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The role of universities in regional development through Smart Specialisation Strategies: Evidence from two Spanish regions (Catalonia and Navarre)

La llamada tercera misión de las universidades está adoptando un papel cada vez más prominente más allá de sus funciones tradicionales de enseñanza e investigación. El nuevo marco europeo de políticas de cohesión, basado en el concepto de Smart Specialisation Strategies (RIS3) o Estrategias de Especialización Inteligentes, refuerza esta tendencia de situar a las universidades entre los actores clave del desarrollo regional. Este artículo analiza el papel de las universidades en las RIS3 observando los casos de dos regiones españolas: Cataluña y Navarra. En el artículo se extraen conclusiones a partir de dos estudios de casos realizados por separado. El trabajo se basa en una metodología cualitativa, que incluye entrevistas exhaustivas con gestores de universidades en ambas regiones, investigación documental y triangulación de los resultados con el sector público. El artículo trata los instrumentos seleccionados, mediante los cuales los HEIs contribuyen a la implementación de las RIS3, e identifica algunos retos que las universidades deben acometer para garantizar que se exploten las oportunidades de las RIS3.

Unibertsitateen hirugarren xedea deritzona gero eta garrantzi handiagoa izaten ari da. Bere ohiko irakaskuntza eta ikerketa funtzioetatik harago. Kohesiorako europar politiken esparru berriak, Smart Specialisation Strategies (RIS3) edo Espezializazio Adimenduneko Estrategiak kontzeptuan oinarrituta dagoenak, unibertsitateak eskualde garapenaren partaide nagusien artean jartzearen joera indartzen du. Artikulu honek, unibertsitateek RIS3-etan duten funtzioa aztertzen du. Horretarako, Espainiako bi eskualderen kasuak erabili dira: Katalunia eta Nafarroa. Artikuluan, bereizita burutu diren bi kasuren azterketetatik lortutako ondorioak lortzen dira. Lana, metodologia kualitatiboan oinarritzen da. Metodologia horrek, bi eskualdeetako unibertsitateen kudeatzaileekin izandako elkarrizketa sakonak, dokumentazio ikerketa eta sektore publikoarekin egindako emaitzen triangulazioa ditu bere baitan. Artikuluak, aukeratutako tresnak jorratzen ditu, horien bitartez, GHEak RIS3en inplementazioa bultzatzea laguntzen dutenak. RIS3-en aukerak baliatzea bermatzeko unibertsitateek landu behar dituzten erronka batzuk ere identifikatzen ditu.

There is an increasing prominence given to the so called third-mission role of universities beyond the traditional core functions of teaching and research. The new Cohesion policy framework at European level, based around the concept of Smart Specialisation Strategies (RIS3), reinforces this trend placing universities among the key actors for regional development. This article analyses the role of universities in RIS3 by looking at two different Spanish regions: Catalonia and Navarre. The paper draws common lessons from two separately-conducted case studies. The work is based on a qualitative methodology, which includes in-depth interviews with university-managers in both regions, desk-based research and a triangulation of the findings with the public sector. The article discusses selected instruments through which HEIs contribute to RIS3 implementation and identifies some challenges universities need to address to ensure opportunities from RIS3 are exploited.

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Palabras clave: RIS3, Instituciones de Educación superior, Cataluña, Navarra

Keywords: RIS3, Higher Education Institutions, Catalonia, Navarre

JEL codes: I23, I28, O31

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The results from the Navarre case study are based on the results published in the Joint Research Centre in the JRC Technical report-Navarre case study¹.

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¹ Campillo, I., Arregui-Pabollet, E. & Gomez Prieto, J. JRC Technical Report: Navarre case study (2017).

1. INTRODUCTION

Higher Education Institutions (HEIs) are today critical players in the knowledge-based economy. The two traditional functions of universities are the generation of knowledge (research) and its transmission (teaching). However, empirical evidence shows that there has been an intensification of industry-academia relations in the past twenty years, mainly as a response to public budgetary stringency and because of the increasing role of the university in regional development and in society in general. This new mission –conceptualised under the term «third mission» or «third stream»– refers to all those activities whereby universities can directly address social welfare needs and private or public economic objectives (Molas-Gallart, 2005).

The «third-mission» of universities has gained more attention in recent years not only in the academic literature (Loi and Di Guardo, 2015; Secondo *et al.*, 2017) but also in recent policy developments at European level. The agenda for the modernisation of Europe's higher education systems (European Commission, 2011) called on universities to adapt to new challenges by taking into account the needs of the labour market in their activities and by engaging more intensively with public, private and non-governmental entities with the aim to enhance regional development. Moreover, the current Cohesion Policy framework (2014-2020) reinforces significantly the role of universities in regional development through the concept of Smart Specialisation Strategies (RIS3) (Kempton *et al.*, 2013). RIS3 strategies are aimed at developing regional and competitive advantage through a bottom-up identification of a limited set of priorities for investment. These are to be identified and pursued through the interaction of stakeholders across the quadruple helix², involving government, industry, academia and society at large in the so-called Entrepreneurial Discovery Process (EDP).

These messages are reinforced in the renewed EU agenda for higher education (European Commission, 2017) which stresses that HEIs should be more engaged in regional innovation policies. The document emphasizes the decisive role HEIs should have in connecting actors of the innovation ecosystem and in aligning their activities, especially their educational programmes, to smart specialisation strategies.

Although universities' capacity to contribute significantly to the process of regional development seem to be broadly recognised, it is difficult to evaluate whether and how such potential can be untapped (Kempton *et al.*, 2013). This paper explores this topic by drawing lessons from two separate case studies conducted within the Joint Research Centre, under the umbrella of the Smart Specialisation Platform³, namely:

² According to the Quadruple Helix (QH) innovation theory, an innovation economy is based on four helices –Academia, Citizens, Firms and Government– and their interaction. For more information see Committee of the Regions (2016) and Woo Park (2014).

³ <http://s3platform.jrc.ec.europa.eu/home>

- An analysis of the role of Universities within the RIS3CAT Communities, an instrument put in place in Catalonia to implement the local RIS3. The case study was conducted in 2016, with the collaboration of the Catalan Association of Public Universities (ACUP) and more details are available in Marinelli and Elena-Pérez (2017).
- An analysis, broader in remit, of the role of HEIs in Navarre. This case study was conducted in collaboration with the Navarre Government (in the framework of HESS Project4). More information on this study is available in Campillo *et al.* (forthcoming).

Catalonia and Navarre are among the most advanced regions in Spain. They are classified as moderate innovators in the EC Regional Innovation Scoreboard 2016⁵. Both regions host a set of heterogeneous universities and have engaged them in their RIS3 development.

Whilst the two case-studies differ significantly in scope, together they allow some interesting reflections on the role of universities in RIS3 implementation and provide much needed empirical evidence in this under-explored field of research. In particular, building on the Catalan and Navarran studies conducted in the JRC, we are able to draw some conclusions on:

- Some useful instruments that allow universities to actively implement RIS3, through research and technology transfer activities⁶.
- Some crucial reflections on the complexity, for HEIs, of adapting to the new demands posed by RIS3 and, more generally, third mission activities.

The rest of the paper is organised as follows: Section 2 highlights the main academic and policy background in relation to universities' third mission and their role in regional development; Section 3 describes the Smart Specialisation Strategies of both regions, as well as some of their main instruments to implement it; Section 4 describes succinctly the methodology and fieldwork carried out in both studies and provides a brief overview of the participating universities; Section 5 distils the main findings relative to the instruments explored and key cross-cutting issues and chal-

⁴ Higher Education for Smart Specialisation (HESS project). HESS project is jointly developed by DG JRC and DG Education and Culture of the European Commission. Starting in March 2016, the aim of the project is to understand how higher education and Higher Education Institutions can contribute to the successful implementation of S3, helping to build innovation capabilities by strengthening the role of HEIs in regional partnerships and promoting the integration of higher education with research, innovation and regional development in S3 policy mixes, particularly in the use of European Structural and Investment (ESI) Funds. For more information: <http://s3platform.jrc.ec.europa.eu/hess>

⁵ For more information see: https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en

⁶ This is not to say that educational activities, i.e. the first mission of universities, are not relevant to RIS3 implementation, see Marinelli *et al.* (2017) and Campillo *et al.* (forthcoming).

allenges related to universities engagement in RIS3 and third mission activities; Section 6 concludes providing a summary and some brief implications for policy.

2. **BACKGROUND: CONNECTING UNIVERSITIES TO REGIONAL DEVELOPMENT**

2.1. **Third mission of universities and its role in regional development**

The concept of «third mission», used to understand the changing nature and responsibilities of universities⁷ comprises three streams of actions (a) innovation, technology and knowledge transfer, (b) continuing education and life-long learning and (c) broader social engagement (E3M 2010; Rothaermel *et al.*, 2007; Secondo *et al.*, 2017).

The first of these elements is the one explored in this paper and refers to two critical aspects of knowledge-based development: the commercialisation of science and the role of university-industry links as critical elements of regional innovation systems (e.g. Bercovitz and Feldman, 2006; Guan and Zhao, 2013).

The increasing strategic importance of third mission has put strain on higher education and research institutions. Underpinning this process, in fact, lays an important organisational and governance shift for universities: whilst attending all their traditional responsibilities, they are required, on the one hand, to be more directly engaged with market and entrepreneurial dynamics; on the other, to become conscious of their pivotal role as stakeholder capable of engaging in regional economic and cultural development.

The complexity of this organisational transition is reflected in barriers and tensions created by third mission activities (Koryakina *et al.*, 2015), despite their increased recognition and importance also among external stakeholders (Pinheiro *et al.*, 2015).

2.2. **Policy context: RIS3, Entrepreneurial Discovery and Universities**

In the context of EU cohesion policy, the concept of Smart Specialisation⁸ (Foray and Goenaga, 2013) has mainstreamed innovation policy as a tool for regional development. The European Commission (EC) has asked Member States and European regions to establish their own Research and Innovation Strategies for Smart

⁷ Looking for active engagement in regional development, the OCDE (2007) identifies four areas where the university can be pro-active: regional innovation –which is closely related to the research function–; human capital and skills development –which are linked to the teaching activity–; social and cultural development –which are linked to the public service role of universities–; and regional capacity building throughout the involvement of the academic community in the civil society (Goddard *et al.*, 2014).

⁸ For more information on Smart Specialisation concept and process see: <https://ec.europa.eu/jrc/en/research-topic/smart-specialisation>

Specialisation (RIS3) as a prerequisite to access structural funds for research and innovation (EC, 2014b). Such strategies identify areas in which research and innovation investment has the potential to generate economic growth and social development through two main instruments: (a) a solid evidence-base and data analysis and (b) the process of entrepreneurial discovery, or EDP (Foray, 2015; McCann, van Oort and Goddard, 2017; Periañez, Marinelli and Foray, 2017), whereby stakeholders from the quadruple-helix (public, private, research and non-governmental sector) interact to co-detect areas of strategic potential.

The latter is considered the engine of RIS3 and is based on the recognition that the public sector, by itself, is not able to define future priorities for investment: an inclusive, interactive and bottom-up process of stakeholders' engagement is thus essential to establish realistic directions for local development.

Whilst the EDP was, at first, conceived exclusively as a procedure for choosing RIS3 investments priorities, it has conceptually evolved towards a continuous process that keeps stakeholders engaged throughout the strategy's cycle, providing avenues for implementation, refinement and revision of the priorities themselves (Periañez, Marinelli, Foray, 2016). Particularly important for this paper, is regions can allow the EDP to keep going by devising instruments that promote dialogue and experimentation among stakeholders.

Universities, as key regional knowledge assets, are important actors in the EDP. Their ability to make the most of this process and of RIS3 is strongly related to their third mission activities. As such, the EDP and RIS3 pose to HEIs strains and opportunities similar to those highlighted in session 2.1.

3. THE RIS3 IN CATALONIA AND NAVARRE

3.1. The Smart Specialisation Strategy in Catalonia – the RIS3CAT

In January 2013 the Catalan Government launched the preparations for the *Research and Innovation Smart Specialisation Strategy for Catalonia (RIS3CAT)* and the final document was submitted for approval in January 2015⁹.

The RIS3CAT builds on the *Catalan Strategy 2020* (Estratègia Catalana, 2020) approved in March 2012 and developed around the goals and framework policy designed by the European Commission (EC). The RIS3CAT defines the framework within which the Catalan Government establishes research, development and innovation (RDI) actions and programmes over the period 2014-2020 and provides support for the generation and development of innovative projects.

⁹ Available at: http://catalunya2020.gencat.cat/web/.content/85_catalunya_2020/documents/arxius/07_PO_FEDER_CATALUNYA_2014_2020.pdf

The RIS3CAT contains a SWOT analysis of Catalan economy, which identifies the main economic players and proposes a vision, four strategic objectives and four pillars of action, namely: Leading sectors, Emerging activities, Cross-cutting technologies, and Innovation environment (see Appendix 1). The priority-identification process is the results of different instruments such as public consultation, expert groups, workshops, etc. which put together the key innovation and research actors¹⁰. It is expected that through this strategy Catalonia will receive almost € 2,000M in European funds (mainly from the European Regional Development Fund (ERDF) and the European Social Fund (ESF) for the period 2014-2020.

From the implementation point of view, the RIS3CAT defined several instruments, including the RIS3CAT Communities (*Comunitats RIS3CAT*), which are discussed in this paper, as an example of instrument fostering a continuous EDP.

The RIS3CAT Communities¹¹ are voluntary groups of at least eight public and private RDI stakeholders and companies with operational bases in Catalonia, who define and pursue action plans of RDI activities. They are accredited by the Government of Catalonia through a competitive process, and on that basis they can obtain funding for their action plans from the ERDF Operational Programme (OP).

Table 1. TYPES OF PROJECTS IN THE ACTION PLANS

- (1) **Major industrial research and experimental development projects**
 - Industry R&D projects Technology valorisation projects.
 - Actions to evaluate and validate experimental prototypes and production systems, pilot schemes, new products or services, or advanced methods and materials.
- (2) **Technical and scientific facilities**
 - Facilities (laboratories and pilot plants) to provide industry with tools for industrial validation.
- (3) **Interregional cooperation projects in the field of innovation**
 - Actions or projects with organisations and companies in other European regions and EU countries, such bilateral R&D programmes, public-private partnerships (PPP) or activities organised by knowledge and innovation communities (KICs).
- (4) **Innovation projects in the fields of processes and organisation**
 - Actions developed by SMEs to improve production, supply methods or business practices, organisation in the workplace and foreign relations.

¹⁰ http://catalunya2020.gencat.cat/web/.content/85_catalunya_2020/documents/arxiu/06_elaboracio_ris3cat_2014.pdf

¹¹ This paragraph builds upon the description provided in http://catalunya2020.gencat.cat/web/.content/85_catalunya_2020/documents/angles/arxiu/pa_ris3cat_201511_en.pdf

5. DISCUSSION

The data presented above –and succinctly visualised in figure 3– show that the majority of projects governed by Agder’s regional R&D coalition in the last fifteen years are characterised as *low* in both partner and case complexity (type 1). This, in combination with some continuity at the individual level in the regional development coalition governing these programmes, has allowed for social capital and trust to develop in the region. That said, an interesting downwards movement is detected over time, with earlier endeavours (VC2010 & VRI1) having higher degrees of both case and partner complexity when compared to more recent developments. The observation that VRI1 represents more complexity for the regional development coalition than MOBI and VC2010 is relatively uncontroversial. All program activities and regional stakeholders participating in previous programs are now supposed to participate and coordinate their activities in the new VRI program. In addition, the case complexity increases as new development topics are added, and is subject to both research and development. This represents a challenge for the regional leadership in the regional development coalition as well as the project participants. There had therefore been a gradual but steady move from high towards lower levels of case complexity, as illustrated by the VRI initiatives and the respective lessons learnt over time.

Activities aimed at cluster development and cross-sector collaborations are located in the middle of the model; what could be characterised as a new «type 5» sweet spot. In contrast, support coalitions aimed at institutional capacity building over the long run (e.g. education and partners’ bilateral relations) tend to rank low in both partner and case complexity. This seems to suggest that an «ideal type» vibrant regional coalition ecosystem would be composed of a diversity of local initiatives with differing degrees of complexity, yet gradually moving from type 1 to types 5 and 4. Interestingly both types 2 and 3 seem to have been under-explored in the case of Agder, tentatively suggesting that case and partner complexity go hand in hand, i.e. when one is high the other also tends to be high, and vice versa. It is interesting to note that the regional development coalition, in collaboration with the Research council of Norway, seems to have self-corrected when complexity in both partner and case becomes so high that it becomes unmanageable. Such corrections can be viewed as critical interventions resulting from joint learning, thus pointing to emerging strategic postures by the regional leadership (Sotarauta, 2015; Sotarauta *et al.*, 2012a). In the Agder case, such strategic interventions secured a less ambitious yet more workable developmental agenda in the R&D-field.

There are many challenges for regional leadership seeking to utilise regional development coalitions as mechanisms for realising developmental aims. These include, but are not limited to, regional institutional capacity, industrial structure, strategic orientation of regional policymaking, competence (broadly defined), national and international policy and regulations, marked situations and social capital. A key regional lead-

The Moderna Plan was a medium and long-term strategic plan aimed at changing the economic development model of Navarre, based on the participation of the citizens and institutional consensus. The plan was promoted by the main political, education, business and social institutions, grouped together in the Steering Committee of the Plan, and it included the contribution of more than 1500 citizens. Moderna was in line with the Europe 2020 strategy, promoting inclusive, sustainable and smart economic growth, and it was considered by the European Commission as a good practice in the regional smart growth strategies. Thus, Moderna Plan constituted the first Navarre's RIS3.

During 2016 a participative process was developed to update the Navarre RIS3. During more than six months different forums, encounters and meetings were held gathering different actors of the quadruple helix. By this collaborative and participatory methodology, focusing on different themes and issues, the Navarre RIS3 was improved and updated. The updated S3 was presented recently, in November 2016, by the President of the Navarre Government. Table 2 summarises the main axes and priorities of Navarre.

Table 2. NAVARRE'S RIS3, AXES AND PRIORITY ECONOMIC AREAS OF NAVARRE

The vision of the future follows five axes of development:

- Cohesive Navarre, socially and territorially, as the ultimate goal of the strategy.
- Healthy Navarre, with healthy products and services, caring for people.
- Sustainable Navarre, environmentally responsible and efficient in the use of resources.
- Industrial Navarre, increasing our productivity with technologies 4.0.
- Competitive Navarre, improving the overall position of Navarre companies.

And six priority economic areas:

- The automobile and mechatronics.
- The food chain.
- Health.
- Renewable energies and resources.

These axes serve as criteria of future development applicable to different business sectors and public policies with the following objectives: More Quality of life; More Prosperity; More Sustainability; and Creative and digital industries.

The strategic areas have not only been defined considering sectorial terms but also business development themes addressing social needs, including scientific-technological areas or transversal production systems applicable to different market and sectors. Finally, the RIS3 identified five cross-cutting factors of competitiveness:

Business development; Innovation; Infrastructure; Public administration; Education and training¹⁵.

4. FIELDWORK AND UNIVERSITY SYSTEM

The case studies underpinning this paper adopted a qualitative methodology based on in-depth semi-structured interviews conducted between November 2015 and January 2016 for the case of Catalonia and during November and December 2016 for the case of Navarre.

4.1. Fieldwork in Navarre

In the case of Navarre, the fieldwork was deployed in the framework of the HESS project following an action-research methodology. In a first phase, 15 bilateral interviews were conducted with regional government representatives from different departments working on higher education, Rectors and Vice-rectors of both public and private universities, university professors and research institute managers, technology centres directors, companies' and company associations managers. The interview-guide was sent to the interviewees in advance and the interviews lasted between 45 and 60 minutes. In addition to the interviews, two workshops with key regional actors were held to identify challenges to be tackled and validate and discuss the main findings from the interviews and identify potential actions (for detailed information see Appendix 3). Experts from other regions took part to exchange about other RIS3 experiences and enrich the discussion on the Navarre analysis.

In Navarre there are two universities (for detailed information see Appendix 3): the University of Navarre (UNAV), founded in 1952 and run by the Opus Dei (an institution linked to the Catholic Church); and the Public University of Navarre (UPNA), a young university created by the Regional Government in 1987 (apart from a National Distance Education University (UNED) with two centres, in Pamplona and Tudela).

UPNA is a quite balanced university, which ranks quite well in teaching and research, and is particularly active in knowledge transfer. UPNA seems to be less rigid and more flexible than the average Spanish university, due to its young age and not

¹⁵ It has to be noted that education and training is among the five transversal factors of Navarre S3. The objectives will be oriented towards innovative education and future skills and competencies, boosting high quality vocational and higher educations close to the needs of companies and focused towards Navarre strategic sectors, increasing the competencies for employability and life-long learning. Therefore, the education mission of the Navarre universities is called upon to play an important role in the achievement of the ambitious objectives of the strategy. These aspects are explored in Arregui-Pabollet *et al.* (Forthcoming).

very large size. UPNA could be defined as a regional university from the students' origin point of view: 85% of students are from the region (77% in masters and 63% in doctorate courses).

UNAV is outstanding in teaching, ranking first in Spain, according to IVIE (2016)¹⁶. Its main focus is on undergraduate education. Since 1990, UNAV committed itself firmly with research and currently «seeks to consolidate itself as a Research University». UNAV is by vocation universal. This is partly reflected in the origin of the students in its campus: only 38% of students come from Navarre, 47% are from other Spanish communities and 9% of undergraduate students come from abroad (48% in masters and 36% in doctorate courses).

4.2. Fieldwork in Catalonia

In Catalonia, the eight public universities and members of the Catalan Association of Public Universities (ACUP)¹⁷ were contacted, at the rectorate level, to participate in the study (for detailed information see Appendix 2):

- Universitat de Barcelona
- Universitat Autònoma de Barcelona
- Universitat Politècnica de Catalunya
- Universitat Pompeu Fabra
- Universitat de Girona
- Universitat de Lleida
- Universitat Rovira i Virgili
- Universitat Oberta de Catalunya

Of the eight universities contacted, seven accepted to participate in our study and one (Universitat de Lleida) did not respond to the request. For the others, vice-rectors –or other high-level managers– in the areas of research, innovation and knowledge transfer were interviewed for 45 minutes to 1 hour. As for Navarre the interview-guide was sent in advance.

The HE system in Catalonia is quite heterogeneous. Universitat de Barcelona, Universitat Autònoma de Barcelona and Universitat Politècnica de Catalunya are located in the metropolitan area of Barcelona. They account for the majority of stu-

¹⁶ Fundación BBVA, Instituto Valenciano de Investigaciones Económicas IVIE (2016). U-Ranking 2016. Indicadores Sintéticos de las Universidades Españolas. Available at: <https://drive.google.com/file/d/0B9DIuxBCJhBoSmVyeXRVMHVPUmM/edit>

¹⁷ Catalunya has a total of 12 universities, of which eight are public and are part of ACUP, and the remaining four universities are all private and are not included in ACUP: Vic University, International University of Catalunya, Abat Oliba CEU University and Ramon Llull University. Universitat de Lleida did not participate in the study.

dents (54% of undergraduate students and 59% of postgraduate students). While the first two cover a wide range of disciplines in their teaching and research, the latter is focused on engineering, architecture and sciences.

Universitat Pompeu Fabra, also in Barcelona, is smaller in scale and younger and as its eight departments are concentrated in health and life sciences, ICT, and social sciences and humanities with strong international orientation.

The Universities of Lleida, Girona and Rovira i Virgili (Tarragona) are located in other provinces of Catalonia. They were created in the 1990s, and are, by mission, more directly engaged in their socio-economic surroundings. Such local dimension, however, does not preclude them from positioning themselves in the international arena. Rather, it provides opportunities for specialisation and competitive advantages, hence helping them define the appropriate global niches.

Finally, Universitat Oberta de Catalunya is a particular case. It is the most recently founded university of ACUP, is online-based and pursues e-learning approaches. It is formally located in Barcelona, but its community of over 50,000 students is spread across the whole national territory and beyond. The university holds research and innovation at the heart of its works and, whilst actively engaged in «third mission» activities, its online nature makes it more difficult, compared to the other ACUP members, to engage with local stakeholders.

5. KEY LESSONS: REFLECTIONS ON INSTRUMENTS AND CHALLENGES FOR HEIS PARTICIPATION ON RIS3

The two cases allow to draw some conclusions on (i) universities' participation in the implementation of RIS3 through different instruments, and (ii) the challenges related to universities' alignment to RIS3 and third mission activities.

5.1. Universities' participation in the implementation of the RIS3 through different instruments

The two studies upon which this paper is based have allowed exploring how universities take part in different RIS3 instruments. In the case of Catalonia, Marinelli and Elena-Pérez (2017) focussed exclusively on the so called *RIS3CAT communities*, whereas in the case of Navarre, the broader scope of the study allowed to reflect on different tools related to research and technology transfer, namely Industrial PhDs, The Advanced Innovation and Technology Corporation, the creation or re-direction of the Research institutes of the Public University of Navarre (UPNA).

The few discussed here do not, by any means, exhaust the portfolio of instruments adopted by either region, yet they provide an overview of the ways in which

HEIs can contribute to RIS3 implementation. In particular, the instruments differ along two dimensions:

- The type of activity(ies) pursued
- The type of leadership required

RIS3CAT Communities and ADITech ecosystem are instruments focussed mainly on industrial research where HEIs play a role as part of a broader consortium. The case of industrial PhDs is an example of co-leadership of university and the private sector, whereas the new institutes of UPNA are led by universities and fit clearly in their more traditional activities. These different instruments present their challenges and opportunities for HEIs and reveal different facets of the complex challenges they faced as their role evolves.

Instruments led by consortia: RIS3CAT Communities and ADITech ecosystem

As indicated in Section 3.2 above the RIS3CAT Communities are oriented towards industrial research and innovation for economic competitiveness. They are based on a consortium which defines and implements a shared action plan, as well as a governance and monitoring system. As such they are a good example of a tool fostering a continuous EDP and provide good insights on the role of universities within RIS3.

Catalan universities are represented across the different Communities and have spread their presence according to their scientific and technological expertise. In some cases, universities have decided to take a more prominent role, contributing – with other actors – to the leadership of the community, in others they act as simple participants. In other words, the instrument is designed to accept different configurations of actors' engagement.

Perhaps unsurprisingly, universities reported that the negotiations for the action plans and governance systems of the communities revealed frictions and proved at times difficult. At the same time, several universities pointed out that the instrument could have benefited from more operational directives, that is, better guidelines in relation to financial issues, eligible cost, roles and requirements of participation, calendar of calls, allocation of personnel, etc. Whilst some universities highlighted that this could have been partially avoided if stakeholders had been sufficiently involved in the design of the instrument, part of the difficulties lie in the complex administrative and legal framework underpinning the instruments, which needs to comply with ERDF and national regulations, with which universities may still be acquiring familiarity.

Whilst the RIS3CAT Communities provided a valuable interaction platform, universities did not always feel that it was easy to receive adequate space and recognition. Several felt that, depending on the sector, the needs and capacities of differ-

ent actors were not fitting easily in the design of the instrument. This, on occasion, demanded strong negotiations before trust could be built and consensus could be reached over the action plans. Such frictions reveal the inherent complexity of implementing an instrument that fosters a paradigmatic change in the innovation system, one in which all actors need to adjust their role to new demands and their related legal and administrative frameworks. Despite the caveats, the overall RIS3 experience was considered positive for universities and in line with the changes in the university system experienced in the previous decade.

In the case of Navarre, the Government of Navarre created in 2013 ADITech a technological corporation with the initial objective of having a unique umbrella for the public and private technology centres existing in Navarre in four technology areas: agrofood, biomedicine, energy and industry. The important differences between them in terms of fields of activities, size and staff was introducing important challenges in establishing collaborations, overlapping of activities and scattered research and technology capacities of the region. The streamlining and re-organisation of the existing technology and research centre capacities of the region was behind the creation of ADITech for a more competitive and solid profile of Navarre at EU and international level.

The Navarre RIS3 process has repositioned ADITech as an organisation with the main mission of boosting an ecosystem that gathers the knowledge capacities of 6 technological centres, 3 research centres and 2 universities, in four technology areas and connects them to the companies. For this purpose, the «tractor projects» instrument has been launched by the regional government to encourage collaborations between research centres, universities and companies with the objective of approaching R&D results to the market.

The re-definition of the functions of ADITech towards the creation of this ecosystem is relatively recent and therefore it is too early to evaluate its achievements. Nevertheless the outcomes from the interviews and workshop discussions have pointed out the key role they can play in the integration and coordination of research and innovation actors, leveraging Navarre's position in strategic and large scale projects.

Instruments in university-industry co-leadership: Industrial PhDs and Industrial Chairs

The instrument of «Industrial PhD» supports the employment of doctoral students in local companies, provided the research work is focused in the priority sectors of Navarre. The first call was launched in 2016¹⁸ by the Governments of Nav-

¹⁸ Convocatoria de ayudas «Doctorados industriales 2017-2019» para la contratación de doctorandos y doctorandas por empresas y organismos de investigación y difusión de conocimiento. http://www.navarra.es/home_es/Actualidad/BON/Boletines/2016/214/Anuncio-0/

arre. There is unanimous consensus about this tool as one of the most effective instruments to foster cooperation, establish responsible partnerships, and catalyse a change in the «clash of cultures» between universities and other agents in Navarre (especially university-business interaction). Nevertheless the interviewees feel the instrument would need to be further developed and improved, in particular more funding should be devoted to it and an even finer alignment to the local RIS3 should be pursued.

A second «Industrial PhD call»¹⁹ has been recently published by Navarre after the HESS interviews had been completed. The outcomes from the HESS Navarre case study (Campillo *et al.*) regarding the need to improve the Industrial PhD have been considered in the definition of the new call. As a novelty, the alignment of the PhD candidate research project with the priority sectors, strategic technologies and challenges of the Navarre RIS3 has been introduced as an evaluation criteria.

In addition, Navarre companies have promoted dynamics and mechanisms to become closer to universities creating the Chair ADITech and the Chair Grupo AN with the UPNA, and Chair Volkswagen with UNAV. The Chairs are relevant institutional instruments to strengthen the capacity of the Universities in RIS3 priorities by fostering connections with the private sector. They have been defined as sustainable agreements between the university and certain actors of the region, to promote the integration and convergence between academic disciplines and technological and business sectors, through advanced research and practical training. The Chairs support the development of joint research lines, doctoral thesis and undergraduate projects or master's degrees, granting special awards as well as scholarships related to entrepreneurship.

The UPNA has included in its Strategic Plan for the coming years the objective of intensifying the companies and institutions interested in sponsoring new Chairs.

Instruments lead by universities-UPNA and UNAV Interdisciplinary institutes

Since the year 2013, the UPNA has progressively created a set of research institutes, to boost interdisciplinary research for scientific excellence and stronger connections with the regional business fabric²⁰. The four UPNA Research Institutes are: Institute of smart cities (ISC); Institute for advanced materials (InaMat); Institute

¹⁹ Convocatoria de ayudas «Doctorados industriales 2018-2020» para la contratación de doctorandos y doctorandas por empresas y organismos de investigación y difusión de conocimiento. http://www.navarra.es/home_es/servicios/ficha/6893/Ayudas-para-la-contratacion-de-doctorandos-y-doctorandas-por-empresas-y-organismos-de-investigacion-y-difusion-de-conocimientos-Doctorados-industriales-2018-2020.

²⁰ IV UPNA Strategic Plan 2016-2019. https://www.unavarra.es/digitalAssets/221/221226_1IVPlanEstrategico.pdf

for advanced research in business and economics (INARBE); and Institute for innovation & sustainable development in food chain (IS-FOOD).

The UNAV has as well created the IdisNA- Institute of Health Research of Navarre, a space for multidisciplinary and translational research in the field of biomedicine. The institute gathers most of the biosanitary researchers in Navarre having a key aim of integrating capacities from basic, clinic, epidemiologic research and health services. Moreover UNAV has generated a Biomedical Campus with a number of top-level scientific infrastructures to provide research services in collaboration with companies and other research centres. The Campus gathers capacities of UNAV, the Clínica Universidad de Navarra (CUN) and the Applied Medical Research (CIMA).

The institutes created by UPNA and UNAV constitute an important instrument to position and enhance the involvement of universities in S3 deployment. The four UPNA institutes, even those created before the update of Navarre S3, have been oriented towards the Navarre S3 priority areas. In order to ensure the interdisciplinary approach and strategic vision of the institutes to contribute to the region, the four institutes share a common building and have a single Head of Business Development to support the scientific directors in the management of knowledge transfer, regional engagement and international projection. From the side of UNAV, the IdisNA is perfectly aligned with the Health RIS3 priority area.¹

5.2. Universities' alignment to RIS3

The brief review of instruments above allows to identify some critical dimensions that HEIs need to pay attention to, when contributing to RIS3.

Balancing universities' local and global demands

The regional focus of RIS3, the need to engage with local partners and support facing local techno-economic challenges may be at odds with the pressure to be at the global frontier of scientific research. However, the local engagement pursued through the RIS3 can be complementary to the various international activities pursued whilst competing globally for funding, staff and students in the global arena. The key, as highlighted by HEIs themselves, is to align the opportunities for collaborations offered by local and international stakeholders into a coherent strategy. In the case of Navarre, the two universities of the region show different strengths and

¹ The HESS case study (Arregui-Pabollet *et al.*, forthcoming) has particularly focused its attention in INARBE institute, as it is called to play a key role contributing to the monitoring and evaluation of the RIS3 activities in terms of the contribution and impact to Navarre. Even if this potential contribution still needs to be defined, the institute seeks to give an important added value to the region without losing its identity and core mission as a research entity.

thus can contribute complementarily to the development of the RIS3. The UNAV is a research and internationally oriented university that contributes to attract excellent international researchers and students and position the region in the world. The UPNA is regionally rooted and attracts a large number of local students, attracted by the quality of its education (especially in the engineering fields) and the good connections to local companies.

In the case of Catalonia, it emerged that universities outside the metropolitan area of Barcelona are traditionally more engaged with the territory and with its techno-economic challenges. Their core scientific fields of activity are thus also more closely linked to the territory's needs and the RIS3 process fitted easily in their operational structure. Large universities in Barcelona, on the other hand, are adapting to the need to align global and local demands through new strategies, building upon previous experiences of cooperation with industry, both locally and internationally, and on lessons from other EU initiatives that pursue similar principles (i.e. knowledge alliances, etc.).

Lack of career-incentives to engage in regional development activities

While universities' engagement in innovative activities with local actors, emerged compatible with HEIs institutional strategy, this is not the case at the level of the individual researcher for whom career progression is almost exclusively linked to scientific productivity as measured by traditional bibliometric indicators. Whilst regional collaborative research and innovation activities can indeed lead to scientific publications, hence advancing the individual academic career, they also involve a substantial organizational effort in terms of outreach activities as well as necessary management and bureaucracy, which is more difficult to capitalize for career progression.

In the case of Navarre, the introduction of more flexible research structures, such as foundations with different legal personality but under university governance, was pointed out as a potential mechanism to overcome this problem. This type of structures would give greater flexibility and autonomy to have a more varied profile of researchers in terms of expertise brought, with different incentives in place and activities in which they could engage to contribute to the Navarre²².

Although this tension remains substantially unresolved, the interviewees showed a clear awareness of the situation and were exploring ways to align individual and institutional incentives. Relaxing this pressure over academics is required to bring about effectiveness and efficiency in the professional growth of academics and in the relations that they can establish with other agents.

²² The case of Orkestra in the Basque Country is a good example of such structure.

Difficulties with interdisciplinarity

Instruments to overcome the silo effect between research disciplines and groups have been experienced in the case of UPNA with the Research Institutes, and by the UNAV with the IdisNA and Biomedical Campus platforms. The interviewees of both universities highlighted the importance of university research groups and capacities should be better coordinated to respond to societal challenges.

Nevertheless, the interviews stated that there was a need for more specific instruments that could further boost these type of collaborations. In this regard, the replication of the challenge-based approach model of H2020 calls in regional instruments would be welcome. The societal challenge section of H2020 programme has been defined in a way that proposals to adequately respond to a call for proposal topics need to bring together a partnership of actors with «resources and knowledge across different fields, technologies and disciplines, including social sciences and humanities» (European Commission, 2011). This approach is viewed as very good way of facilitating interactions between research and innovation actors of the region that go from research to market with a focus on innovation oriented activities.

Different universities and different contributions to regional development

Both Navarre and Catalonia cases have shown that universities should not be treated as homogeneous institutions, as each university has a unique way in which it can contribute to the RIS3 implementation.

In the case of Navarreas as previously mentioned, the two universites have complementary functions for the region.

In the case of Catalonia, as discussed above, it emerged that universities outside and within the metropolitan area of Barcelona are adjusting differently to RIS3 demands. Policy makers should take HEIs specific characteristics in consideration, when designing instruments, to ensure their maximum impact.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

In this paper, we have reviewed the role of universities in RIS3 in two Spanish regions, Catalonia and Navarre, by looking at selected instruments and identifying key dimensions underpinning HEIs engagement in the RIS3 process. Both regions appeared as appropriate for this type of analysis because they offer an interesting mix of reputable higher education institutions, with different characteristics and different relationships with the territory.

The analysis has pointed out that universities' contributions to RIS3 can be achieved through different leadership configurations: in instruments with a clear re-

search orientation, universities can exert more direct influence, whereas when instruments foster systemic collaborations –as in the case of RIS3CAT Communities or AD-ITech ecosystem– their role varies and different dynamics can emerge. Furthermore, we have highlighted that HEIs with different characteristics, geographical location, intensity in global/local orientation, research/teaching intensity, can find effective ways to contribute to RIS3. In this respect it is critical for HEIs to be aware of their strengths, their position within the broader innovation system and to pursue alignment between global and local opportunities and demands.

Whilst RIS3 and, more generally third mission activities, present significant opportunities for HEIs, they also cause significant strains, as all actors adjust their role to new demands. These are, on the one hand, reflected in the difficulties reported by HEIs in negotiating with other actors of the innovation system in the case of the RIS3CAT Communities. On the other, they are mirrored in pressure felt by researchers, who are demanded to engage in new activities without an appropriate incentive and evaluation framework in place.

As the transition to a new model of universities unfolds, it is critical that HEIs engage in a continuous process of self-reflection, identifying the structures and capacities that can best serve their strategies. Similarly, policy makers can maximise the impact of HEIs on RIS3 by acknowledging the specificities of different institutions and their relations to the territory.

To conclude, whilst the road ahead is challenging for HEIs, which face a policy environment that is changing faster than their organizational culture, the case studies described provide an optimistic outlook, with universities showing both resilience and initiative in taking up the challenge of being a key actor for local development.

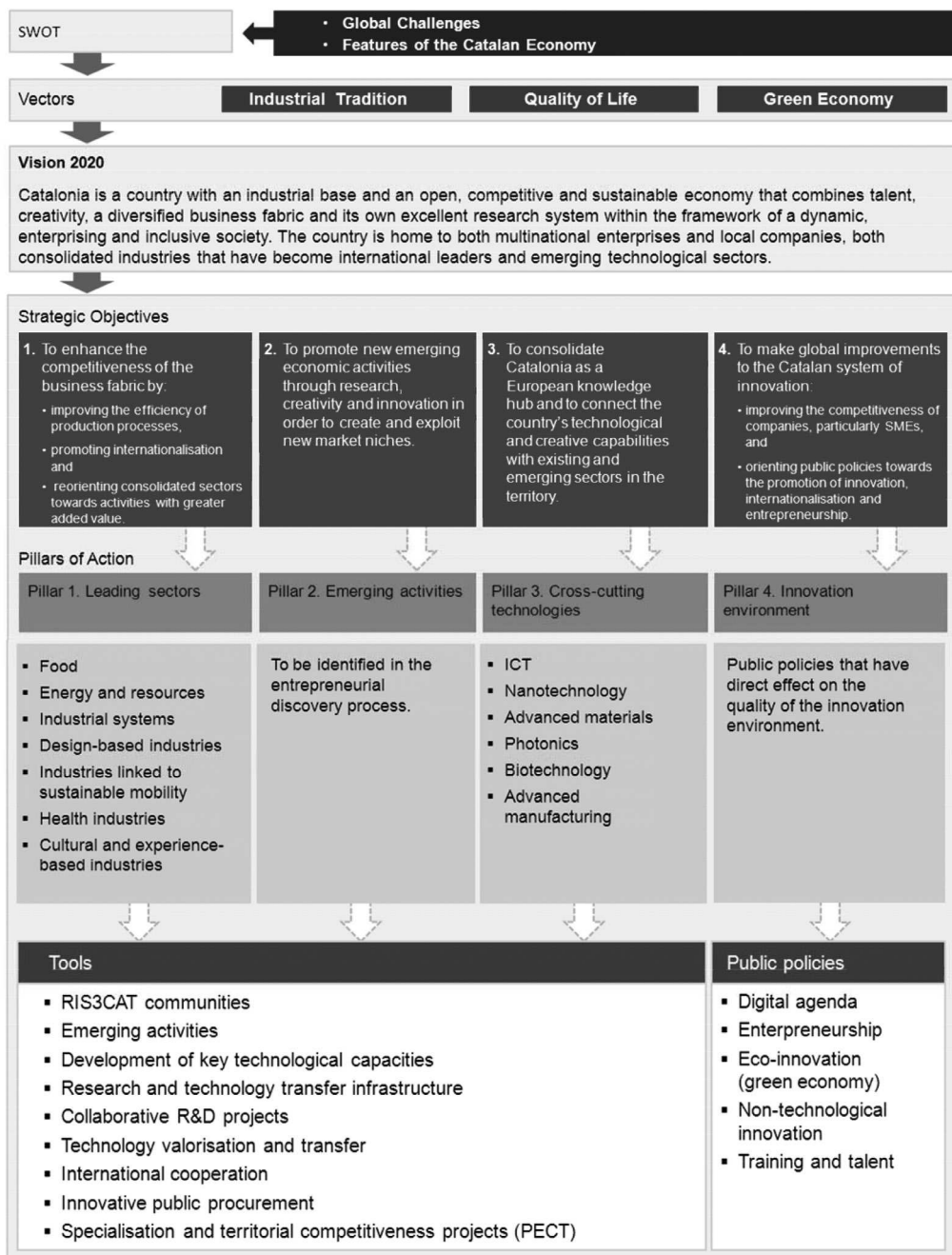
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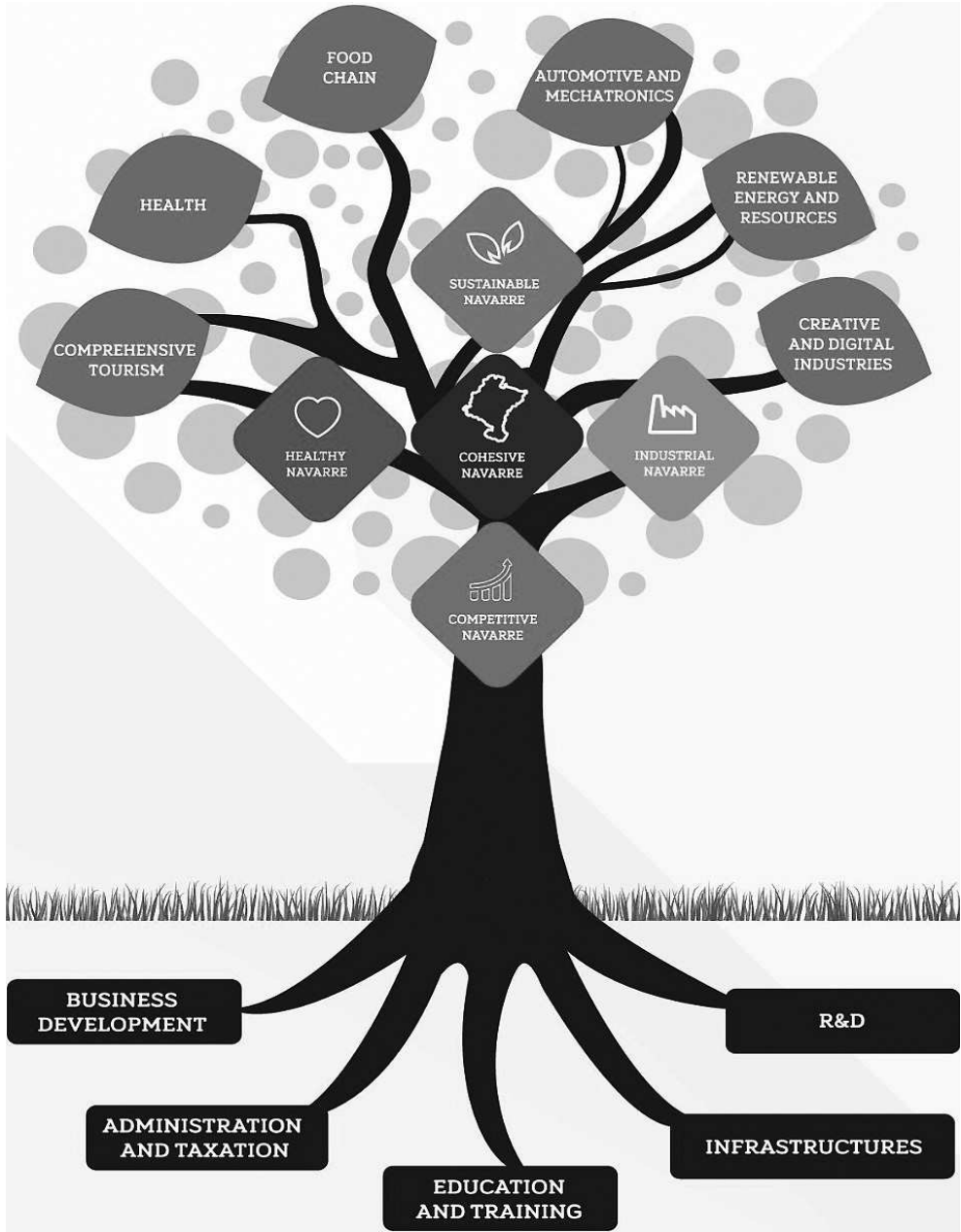
APPENDIX

Appendix 1. OVERVIEW OF RIS3CAT



Source: http://catalunya2020.gencat.cat/web/.content/85_catalunya_2020/documents/angles/arxius/07_ris3cat_2014_en.pdf

Appendix 2. NAVARRE'S TREE: NAVARRE'S UPDATED RIS3 SUMMARY



Source: Smart Specialisation Strategy of Navarre. Update 2016-2020.

Appendix 3. ORGANISATIONS PARTICIPATING IN THE INTERVIEWS AND WORKSHOPS

Organisation	Position	Name
Public University of Navarre (UPNA)	Rector	Alfonso Carlosena
	Vice-rector for Academic Policy	Carmen Jarén
	Vice-rector for Research	Ramón Gonzalo
	Director of INARBE (Institute for Advanced Research in Business and Economics)	Pablo Arocena
	Head of Business Development of Research Institutes	Begoña Vicente
University of Navarre (UNAV)	Vice-Rector for Academic Policy	Pablo Sánchez
	Vice-Rector for Research	Iciar Astiasarán
Government of Navarre	Director General for Universities and Educational Resources	Nekane Oroz José Carlos Pequeño Carlos Martirena
	Director General for Industry, Energy and Innovation	Yolanda Blanco
ADITECH	Director General Technology Cooperation & Excellence Manager	Juan Ramón de la Torre Paula Noya
Grupo Cooperativo Alimentación Natural (AN)	Director for Fundación Grupo AN	Maite Muruzabal
Navarre Business Confederation (CEN)	Responsible for international projects	José Manuel Olivar
Universitat Rovira i Virgili	Vice-rector of Transfer and Innovation	Miquel Angel Bove,
Universitat de Barcelona	Vice-rector of Scientific Policy	Enric I. Canela
Universitat Pompeu Fabra	Vice-Manager in Research and Economy	Jose Jofre Santamaria
Universitat de Girona	Vice-rector of Planning, Innovation and Business	Ramon Moreno Amich
Universitat Politècnica de Catalunya;	Vice-rector of Research Policy	Fernando Orejas
Universitat Oberta de Catalunya;	Director of the Research and Transfer Support Office	Mireia Riera Duran
Universitat Autònoma de Barcelona	Vice-rector of Strategic Projects and Planning	Lluís Tort

Appendix 4. KEY CHARACTERISTIC OF CATALAN UNIVERSITIES (2014)

	Universitat de Barcelona	Universitat Autònoma de Barcelona	Universitat Politècnica de Catalunya	Universitat Pompeu Fabra	Universitat de Girona	Universitat de Lleida	Universitat Rovira i Virgili	Universitat Oberta de Catalunya (UOC)
Location	Barcelona	Barcelona	Barcelona	Barcelona	Girona	Lleida	Tarragona	Online
Year of foundation	1450	1968	1971	1990	1992	1991	1991	1994
Undergraduate students	46.449	28.509	28.804	11.969	13.682	8.779	11.886	39.031
Postgraduate students	10.118	5.735	5.090	5.235	1.374	1.295	2.151	4.331
Academic and research staff	5.312	3.629	2.431	558	1.155	997	921	372
Collaborating lecturers –UOC only								3.406
Undergraduate programs	66	81	68	21	41	31	37	25
Master programmes	140	84	65	25	41	41	46	46
PhD programmes	73	67	51	9	11	9	37	2
Faculties and schools	19	14	17	8	10	9	12	
Departments	106	57	42	8	24	26	24	
Research centres	30	27	16	7	11	5	14	2
Officially recognised research groups	243	220	197	63	42	49	59	14

Source: ACUP Report Universities of Catalonia <http://www.acup.cat/sites/default/files/universities-catalonia-2014.pdf>

Appendix 5. **KEY CHARACTERISTIC OF NAVARRAN UNIVERSITIES
(2014-2015)**

	Public University of Navarre (UPNA)	University of Navarre (UNAV)*
Location	Pamplona	Pamplona
Year of foundation	1987	1952
Undergraduate students	6.638	7.693
Postgraduate Students	1.230	2.617
Academic and research staff	856 (599.2 ETC)	1.411
Undergraduate programs	20	54
Master programmes	33	34
PhD programmes	13	22
Faculties and schools	6	17
Departments	22	71
Research centres/Institutes	4	27
Officially recognised research groups	106	81

Sources: IV Plan Estratégico. Universidad Pública de Navarre. Abril, 2016 and Memoria Universidad de Navarre: Curso 2014/15 and universities' website.

* Figures include all UNAV campuses- not only Navarre one.