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Promoting the creation of Innovation Ecosystems: the case of the University of Porto

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Letter From Academia

Abstract. Universities are increasingly acting as promoters of innovation, economic growth and regional development, a trend that has attracted the attention of both policy makers and researchers. The objective of this paper is to contribute to a deeper understanding of the role of higher education institutions as dynamic promoters of growth and development. The University of Porto is used as a case study to explore how universities can act as innovation ecosystems leaders and integrators. The main contributions of the paper are threefold. First, the case puts in evidence a key success factor: the talent to transform the knowledge produced by universities into valuable solutions for companies and other organisations. Second, links between universities and industry must assume a long-term and relational nature rather than an intermittent and transactional character. Finally, the success of university-based ecosystems depends on the integration of a diversity of actors, resources and competences. This means that a sustainable strategy of innovation and knowledge valorisation requires an approach that fosters both internal and external networking.

Keywords. Technology transfer; Intellectual property; Entrepreneurship, Start-up, Spin-off, Incubation; Ecosystem; Regional development.

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1 Introduction

Universities are increasingly focusing their attention on knowledge-based value creation. Side by side with the two traditional missions – Education and Research – higher education institutions are allocating more resources, efforts and talent for Innovation. This has attracted the attention of both policy makers and researchers. In Europe there is a growing number of studies and reports, most of them produced by institutions of the European Union, addressing the interface universities-industry and its impact on the competitiveness of economy, progress of territories and development of society (cf. Goddard and Kempton, 2011; DG Research and Innovation, 2014; Edwards et el., 2017; Jonkers et al., 2018). Researchers are also paying a growing attention to this issue. Concepts of knowledge transfer (Barro and Fernandez, 2016; Azagra-Caro et al., 2017), university-industry interface and collaboration (Albats et al., 2018; Rohan and Moore, 2018), and entrepreneurial university (Schmitz et al., 2017; Bouncken, 2018) are object of increasing investigation.

The University of Porto is an example of success in this front. With a strategy aimed at fostering innovation and entrepreneurship that began more than two decades ago, the university has achieved significant results. In this context, the objective of the paper is to contribute to a deeper understanding of the role of innovation ecosystems boosted by higher education institutions as dynamic promoters of growth and development. Based on the case of the University of Porto, the paper is structured into six sections. After this introduction, section 2 offers a comprehensive overview of the university with a special focus on its innovation ecosystem. This is followed by three sections on the core of this case study: transfer of technology, creation of new ventures and incubation. The paper ends with a synthesis of the main contributions of the case, and offers a vision for the future of universities as innovation ecosystems leaders and integrators.

2 The innovation ecosystem

The University of Porto has 14 faculties, 1 business school and 49 research units that cover the most important areas of knowledge. The Faculty of Engineering is the largest school with 8 thousand students. The other faculties focus on health and life science, natural and social sciences, humanities and arts. Overall, the university has 32 thousand students coming from more than 150 countries, which puts in evidence the international reputation of this higher education institution. The quality of teaching is closed linked with research. The R&D units along with a significant number of interface institutes make the University of Porto responsible for 25% of scientific production in Portugal. This very significant role is seen by the university as an opportunity but also as an obligation: to actively contribute to the creation of value based on the knowledge produced.

In this context, the University of Porto has a strategy of innovation that involves internal players (faculties, R&D units, interface institutes, tech transfer office and the science and technology park) along with key external actors (companies, business associations, local councils and external R&D centres) in order to create a dynamic innovation ecosystem aimed at promoting both economic, social and environmental development.

The innovation and entrepreneurship ecosystem of the University of Porto encompasses all stages

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of social and economic valorisation of knowledge, from its transfer to incubation, including the support to the creation of new ventures whose competitiveness relies on products, processes or business models based on scientific knowledge.

In order to transform the knowledge generated in its R&D structures into effective solutions useful to companies and other organisations, the university adopts three major approaches (Figure 1): protection and commercialisation of intellectual property, development of joint projects with industry, and creation of spin-offs emerged within its innovation ecosystem.

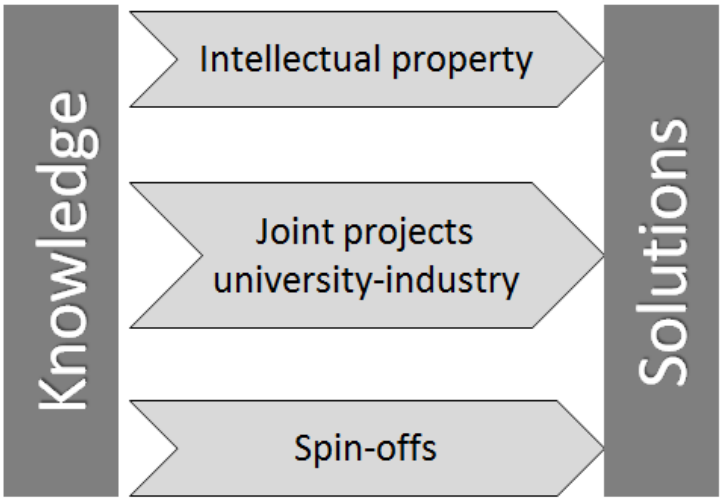

Fig. 1 – The Process of Knowledge Valorisation

In this way, the University of Porto has not only a strategy, but also sound structures with real impact on the ecosystem. The following sections put in evidence the role of the university as promoter of change and integrator of actors, resources and competences.

3 Knowledge transfer

Knowledge transfer relies primarily on U.Porto Innovation, the tech transfer office (TTO). Its mission is to support the value chain of innovation promoting the best use of knowledge based on the interface between the university and industry.

With an extensive experience initiated in 2004, U.Porto Innovation ensures the interconnection between the university's research centres and both large and small companies. To do so, this TTO provides technical support in three major areas: protection of intellectual property, creation of spin-offs, and link to companies. The results achieved are significant as shown in Table 1.

U.Porto Innovation provides the registration of patents and identifies opportunities for their economic valorisation, examining the best alternatives for placing the technologies generated at the university on the market through licensing or the sale of the patents. Because of this strategy, the University of Porto is the leader of Portuguese higher education institutions in terms of patents, most of them in co-ownership with other universities or companies.

Table 1. U.Porto Innovation: Key Performance Indicators.

KPIs (31 December 2017)	
Intellectual property	
Patents registered since 2004	+ 460
Active national and international patents	243
Active licensed patents	23
Promotion of entrepreneurship	
U.Porto Spin-offs	58
Patents held by U.Porto Spin-offs	115
Investment raised by U.Porto Spin-offs	+ 64 M €
Link to companies	
A2B – Academia-to-Business programmes	39
Participants involved in A2B programmes	1 168

(Source: U.Porto Innovation statistics)

On the other hand, to stimulate the creation of new ventures, U.Porto Innovation awards the "Spin-off U.Porto" brand to the start-ups that develop products and services produced as a result of research done at the university. The start-ups granted with this brand become members of The Circle, a club of spin-offs whose objective is to promote both internal and external networking, opening technological, marketing and financial opportunities in the most dynamic global value chains.

The third mission of U.Porto Innovation is to foster the link between the university and large and medium-sized companies. In this regard, the programme A2B – Academia-to-Business deserves a special attention. This innovative approach facilitates the matching between the university's research centres and the industry aimed at establishing partnerships for the joint development of applied research projects. Samsung, Bosch, GlaxoSmithKline, together with the largest Portuguese economic groups (e.g., Sonae, Amorim and Galp) are some of the University of Porto's clients involved in projects based on the A2B programme.

In short, these critical initiatives are, in most cases, the first steps of an investment process towards the development of close and long term relationships with the industry.

4 Generation of new ventures

In addition to what has been referred in the previous section, the university carries out several initiatives to promote the emergence of start-ups whose competitiveness is global and based on the integration of knowledge (whether technology-based or not) in their products, processes or business models. The most relevant initiatives in this field are BIP – Business Ignition Programme and the School of Start-Ups, two complementary programs since the former is technology-driven

while the latter is mainly market-driven in nature. Anyway, both aim at transforming knowledge into viable and profitable business solutions.

BIP is managed by U.Porto Innovation. Its purpose is to develop competitive business models for technologies developed by R&D centres of the university. The programme involves heterogeneous and multidisciplinary teams of researchers, MBA students and corporate executives as mentors. In this 12 weeks course, business models are developed and validated by the market, and then presented to investors such as VCs and BAs.

The School of Start-Ups is run by UPTEC, the science and technology park of the University of Porto. It is directed to entrepreneurs who have business projects and are interested in starting their own start-ups. The purpose of the programme is to support the entrepreneurs in view of the challenges they face when developing a new venture. Those taking part in this programme have the opportunity to work at the science and technology park, integrating a network of start-ups and global companies, and being mentored by senior executives of strategic partners who support them in the validation of their business ideas.

5 Incubation

UPTEC – Science and Technology Park of the University of Porto was created in 2007. It acts not only as incubator of start-ups but also hosts innovation centres of large companies. Microsoft, Vodafone, Alcatel-Lucent, Vestas and the German institute Fraunhofer are some of the stakeholders with innovation centres at UPTEC.

With facilities that cover an area of more than 30 thousand square meters, mostly financed by European funds, the park is structured according to thematic campuses – Technology (UPTEC TECH), Creative (UPTEC PINC), the Sea (UPTEC MAR) and Biotechnology (UPTEC BIO). This gives room for a cluster strategy and the sharing of resources between start-ups, innovation centres and anchor projects, ensuring the specific support they need and, at the same time, keeping them organised in an extensive and crosscutting network of large and small companies, local councils, business associations and policy-makers. Furthermore, this web of relationships created within the park is a critical success factor inasmuch as it fosters not only internal interaction but also external networking with research centres, potential customers and investors.

UPTEC is the largest university-based science and technology park in Portugal with a significant impact on the innovation ecosystem (Table 2). More than 500 start-ups were created over the past 10 years. By the end of 2017, there were 194 ongoing projects at the park, involving more than 2,400 highly qualified people in a range of areas such as nanotechnology, energy, health, biotechnology, information technologies, digital media, architecture, relationship marketing and content production. The annual impact on GDP is quite significant, reaching almost 190 million euros, and the generation of taxes is about 40 million euros per year.

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Table 2. UPTEC: Key Performance Indicators

KPIs (31 December 2017)	
Entrepreneurial projects *	
Total	194
Start-ups	119
Innovation centres	41
Anchor projects	21
Graduated companies	64
Human resources *	
Jobs	+ 2,400
Economic impact **	
On GDP	188 M €
Generated tax revenue	40 M €

Source: * UPTEC statistics and ** study of impact conducted by the School of Economics

7 Conclusion

The University of Porto is strongly committed to the creation of value (economic, social and environmental) based on the knowledge produced in its R&D centres. To do so, it acts as leader and integrator of resources and competences owned/controlled by internal players and external actors. The results achieved are significant in terms of contribution for the creation of a dynamic ecosystem with high impact on the development of the region where it is located.

The contributions of this case study are summarized in the following vision for the future of universities as innovation ecosystems leaders and integrators.

Universities produce knowledge but companies need solutions. The outcome of research conducted in universities is scientific knowledge but what companies need are effective solutions to improve products, processes and business models. In this regard, a key success factor of any university is the ability to transform (which is more than mere transference) knowledge into valuable solutions. An important skill for those who work in the promotion of innovation is the talent to stimulate the "dialogue" between research centres and companies, two types of organisations with very distinct cultures, objectives and governance structures.

Developing long-term relationships. Universities must work with large and small companies, policy-makers, and local authorities at diverse levels. However, these links cannot assume a transactional and short-term character. Rather, they must be long term in nature since this is the only way for building trust and routines between universities and their main stakeholders. This requires vision and a strategic approach acknowledging that close and lasting relationships is the result of an investment process whose results are achieved in the long run.

Networking, networking, networking. The success of any university ecosystem depends on the

integration of different but complimentary actors, resources and competences. In this context, universities face an important challenge since they produce the "raw material" for the global and sustainable competitiveness of most businesses: knowledge. However, its valorisation is only achieved on the basis of a joint work of a variety of actors that operate at regional, national and European level.

To sum up, universities are increasingly recognised as promoters of innovation, economic growth and regional development. The case presented in this paper is not a recipe that can be straight replicated in other ecosystems. Each one has its own idiosyncrasies that deserve a unique and differentiated approach. Nonetheless, the case of the University of Porto offers good insights that can inspire both policy makers and higher education leaders to effectively fulfil the Third Mission of universities.

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Biographies

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