



**The Role of
Universities in
Innovation and
Regional Development**

ENTREPRENEURIAL UNIVERSITIES AND REGIONAL INNOVATION

MATCHING SMART SPECIALISATION STRATEGIES TO REGIONAL NEEDS?

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Abstract

Universities are expected to play a leading role in the smart specialisation strategy process. However, a gap between discourse and practice is marking the RIS3-related regional development programmes, which can be extended to the involvement of universities in the process. A mismatch can be speculated between the expectations towards universities' roles in RIS3 implementation and actual practice, and its repercussions on a regional innovation ecosystem. This chapter addresses the extent to which the role played by universities in a region's innovation and entrepreneurial practice aligns with the smart specialisation strategic outline. As an in-depth case-study of the University of Aveiro (Portugal), it draws on both quantitative and qualitative data, with an analysis of RIS3 approved projects in the Portuguese NUTS II Centro region, and interviews with key actors within the university and the regional administration. Through this, it weighs the contribution of entrepreneurial universities to the RIS3 goals, drawing lessons for public policy and discussing the future of RIS3.

Keywords: Structural Funds, University of Aveiro, Less-Developed Region, Public Policy, Higher Education, RIS3, Portugal, Centro, Policy Process

JEL: I23, O2, O38, R58

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Introduction

Universities have been imbued with the responsibility to contribute to the development of their regions, not just through their teaching and research missions, but increasingly through a «third mission» of dynamic engagement with external, and mainly regional partners (Charles, Kitagawa, & Uyarra, 2014; Chatterton & Goddard, 2000). In turn, the promotion of interaction between the university and other regional institutional actors through diverse engagement mechanisms is believed to stimulate innovation processes (Uyarra, 2010). Adapting to the strain of these growing expectations, and in search of alternative funding sources, universities have assumed a more entrepreneurial approach in their regional engagement. This is exemplified by their involvement in the development of incubators and science parks, and by their increasing pursuit of contract research, consultancy services and partnerships (Jongbloed, Enders, & Salerno, 2008). The importance of these relationships has been progressively underlined and encouraged in the political discourse, more evidently within EU's most recent Cohesion Policy, which in its incorporation of the smart specialisation concept has linked structural funds to these kinds of research and innovation initiatives (Goddard, Kempton, & Vallance, 2013).

Universities are also considered crucial institutions in the regional development dynamics associated with smart specialisation strategies (RIS3). The basic underlying argument is that development potential inherent to the knowledge generation, diffusion and dissemination capacity of academia is instrumental in a regional development policy context inspired by the smart specialisation concept (Begg, 2016). In other words, universities are expected to play a leading role in strategy implementation, relying on what is unique in a given region, namely the

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R&D and innovation domains in which that region can hope to excel (Foray, David, & Hall, 2009).

There is, however, evidence that a gap between discourse and practice is marking the RIS3-related regional development programmes (e.g. Iacobucci, 2012; Kroll, 2017), particularly evident in less-developed regions (LDRs), and which can be extended to the involvement of universities in the process. Universities themselves manage different forms of incorporation of the RIS3 processes, which are very much dependent on territorial context, historical legacy (Breznitz & Feldman, 2012) and overall entrepreneurial architecture (Salomaa, 2018). As can often be the case of universities in peripheral regions, even entrepreneurial ones, if there is a divergence between the universities' activities and the needs of the surrounding local innovation ecosystem (Charles, 2016), it is likely entrepreneurial spillovers will remain minimal (Brown, 2016) and RIS3 processes fail to further them. Accordingly, one can speculate about a mismatch between the expectations towards the role of universities in RIS3 implementation and actual practice, and its repercussions on a regional innovation ecosystem.

This chapter seeks to reflect on the potential of an entrepreneurial university's capability to contribute towards regional development through its collaboration in the RIS3 process and the implementation of the resulting projects. Empirically, it presents an in-depth case study of a university – the University of Aveiro – in a particular regional context – the less-developed Centro NUTS II region of Portugal –, aiming to address the relation between the regional government authority, the RIS3 process and the university in responding to regional needs and in fomenting the innovation and entrepreneurial ecosystem. The study strives to contribute to

the debate on the implementation issues of regional policies driven by smart specialisation, focusing particularly on the role of academia.

Background

Knowledge-based Innovation Policy: RIS3 and universities' role in creating an entrepreneurial ecosystem

Scholars from the fields of regional studies and economics have widely acknowledged innovation, in the form of creative technological discovery, as a key factor in unlocking territorial development and competitiveness (Freeman, 2002; Gibson & Naquin, 2011; Krammer, 2017; Rosenberg, 2004). As conceptualisations evolved, innovation processes transformed from more linear, chain-like technical models to more systemic frameworks that considered their spatial, organisational and institutional dimensions (Cooke, Gomez Uranga, & Etxebarria, 1997; Etzkowitz & Leydesdorff, 2000; Landabaso, 1997; Lundvall, 2010). In the latter, innovation was finally perceived as an inherently complex, interactive, territorial and combinatorial process between markets, policy, science, technology and, ultimately, knowledge and learning (Edquist, 1997; Santos & Caseiro, 2015). Territorial competitiveness, in this sense, is progressively dependent upon the generation of knowledge and the promotion of collective learning mechanisms (Morgan, 1997; Santos & Caseiro, 2015). This has been approached paradigmatically in the literature on innovation systems and the 'learning region', which brought the role of knowledge and institutions to the centrefold of these dynamic and creative innovation processes (Gunasekara, 2006; Lundvall, 2010; Morgan, 1997).

Institutional and social dimensions are thus assumed by some authors (Morgan & Henderson, 2002; Morgan & Nauwelaers, 1999; Santos & Caseiro, 2015) as equally,

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if not more important than infrastructural and fundamentally quantitative and economic factors in fostering territorial competitiveness and innovation, particularly in less-developed and peripheral regions. As an example, regional actors should not just be able to access knowledge but also have the capacity to learn and adapt, something facilitated by relational processes (Godin, 2006; Morgan, 1997). As such, regional and innovation policies seeking to address the issue of territorial competitiveness and 'bridge the gap' between more and less-developed regions have started emphasising institutional capabilities and endogenous potential by fostering interaction among regional actors to spur collective learning.

In the European context, the most recent regional innovation policy framework of smart specialisation emphasises this approach (Foray et al., 2009). As the basis for interventions in research and innovation through the European Structural and Investment Funds (ERDF), the smart specialisation concept and resulting strategies (Smart Specialisation Strategies – S3 – or Research and Innovation Smart Specialisation Strategies – RIS3) are now an integral part of any EU region's economic development efforts. The guiding principles of smart specialisation consider the collaborative character of innovation within a participatory process designated as the entrepreneurial process of discovery. Within it a diverse set of regional stakeholders and institutions (e.g. local and regional government, industry, universities and research institutions, third sector organisations, entrepreneurs) come together to discuss and develop a vision for the region, progressively identifying and supporting areas of strategic potential that can generate competitive regional advantage (Foray & Goenaga, 2013). By setting R&D and investment priorities based on regional uniqueness, S3 not only inherently

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emphasises endogenous potential and place-based (rather than 'one-size fit all') innovation strategies (Barca, McCann, & Rodríguez-Pose, 2012), but also increases the focus on knowledge-based and collaborative innovation as a way to boost regional competitiveness and development (Santos & Caseiro, 2015). Especially in regard to the latter, universities have been brought to the forefront of regional innovation policies, with RIS3 highlighting them as key institutions in guiding the strategy process and the identification of regional advantages and trends (Foray et al., 2009). In aiding the leveraging of existing knowledge stock to create new regional trajectories through the diversification and upgrading of the R&D system, entrepreneurial and regionally-engaged universities, in particular, have become a critical asset for the design and implementation of RIS3 strategies to better connect with regional context and needs (Santos & Caseiro, 2015).

Entrepreneurial and regionally-engaged universities

The roles of higher education institutions, from henceforth referred to simply as universities, have shifted throughout the years in the face of both external demands and endogenous processes that required their engagement with society (Clark, 1998; Etzkowitz et al., 2008). Whereas in the past their mission was that of predominantly disseminating knowledge through teaching, the concept of research-based teaching, presented in the 19th century by Wilhelm von Humboldt, added to universities the function of knowledge producer (Rodrigues, 2001). More recently, expectations regarding universities' ability to drive economic development and innovation dynamics (European Commission, 2011), to anchor and combine global knowledge assets with local processes, and to create a potential for regeneration and development, particularly at the regional level (Charles, 2016), have influenced the incorporation of a «third mission» within these

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institutions – that of external and regional engagement. This typically refers to activities of social, entrepreneurial and collaborative character that are undertaken by universities with external partners (Etzkowitz & Leydesdorff, 2000; Zomer & Benneworth, 2011), potentiated by proximity and territorially-specific processes, and therefore more emphasised at the local and regional level (Morgan, 1997). These shifts in the academic *ethos* reflect a clear trend in institutional adaptation, a transition from knowledge for its own sake to knowledge valued by its applicable potential, and even beyond with more network-based knowledge generation/creation activities (Etzkowitz & Leydesdorff, 2000; Gibbons et al., 1994).

With society now relying primarily on (scientific and technological) knowledge to be able to compete in an increasingly globalised economy, a greater emphasis has thus been placed on a connected, engaged and entrepreneurial university that can contribute towards the development and competitiveness of its surroundings (Brown, 2016; Etzkowitz & Leydesdorff, 2000; Gunasekara, 2006). State agencies have increasingly sought to support «third mission» activities, to interlink knowledge producers and users, and to maximise the impact of universities in the region (Brown, 2016; Drucker & Goldstein, 2007; Etzkowitz & Leydesdorff, 2000). This is particularly the case of regional innovation policies like S3, which by considering universities' potential in building-up regional economic, technologic and institutional capacity, progressively brought them to the centrefold of regional innovation and entrepreneurial ecosystems (Audretsch, 2014; Brown, 2016; Charles et al., 2014; Cooke et al., 1997).

Universities' incorporation of the «third mission» and their more pronounced role in economic development inevitably materialised in a more entrepreneurial turn (Etzkowitz & Leydesdorff, 2000), with the emergence of new functions and bodies

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that could facilitate the connection between knowledge and the territory. Specialised infrastructures were created for this effect, namely technology transfer offices (TTOs), incubators, science parks and other intermediate facilities that could promote and manage this relationship with external entities (Brown, 2016; Jongbloed et al., 2008). This could thus stimulate the innovation ecosystem in which the university was integrated, accruing alternative funding sources and outside recognition in the process. In this sense, in seeking to play a more prominent role in knowledge-based innovation processes alongside other relevant institutions in the region, like industry and the state, the university has become more entrepreneurial, more active in its interactions with other actors and in the combined performance of its main missions (teaching, research and engagement) (Etzkowitz & Leydesdorff, 2000). As Santos & Caseiro (2015, p. 541) state, this requires universities to be imbued with a sense of discovery and risk, to approach knowledge as "*an asset which can be created, developed, transmitted and valued*", and to take on a more anticipative, active and strategic role in the promotion of its transfer to society, instead of remaining in a distant 'ivory tower' (Etzkowitz & Leydesdorff, 2000).

Contribution of the entrepreneurial university to regional innovation

An entrepreneurial university is thus believed to have the potential to foster interactivity and collective initiatives in a regional context (Clark, 1998; Etzkowitz & Leydesdorff, 2000), adapting its organisational architecture in the face of external demands and according to its institutional objectives (Clark, 1998; Etzkowitz et al., 2008). The regional and institutional context, such as funding availability and financial constraints, local employment opportunities, and other socio-historic factors will therefore be highly influential in defining the entrepreneurial

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universities' regional role (Breznitz & Feldman, 2012; Salomaa, 2018). If the university's entrepreneurial endeavours are disconnected or disassociated from the regional socio-economic landscape, knowledge spillovers and effective learning dynamics are less likely to occur. This is particularly the case in LDRs, where the knowledge being produced and transferred is often unable to be absorbed by the local economic and entrepreneurial ecosystem (Bonaccorsi, 2016; Brown, 2016). Despite such restrictions, universities are widely acknowledged to serve as sources of knowledge that can stimulate the regional economy. They present and stimulate as generative, absorptive, collaborative, and leadership capacities (Goddard et al., 2013) that can play a key role for innovation policy initiatives to build new niches of knowledge and have impactful and positive outcomes.

According to Santos & Caseiro (2015), the concept of the entrepreneurial university and the smart specialisation framework are mutually reinforcing and amplified. A university that pursues an entrepreneurial approach, promoting an adjusted institutional architecture and culture (Salomaa, 2018) and facilitating collaboration with regional partners, can be easily linked with the more relational and networked vision of innovation present in S3. Furthermore, by encouraging an entrepreneurial mindset and ultimately a society that stimulates a culture of "*risk, search and discovery*" (Santos & Caseiro, 2015, p. 541), such a university can more easily identify, exploit and carve out unexplored economic opportunities – a central tenet within the S3's entrepreneurial process of discovery. In turn, S3 aims to support regional innovation capabilities on pair with entrepreneurial universities by fostering actor networks and interaction and enhancing collective learning processes capable of producing strategic knowledge. In the end, the role of universities in the RIS3 as relevant stakeholders and social connectors, partner

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institutions, policy actors and knowledge producers can be of great importance to strategy implementation, and enable the construction of a sustainable entrepreneurial ecosystem (Santos & Caseiro, 2015). The latter is presented by the authors as resulting from the interaction of entrepreneurial universities and S3.

It is nevertheless important to recognise that the promotion of an entrepreneurial culture or of the «third mission» more generally within universities is not straightforward and far from reaching effective institutionalisation and operationalisation (Fonseca, 2018). The integration of entrepreneurial activities with more traditional academic functions is still incongruent and disordered, suffering from a lack of clear strategic institutional alignment capable of directing such activities and with little incentives in place to support academic engagement. Even though, entrepreneurialism in academia was in part driven by the need for alternative funding sources, monetary incentives seem insufficient (D'Este & Perkmann, 2011), with these still being activities that are not prioritised and that rarely play a role in the career evaluation of academics.

Can the entrepreneurial university help match RIS3 to regional needs?

The promotion of RIS3 can be summarised as an attempt to create a regional and dynamic entrepreneurial ecosystem conducive to territorial collective learning and innovation (Santos & Caseiro, 2015). In practice, while smart specialisation has gained momentum as a policy concept and instrument (Foray, David, & Hall, 2011), it has been faced with several implementation difficulties, particularly in the case of LDRs (Krammer, 2017). More developed regions with stronger innovation and entrepreneurial ecosystems generally succeed in supporting innovation endeavours, namely in translating knowledge into the productive sector. However, LDRs are faced with certain characteristic shortcomings that can hamper the

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effective establishment of this connection: insufficient and/or inefficient locally-based R&D activities; a lack of absorptive capacity for R&D by local firms; and a weak or fragmented entrepreneurial ecosystem, with a lack of interaction between economic and institutional agents (Bonaccorsi, 2016; Huggins & Johnston, 2009; Krammer, 2017; Rodrigues, 2001). More generally, the RIS3 is still believed to have a weak conceptual basis that is hindering to the effective leverage of collective processes. Kroll (2017) highlights that current regional stakeholder participation and consultation in RIS3 cannot be rightfully named as entrepreneurial processes of discovery, as the bartering of individual interests still overshadows larger community-oriented visions and practice. Iacobucci (2012) warns RIS3 can tend toward ambiguity by diluting the focus on R&D-based innovation and specialisation, and that regions with weak research infrastructure may need a balanced mix of research and innovation policy to help correct infrastructural problems and stimulate the innovation system simultaneously.

In this, the presence of an entrepreneurially-veered university in a region undoubtedly has the potential to substantiate the current S3 framework in that it can provide the innovation process with key incremental organisational support, promoting an entrepreneurial culture within the region and among regional actors that can strengthen regional competitiveness and development. While this potential is present, the role of these universities in effectively linking the S3 with the regional fabric, as well as their role in developing collective learning and absorptive capabilities, is still unexplored (Santos & Caseiro, 2015). Without disregarding the role other actors may play in the RIS3 and in the building of the entrepreneurial ecosystem (Santos & Caseiro, 2015), or in the role of policy in creating the conditions for such a system to emerge (Huggins & Johnston, 2009),

this chapter considers relevant to explore the role of entrepreneurial universities as key actors in driving RIS3 policy and in linking it with regional needs, analysing their agency in the process, in particular in the formulation and implementation stages.

The Case of the University of Aveiro: Research and Innovation Policy and Regional Priorities

This section focuses on the participation of an entrepreneurial university in the RIS3 strategy process. It considers the engagement in both the formulation and the implementation stages of the process to provide a more comprehensive view of a university's influence on the policy's orientation, its own adaptation to the strategy and, its contribution to its application. While it discusses the issue of universities' contribution towards matching a smart specialisation strategy to regional needs in a specific institutional and geographic context, the intent is to draw theoretical reflections and policy lessons that will allow for broader consideration.

A single case-study approach was deemed fitting by the authors given its potential for more in-depth exploration (Flyvbjerg, 2006). The University of Aveiro (UA), in Portugal, was chosen for three main reasons. First, it is a relatively young university that has assumed a strong connection to its region since its creation in the 1970s, embodying an entrepreneurial discourse and approach in regional engagement. Second, its location in the peripheral and less-developed regions of Centro (NUTS II) and Aveiro (NUTS III) provides a useful context to explore the matching of entrepreneurial and innovative activities with regional needs in an LDR, where there may be shortcomings in infrastructural, institutional and connective capabilities. Third, UA has been increasingly active and involved in regional innovation policy

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and structural funds' projects at regional, sub-regional and local level, engaging often as a relevant partner to government authorities and other relevant institutional stakeholders. More prominently, and as will be discussed in this chapter, UA has participated in the RIS3 of Centro region for the period 2014-2020, and has partnered with the sub-regional authority of Aveiro region – the Intermunicipal Community of the Region of Aveiro (CIRA) – in the design and management of structural funds for two territorial development strategies in the periods of 2007-2013 and 2014-2020.

Concretely, this chapter draws on data from the Centro regional authority (CCDRC¹) concerning projects financed by the Portugal 2020 programme (supported by the European Regional Development Fund) from 2015 to 2019. The available data (CENTRO 2020, 2019), last updated on March 31st 2019, provides information on the set of supported innovation projects, namely their geographical and sectoral distribution, the partners involved and the volume of allocated funding. It thus allows for investigating the extent to which the projects match the specialisation domains of the RIS3, as well as the nature and focus of universities' involvement. Complementing this is a qualitative analysis of 31 semi-structured, in-depth interviews with key actors within the university and the regional (CCDRC) and sub-regional (CIRA) administrations, conducted by the authors in the Spring and Autumn of 2018. Discussions centred on the extent and nature of UA's engagement within these strategies, particularly the RIS3; UA's institutional and organisational adaptation in the face of its engagement in regional innovation

¹ Commission of Coordination and Regional Development of Centro, or Comissão de Coordenação e Desenvolvimento Regional do Centro in Portuguese.

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policies; and, finally, the dynamics of UA's participation in Centro funded projects (exclusively ERDF/FEDER). The interviews cover 21 projects funded from the scheme, 10 of them being small-scale grants for intellectual/industrial property (IP) projects, mainly covering patent costs for promising research outcomes. These IP projects were centrally applied and managed by UATEC², UA's technology transfer office. The other projects led by UA vary from large-scale initiatives within regional "platforms", to small and medium size projects that have a stronger regional focus. Two of these projects strive to reinforce internationalisation by encouraging



Figure 1 - Map of Portugal Displaying NUTS II Statistical Divisions and the NUTS III Aveiro Region. Authors' own adaptation.

researchers to bid for grants from Horizon 2020, whereas the others have stronger links with external stakeholders such as local businesses and government authorities.

Brief picture of the regional context

The region of Centro (Figure 1) is, as the name suggests, located in the central-most area of continental Portugal, benefitting from a strategic positioning between the country's major metropolitan centres – Lisbon, the capital, and Porto. Centro is one of seven Portuguese administrative regions, corresponding to the NUTS II European statistical subdivision, and encompasses

approximately 30% of the country's total area, with a population of over 2 million

² Unit of Transfer and Technology, or Unidade de Transferência e Tecnologia in Portuguese.

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inhabitants (European Commission, 2019). This population is unevenly spread out throughout the region, with a greater density in the more urbanised coastal areas (like Coimbra, the region's capital, and Aveiro), and a characteristic 'desertification' of the more rural interior, except for some urban centres (e.g., Viseu, Castelo Branco).

In economic terms, the region's GDP corresponds to roughly 19% of the national one, but its purchasing power is still below both national and European averages (European Commission, 2019). It is considered an LDR in a country that is, nevertheless, a moderate innovator, according to the EU's Regional Innovation Scoreboard of 2018. Given that the region encompasses a great territorial area, Centro benefits from a rich variety of (natural) resources that have contributed to its economy becoming relatively diversified. It is both competitive in low technological industrial sectors – like ceramics, agro-food and forest industries – and increasingly in medium to high-tech sectors – namely ICT, biotechnology and health, renewable energies – which are bringing new applications to more traditional industries (Rodrigues & Teles, 2017).

Centro is the third highest ranked region in Portugal regarding its gross expenditure on R&D with growing investment over time (European Commission, 2019). In this, its economy and innovation-related endeavours, Centro owes a lot to its higher education institutions, which include three universities – the University of Coimbra (UC), University of Beira Interior (UBI) and University of Aveiro (UA) – five public polytechnics and many other private education and research institutes. Nearly half of the R&D expenditure in the region results from activities

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implemented by higher education institutions, with businesses following suit and lastly government and other private institutions (European Commission, 2019).

Not following a regionalised tradition, the central government of Portugal is the one responsible for regional development and, in the most part, for the definition of research and innovation policies as well. Regional commissions, such as the CCDR of Centro, possess administrative and financial autonomy but are merely decentralised bodies of the central government. Their competencies include, nonetheless, regional and urban planning and development, environment, inter-regional and transnational cooperation, as well as the management of financial instruments and EU programmes based on funds allocated to Portugal by the EU (European Commission, 2019). The RIS3 Centro is one such instance. Through it, the region aims to enhance its overall performance in GDP and R&D in the national context as well as reinforce internal territorial cohesion and resilience (European Commission, 2019). To achieve this, and together with regional stakeholders, eight strategic priorities have been defined in RIS3 Centro, linked to the above-mentioned main regional industrial sectors but also including sea-related economic activities and tourism. In turn, combination of these areas has been promoted through three main transversal scopes: i) sustainable industrial productivity; ii) energy efficiency; and iii) rural innovation (CCDRC, 2014b). The 2014-2020 RIS3 was implemented within the overarching CENTRO 2020 strategy and its funding instrument – the Regional Operational Programme (ROP) –, which had around €2.2 billion EU funds, €1.8 billion of which were European Regional Development Funds (ERDF) and €404 million European Social Funds (ESF) (European Commission, 2019). Within the ROP (CCDRC, 2014a), ten priority axes were defined to orient investment, namely:

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1. Research, development and innovation (IDEIAS);
2. Competitiveness and internationalisation of the regional economy (COMPETIR);
3. Develop human potential (APRENDER);
4. Promote and stimulate employability (EMPREGAR and CONVERGIR);
5. Strengthen social and territorial cohesion (APROXIMAR and CONVERGIR);
6. Affirm the sustainability of resources (SUSTENTAR);
7. Affirm the sustainability of territories (CONSERVAR);
8. Reinforce institutional capacity of regional entities (CAPACITAR);
9. Reinforce the urban network (CIDADES);
10. Technical assistance.

According to the available data set of CENTRO 2020's funded projects (CENTRO 2020, 2019), from 2014 until March 2019 an open call process yielded the approval of 5166 projects to a total funding of €1.303.231.907,03. While the majority of

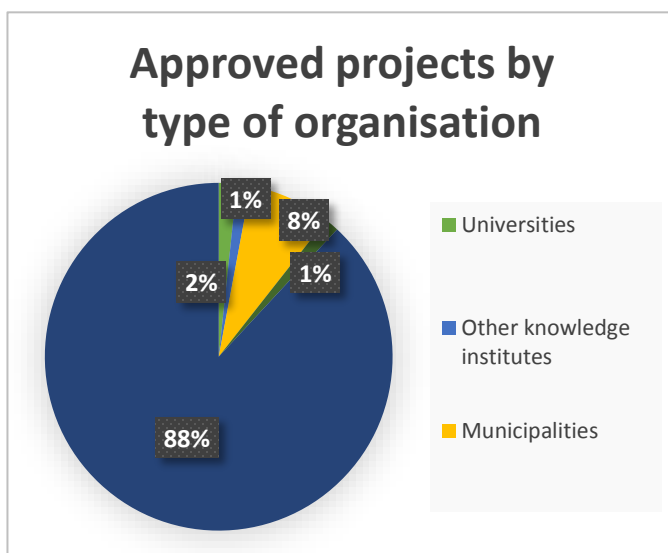


Figure 3 - Centro 2020 ROP Distribution of Approved projects by Organisation Type. Authors' own analysis.

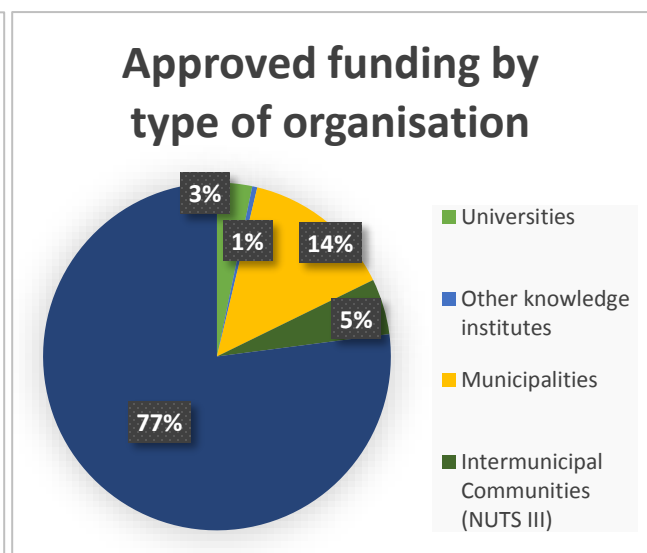


Figure 2 - Centro 2020 ROP Distribution of Approved Funding by Organisation Type. Authors' own analysis.

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these were granted to the private sector (Figure 2 & Figure 3), other regional bodies, like scientific and knowledge institutes and sub-regional and local government authorities, were able to become main beneficiaries in these projects. Intermunicipal communities, in particular, having been allowed since 2008 the partial management of regional funds provided their elaboration of a territorial development plan, emerged in this 2014-2020 period as major actors in RIS3 project management and fund implementation, granting local government nearly 20% of the allocated funding (Figure 2).

While territorial cohesion was one of the main goals in the elaboration of the RIS3, the data still demonstrates the existence of an asymmetry in fund allocation (Figure 4), a result of coast-interior economic disparities. Sub-regions like Aveiro, Coimbra and Leiria, benefitted from more developed industrial and service sectors, as well as institutions – such as UA and UC – capable of providing greater support to innovative initiatives. At the exception of the sub-region of Beiras e Serra da Estrela, where the UBI has made efforts in stimulating the surrounding economy, the other more rural and peripheral regions were inevitably at a disadvantage in the attraction of investment.

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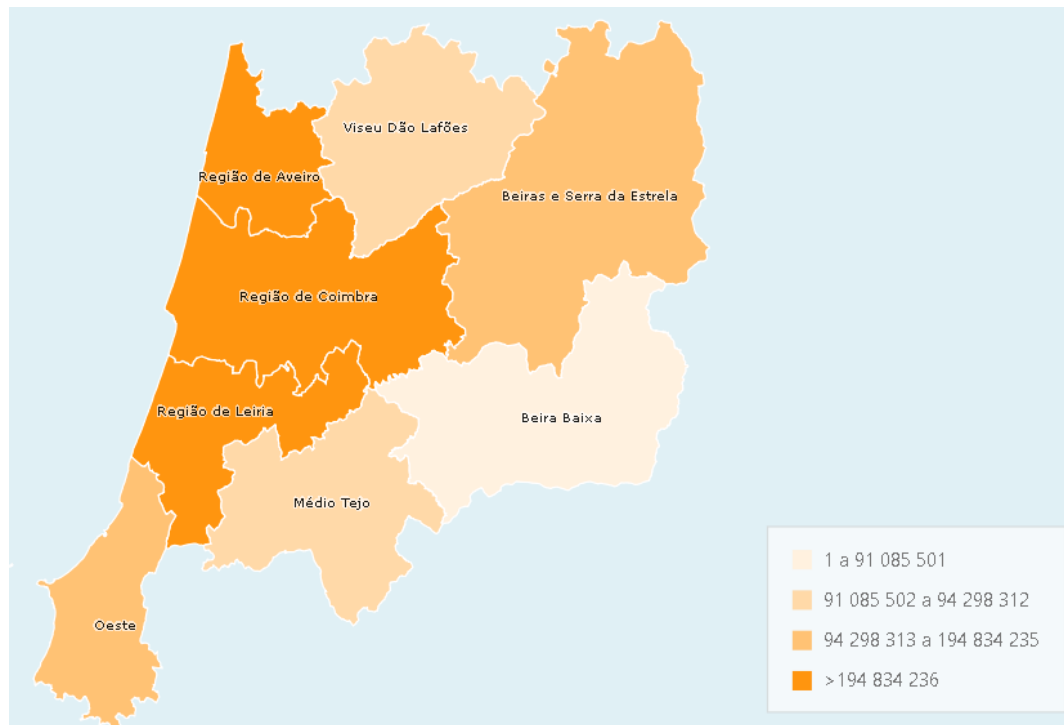


Figure 4 - Distribution of Approved Funding (€) in the Centro Region by NUTS III. Source: CENTRO 2020 (2019)

Universities in the RIS3: UA's Engagement, Alignment and Entrepreneurial Practice

Considering knowledge institutions and, particularly, universities as central actors in the S3 and overall regional innovation policy process (Foray et al., 2009), it is curious to observe that in the Centro region, these bodies were only the main beneficiaries in 3% of the projects and 4% of the allocated funding. Their role in the process, nevertheless, cannot be solely perceived by this factor. Their engagement in the strategy's formulation, as well as their involvement in projects where they were not necessarily the leading actor, should be explored as well, and it is through this lens that we approach the case of UA. First, dissecting the capture of RIS3 projects and funding of each of the three Centro region's universities, there is a clearer competition between UA and UC: while UA was able to attain the approval of more projects (47 projects in total), with less projects the UC was

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granted more funding (Figure 6 & Figure 5). The UBI has, so far, accrued the less projects and funding. This dynamic can be partly explained by historical, contextual and institutional aspects.

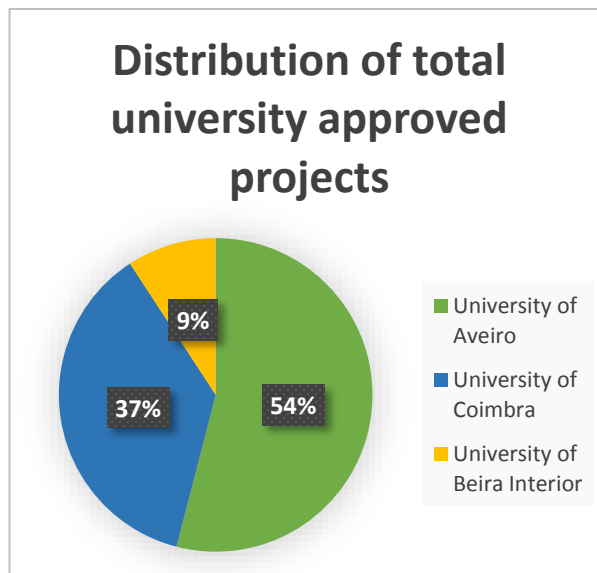


Figure 6 - Centro's ROP distribution of university-led projects by institution. Authors' own analysis.

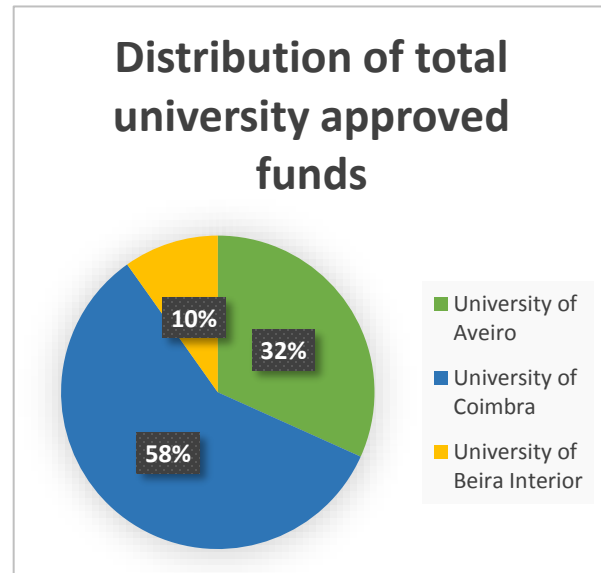


Figure 5 - Centro's ROP Distribution of university-led project funding per institution. Author's own analysis.

Of the three universities located in the Centro region, only the UC is over 50 years old. It was created in the late 13th century and is one of the oldest universities in Europe. Unsurprisingly, it is a pivot in the Portuguese higher education (and political) system and has been associated with a more traditional academic orientation, focusing on teaching and research. On the other hand, UA and UBI are two young universities created in the 1970s, a time of massification and restructuring of higher education in Portugal, and as a result of a need for innovative alternatives in a period of industrial decline. This beginning led UA and UBI to structure their organisations to respond to new academic and societal challenges, and thus become more entrepreneurial. In the case of UBI this was nevertheless more difficult to accomplish, as its surrounding region faces characteristic problems of the Portuguese interior: an ageing population and

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insufficient infrastructure and communication links that hinder the formation and stimulation of an innovation system.

Focusing on the case of UA, as an interviewee confessed, "*we can say that university of Aveiro from the beginning, from its origin was much more outward looking to its regional ecosystem, let's say, than the others*". Its creation was the result of local lobbying for a knowledge institution that could revitalise and support the increasingly stagnant industry. But it was nevertheless an already highly-industrialised coastal region with good links to the main economic and knowledge hubs: Porto, Coimbra and Lisbon. Its implantation was also accompanied, in the same decade, by the opening of the Innovation Centre of Portugal Telecom in the city of Aveiro, in whose facilities the university started its activities. UA's initial regional orientation inevitably became strongly defined by regional needs and industry demands, with a focus on characteristic regional sectors (e.g. ceramics and materials, agro-food), as well as new areas of scientific and technological potential (e.g. ICT, sea and environment, tourism, biosciences and other fundamental sciences) (Rodrigues & Teles, 2017). To support this, UA has created several interface units that could build up on its academic strengths and orient them towards entrepreneurial endeavours. Namely, the Office for University-Business relations, that has created a portfolio of university resources and contacts available for firms; the technology transfer office of UATEC, a more proactive structure that has sought to strengthen internal coordination and external network collaboration; key management positions and boundary spanners, like the Vice-Rector for University-Society relations and the Pro-Rector for Regional Development, the latter specifically responsible for managing cooperation with government authorities; and other bodies like the incubator and the new science park that are

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helping to promote technology transfer and business creation. UA has thus been asserting itself as an entrepreneurial and innovative university.

Besides the more common university-business relationship within the entrepreneurial framework, because of its proximity to regional needs UA has also been consistently and increasingly engaged with the local and regional government. This is more evident in its consultancy work with surrounding municipalities and in its partnership agreements with CIRA, which sought UA's collaboration in developing two territorial development plans for the periods of 2007-2013 and 2014-2020 (Fonseca, forthcoming; Rodrigues & Melo, 2013; Rodrigues & Teles, 2017). The university was thus well-positioned to not just significantly contribute to the RIS3 policy process but to engage more extensively with its immediate region to maximise the outcomes. UA was involved in the regional and sub-regional policy formulation stages. In the RIS3 process, it was present as a stakeholder at the table to assess opportunities in the territory and guide the discourse. Namely, UA participated in several thematic and working groups that advanced the discussion on the priority sectors and transversal areas of RIS3, specifically leading the working group and RIS3 platform on Sustainable Industrial Solutions. Interviewees unanimously considered UA to have been one of the most active and participating stakeholders, having designated representatives to be involved in all working tables. One interviewee from CCDRC that was greatly involved in the development of the RIS3 process presented some reasons as to why UA's role in the RIS3 might have been so relevant:

Aveiro had a strong role, not just as a university, but... a lot of the companies and some of the autarchs were connected to Aveiro. For example, to discuss ICT, I know that a lot of people from Aveiro participated, both from the university and the pole that is physically

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situated in Aveiro. (...) Aveiro is also a region that has a strong component of science and technology. It has some of the competitiveness poles that were invited to participate in RIS3. So, it had already people that were perhaps more aware of the RIS3 discussion dynamics.

The existing entrepreneurial fabric within the Aveiro region, and the heightened connectivity between it and the university, therefore created the opportunity and the entry points for the university to be more engaged within the policy process and shape the emerging discourse. As another interviewee stated, “[The University of] *Aveiro benefits from being more integrated in the regional ecosystem*”. They go on to give the example of UA’s commitment to the region in the form of its close partnership with CIRA, considering it as a “*meaningful*” demonstration of the university’s active support and effort in aligning the regional policy at multiple levels.

UA’s organisational structure was also highlighted as a facilitating factor permitting a more strategic and unified dialogue between the institution and the regional authority. Specifically, UA has no faculties. Instead, it is endowed with what it designates as a matrix structure, in which below the rectory level there are only the departments. This allows, according to an interviewee, for a clearer direction and alignment between the management level and the rest of the university, as “*messages flow much more smoothly to the departments and it’s easier to engage*”. Internally, UA has also chosen to adapt to the new S3 framework by creating eight so-called «technological platforms», cluster-like networks for regional engagement and project stimulation, focused on the themes defined within the RIS3 Centro and its own disciplinary strengths (e.g. sustainable habitat, agro-food, sea, smart communities, moulds and plastics). While the CCDRC has still not integrated these platforms within its overall plan of action, their creation was

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associated with regional priorities, and it was an adaptation that UA alone chose to adopt and where it remains at the vanguard relative to other Centro universities.

Therefore, it appears evident that in the early stages of the process UA played a relevant role by not only seeking to participate in the dialogue between stakeholders that was being spurred by the CCDRC for the RIS3 process – i.e. the entrepreneurial process of discovery – but also in creating and promoting this interchange and connectivity in its immediate surroundings, namely by its cooperation with CIRA and the creation of organisational structures to support knowledge transfer and network collaboration (specifically the technological platforms). For interviewees from the CCDRC this interaction, paired with the transmission of expert knowledge and the promotion of learning dynamics, was the most important contribution of universities in the RIS3, and the main aim that they sought with the process. It was also the biggest advantage in the project proposals that included universities. According to an interviewee, “[universities] *understood better than others how they should present their projects, and that to align themselves with RIS3 they needed to state how what they were proposing could have an impact. We are not experts in those small, these specific scientific fields*”. In the end, UA was the main beneficiary in 47 RIS3 projects, mainly within the priority axes of IDEIAS, COMPETIR, and APRENDER, the three most related with research, education and competitiveness, emphasising their role in stimulating regional knowledge-based innovation. With these projects UA accrued €13.488.934,37. Nevertheless, through their partnership with local municipalities and CIRA, they became involved in cultural and natural heritage and digitalisation projects relating to the axes CONSERVAR and CAPACITAR, which on their own granted funding of over € 4 million. In this sense, the degree of UA’s regional

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engagement through the RIS3 Centro appears much more diversified, strategic and purposeful.

Implications in Implementation

Historically, structural funds' (SF) instruments have been an important source of funding for universities in Centro and, particularly, for UA. As one interviewee remarks, they have enabled significant investments for capacitation and the upgrading of infrastructure and resources: "*many things were constructed, like the incubator, many labs in all the universities of the region, Aveiro, Coimbra...research centres that are associations of universities and companies, all funded by FEDER in the last 30 years*". Nevertheless, while this same investment has improved UA's entrepreneurial capacity to connect to its region, there has been a shift not only in the availability of funding, but also in the way this funding and projects is viewed within the academic institution. Although there is currently more emphasis regarding research and development projects over capital/infrastructure projects, structural funds from the CENTRO-FEDER (Centro's ROP) are being resorted to more as a question of 'survival' of the academic institution rather than as a means of reinforcing institutional engagement with regional development activities. This has made the latter somewhat unimportant on both an institutional and individual level. Interviewees suggested that the reinforcement of entrepreneurialism has translated into an almost forceful pursuit of funding for academics to maintain their position: "*you have to fund yourself and that's it*". That same 'survival' through SF funds was echoed throughout the institution, as it was admitted that "*the orders are that the university should go for anything we can*" or otherwise "*many things would stop. Because there is no budget for research*".

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There is an evident stronger push from the university to apply for external funds, and CENTRO-FEDER was considered the most accessible instrument. FEDER funding was seen by academic interviewees as a valuable tool to interact with local SMEs, but a number of challenges associated to its utilisation by the university still remain, from academics lacking the skills to collaborate with businesses (*"to change your paradigm as a scientist, to think about the productive sector, it is a huge challenge"*), to the university not viewing collaboration as valuable as researchers would hope (*"...the ultimate mission of knowledge institutions, which is to bring to the productive sector the knowledge generated in the university, I think that this is not valued"*). Academics' motivation to engage with local stakeholders and respond to regional needs thus greatly varied. Whereas some researchers wanted to engage with regional development projects to give back to the community, serve local companies and transfer academic results, others did not make any kind of distinction between regional, national or even international project activities. As one interviewee admitted, *"the origin of the money does not matter much."* They also pointed out that *"what really counts is the possibility to establish networks"*, which suggests that the establishment of collaborative partnerships with other actors is seen as relevant for increasing the success of project bids and the quality of research and, somewhat, for the continuation of innovative endeavours.

The unimportance of regional engagement activities was also explained by a lack of strategic management, accompanied by cultural issues and its insignificance in universities' national evaluation framework. However, personal commitment and the ability to understand regional needs, to *"speak the language of the people in the region – and translate the position of the university to the municipalities"*, was

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considered a key feature in establishing projects and collaboration with a stronger regional focus. According to interviewees, building a strong relationship with local authorities required individual engagement and commitment, and a lot of effort from the university's side. But today these links are more established.

Even though UA has been one of the key players in establishing the RIS3, the interviewees found that that the regional strategy was not well communicated from the top level. While UA's matrix structure could have allowed for a broader informed interest, integration and coordination in regards to the policy's progress, a lack of strategic planning and effective management resulted in many academics not considering S3 relevant or not knowing exactly what it entails. However, the simple act of thinking about potential regional impact of research activities in the SF bidding process was considered a good exercise to increase academics' awareness of societal needs, and a way to establish a closer connection with the community.

The most often repeated regional benefits of SF projects' activities were promoting research, providing information for policy-making processes, developing links with businesses and creating jobs, especially in the regional priority sectors such as the ceramics industry and ICT. Part of the CENTRO-FEDER projects led by UA have managed to initiate multidisciplinary collaboration around these themes both within the university and with external partners (e.g. SmartWalk³). These projects were seen as beneficial for the region, but typically their continuation after the pilot phase and the end of the funding depends on local authorities. Ultimately, while

³ A Smart Cities project for active seniors. More information at <https://uaonline.ua.pt/pub/detail.asp?lg=pt&c=55630>

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SF funding opportunities can make *"universities keener to cooperate with regions and regional agents"*, in practice, the regionally-funded SF projects were not seen as very aligned with RIS3 objectives. The latter also do not have a major role in the projects' design. Only the larger scale institutional initiatives had a somewhat strategic approach to regional development, whereas the smaller CENTRO-FEDER projects were designed more opportunistically by individual researchers. As a UA researcher stated, *" (...) there's always, always a box that we need to fill in, trying to mention and justify why this research is aligned with the RIS3. (...) I really don't believe that it had an impact."*

In some CENTRO-FEDER calls there are limitations about the amount of applications per institution, which can create internal competition, but also lead to more collaboration. As one researcher admits, *"if it wasn't for this funding opportunity, we would not be working together as intensively as we are now doing"*. On the other hand, it can also force universities to manage project portfolios more strategically in the future. Some of the interviewees believed that this strong established relationship with government authorities has had an impact on the amount of granted project funding:

There is a really good relation between the university and CIRA, and the city [of Aveiro], a very good one. And that type of interaction helps us to get structural funds. Because we understand the reality and they understand the HEIs' role. And perhaps it's one of the reasons that we have so many SF projects funded.

Interviewees agreed that the knowledge UA has presented to both regional and sub-regional entities has played an important role in improving collective learning, particularly considering this more scientific and technical language of innovation is not these authorities' domain. Nevertheless, they suggest there is still a lot of

work to be done in optimising communication. In the end, the steering impact of regional funding instruments was repeatedly emphasised and considered positive in the sense that SF programmes are promoting new ways of collaborating and pushing academics to work more closely with their regions. As a UA professor remarked, "*the most effective way of putting universities to work according to the direction of S3is through funding. It's the only way, I think*".

Challenging Entrepreneurial Universities' Regional Impact

The role of entrepreneurial universities in stimulating regional innovation has been widely emphasised in the literature, particularly for their capability in valuing knowledge and applying it into a useful asset for society. This chapter sought to understand if, in a context of smart specialisation in which regional priorities, knowledge-based innovation and collective learning mechanisms are being prioritised, the entrepreneurial university emerges as a key actor in the process. Particularly, if the potential of an entrepreneurial university is furthered or realised in this policy framework, namely through its effective collaboration in the RIS3 policy formulation process and in the implementation of the resulting projects.

Within the RIS3 Centro process analysed, knowledge institutions, but especially universities, were considered key actors, and they sought to be integrated as much as possible in the entrepreneurial process of discovery being carried out. Some universities had the capacity or the will to do so more than others, and the University of Aveiro was seen by interviewees as standing out in this aspect: it nominated representatives from its roll of experts to participate in the thematic and working groups being created throughout the process, even leading one of the emerging RIS3 platforms on Sustainable Industrial Solutions. These

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opportunities for universities and other stakeholders to interact within this entrepreneurial process of discovery organised by CCDRC allowed for the establishment and/or the strengthening of networks, observed by interviewees within the regional authority as later leading to projects.

In the implementation stages, UA can also be considered as possessing the organisational structure and institutional partnerships needed to maximise its gains in structural funds and manage its involvement with other regional actors. Aside from the bodies and infrastructure already in place within the university that had been supporting its entrepreneurial activities throughout the years – such as UATEC, the incubator, the University-Business office and the Pro-Rector for Regional Development – others were created specifically to answer the challenge being posed by the S3 framework and the regional authority – namely UA's Technological Platforms, and more recently, the science, which aims to be a connecting point between regional stakeholders. In the end, UA was the main beneficiary in 47 CENTRO-FEDER projects, but it was its multiple partnerships and agreements with other regional actors, particularly with CIRA and local government, that enabled it to be a partner in a few other projects throughout the region. Through them, UA contributed not only to projects within the more common academic scope of education, research and innovation, but also to those within the areas of sustainability, environment, culture and public services. Its connection to the region, and its interaction with multiple local actors, allowed it then to upgrade regional R&D and knowledge assets and to diversify its natural range of action to respond to regional needs in a more comprehensive manner. This follows Brown's (2016) and Santos & Caseiro's (2015) argument that entrepreneurial universities should expand their activities to realms beyond those

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typically associated with commercialisation and technology transfer. Instead, and especially in LDRs and peripheral regions, the involvement of universities in institutional capacity-building can be fundamental for more directly matching regional priorities and funding with regional needs (Fonseca, forthcoming).

There are, nonetheless, hindering factors in UA's contribution to the implementation phase of RIS3 that can potentially be expanded to universities in other contexts. While structural funds, and the projects thus supported, have been historically important for UA and other universities in the region, enabling investments in the capacitation and upgrading of infrastructure and resources, there are insufficient institutional mechanisms and culture that can enable their linkage with a regional mission. There is a push at the institutional level for academics to apply for such project funding, but this is viewed as opportunistic and necessary for the survival of their research, and in no way related to a pursuit for a strategic orientation to regional priorities. Ultimately, a communicated strategic planning regarding regional engagement is lacking from the institutional level, leaving academics' engagement endeavours feeling 'scattered' and lacking concrete long-term impact.

There is, nonetheless, potential in what the RIS3 can bring towards the activities of entrepreneurial universities. Interviewees believed that the required consideration of impact in the SF bidding process was a much-needed prompt for academics to consider societal needs and impact. It was also widely agreed that SF projects helped promote research, develop links with businesses, and provided crucial information and knowledge for policy processes. Even though SF projects led by the university might not have been intentionally directly aligned with RIS3 objectives, even though it is expected in the strategies and funding guidelines,

especially when the university itself has engaged in the policy-design process, ultimately this wide-range of benefits can sustain the argument that they served to substantiate UA's regional engagement and even the current S3 framework. UA provided the innovation process with key organisational support. In turn, the lingering interactivity present in UA's surrounding region was enhanced as a result of this policy intention set with the RIS3, that provided it with a clearer direction to regional needs. But as an interviewee suggested, "*the notion of the university as a key actor in the region needs to depart from the university itself*".

From Policy Discourse to Integrated Collective Learning

The strategy processes initiated with RIS3 are still in the beginning stages of what is an experiment of spurring collective vision-definition for a region. One of the interviewees stated that it was unclear for anyone involved "*how that definition was going to relate with the design and implementation of the funds*", leading regional authorities to often seek to "*maintain the maximum space possible to accommodate what was their manoeuvrability for the implementation of the community framework programmes*". It is therefore pressing to understand if the rhetoric of valuing endogenous resources, of defining and identifying regional opportunities through the pursuit of collective network processes for knowledge-based innovation, was being translated into practice. As a key actor in stimulating these processes, the entrepreneurial university (namely UA) was chosen for this analysis, as through its multidisciplinary and varied engagement mechanisms it had the greatest potential in bridging this dichotomy between discourse and practice. While the data suggests this, some of the conclusions presented, nevertheless, point to the need for further work to be done to successfully attain this:

1. *Enhancement of communication* to all stakeholders and regional actors on RIS3 objectives and the development of the policy process, including achieved goals. This would allow for better actor integration throughout the process and permit more effective and strategic coordination. It is a task of not only the regional government authority, but also of each institution involved. Universities, given their loosely-coupled character, would find in this a worthy challenge that could clearly define an oriented regional mission and promote internal interactivity.
2. *Foster the involvement of often-excluded actors* in order to avoid individual interests and 'monopolies' to overshadow community-oriented visions and practice. In the case of this chapter, an excluded actor could refer to the UBI, a university in a peripheral and less-favoured setting that faded in its involvement relative to the other universities. It could also extend third sector organisations or other actors that do not benefit from being a part of a dynamic entrepreneurial network and region, but that can nevertheless bring something to the table.
3. *Emphasise the collective and immaterial benefits* that can emerge from the strategy process, namely the fostering of collective learning dynamics, of which territorial competitiveness is often dependent on. Promote stakeholder linkages that go beyond economic outcomes and that present a pedagogical and innovative approach to their interactions and projects, in order to build wider institutional capacity.

Further study to complement this assessment could explore comparatively the role of each actor within the RIS3 process to evaluate their impact in promoting dialogue and the strategy's implementation. Similarly, a more granular, in-depth

analysis of each funded project led by the university has the potential to identify further organisational constraints and provide a detailed evaluation on the effective impact of these projects on regional development. Lastly, an analysis of other universities in other contexts where RIS3 is taking place would enrich the debate and strengthen reliability of the findings.

Conclusion

The results obtained from this analysis allow for an overall assessment of the level of involvement of an entrepreneurial university in the RIS3 process, and how this played a part in matching the S3 domains with regional needs. They also weigh on the contribution of entrepreneurial universities to the general and fundamental goals of the RIS3 approach, drawing lessons for public policy and opening the discussion on the future that RIS3 will have in EU regional policy. As such, the chapter addresses the extent to which the role played by universities in a region's innovation and entrepreneurial practice matches or mismatches the smart specialisation strategic outline.

The case of the University of Aveiro, located in the Portuguese Centro region, enabled the furthering of this debate as it provided a perspective of an entrepreneurial university within the context of an LDR, that nevertheless strives to actively engage in the regional policy process. Observed difficulties include the promotion of an effective link between regional domains defined within the regional policy to the university's institutional strategic mission, as the latter is not always developed or transmitted to academics in a successful manner. It is possible to discern the inefficiency of certain institutional mechanisms that may be hindering regional engagement, particularly in the framework of entrepreneurial

universities. Nevertheless, the S3 framework and the funding therein provided seems to have contributed to more directly link UA's research to regional needs. In turn, the university's strong local partnerships enabled it to more effectively leverage the received funding, and advanced and diversified its action throughout the region, ensuring the promotion of a more dynamic entrepreneurial ecosystem and collective learning. There are, therefore, clear and broad benefits to be had in entrepreneurial universities' more active involvement in the RIS3 process. But it is nevertheless important to emphasise the role of effective institutional mechanisms, culture and of the diverse set of actors that complement this work.

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