

Parallel to the massive expansion of higher education in recent decades there has been a preoccupation with the role that universities play in contributing to the economic and social well-being of their surrounding areas. In the so-called «knowledge economy», universities are perceived as fulfilling an ever-growing spectrum of roles: to educate and train students; to conduct and disseminate excellent research; to boost productivity through collaborative relations with external partners; to make socio-economic contributions to their localities and businesses in general; and to enhance civic value in the public realm. In the current context of economic crisis and reforms in the governance and funding of higher education, the pressure for universities to contribute to innovation and economic development is ever increasing but at the same time becoming more challenging.

Given the importance of universities to regional innovation systems and the high expectations currently placed on the ability of universities to deliver economic, social, environmental or cultural benefits through their «third mission» activities is the motivation for this special issue, the objective of the special issue is to shed light on the role of universities as transformative actors in regional development and the associated challenges and tensions.

More specifically, the monograph aims to contribute to the economic debate, by providing a broad and comparative perspective focused on: a) the leadership role of universities in place-based economic development strategies, b) the third mission role of universities within regional and national policy contexts; c) the design and assessment of technology transfer mechanisms; d) the role of universities as global connectors and e) internal organizational dimensions. These themes move from the more holistic and strategic to the more concrete, informing order of presentation of the eleven articles comprising the special issue. The following sections first provide an overview of the evolution of the debate, highlighting how it has evolved over time and the shifting expectations placed upon universities.

The «third mission» of universities

Universities have long been considered as key contributors to regional economic development through their various missions of teaching, research and the so-called «third mission» of external engagement in support of innovation and social change. The idea of the third mission has gained prominence in the last two decades as universities are being increasingly encouraged to valorise their research for the benefit of the

economy and society at large. According to authors such as Henry Etzkowitz¹, universities are undergoing a «second academic revolution» incorporating economic development as part of their main missions, following a first revolution characterised by the institutionalization of research activities. In this context, since the early 1990s and driven by funding pressures and government incentives, universities are seen to be placing a higher priority on being relevant and responsive to broader stakeholder needs.

The complex and multifaceted ways in which universities and their external environment interact have been the subject of much scholarly interest in recent years. This has been directed at understanding the mechanisms through which this interaction occurs and the multitude of factors driving or hindering this engagement, including firm, industry and university characteristics, the motivations and attitudes of scientists, as well as the role of incentive structures and dedicated government policies to support commercialisation and third mission more generally².

The contribution of universities to economic development has been found to occur through a wide range of mechanisms, including formal as well as more informal, softer and immaterial ways of interaction, with much economic impact from universities occurring through the production of highly qualified graduates. Despite this evidence, policy and academic interest has overwhelmingly focused on formal commercialisation mechanisms such as patenting, licensing and spin-off activities, reflecting too narrow a conception of knowledge exchange.

Commercialisation of university intellectual property (IP) is in fact a relatively infrequent form of interaction compared to other means such as consultancy, training activities and other activities that may be more hidden or less easy to quantify. Further, interaction takes place with a variety of actors from the public and third (not for profit) sectors as well as with private sector actors. Studies tend to show that the proportion of academics involved in research collaboration with private industry is actually rather low (with only a fraction involved in commercialisation activities), collaboration being more extensive with public and third sector actors such as hospitals³.

In terms of the use that industry makes of universities, evidence from innovation surveys consistently shows that while firms use university research for a variety of purposes, universities are a relatively infrequent partner for innovation compared to other sources of knowledge such as suppliers or competitors. Engagement with universities is more frequent in science and engineering-based industries but also in

¹ ETZKOWITZ, H. (1998): «The norms of entrepreneurial science: Cognitive effects of the new university-industry linkages». *Research Policy* 27(8), 823-833.

² For an extensive review see PERKMANN, M. *et al.* (2013): «Academic engagement and commercialisation: A review of the literature on university-industry relations», *Research Policy*, 42(2): 423-442.

³ As shown for instance in HUGHES, A.; KITSON, M. (2012): «Pathways to impact and the strategic role of universities: new evidence on the breadth and depth of university knowledge exchange in the UK and the factors constraining its development». *Cambridge Journal of Economics*, 36(3), 723-750.

knowledge intensive services, and in firms that are large, R&D active and with a more «open» innovation strategy⁴.

Organisational characteristics, incentives and regulatory structures also influence the rate and type of university-industry interactions. For instance in many countries, legislative changes have been introduced to develop the incentives and framework conditions for commercialisation of academic research. Policy changes such as the Bayh-Dole act in the US and the abolition of the so-called professors' privilege have been introduced in many countries to promote the diffusion and application of research, with varying results. Government support for the third mission of universities has also led to a considerable expansion of knowledge exchange infrastructure and capabilities, including the setting up of technology transfer offices (TTOs) and other infrastructure such as science parks and incubators.

Universities and regional development

While the extant literature in the economics and management of innovation has extensively engaged in understanding the relationship between university and industry (with a focus on the different mechanisms through which this substantiate and the drivers and barriers influencing the different actors at the micro-level), comparatively less attention has been paid to the relationship between HEIs and regional development and the geographical dimension of university-industry interactions.

While early knowledge spillover studies demonstrated the benefits, in terms of R&D activity, patents and rate of innovation, of locating near a university⁵, more recent research has sought to understand the nature of these local interactions. Certain university-industry linkages are locally specific, and geography plays a role in influencing firms' choice of academic partner. However, the spatial dimension of these relations is far from simple and uniform and many factors, such the nature of regional and institutional contexts and management practices, influence the geography of university-industry links.

In recent years, and informed by regional system of innovation and triple helix approaches, universities are increasingly perceived as not only «knowledge factories» (with university research automatically spilling over onto regional economies) but as key institutional actors and partners in regional innovation systems, especially in

⁴ See for instance: COHEN, W.M.; NELSON, R.R.; WALSH, J.P. (2002): «Links and Impacts: The Influence of Public Research on Industrial R&D». *Management Science* 48, 1–23; LAURSEN, K.; SALTER, A. (2004): «Searching high and low: what types of firms use universities as a source of innovation?». *Research Policy* 33, 1201; TETHER, B.S.; TAJAR, A. (2008): «Beyond industry-university links: Sourcing knowledge for innovation from consultants, private research organisations and the public science-base». *Research Policy* 37, 1079–1095.

⁵ Following the seminal contribution of AUDRETSCH, D.B.; FELDMAN, M.P. (1996): «R&D Spillovers and the Geography of Innovation and Production». *The American Economic Review* 86, 630–640.

regions lacking a dynamic, research led private sector. Universities are seen as key «anchors» linking the region with external sources of knowledge, key civic actors addressing social and economic problems and key players in regional coalitions for place-based development.

There is therefore a growing recognition among universities and local/regional leaders of the potential for mutually beneficial relationships between universities and their surrounding regions. In this context, the «engaged» or civic university model⁶ considers that the third mission of economic development should be a guiding and integral principle of the organisation and practice of universities and not just a separate strand of activities. It advocates a more «developmental» role of universities, including a stronger and more engaged regional focus of all of their activities, including their contribution to workforce skills development in order to meet the needs of regional firms, supporting high-value knowledge clusters, and influencing regional strategies and institutional development.

New policy paradigms, such as smart specialisation, further stress this transformative role of universities, particularly in less developed regions. More specifically, in the context of Europe 2020 universities and research organizations are seen to play a key role in initiatives for «smart growth»: innovation, education and the digital agenda. As knowledge producers, universities play a key role in the design and implementation as well as in the development of capacities for smart specialisation⁷.

Universities can act as knowledge connectors anchoring global knowledge to the regions and addressing societal challenges that have both local and global dimensions. They can assist regions in understanding the region's knowledge assets, supporting prioritisation efforts through ensuring a better match between industrial capabilities and research capabilities, enabling entrepreneurial discovery processes and supporting firms' innovation processes.

In this respect, and in order to contribute to regional innovation strategies, 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.

Challenges to regional engagement of universities

As has been made apparent so far, high expectations are placed on the contribution that universities make to the social and economic development of regions.

⁶ GODDARD, J.; KEMPTON, L.; VALLANCE, P.; CAPPELLO, R.; OLECHNICKA, A.; GORZELAK, G. (2012): *The civic university: Connecting the global and the local. Universities, cities and regions loci for knowledge and innovation creation*, Londres: Routledge, 43-63.

⁷ EUROPEAN COMMISSION (2014): «The role of universities and research centres as drivers for Smart Specialization at regional level», European Commission.

However, in pursuing this agenda one should be cautious not to overlook the diverse and context dependent nature of engagement and the multiple forms that this engagement can adopt, as well as the tensions and contradictions associated with this agenda.

Ideal-type models of the entrepreneurial university, the engaged university or the triple helix fail to fully grasp the difficult interplay between actors in different institutional spheres (universities, businesses and government)⁸. They do not specify how this interplay is likely to take place, and how the tensions hindering the strategic alignment of university missions may be overcome. Universities are increasingly becoming «hybrid organizations» incorporating elements of different «triple helix» institutional spheres, yet it is unclear how they are meant to fulfil that role. These models risk advocating a one-size-fits-all model of universities where they are expected to seamlessly fulfil their three missions, evidencing a huge gulf between the promise of regional benefits and the practicalities of delivering concrete development activities harmoniously with core university activities.

Universities are not monolithic organizations in pursuit of a clear strategy with a single voice, but multi-dimensional and complex organizations comprising multiple groups of experts that respond to their international communities of scientific practice to improve their reputation and career development. Regional engagement is just one of multiple agendas, activities and incentives influencing universities and academics, and the regional level is one of multiple scales at which these agendas, activities and incentives act upon universities. Additional activities for economic engagement are unlikely to be incorporated unless they support universities, e.g. through additional resources, expertise or reputational impacts, to fulfil their core mission of teaching and research⁹. Imposing multiple missions upon universities carries the risk of strategically overloading them, leading to a crowding out of one or more of their activities.

A one-size-fits all idea of a «third university mission» alongside teaching and research is actually nonsensical because engagement is context-dependent. Universities and regions therefore need a much better understanding of their own contexts in order to improve their performance rather than seeking simplistic best-practice third mission instruments elsewhere. The nature of the interactions undertaken and the ways in which they are valued is heavily mediated by system and institutional conditions, including funding, organizational structure, institutional culture and tradition. For instance in the UK the nature of engagement of old, research-inten-

⁸ For a discussion of the dangers of a one-size-fits all approach see BENNEWORTH, P., PINHEIRO, R. & SÁNCHEZ-BARRIOLUENGO, M. (2016): «One size does not fit all! New perspectives on the university in the social knowledge economy». *Science Public Policy* 43, 731-735.

⁹ For a longer discussion see UYARRA, E. (2010): «Conceptualizing the Regional Roles of Universities, Implications and Contradictions». *European Planning Studies* 18, 1227-1246.

sive universities differs strongly from that of «new universities» which are more «locally oriented» given their focus on vocational education and training. In addition, the internal organizational structure of universities and university departments mediates the nature of their interactions and the process by which universities create regional benefit.

Externally, different conditions and policy mixes, including national policies for regional development, research and higher education will condition third mission policies and efforts of universities to engage with their regions. The nature of this engagement will also vary according to the characteristics and needs of the regional innovation system. For instance, in old industrial regions such as the Basque Country, universities can strengthen the innovation system and support economic restructuring and diversification by stimulating the linkages between «local buzz» and *global pipelines*, attracting external investment and internationalising its economy. This requires that universities are adequately integrated with the regional productive system and development strategy on the one hand, and open and connected to international knowledge networks on the other.

Finally, different types of universities and other public or semi-public knowledge producing organizations may coexist in a regional innovation system, with conflicting or synergistic relations. Universities are not the only actors doing research. Many countries and regions have significant research organizations outside the university system, whether basic research-oriented institutes such as the Max Planck institutes of Germany, or applied research organisations in support of industry such as the Fraunhofer institutes in Germany, SINTEF in Norway or Tecnalia and IK4 in the Basque country, influencing the nature of third mission engagement of universities.

Overview of the special issue

This special issue comprises a series of academic papers tackling the specific challenges discussed above. More specifically, the papers by Elena-Pérez, Arregui and Martinelli, as well as the paper by Pinheiro y Normann, analyse the leadership role universities can play in supporting place-based development strategies; the papers by Guerrero and Urbano, Benneworth, Zeeman, Pinheiro and Karlsen, and Kitagawa, focus on the third mission role of universities within regional and national policy contexts; Guimón and Luna deal with the role of universities as global connectors; Benassi and Rentocchini, Finardi and Breznitz, and De Fuentes and Dutrénit, focus on the design and evaluation of technology transfer mechanisms; and finally Cañibano, Corona, Molas and Vilardell, and Alcalde, Aranguren and Wilson, analyse the internal organisation of universities and how that affects their performance and external engagement.

A summary of each of these contributions is provided next.

Focusing on the regional leadership role of universities, the paper by **Susana Elena-Perez, Eskarne Arregui Pabollet** and **Elisabetta Martinelli** engages with universities adopting a leadership role in the design and implementation of regional innovation strategies. The current Cohesion Policy framework (2014-2020), and more specifically the new agenda of smart specialisation, has reemphasised the role of universities in regional development. It is expected that universities are able to play a key role in entrepreneurial discovery processes, actively engaging in the identification of key priorities for the region. This paper explores this topic by drawing lessons from the case studies of two Spanish regions (Catalonia and Navarre). They identify a diversity of mechanisms deployed in the two regions to support the participation of universities in the implementation of the RIS3, as well as some critical dimensions influencing the alignment of universities with the RIS3 process, most notably the difficult balancing of universities local and global demands, the lack of career incentives to engage in regional development activities, challenges associated with adopting an interdisciplinary approach, and the heterogeneity of the HE sector.

The paper by **Rómulo Pinheiro** and **Roger Normann** explores the role of universities within broader regional development coalitions, contributing to institutional renewal and capacity building at the local level. The paper focuses on the role of leadership in regional coalitions for regional development, involving a multiplicity of actors. They propose a model based on two structural characteristics of such networks, namely case complexity and partner complexity, which is used to empirically study the implementation of a national programme for stimulating regional innovation in Southern Norway. This particular programme (VRI) is steered and partly funded by a regional development coalition composed of representatives from regional industry, the university, research institutes, incubators, social partners, regional funding agencies, individual researchers, municipalities and the counties. The historical analysis of the regional programmes thus provides some important conclusions in terms of the need to pay careful consideration to the complexities of building regional development coalitions. Building these coalitions takes time and requires collective leadership.

Using the perspective of the engaged university, the paper by **Maribel Guerrero** and **David Urbano** reflects on the realities and the challenges faced by universities in a region characterized by relevant structural changes as the Basque Country (Spain). Despite the relative robustness of the Basque infrastructure and support system for research and innovation, they argue that a key challenge for universities is to strengthen their involvement in supporting knowledge transfer, high value added entrepreneurship and active collaboration with the Basque innovation ecosystem. Drawing from interviews to key actors involved in technology transfer activities in the three universities, the authors describe the main features of Basque universities' engagement with triple helix actors, including their use of different knowledge transfer mechanisms with small and large firms, producing different re-

sults. They argue that Basque universities are following an innovative university model, where collaboration, entrepreneurship and innovation are the key pillars of their contributions to regional structural changes. However certain conditions need to be in place for a truly «entrepreneurial university» model, for instance a better recognition of knowledge transfer activities in academic promotion criteria, a more effective policy support for universities' engagement with industry and society, greater incentives for attracting and retaining talent, and greater societal awareness of the importance of innovation and entrepreneurship. They also suggest the need to further develop university governance systems, autonomy and culture in order to better support innovation and entrepreneurship and a better integration with the Basque innovation ecosystem.

The paper by **Paul Benneworth, Nadine Zeeman, Rómulo Pinheiro** and **James Karlsen** discusses how national higher education policies on teaching, research and administration shape the ways in which universities engage in regional development. The paper looks at the case of Norway, where universities play a key role in ensuring economic cohesion in remote rural areas and analyse how national higher education policies might be inadvertently limiting universities' strategic scope for regional engagement. While universities are encouraged to play a third mission role, higher research and education policy in Norway has over time placed more importance on academic outputs and excellence, greater efficiency and critical mass through the encouragement of university mergers, and a tendency to impose a one-size fits all model of higher education. On the other hand, while a number of research and innovation policy tools have been introduced to support the innovation role of HEIs, they have tended to prioritise strategic sectors located in core regions, further undermining regional engagement efforts. They conclude with a plea to pay attention not only to specific third mission activities, but also to how broader incentive frameworks may be influencing universities and effectively crowding out these very third mission efforts.

In her contribution to the special issue, **Fumi Kitagawa** discusses the evolution of third mission policies in the UK. The UK case is interesting because of its large and diverse HE sector, devolved HE policy and its long history of promoting the third mission of universities, in a context of persistently high regional economic disparities. This paper reviews the development of government policies, universities' institutional strategies, and management practices over the last 20 years, as observed in UK regions. Using figures from the Higher Education Business and Community Interaction Survey (HEBCIS), the paper provides a comparison among UK regions in terms of involvement in third mission activities. It further discusses the diverse and complex setting (in terms of organisational diversity, institutional strategies, management practices at regional needs) in which universities are pursuing third mission activities in the UK. This is set in a context of a broader transformation of the Higher Education sector, influenced by changes in the fee regime, pressures to

demonstrate impact of research, a weakened institutional governance structure for the regional development and the uncertainty created by the Brexit vote. The paper discusses these challenges, with particular reference to management implications at the local and regional levels.

Viewing universities as global connectors, the paper by **José Guimón** and **Alvaro Luna** explore a different dimension of HEIs, namely their role as global-local knowledge nodes. More specifically, they examine how foreign universities and research institutes can contribute to innovation and economic development in the host region. They argue that a policy of attracting foreign universities can support the development of regional innovation systems, in terms of upgrading local capabilities, attracting local talent, increasing global scientific collaboration that can spill over to the regional scientific and productive system, and improving the general image and attractiveness of the region. While there are potential opportunities in such strategies, there are also obvious risks, such as unnecessary overlap in activities, damaging competition and brain drain. The authors explore these issues through a number of international experiences, before interrogating to what extent this could constitute a viable strategy for the Basque Country. Based on a number of expert interviews, they authors conclude that, while deploying such a strategy could support the internationalization of the Basque system of Higher Education and the Basque economy, its implementation would face significant administrative and political barriers and tensions.

Focusing on technology transfer issues, **Mario Benassi** and **Francesco Rentocchini** conceptually explore the contribution of academic spinoffs to regional economic development, an aspect that has been relatively neglected in the literature. Their paper explores two major research lines that can contribute to this area of study: (i) management practices and (ii) hybrid organizations, which “exist at the interface between non-profit and for-profit business models”. They firstly consider the need for scholarly work able to critically evaluate the effect of management practices on performance, and shed light on which of them can help to explain the positive role of academic spinoffs on regional economic growth. Secondly, using the perspective of the university third mission, the authors consider that universities are becoming hybrid institutions. But how universities combine profit and non-profit, market value and social value, is complex and not well understood, since it involves attributes that can be incompatible and mutually conflicting. They conclude that the external ecosystem is a crucial element in order to recombine the two contrasting logics in the link between academic spinoffs and HEIs, which is central in the implementation of sound management practices.

From the same perspective, treating universities as relational institutions, **Ugo Finardi** and **Shiri Breznitz** investigate the factors that affect technology transfer and commercialization at Italian universities. The paper focuses on the peculiarities, strengths, and weaknesses of the Italian model of technology transfer, which is lag-

ging behind compared to other developed economies. In particular, this paper examines the factors influencing commercialization results. The paper is informed by a comparative case study of two specialized technological universities that are engaged in general teaching and research activities in engineering and architecture: Politecnico di Torino and Politecnico di Milano. They find that technology commercialisation is shaped by internal factors such as the individual institution's approach and resources dedicated to technology commercialization. However, external factors such as the presence of a strong and diverse industrial base has been the most important factor influencing their ability to commercialize technology, particularly in the case of Milan.

In their paper, **Claudia De Fuentes** and **Gabriela Dutrénit** analyse technological capacities to establish relationships between the manufacture sector and universities in Mexico. Using a k-means cluster analysis, they divide the manufacturing sector in two groups: firms with high and low technological capacities. In general, the first group includes those firms that are older, more innovative, have more employees and higher investment in R&D activities. Subsequently, through the analysis of different interaction mechanisms (such as publications, conferences, licenses, consultancy, R&D projects) grouped in four channels (traditional, commercial, collaborative and mobility), their results suggest that those firms with higher technological capacities use more complex mechanisms in their interaction with universities, being able to identify external sources of information and assimilate the knowledge provided internally. The authors conclude by suggesting that policies linking university and industry should be reinforced, paying special attention to the capacities available in private firms.

By looking at the internal configurations of HEIs, **Carolina Cañibano**, **Carmen Corona**, **Jordi Molas Gallart** and **Immaculada Vilardell** study the differences in the organizational strategies of two Spanish university departments in the social sciences within a context of strong institutional homogenization and regulation of the higher education sector. Focusing on two elements of organizational dynamics in university departments, that is human resources strategies and the management of economic resources, they observe differences in organizational strategies and cultures that derive from the choice of specific strategic objectives. These choices are reflected in the implementation of different staff recruitment and promotion policies, and in different ways to reward academic excellence.

Henar Alcalde, **Mari Jose Aranguren** and **James Wilson** focus on the role of academic organizations as change agents for territorial development. Their paper examines the role of organizational culture influencing the ability of academic organizations to collaborate with territorial agents. The paper reflects on the experience of Orkestra –the Basque Institute of Competitiveness–, a research institute located in the Basque Country (Spain) and created with a mission to work with other regional actors to foster competitiveness in the Basque Country. In order to fulfil this role, it

has been necessary to constantly adapt and change the values and approaches to interaction of researchers through the transformation of the culture within Orkestra. The authors describe this process of cultural change, and conclude by saying that culture must be understood as a dynamic capability for organizational change. Without it, academic organizations may be locked into institutional or structural inertia that renders them unable to adapt effectively to new external contexts.

Disclaimer

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