and participatory mechanisms conceptualized as the smart specialization concept's main proponents have hardly been fully accomplished in the Portuguese regions, and more generally in the majority of EU regions. In the case of Portugal, the challenges were varied. Laranja et al. (2019) identified key challenges, such as the existing heterogeneous competencies and instruments to act strategically and implement their priorities. In addition, the multilevel governance system was designed to provide coherence, but there were many difficulties in putting it into practice. One of the biggest issues was the difficulty of Portuguese ENEI and regional S3s in selecting their priorities, as they identified too many. Additionally, the definition of priorities and actions was often given by non-representative sets of regional actors, mainly those from science and/or with closer relations to regional authorities. Moreover, elsewhere Laranja has argued that

the priority-domain definitions were therefore taken as focus areas for public funding, not as areas for experimentation and learning through entrepreneurial discovery. Hence, the idea of having a self-unfolding discovery process where both public and private sectors collaborate was somewhere lost by reducing S3 to a bureaucratic set of criteria for accessing R&D and innovation funding. (2022, p. 855)



Laranja further adds: 'in many cases, these joined-up meetings lacked the engagement of private sector firms, and the principal-agent to drive the process was still the regional authorities (CCDRs), in some cases strongly influenced by vested interests of their local university establishments.'

3.2 | Some methodological notes

This study aims to contribute to the understanding of the role of universities in the S3 process, particularly considering their transformation and participation in peripheral regions. Analytical frameworks for the regional innovation impact of universities require robust concepts and information to deliver relevant evidence. A mixed methods 'narrative with numbers' can be an appropriate format to identify, categorize, interpret and explain the regional engagement dynamics of universities (Jonkers et al., 2018). Thus, the empirical component is inspired by the experience of the author in several S3 activities, preparation and evaluations in the last decade;² even if the majority of empirical material used is mixed, quantitative data and qualitative information, mainly extracted from recent national and international projects that are identified below,³ are influential in the consolidation of the author's vision of S3 processes.

In terms of national projects, the impact of European structural funds on knowledge transfer and valorization dynamics in Portugal (AM&A, 2018), the impact on incentive schemes in PT2020 (Ernst & Young/Augusto Mateus & Associados and Católica Porto Business School, 2019) and the evaluation of knowledge-transfer best practices (EY-Parthenon, 2020) were instrumental as the national and regional S3s were crucial to strengthening collaborations between universities and firms but also, and very importantly, to defining articulations, complementarities, and a shared rationale, thereby increasing coherence among a series of public policy instruments. Some of the data analysed in this last study are reused in the next section in a novel analysis to illustrate specific issues concerning university–industry collaboration by means of social network analysis (Ter Wal & Boschma, 2008).

In terms of international projects, it is relevant to underline the participation in two initiatives of the Joint Research Centre (JRC). The first, lagging regions (LAGREG), facilitated the comparison of the Centro (PT) region and national-level S3 policies with other member states and regions, showing the increased difficulties of a variety of peripheral regions, less developed or with growth problems, in terms of entrepreneurial discovery process implementation and shared governance (Laranja et al., 2020), or regarding open government data and monitoring (Fuster Martí et al., 2020). The second, higher education and smart specialization (HESS), is a crucial project that intends to understand the relationship between S3s and universities, that is, how universities can contribute to the successful implementation of an S3 using a series of cases studies from all over Europe. In this specific case, the seven regions of Portugal were analysed to provide a national understanding of the process (Pinto et al., 2021). Some of the empirical material from HESS is reused in the next sections. It refers to qualitative information coming from 23 interviews, administered between June and September 2019, and 7 carried out in all NUTS II regions of Portugal: Norte, Centro, Lisbon Metropolitan Area, Alentejo, Algarve, and the Autonomous Regions of Azores and Madeira (September–December 2019), and pre- and post-project seminars held in May 2019 and July 2020 (online due to the pandemic restrictions).

²For the author, participation in the elaboration of the RIS3 Algarve (CCDR Algarve, 2014) in 2012–2014 was important for learning about the difficulties in developing an evidence-based strategy and the challenges of peripheral service-based economies, in particular tourism, on innovation policy. This perspective, with the inadequate neglect of a doing–using and interaction mode of learning (Jensen et al., 2007), which now is almost mainstream, was quite counter-intuitive for many in the early moments of RIS3 design (cf. Cooke, 2016). It was also in this phase that multilevel tensions between national–regional bodies and excessive centrality given to dominant regional HEI players were detected in several collaborative joint events focused on entrepreneurial discovery. This is not specific to Portugal, as many member states trying to employ multilevel approaches to S3 suffered similar processes (Chrysomallidis & Tsakanikas, 2017).

³Following the Algarve S3 experience, it was also possible to learn from the RIS3 Pernambuco (Brazil) in 2017. This was the first exploratory experience for the design of an innovation strategy based on S3 principles outside the European Union and supported by the European Commission. The strategy focused on the knowledge combination of two important economic sectors (automotive IT and clothing). From this experience, the excessive dominance of public research and education actors as knowledge brokers, tensions between the state government authorities and the firms, and the effects of extreme inequality were quite visible as limitations to an effective transformative innovation strategy such as S3 should be (for a review of this experience, see Pinto, 2018).



4 | S3 IMPLEMENTATION CHALLENGES IN PORTUGAL

4.1 | Regional diversities in Portugal (or the different ways of being peripheral)

Without causing too much harm to the prevailing vision and other deeper analysis on regional asymmetries, we can state that Portugal presents deep differences in terms of regional capacities and adaptive capacities. This is shown, for example, by the innovative capacity, as published in the periodic regional innovation scoreboard scores (European Commission, 2021), with quite different resilience capacities to cope with the financial downturn in the 2007–2008 crisis (Pinto, Healy, & Cruz, 2019c) or the recent pandemic crisis (Ferrão et al., 2023).

The innovation index scores (Figure 1) provide a decent approximation for this issue, revealing that Portuguese regions – even if all NUTS II regions in Portugal can be considered peripheral in relative terms as they are below EU average – are moving, at least, in two different groups: one that collects Lisbon, Centro and Norte as the best performers in the country and the other that shows diverse patterns concerning their regional specializations.

These differences are also mirrored by the regional dispersion of universities and other higher education actors. In fact, many regions are not only limited in terms of the number of public HEIs, but also in terms of students (Figure 2). Norte presents a relevant number of entities in higher education, both from the university and polytechnic subsystems, with around 75,000 students. The University of Porto and University of Minho are key institutions in terms of size, but the University of Trás-os-Montes e Alto Douro and the Polytechnics of Porto, of Bragança, of Viana do Castelo, and of Cavado e Ave also play a crucial role in terms of local dynamics. Centro region includes three relevant universities: University of Coimbra, the oldest in the country, University of Aveiro and University of Beira Interior, along with several polytechnical institutions with around 75,000 students. Lisbon includes a student population of more than 100,000 students and a variety of organizations with no parallel in the rest of Portugal, in particular with the University of Lisbon, the biggest in the country in terms of size. Alentejo and the Algarve have more limited networks. Alentejo includes three main organizations, including the University of Evora, and the Algarve is dominated by a single public university.

The regions are quite diverse in their economic and scientific specializations, which translates into quite a diverse list of thematic priorities (cf. Figure 2) as well as policy outcomes in the national and regional S3s. Using the policy outcomes as classified in the Eye@RIS3 tool (<https://s3platform.jrc.ec.europa.eu/map>), sustainable innovation

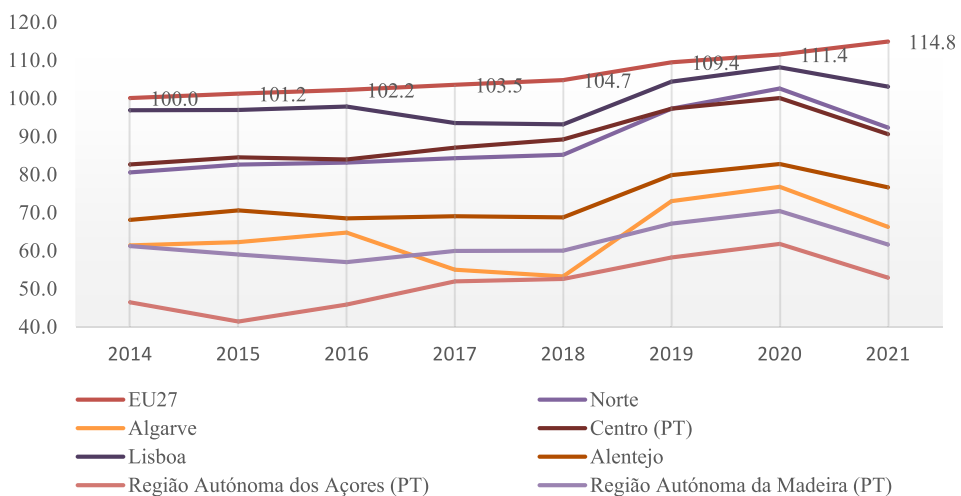


FIGURE 1 The recent evolution of Portuguese regions in the regional innovation index (2014–2021). Source: Based on data from regional innovation scoreboard available at <https://ec.europa.eu/docsroom/documents/46031>

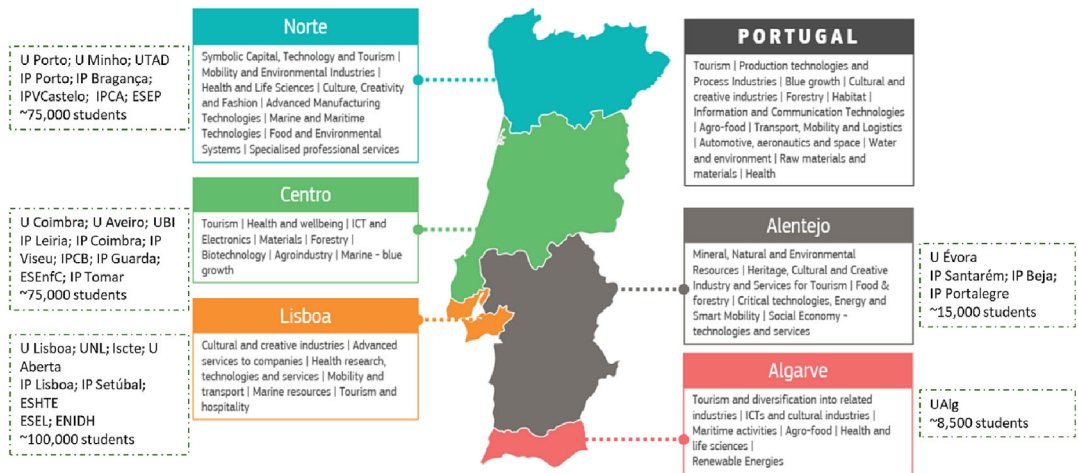


FIGURE 2 S3 priorities and public higher education institutions and enrolment. *Source* (map): Adapted from Marques Santos et al. (2021), student enrolment data from DGEEC/MED – MCTES.



FIGURE 3 Policy outcomes in S3 in Portugal. *Source*: Data from eye@RIS3, word cloud generated by MonkeyLearn's WordCloud Generator.

and digital transformation can be identified as leading in the mentions in the different S3 national and regional documents (cf. Figure 3).

A complementary perspective is offered by the analysis of data regarding a particular type of publicly supported project; the co-promotion R&D projects. Using the database provided by the National Innovation Agency (ANI) (EY-Parthenon, 2020), a network analysis allows for the creation of a set of visualizations that reveal an approximate structure of the national innovation network. The analysis closely follows the principles of social network analysis (cf. Carrozza et al., 2020 for a recent application of the method). The network encompasses 1,275 different nodes (formal actors who were beneficiaries of this instrument) and 3,111 relationships (4,349 counting repetitions), in a total of 1,226 projects (638 in the period of QREN 2007–2014 and 588 in the Portugal 2020 period 2014–2020). The network is populated by a large proportion of firms, but academic and intermediary entities are also present and play central roles in connecting the network (Figure 4). The relevance of universities is also evidenced by the number of projects they attract, and it is clear that, despite being much less numerous, they concentrate large volumes of projects and investment. The figure below also shows, with different thicknesses, the ties with repeated

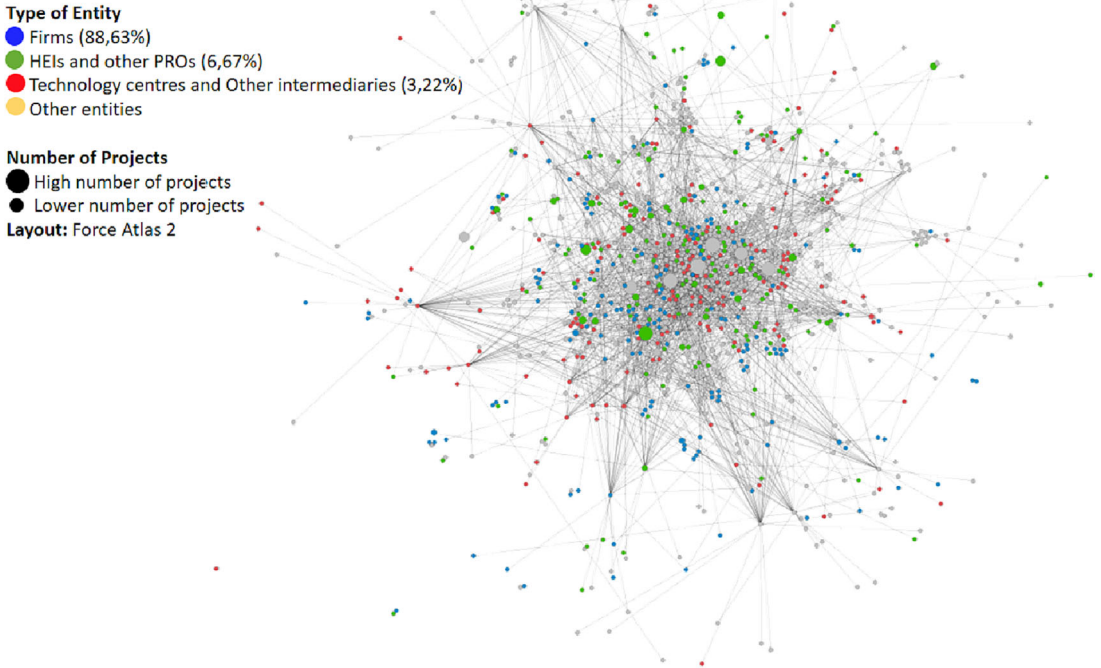


FIGURE 4 The Portuguese innovation network, based on co-promotion projects (2007–2020). *Source:* Based on database from ANI and the analysis from EY-Parthenon (2020), using software Gephi.

collaborations during the analysed period. The most repeated relationships commonly involve universities at the core of the network. This is evidence of the social capital (Rutten et al., 2010) of universities within the innovation system.

These figures directly reflect the size of the ESIF available by region, which biases other types of considerations. Nonetheless, it is clear that the entities from the Norte and Centro regions populate a large part of this network; about 80% of the nodes. The linkages by region reveal that again, a significant part of the projects are concentrated in the Norte (34.28%) and Centro (26.58%) regions. The regions of Lisbon (5.04%), Alentejo (3.41%) and Algarve (0.94%) show lower values. Table 2 below facilitates two interesting pieces of evidence that in all regions, the number of university projects and their degree – number of linkages of each node – is always higher than the global mean, and that in the two regions where this kind of instrument was more relevant, Norte and Centro, this pattern of the relevance of the university as knowledge broker is even clearer.

4.2 | The future of S3 and university engagement

The content analysis of the qualitative information (cf. Hsieh & Shannon, 2005 for a review) from the interviews and focus groups (Pinto et al., 2021) is organized below according to dimensions of novelty regarding the key challenges for universities and S3s, the different roles that actors now play in the strategy (and in regional innovation dynamics in general), and finally, the challenges for the institutionalization of the S3 approach in regional innovation policy.

**TABLE 2** Projects and degree of HEIs in co-promotion projects (2007–2021).

NUTS II		Number of projects	Global mean*	Mean for universities**	University intensity***
Alentejo	Projects	79	1.82	6.20	3.4
	Degree		3.54	4.00	1.1
Algarve	Projects	21	3.52	10.25	2.9
	Degree		4.57	8.00	1.8
Centro	Projects	471	3.55	21.50	6.1
	Degree		5.36	15.86	3.0
Lisboa	Projects	143	3.20	9.65	3.0
	Degree		4.06	8.48	2.1
Norte	Projects	544	3.63	17.52	4.8
	Degree		5.71	14.39	2.5

* (Total number of projects-Degree/Total number of nodes).

** Number of projects (Degree) with universities – Degree/Number of universities).

*** (Mean for universities/Global mean).

Source: Author creation based on data from EY-Parthenon (2020).

4.2.1 | Challenges for universities and S3s

Regarding key challenges for universities, crucial aspects can be organized into two types of identified problems: first are those that are directly related to the external dimension factors regarding the university, namely the limited absorptive capacity of the regional business fabric of knowledge that is critical for many S3-selected domains, differences among actors concerning what S3 means in practical terms, problems in the active animation of regional S3s with a lack of dedicated bodies and agencies, limited customization of the policy mix according to regional needs and identified priorities, and difficulties in addressing social aspects related to innovation, that is, to develop social innovations centred on societal challenges and social needs or to stimulate socially distributed models of creation of innovation, such as open innovation. Second, the ones that regard internal aspects of the university concern particular institutional aspects, such as management systems and organizational culture or internal governance and leadership, fundamental to shaping effective relationships with other innovation actors (Tijssen et al., 2021). In this regard, the internal deficit in the identification and activation of the individual brokers in the different S3 domains that can be catalysts for change inside the university and the connectors with external S3 dynamics, as well as the limited incentives for academics to participate in S3 collaborative activities that continue to favour scientific publication, were underlined.

4.2.2 | Different roles that actors play in the strategy

There is also evidence that what is expected from a variety of actors in the S3 process is quite different from more conventional views of the RIS. The state should be entrepreneurial. This is in line with the vision of the entrepreneurial state (Mazzucato, 2013), which argues that the state can and should be innovative and not just a space for institutional, market and society regulation. This is a paradigm shift in the way the state is also perceived. The identification of innovation is now crucial in policy agendas, directly addressing the answers to new social problems and the potential of linking economic, scientific and technological areas through collective entrepreneurial discovery processes. Stimulus, development and direct implementation of innovations to solve social challenges, based on collective efforts such as those proposed by a mission-oriented policy in which the state is also the space for the creation of new markets (Mazzucato, 2018), are required. The COVID-19 crisis reinforced the role of the state after years of



pressure to reduce its functions because of austerity policies and predominant neoliberal ideology, particularly the naïve trust in the market functioning as an optimal instrument for allocation and distribution in society. Until now, the implementation of S3s suggests that the role of the state was not significantly different from other innovation strategies, but the state certainly plays a pervasive role. This can potentially be a differentiating element of S3 vis-à-vis conventional RIS approaches.

Firms have also changed their role. They are not only beneficiaries of public policies and ESIF resources, but they are also seen as co-creators of the strategies, deeply engaged in shared governance and co-decision-making in the S3. Users, or beneficiaries of innovations or even society in more general terms, have an enlarged role in S3s, something that was also pointed out in the interviews and focus groups. They are a new sphere of influence, as advocated in the fourth helix models (Hasche et al., 2020), assuming participation and activity in the governance of the processes for S3 development. This is highly aligned with the needs of the citizenry, which can be stimulated only by strong civic engagement on the part of universities.

It is consensual that universities have their three traditional missions related to education, research and regional engagement, but their role goes beyond that for S3s. They are crucial for regional renewal and for the provision of knowledge-intensive services and equipment, and they are the knowledge brokers in the region and with external markets. They are also seen as the main animator of their RIS and, consequently, of the S3.

Universities, as well as public research bodies, have been deemed to be crucial for regional innovation for decades. Below, the four perspectives of universities as knowledge brokers (Kangas & Aarrevaara, 2020) are analysed with the institutionalization phases proposed by the ANT to identify key activities in the S3 process.

The social dimension of networks is particularly important as key activities are developed in the initial steps of institutionalization and the legitimation of the strategy as a key process for regional development, but it needs to continue during the entire process to create network dynamics, social capital and trust among different actors. It is commonly seen that in advanced phases of institutionalization, some universities have guaranteed a key role in the S3 animation.

This is directly connected with a second dimension: decision-making and control. Many times, during problematization, universities are key in the definition of priorities, often by demonstrating their existent capacities or trying to draw the priorities closer to strategic scientific areas of the specific HEI. Universities often assume positions of leadership that are particularly consensual as universities are seen by other, particularly private, actors with more limited restrictions concerning self-interest. Universities often influence the design of evaluation and monitoring systems. Activities to mitigate issues of a lack of absorptive capacity are also common. These are done in a way to grant some control.

As knowledge brokers, universities are crucial in the cluster building, here understood not only as the creation of specific subset of activities for regional development but also as the regional community of practice for the S3. Universities participate in EDP or other participatory sessions and are fundamental in more advanced phases in which governance mechanisms are in motion. In addition, they are crucial in mobilizing resources, namely ESIF resources, and attracting and retaining human capital in the region.

Finally, universities also play a relevant role regarding exchange elements. This dimension is connected to market-based interactions that may be instrumental to developing and implementing an S3. Often universities are contracted in the early phases to produce studies about regional innovation. They represent the region at international events, presenting the region to a variety of actors and publics. In the advanced phases of the strategy, universities align training and educational offers with S3 needs. They provide services and infrastructure regarding innovation needs. Universities assume a pivotal role in the connection of S3 with external markets and relevant international value chains (Table 3).

4.2.3 | Challenges for institutionalization

The results also show plausible risks for the institutionalization of the innovation policy's success in three main types of aspects.



TABLE 3 Phases of institutionalization and the role of university as knowledge brokers in S3 in peripheral regions.

Phase	Problematization	Interessement	Enrolment	Mobilization
Social dimension of networks	Legitimation of the strategy	Social capital and trust Creation of linkages	Bridging different types of actors Maintenance of network activities	Consolidation of centrality and assuming as a key translation enabler
Decision-making and control	Initial contribution for definition of priorities	Leadership and guidance Redefinition of priorities	Definition of evaluation and monitoring systems	Activities to reduce absorptive capacity issues in the economic fabric
Cluster building	Meetings with key stakeholders	Coordination of EDP related initiatives	Animation of participatory mechanisms	Attracting and retaining talent Animating proposals for ESIF utilization
Exchange elements	Studies for an evidence-based strategy design		International representation of the region and its S3	Animating proposals for ESIF utilization, particularly R&D in co-promotion Training aligned with S3 needs Provision of KIBS to regional actors Provision of infrastructure Connection with external markets and value chains

Source: Author creation.

One concerns the innovation systems, in particular those that are dominated by a single or few powerful actors from higher education, which may lead to what is here defined as institutional hijacking – the monopolization of the innovation policy process by the interests and agenda of a limited number of dominant regional innovation actors. This is, for example, the case of the Algarve region, where the University of Algarve is the dominant and only public higher education with significant critical mass (cf. Pinto, Nogueira, et al., 2019). Conversely, there exists the opposite case, with many higher education actors functioning at regional and local levels, explicit tensions and excessive competition for funds and influence arising, in particular more closely aligned with the decision bodies, such as the CCDRs. This is the case of the Norte and Centro regions. In particular, some opposition is evident between universities, assumed mainly by regional authorities to be crucial, and polytechnics, assumed to be less important to S3 dynamics, particularly in the initial phases of strategy design, but having demonstrated high engagement in the overall process. We define this as institutional fragmentation – the case where the vision and expectations of many individual innovation actors are not reflected by the S3 dynamics, and thus they feel that they are passed over in terms of public access to the policy process, from design to public allocation, in favour of other similar actors.

There are also questions concerning the integration in the territory; in particular, the multilevel perspective seems to confuse the different individuals, especially those from the universities. The territorial emphasis is not consensual if a regional-national focus should be preferred in S3 over a more localized, that is, a deep place-based, approach. One of the aspects that directly links with this is the attraction, creation or retention of talent and firms in more peripheral territories. Many actors shared a preoccupation that S3 is enough, together with other policies being implemented, to stimulate regional convergence and avoid the absorption of resources into the most developed region, Lisbon.

Finally, there is a growing concern regarding the necessary focus on transformation. This concerns not only the much emphasized need to structure S3 in terms of transformative action, a transformational roadmap, and a dedicated action plan by accepting that S3 priorities are not sectors or scientific domains, but also that it is crucial to



avoid antagonism and the counter-mobilization of important actors or the dominant economic sectors that may feel threatened by the change suggested in the S3 agenda. To avoid this, exploring relatedness (Boschma & Frenken, 2011; Neffke et al., 2011), where these actors and sectors can be a part of a gradual institutional change, is key. This refers to what is often defined as institutional layering (van der Heijden, 2011), referring to a gradual institutional transformation through a process in which new elements are attached to existing institutions and so gradually change their status and structure. It is essential that the new does not replace the old, but rather, that it is added to it to avoid tension.

5 | CONCLUSION

RISs have made an important contribution to the rationale for policies promoting regions' innovativeness and competitiveness. Placing the RIS at the centre of economic growth shows innovation to be a socially interactive learning process that takes part between multiple organizations and individuals, such as universities, innovation agencies, national and regional governments, entrepreneurs, firms and civil society (Asheim, 2019). S3s are one of these policies, developed since 2012 in the majority of European regions and serving as a crucial criterion to access ESIF. They are also an inspiration for new industrial policies in other parts of the world.

Even if it is considered a positive experience, S3s are still subject to conceptual and practical criticism both from the academic side and in terms of their actual implementation. But in many territories, the implementation of an S3 has been an instigator of change. For the first time or to a greater degree compared with former innovation strategies through collective efforts, especially focusing on the entrepreneurial discovery process and the participatory governance of regional innovation, a larger group of actors from different institutional domains has been deeply involved in regional innovation in many European regions.

This was the case of Portugal, where an S3 was used as an opportunity to strengthen regional dynamics with the participation of a wider group of innovation actors. In fact, this is one of the encouraging aspects retained from several studies and evaluations concerning the Portuguese S3 implementation with limitations and delays. The S3 approach contributed to more directly connecting the university's research to regional needs. In turn, the university's strong local partnerships enabled it to leverage the funding received more effectively, advancing and diversifying its action throughout the region and thereby ensuring the promotion of a more effective RIS and of collective learning.

This article used the accumulated learning, often tacit, inspired by a series of experiences related to S3s. More formally, it benefitted from a series of interviews, results from focus groups and ESIF data on university–industry collaborative projects to debate the incremental institutional change stimulated by this policy tool. S3 implementation was used in this study as strategic research material exhibiting interesting features for the institutionalization of regional innovation.

Portugal and its regions are considered peripheral when compared with other member states in the EU context, particularly concerning innovation performance. It is often considered a country concentrated around the main metropolitan area of Lisbon. The results suggest that the different regions, even if considered peripheral in the European landscape, represent very different profiles concerning innovation capacity, economic fabric specialization and RIS composition. The example used in this article of a comparison of the regions of the Algarve or Alentejo compared with Norte or Centro, which are all considered disadvantaged, shows that they have clear contrasts when comparing innovation performance or the density and number of relations promoted by ESIF. These disparities help to understand that the peripheral character of a region is far from being a homogeneous category as it is often used in literature or in policymaking. Universities play a key role as knowledge brokers in the S3 process. They not only guarantee the connectivity of regional innovation networks, as suggested by the network analysis presented, but they are also very active players in decision-making and control in the collective dynamics and connection of the region with external actors. Different types of institutional change are thus in motion, from institutional hijacking with the dominance of a few but prevailing actors, to institutional fragmentation with exaggerated competition for funds and



influence. Additionally, as transformation strategies, S3s are not consensual and encompass tensions and the varying perspectives and expectations of different actors. To overcome counter-mobilization and resistance to S3 agenda implementation, an anchor in institutional layering may be instrumental.

A major revelation of the study and the observation of this and other S3 experiences is that open and shared governance have been more wishful thinking than a real S3 achievement. Governance, in particular the EDP as conceptualized by the smart specialization's main proponents, has hardly been fully accomplished, and has only marginally impacted on the innovation performance of EU regions, including the Portuguese regions. Additionally, it would also be relevant to analyse how the cases of higher education involvement in S3 in Portugal compare with other examples, particularly in peripheral regions elsewhere in Europe.

This article presents a tension between a rather optimistic view regarding the transformative potential of smart specialization and a darker perception grounded in institutional capacity problems in S3 implementation. Smart specialization rationale, to be helpful and capable of use in a variety of territories, should take into consideration the territories' characteristics and existent vulnerabilities. There is also a probably excessively enthusiastic view of universities as the crucial agent of the S3, as they also face a wide range of challenges. Higher education, research and innovation are crucial to regional responses to societal challenges and the creation of transformation roadmaps, as seen during the pandemic as well as in the peripheral regions. However, if regional policymakers really intend to use universities as an engine for innovation and regional economic growth, they must consider instruments aimed at easing the institutionalization of S3 as a vibrant collective process.

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